



## Agriculture Sector HRD Plan

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## Acronyms

BCQF	Botswana Credit Qualifications Framework
BCA	Botswana College of Agriculture
BEC	Botswana Examinations Council
BGCSE	Botswana General Certificate for Secondary Education
BMC	Botswana Meat Commission
BNVQF	Botswana National Vocational Qualifications Framework
BOTA	Botswana Training Authority
BQA	Botswana Qualifications Authority
BTEP	Botswana Technical Education Programme
BVTC	Barolong Vocational Training Centre
BURS	Botswana Unified Revenue Service
CBI	Competency Based Instruction
CBT	Competency Based Training
CEDA	Citizen Entrepreneurial Development Agency
CICE	Centre for in-service and continuing education
CSO	Central Statistics Office
DVET	Department of Vocational Education and Training
DTEF	Department of Tertiary Education Financing
ECCD	Early Childhood Care and Development
EE	Enterprise Education
GDP	Gross Domestic Product
HRD	Human Resources Development
HRDC	Human Resources Development Council
HRDF	Human Resources Development Fund
JAB	Junior Achievements Botswana
JC	Junior Certificate
JCE	Junior certificate Examinations
JOI	Job Opportunity Index
JVD	Job Vacancy Data
LEA	Local Enterprise Authority
LFS	Labour Force Survey
MoA	Ministry of Agriculture
MFDP	Ministry of Finance and Development Planning
MoESD	Ministry of Education and Skills Development
MTTC	Madirelo Training and Testing centre
NAMPAADD	National Master Plan for Arable Agriculture and Dairy Development
NDP	National Development Plan
NIP	National Internship Programme
NGO(s)	Non-Governmental Organisation (s)
NPAD	National Policy on Agricultural Development
NVQ	National Vocational Qualifications
PESTEL	Political, Economic, Social, Technological, Environmental and Legal
PPP	Private Public Partnership
PSLE	Primary School Leaving Examinations
PTF	Production Training Farms
RVTC	Ramatea Vocational Training Centre
SADC	Southern African Development Community
SC	Sectorial Committee

SMEs	Small, Micro, Enterprises
SWL	Structured Workplace Learning
TEI	Tertiary Education Institution
TIPS	Teacher in Industry Placement Scheme
TVET	Technical and Vocational education Training
VAT	Value Added Tax
VTF	Vocational Training Fund
UB	University of Botswana
YES	Youth Empowerment Scheme
YFF	Young Farmers Fund

## Executive Summary

The HRD Plan aligns with the situational analysis of the agricultural sector and is geared towards supporting government's policy of transforming the sector. This document provides stakeholders with the basis for discussions and decision making on skills development for the agricultural sector. The objective of the Agriculture Sector Plan is to:

- Profile the sector;
- Identify key skills issues;
- Determine demand and supply for skills and skills mismatches;
- Identify potential costs of the plan and a funding strategy;
- Outline a skills transfer strategy; and
- Provide a monitoring and evaluation strategy.

The approach to HRD planning draws on a combination of labour market intelligence collected from a Job Opportunity Index (JOI), evidence collated from discussions with key stakeholders and other key data, to signal current and future needs for the agriculture sector. Short term, rather than long term, planning is considered necessary given the dynamic nature of labour markets and the need to respond to frequent changes in the demand for goods, services and technology.

Agriculture covers the cultivation of land to produce crops, vegetables and fruits, raising of animals, forestry (both natural and man-made), beekeeping and fisheries. The sector encompasses all the value chain activities involved in bringing food and fibre from farm to plate. The different subsectors include:

- Beef
- Small-stock (goats and sheep)
- Dairy
- Piggery
- Poultry
- Ostrich
- Rain-fed arable agriculture (cereals, small grains, beans and pulses)
- Horticulture
- Beekeeping
- Fisheries
- Forestry
- Agribusiness.

Agriculture is the main source of livelihoods for Botswana, with nearly 40 per cent of the country's population residing in rural areas. The sector is important because of the multiple backward and forward linkages to other sectors of the economy such as input services, transport, manufacturing, advisory services, financial services and tourism.

The sector's contribution to GDP declined from 40% in 1966 to about 2 % in the current period. This is due to stagnation of the sector and growth of other sectors especially mining and

tourism. Most farmers are classified as traditional with males dominating this sector. Youth participation is very low at about 10 percent. Most farmers have a low education with no formal education or limited primary education. Most farmers in Botswana do not produce enough to meet their own subsistence needs and have no surpluses to sell. As a consequence the country depends heavily on food imports. The key challenge facing Botswana is how to manage drought. The country has a semi-arid climate with a mean rainfall ranging from 650 mm in the northeast to less than 250 mm in the southwest. This makes rain-fed crop production risky and uncompetitive. In terms of livestock production most cattle herd is found on communal land. Productivity indicators for cattle have remained stagnant over time even though they are higher for commercial farms. Productivity indicators in the small stock industry also indicate poor performance with limited commercialisation. Promising areas of agriculture are the emerging high value subsectors or non-traditional agriculture, including: poultry, dairy and horticulture. The poultry subsector, has witnessed massive growth and transformation and the country is now self-sufficient in chicken meat and eggs. Dairy output has also expanded by a factor of 2 between 1997 and 2007 and horticulture by a factor of 5.5.

Ostrich, piggery, beekeeping, fisheries and forestry remain underdeveloped in the country. More needs to be done in terms of skills training to develop and expand these subsectors so that more people can go into these sub-sectors on a commercial basis.

Botswana's agro-processing or agribusiness subsector is also underdeveloped. This means that there are fewer jobs in agro-processing and consequently, fewer places where young learners with an interest in farming can be placed for internships or "learning by doing" in industry. The country's huge import bill in terms of agricultural imports amounts to an exporting of jobs. Government expenditure on agriculture accounted for 8-10 percent of total public expenditure between 1980 and 1988 and declined to 2 percent in 2009. Recent estimates are that it is about 4 percent which fall far below the SADC commitment of 10 percent. Within the Sector, development expenditure lost priority to recurrent expenditure, meaning that infrastructural and human skills development was not accorded much priority. There is a need to rethink and increase expenditure in agriculture and target human capital skills development and training for agriculture. The general policy environment does not enable the agriculture sector to thrive.

At the policy level, contributing factors to changes in the agricultural sector, include: the 1991 Botswana's national policy on agricultural development (NPAD), economic diversification, technology and the environment. The national policy on agricultural development supported a shift from food self-sufficiency to food security, emphasising the need to import part of production especially where it is relatively costly to produce the grain domestically. NPAD also aims to improve productivity through use of measures to ensure commercialisation, market access and participation of disadvantaged groups (women, youth, etc). It is anticipated that, as more and more women and young people engage in agricultural activities, agribusiness industries will operate along the value chain, and there will be a rise in the demand for more biotechnologists, molecular and plant technologists, food processors/manufacturers, food scientists, animal product processors, etc.

One of Botswana's key challenges is to diversifying the economy away from diamond dependence. The agriculture sector is one key sector targeted for economic diversification through such policies as National Master Plan for Arable Agriculture and Dairy Development (NAMPAADD) and others. Against this background there is a need for appropriate skills to facilitate the contribution of the sector. There is also a need to facilitate the use of technology in the agricultural sector. Technology can contribute towards improving access to market information (and hence reduction in transactions cost), new technologies and financing

opportunities, particularly for the youth who are more literate in technology. Given that the youth in Botswana are not attracted to the agriculture sector, adoption of appropriate technology has major skills and human resource implications. Appropriate skills development and training will be needed to adopt existing technologies to achieve the above-listed advantages.

In order for farmers to use suitable farming practices and get the best possible results, there is a need to take into account the natural ecological system of Botswana, particularly given that farming is mainly undertaken by traditional farmers who largely rely on the environment, such as rainfall and grazing. These points towards the need for soil scientists (physicists, biologists, etc), irrigation specialists, seed technologists, feed producers, effective extension officers, etc., as well as the involvement of Government in stabilising agricultural output prices, training, building of road infrastructure and drainage.

The agricultural sector in Botswana is the largest single employer of labour and most of the workers have minimal skills or a low education level. This situation occurs because most of the agriculture in Botswana is subsistence. (In this context, the agricultural sector has low levels of productivity.) Part of what explains low productivity and poor work ethic are low wages for the sector and relatively poor working conditions. Some of the factors responsible for poor working conditions are the inapplicability of some of the Employment Act provisions to agriculture, inadequate education and training about labour relations matters for most workers and employers, as well as inadequate labour inspectors from the Department of Labour to enforce the labour standards and laws. There is a large need for short term training to effectively raise the labour productivity of those engaged in the sector. Unemployment also occurs in the sector and this relates to low demand for their skills, or a problem of a skills mismatch, most of which relate to poor quality of the programmes or a general problem of lack of relevance due to inadequate practical training. The unemployed graduates in this sector require support in terms of retraining and targeted mentoring, especially from programmes delivered by LEA and CEDA in financial and business management. In so doing, it is important to ensure that what LEA and CEDA are doing is harmonized so that potential beneficiaries are not given conflicting advice by the two agencies. Adopting such an approach would provide the unemployed with improved funding opportunities to start their own agriculture related activities. For the more recent ones, retraining should be accessed through the national internship programme targeted as areas of growth. The agricultural sector needs to be rebranded as the go to sector in terms of employment generation.

From the Job Vacancy data the highest demand occurs for farm labourers, cattle herders and those in subsistence agriculture. These again will require short term training to provide the skill required for productivity improvements. This must be accompanied by training to ensure the agricultural sector becomes more commercialized.

On the supply side, most of the currently employed workers only have achieved primary education or less. The Ministry of Agriculture has similar problems with their employees, especially those employed in the industrial occupational category. There are also issues around the quality of skills supplied to the sector from the various levels of education since pass rates have been declining. The situation is made worse by the lack of practical training, especially at the primary level where there are no longer gardens and agriculture is unattractive to young students.

Agricultural education and skills training opportunities exist at the secondary school and tertiary levels, including programmes delivered at vocational training institutes. But the outcomes of learning and training has not been translated to higher agricultural productivity on farms and this is due to a mismatch or inadequacy of what is being currently delivered by providers.

The need for the education and training systems, along with partners, to develop clear pathways of learning leading to occupations and careers in agricultural education and skills training must be integrated into the school curriculum at the primary, junior and senior secondary levels. This will help develop the knowledge, skills and attitudes, enabling children and youth to develop an appreciation of the role agriculture plays in transforming and empowering their lives.

At the secondary school level agriculture is included in the curricula, but more emphasis is given to theory and minimal resources are devoted to their practical application. This is a critical omission since many students have no understanding of farm life and the challenges that takes place on the farm on a daily basis. This is particularly true for students residing in urban areas.

At tertiary education level the Botswana College of Agriculture is being transformed into a university and will be the main supplier of skills for the nation. The enrolment numbers over time indicate that BCA is producing more qualified agriculture graduates than can be absorbed by the labour market, especially given the small size of the commercial sector. There is concern that graduates may not be adequate for emerging areas such as horticulture and bee keeping. It is also clear that the practical applications of the current programmes is not adequate. This helps explain why a significant number of graduates remain unemployed and do not venture into self-employment in the agricultural sector. The current HRD plan proposes strategies for tackling these, covering: retraining and practical experience for future graduates. There is also need for improved relevance of the curriculum to address the higher levels skills required for growth. It is also apparent that all courses must include a module on skills for self-employment in the agriculture sector.

Skills in high demand at different levels together with indicative numbers are identified in the plan shown in Tables 4.10 and 4.11. The higher level skills cover those associated with research and degree level qualifications, such as PhDs, MPhils and other degree. Amongst the key areas in high occupational demand were the following: veterinarians, agronomists, irrigation specialists and florists. However, the majority of demand for workers occurred at the skilled technician and associate level, especially for plant pathologists, food scientists, animal breeders, dairy scientists, pharmacologists, agricultural extension workers, farm supervisors, poultry producers, feed producers and business managers. Demand for skills also occurred at the operational level. Within the area of skilled operatives the highest demand is for horticultural workers, industrial machine operatives and lay-extension workers. For the category of elementary workers there is a higher demand for animal handlers, cattle herders, crop farmers and horticulture workers. The Certificate and Diplomas programmes in the former areas should be delivered by BCA and other providers, such as Land Based Training and brigades.

Employees and farmers also require skill upgrading in basic skills, especially: literacy and numeracy, farm record keeping, fence erection and maintenance, etc. At higher level occupations there is a need for upgrading in the areas of project management, marketing, etc. These skills can be provided mainly by BCA and other related training institutions such as

the Faculty of Business and Faculty of Social Sciences at the University of Botswana on a short terms basis.

For all the workers, there is need for work readiness skills. Given Botswana's problem with work ethic issues and the lack of productivity in sectors, these are skills that can be provided to employees in all sectors and not just for the agricultural sector. Part of these work readiness skills should be imparted in the formal school system to change the work attitude at a relatively young age for the future workforce.

A key part of developing new skills is how they are funded. A funding strategy was developed to help ensure responsiveness and sustainability. This comprised the cost associated with producing the skills that are identified by the HRD plan (i.e., the cost of the plan), and how these funds will be raised (funding strategy options).

The estimated budget for training high level workers in demand for the agricultural sector during NDP 11 is P622 million for the whole plan period based on the proposed university enrolment projections. This however is not realistic given that the enrolment projections are not demand driven. Using the demand driven figures, the estimated amount of money needed to train workers at the various skills (in high demand) is about P65, 304, 720.00 per annum and is broken down as per appendix A2 and A3 with the detailed costing.

Funding strategy options recommend the use of a PPP as a broader funding strategy to provide opportunities to increase funding pool for training, research and project-based activities in agriculture. It is also a key means of providing industry involvement, especially the farmer's associations and employer engagement in partnership with government and other stakeholders.

A further potential funding strategy is to develop a form of grants mechanism that links skills development to improvements in productivity. This could comprise a group of farmers with small holdings coming together to submit a proposal for this grant. The grant could support technology, improved access to markets, facilitation of supply chains and be linked to skills development. The criteria for the awarding of grants would need to be developed, with more detail added on what productivity links are to be applied: this needs sector-wide discussion and agreement.

Another possible funding source is the Human Resources Development Fund (HRDF). Given than it is now possible under the revised HRDF regulations to provide training to a larger pool of employees across a broader range of levels i.e. professional and managerial level training, this should be explored as a means of funding training through farmers' associations.

Training should be such that it provides enablement for some of the graduates to be in a position to start their own businesses to provide employment for themselves and others. This requires introduction of more practical training topics such as training in entrepreneurship, business etiquette, leadership, business organisation, finance planning and management, etc. Moreover, there would be need for attachment of students in industries so that they can gain practical experience and the confidence needed to start a business.

A skills transfer mechanism is also recommended for this plan and involves several methodologies plan. A key methodology is the use of competency based training. Training should also be afforded to staff through programmes such as train the trainer. Learners should have various work experience programmes such as structured workplace learning, apprenticeships and internships.

The monitoring and evaluation of the plan should be aligned to NDP 11 in order to ensure adequate resourcing. A performance management framework is recommended to ensure quality assurance at different stages of the plan i.e. at the entry, during implementation and at the end of the planning period- need quality data and other information.

The strategic framework for the implementation of HRD plan is presented in section 8. These are divided into three broad areas. These are those for HRD Plan and those complimentary to the plan, and those meant to improve the investment and productivity capacity within the agricultural sector. Table 8.1 provides those reforms with key objectives under each, activities, outcomes, indicative targets and responsible party (ies) while Table 8.2 provides priority of these reforms. Annex A provides details of complementary broad reforms for successful implementation of HRD plan. Annex B provide the broad reforms for improving the investment and productivity capacity within the agricultural sector.

## **Section One: Background of the Plan**

### **1.1 Introduction**

Botswana has chosen to abandon manpower planning and follow a Human Resource Development (HRD) approach to skills planning. This Sector HRD plan is linked to the National Human Resource Development Plan and will ensure the required number and type of employees are produced for the agriculture sector. The current HRD planning method is eclectic, using labour market analysis and signaling to determine skills in demand. This is supplemented with PESTEL (Political, Economic, Socio-cultural, Technological, Legal and Environmental) analysis to help determine the strategic direction of the sector and the corresponding impact on future skills. Key stakeholders in the agriculture sector also provided further qualitative perspective of the sector's future direction.

The HRD Plan aligns with the situational analysis of the agricultural sector and is geared towards supporting government policy goals for transforming the sector. This document will provide stakeholders with the basis for discussions and decision making on skills development for the agricultural sector. The objective of the Agriculture Sector Plan is to:

- Profile the sector;
- Identify key skills issues
- Determine demand and supply for skills and skills mismatches;
- Identify potential costs of the plan and a funding strategy;
- Outline a skills transfer strategy; and
- Provide a monitoring and evaluation strategy

### **1.2 Human Resource Development Planning Approach**

The former approach used for skill planning in Botswana was manpower planning. Due to complexities associated with globalization and technical difficulties of implementing manpower planning, the Botswana government has decided to use Human Resources Development Planning. This is used in the current plan for the agricultural sector. This approach draws on a combination of labour market information collected from a Job Opportunity Index (JOI), evidence collated from discussions with key stakeholders and other key labour market data to help signal current and future needs for the agriculture sector.

Human Resource Development (HRD) Planning is concerned with ensuring that the sector will have the required number of employees with the right skills, experience and competencies, at the right time and at the right cost (in order to meet the strategic objectives of the sector). The exercise of forecasting demand and supply relates to determining, respectively, the numbers and type of employees that will be needed by the sector in the future and the numbers and type of employees that will be available.

Although several factors are important for determining future demand in the agriculture sector, the following issues should be taken on board: (i) 70 percent of rural households derive part of their living from agriculture (using small farms and rain-fed farming), (ii) there are signs that crop production and productivity have been declining, despite the growing population, and (iii)

the performance of the arable sector as a critical factor to reduce the high levels of food import (Republic of Botswana, 2009, National Development Plan (NDP), 10).

On the supply side the HRD plan involved investigating the supply of skills coming onto the labour and the process involved in producing them. This includes:

- The current labour market, including unemployed people with relevant skills and current employees receiving workplace retraining and up-skilling such as those in the National Internship Programme.
- The general formal education (primary and secondary school system) role in preparing youth for the workplace and in particular for the agricultural sector;
- The role of the tertiary sector in developing knowledge and skills for the market, especially looking at the output from Botswana College of Agriculture (BCA) and its future transformation into a University of Agriculture and Natural Resources;
- The contribution of the vocational education and training to the skills for the market.

The analysis of these sources includes both quantitative and qualitative elements to determine the adequacy of the supply as well as the quality of existing provision. Focus group discussions using structured questionnaires with key stakeholders in the sector and different subsectors have been used to generate information on skills scarcity, issues of skills quality, providing information on what skills gaps currently exist, and those that will be required in the short to medium term period. Short term, rather than long term planning is considered necessary given the dynamic nature of labour markets and the need to respond to frequent changes in the market for goods, services and technology.

## Section Two: Sector Profile

### 2.1. Definition of the Agricultural Sector

Agriculture covers the cultivation of land to produce crops, vegetables and fruits, raising of animals, forestry (both natural and man-made), beekeeping and fisheries. The sector encompasses all the value chain activities involved in bringing food and fibre from farm to plate. A well-functioning and productive agricultural sector is critical to the well-being of a country's population since the sector has the potential to make five important contributions: *providing food and fibre, employment, markets, capital and foreign exchange.*

The agricultural sector is segmented into different sub-sectors, which include the following:

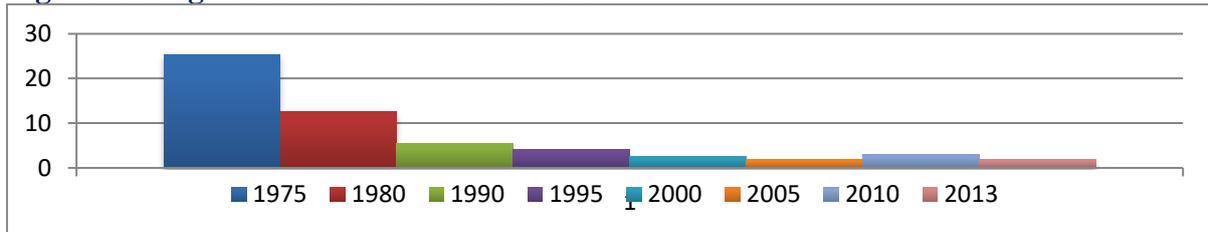
- Beef
- Small-stock (goats and sheep)
- Dairy
- Piggery
- Poultry
- Ostrich
- Rain-fed arable agriculture (cereals, small grains, beans and pulses)
- Horticulture
- Beekeeping
- Fisheries
- Forestry
- Agribusiness.

Agriculture is the mainstay of Botswana's rural economy because it is the main source of livelihood for about 70 percent of the country's population residing in rural areas (Statistics Botswana, 2014). The sector is also important because of the multiple backward and forward linkages it has to other sectors of the economy such as input services, transport, manufacturing, advisory services, financial services and tourism. As a consequence when agriculture thrives, the rest of the economy will prosper.

### 2.2 Economic Performance of the Sector

Agriculture's contribution to Gross Domestic Product (GDP) has declined from 40% at independence in 1966 to 1.9 percent (Bank of Botswana, 2013). This decline can be attributed to stagnation of agricultural productivity coupled with growth in other sectors, especially mining; and more recently, tourism. Figure 2.1 shows agriculture's contribution to GDP for selected years.

**Figure 2.1: Agriculture's Contribution to GDP**



Source: Bank of Botswana, (2013).

The decline in agricultural productivity has caused lower than normal return on investment and low relative wages in agriculture; and many workers moved out of agriculture in search of better opportunities in other sectors of the economy. Nonetheless, agriculture is still the leading employer in the rural areas because there are few opportunities outside agriculture. Hence, developing and raising productivity of the sector remains a priority for government.

## 2.3. Agricultural Sector Performance

### 2.3.1. Agricultural Production Systems

Agriculture in Botswana is characterized by the coexistence of traditional and commercial production systems. Recently, the notion of classifying farmers as traditional and commercial has been contested in some circles. In the main, the concern is that the term traditional is seen as backward and seems to suggest that these farmers are ignorant and use outdated methods of farming. Proponents of this view argue that even some commercial farmers use outdated methods such as broadcasting of seed so it is deceptive to assume that commercial farmers are those that use modern planting methods like row planting. Rather than classifying farmers as traditional or commercial it has instead been suggested that perhaps a better way of classifying farmers would be to use the scale or size of the farm. The challenge with this approach is that all official statistics from *Statistics Botswana* and Ministry of Agriculture already classify farmers according to the agricultural production system which is either traditional or commercial, therefore in this plan we use the official statistics and the classification used therein.

Differences between the two systems are due to type of land tenure, level of technology and degree of market integration. The traditional system is rain-fed and mainly operates on communal land while the commercial system uses irrigation and operates on leasehold and freehold lands.

Statistics Botswana (2014) agricultural farm survey carried out in 2012, indicates that during the 2012 agricultural season there were 122, 600 active farmers in the country. Of these, 121 766 were traditional farmers and 894 were commercial farmers. Male farmers dominate the traditional system making up 55.5 percent compared to their female counterparts with only 44.5 percent participation. There has been gradual increase in women participation in traditional agriculture over the years. About 80 percent of the farmer's farm on a full time basis, while the other 20 percent farm on a part time basis. Due to low productivity in farming, farmers are forced to engage in a wide range of economic activities to supplement income from farming. For example, in 2012, 17 percent of the farmers engaged in supplementary economic activities such as owning a trading store/shop/vendor business, brewing and selling traditional beer, or providing transportation or ploughing for hire services. The survey also revealed that many farmers do not depend on their crops or livestock sales for sustenance. Instead, they rely on paid employment as well as pension incomes and remittances to supplement earnings from

their farm produce. Not surprisingly, the same survey put youth participation in agriculture as being very low at only 9.6 percent. That is, out of a total of 121,766 farmers countrywide, only 9.6 percent are aged between 15 and 39 years. This means that most of the farmers are the elderly with an average age of 57 years of age. Most farm workers have never been to school and do not have the proper skills and training for the work they are hired to do on farms.

Most farmers in Botswana do not produce enough to meet their own subsistence needs and have no surpluses to sell. Hence, the country depends heavily on food imports. Yields on traditional farms are consistently low because they tend to be located on land that is of low quality while commercial farms tend to be located in parts of the country that are relatively more suitable for crop production. Additionally, in the traditional system, risk averse and resource poor farmers use indigenous farming techniques like broadcasting. In contrast, commercial farmers use modern farming techniques and focus on profit maximization. Nevertheless, the traditional system dominates in terms of area cultivated and cultivation of cereal crops, mainly sorghum while the commercial system dominates the arable sector in terms of high value crops cultivated such as horticulture.

### **2.3.2. Land and Water Resources**

Botswana is a landlocked country lying in the centre of Southern Africa between Zambia, Zimbabwe, South Africa and Namibia. The total area within national boundaries is 581,730 km<sup>2</sup>. Its altitude averages about 1 000 meters above sea level, but most of the country is flat with gentle undulations and occasional rocky outcrops. The main forested areas are in the north and north-eastern parts of the country. Most soils are light with limited water-holding capacity.

Three agro-ecological zones can be distinguished in the country. In the centre and west, the Kalahari Desert covers over two-thirds of the total area. The predominant landscape consists of savannah grasslands interspersed with woodland. The sandy soils are not well suited to cultivation, but support considerable numbers of cattle, goats, other livestock and wildlife. The east of the country, consisting of loamy clay soils, has a less harsh climate and more fertile soils than the Kalahari. Rainfall is generally in excess of 400mm annually. The predominant landscape is savannah grasslands and woodlands, with a small amount of forest. In the northwest, the Okavango Delta presents a different landscape: vast areas of open water and lush, green wetlands with an abundance of wildlife. The area of the Delta varies according to season and rainfall. To the east of the Delta lie vast, flat, salty depressions, the Makgadikgadi Pans where there once was a huge lake, the endpoint of the Okavango River.

Botswana's climate is arid and semi-arid, with low rainfall and high rates of evapotranspiration. Mean annual rainfall is 416 mm, ranging from 650 mm in the north east to 250 mm in the extreme southwest. Rainfall occurs in the form of localised showers and thunderstorms, resulting in large temporal and spatial variations. Rain generally falls between October and March, but the pattern is highly irregular. Frequent meteorological droughts are characterised by conditions of low rainfall, high temperatures and elevated soil moisture stress. Daytime temperatures in summer can reach 40°C while winter days are invariably sunny and cool to warm (5-23 °C). Annual open water evaporation varies from about 1 900 mm to 2 200 mm. Evaporation rates are highest in the summer where 80-95% of the rainfall occurs.

A key challenge for Botswana is that the country is drought prone. Botswana's climate and agroecological conditions greatly diminish the ability of the agricultural sector in terms of being productive enough to meet the country's food needs. Only about five percent of the country is suitable for agricultural crop production and less than 1% is cultivated. Most arable production takes place in the eastern region where rainfall and soil conditions are most

favourable. The western region with the poorest soil and climatic conditions has the lowest level of production for all crops. Irrigation is mostly used by commercial farmers. Livestock production is also hampered by recurrent droughts as can be seen by the drop in livestock numbers during drought years. Climate change means that the country's farmers will have to adapt to the changing climate which implies hotter, drier and shorter growing seasons for crops.

To ensure sustained agricultural land and water resources for the future during NDP 9, the Division of Land Utilization (Department of Crop Production) has been tasked with demarcating ranches, land rehabilitation, land gazettement and water and irrigation development. For example, under land gazettement, land was identified for the Zambezi Integrated Agro-Commercial Project and associated commercial horticultural farms. Under water and irrigation development the Ministry developed several water irrigation schemes such as the one at Glen Valley and Dikabeya with about 263 ha made available for horticultural production. It is also intended that irrigation schemes will be developed around the multipurpose dams of Thune and Lotsane. Other irrigation schemes using treated effluent will be developed at Francistown, Tonota, Palapye and Ghanzi. The above activities are all ongoing under NDP 10.

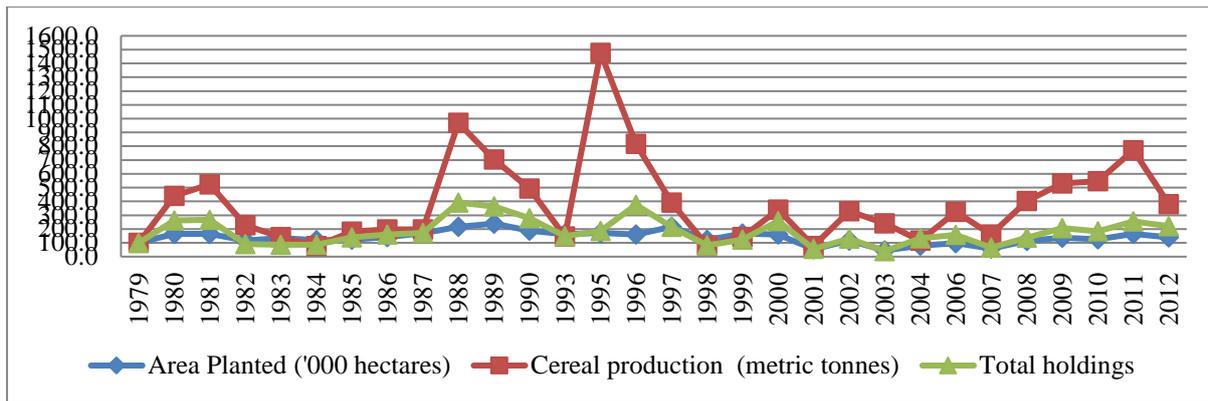
Overtime, land use conflicts have arisen in the country as population pressure and development places pressure on agricultural land which faces competition from other sectors that want agricultural land to be used for other activities such as manufacturing and tourism etc. In other scenarios land owners may have left land idle because they do not have the resources and wherewithal to cultivate the land but instead could lease the land. As such arrangements come about and increase in number their complexity is likely to lead to conflicts between the owner and the lessor. For example, at the end of the lease agreement the land reverts back to the owner but the lessor would have made investments on the land. Issues around how he gets compensated for that would have to be addressed in the lease agreement failing which there would be some disagreement. As such issues arise there will be need to train lawyers who will be knowledgeable about land use law who are equipped to deal with issues of land conflict as and when they arise.

The Ministry of Agriculture has now zoned the country into agricultural regions. This is a commendable achievement as it now means that agricultural scientists can now give proper or targeted advice to farmers regarding which crops and livestock are suitable for cultivation and rearing based on the actual zone where their farm is located. It is expected that this will go a long way to boosting efficiency and productivity within the sector. It will also assist government and policy makers in determining which skills are going to be needed in which zones to be better able to assist farmers solve problems and challenges they face in their zones.

### **2.3.3. Rain-fed Crop Production**

Low and erratic rainfall and frequent droughts make rain-fed crop production risky and uncompetitive. Figure 2.2 plots indices of cultivated area, cereal production and the number of crop holdings. Cereal output fluctuates with rainfall and the periods when government support programmes were introduced. Increases in output do not necessarily signify productivity improvements but are rather, a result of more land cultivated through public programs such as ISPAAD. Therefore, it is necessary for government programmes to be coupled with skills and training programmes whose sole aim is to raise productivity on farms.

#### **Figure 2.2: Crop Indices (1979=100)**

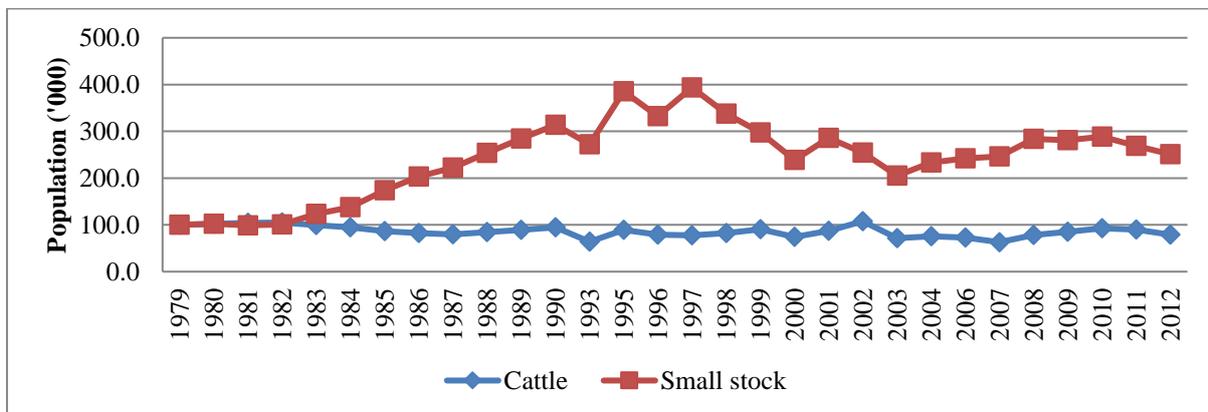


Source: Statistics Botswana (Various).

### 2.3.4. Livestock Production

Over 85 per cent of the national cattle herd is found on communal land where access to grazing is free and unrestricted. The commercial sector accounts for the remaining 15 percent found on freehold and leasehold ranches. Figure 2.3 shows indices of livestock population since 1979.

Figure 2.3: Indices of Livestock Population (1979 =100)



Source: Author computed with data from Statistics Botswana (2014).

Productivity indicators for cattle such as the birth, mortality and off-take rates remained stagnant over time. While these indicators are better on commercial farms, none of the targets set NDP 9 were met. This suggests that breeding methods, herd management and marketing practices of producers have not changed over time. Productivity indicators in the small stock industry also indicate poor performance with limited commercialisation. The NDP 9 target of 30 per cent has not been reached for the two systems.

Non-traditional agriculture encompasses the new and emerging high value subsector or non-traditional agriculture, which covers poultry, dairy and horticulture amongst others. Performance indicators for the non-traditional agriculture yield mixed results. The poultry subsector, has witnessed massive growth and transformation such that the country is now self-sufficient in chicken meat and eggs.

Dairy output (milk) expanded by a factor of 2 between 1997 and 2007, representing a slow but positive growth over the 11-year period. Horticultural output increased by a factor of 5.5 over the same period representing substantial growth, making it a priority area for diversification. The output growth in horticulture and dairy occurred at a much slower pace than in the poultry industry because of the high start-up costs and expertise required for dairy and horticulture management. More needs to be done to train specialists in fodder production for dairy. Producing fodder efficiently in the country can reduce feed costs for dairy and raise profit margins for dairy farmers. For horticulture, training of people who can recycle and clean grey water will be needed so that this water can be safely reused in horticultural production.

Ostrich, piggery and beekeeping remain underdeveloped in the country and more needs to be done in terms of skills training to develop and expand these subsectors. Necessary skills needed here are trained ostrich breeders, piggery breeders and apiculturists. Fisheries and forestry are also largely underdeveloped with the majority of fishers doing so in the northern part of the country on a seasonal and subsistence basis. More needs to be done to develop skills related to aquaculture so that more people can go into fishing on a commercial basis all year round. Agroforestry also needs to be developed in the country.

Botswana's agro-processing or agribusiness subsector is largely underdeveloped. This is a missed opportunity because at each stage in the agricultural value chain, opportunities abound for the people to be engaged as agro-entrepreneurs. These include: at the farm input procurement level (e.g. seed distribution business), production level, agro-processing level, packaging level, distribution level, and retail level. But for workers to perform well at all levels along the value chain, they will need to acquire appropriate skills through training. Unfortunately, not many training opportunities exist in agricultural commodity value chains, which remain underdeveloped.

The lack of developed agricultural commodity value chains in the country is a major disadvantage to the country because of the missed opportunities arising from their underdevelopment. There are very few agro-processing industries where people with an interest in farming can be attached for practical learning experiences or "learning by doing". The country's huge import bill in terms of agricultural imports also amounts to an exporting of jobs. For example, the country exports raw leather and then imports high-end leather goods, which with the right skills and training could have been produced in the country. With a youth unemployment rate of 40 percent, the lack of value addition within the country via agro-processing is a missed opportunity for agro-entrepreneurship, job creation and poverty reduction. There is a need to rebrand the agricultural sector to make it the go to sector in terms of employment generation in the country.

The fact that agro processing in Botswana is underdeveloped has not gone unnoticed by government and key stakeholders in skills development arena. There are stakeholders in the country whose main remit is targeting at the development and support of agro processing who have in the past and present continued to support agro-entrepreneurs. These include Botswana Development Corporation (BDC), National Food Technology Research Centre (NAFTRC), Local Enterprise Authority (LEA), Junior Achievement Botswana (JAB) and Citizen Entrepreneurial Development Agency (CEDA). BDC has in the past supported through financial support of joint ventures such as Fabulous Flowers and CEDA has amongst others supported agro-processors such as Delta Dairies. While such support was mainly financial there were also skills, training and mentoring support provided to assist the businesses. CEDA attaches mentors who have skills and relevant business training and experience to start-ups in the mentor's area of expertise. In this way, the mentor can provide regular advice to the

business as it grows and evolves. Currently LEA has identified key sectors of dairy, horticulture and leather industries and via a clustering approach is providing human skills and mentoring support to agro-businesses in these areas. It is important to ensure that LEA and CEDA harmonise what they are doing in terms of providing mentorship and advice in areas of financial and business management so that they are not giving potential beneficiaries conflicting advice when it comes to their business plans, their viability and access to financing. Similarly, JAB has several mentoring programs in place to support youth entrepreneurship. JAB targets youth and gives support to their businesses or companies at an early stage while they are in secondary school. It offers experiential programs or “hands on” learning programs which focus on the core content areas of work readiness, entrepreneurship and financial literacy which are essential for a successful business. At NAFTRC the research centre employs food technologists and food scientists whose role is to develop and market test valued added food products that can support the agro processing sector. But still a lot more has to be done to ensure the development or establishment of viable and sustainable agro processing in the country. Government has recently built an agro processing plant in Selebi-Phikwe which will go a long way to support adding value to foods produced by the agricultural sector. The availability of a processing plant creates an incentive for farmers to boost production as the plant ensures that there will be an outlet for perishable products such as horticultural produce to be processed into other differentiated food products. It also provides a place for food technologists to hone their skills.

Worldwide, consumers are becoming increasingly more discerning of what they buy in terms of taste, standards, and product quality, etc. Hence, producers face new quality assurance challenges on how to satisfy the emerging consumer demand in order to successfully compete locally and in markets abroad. Producers or farmers need to be flexible and responsive to the food needs of housewives when it comes to the food varieties and the quality of food they produce because at the end of the commodity value chain housewives are the ones preparing the food that is consumed. Consequently, there continues to be an increasing need for those entering the agricultural sector as well as for existing participants to acquire appropriate and quality-based skills and training for the sector.

Reasons for poor performance on farms can be classified as *structural* and *environmental*. Structural causes include: limited access to input markets and financing, low adoption rates and use of improved technologies, poor infrastructure, over-dependence on rain-fed agriculture, poor agricultural land management practices, poor extension services, lack of appropriate information dissemination and technology transfer, poor linkages with various commodity value chains, changing demographics and age distribution of the farming population including the gradual feminization of the agricultural sector, and many more factors that lead to low agricultural productivity (Ministry of Agriculture, 2011). Environmental causes include: prolonged droughts, land degradation, poor water resources management, pests and diseases, and climate change (Ministry of Agriculture, 2011). Hence, there is need for agricultural transformation in Botswana for both smallholder farming and commercial agriculture.

In summary, following factors have been identified as impacting on agriculture and causing the sector to change: climate change, change planting seasons, lack of appropriate skills and role clarity, lack of appropriate technology, lack of infrastructure in production zones, high input costs, insufficient research into appropriate technologies for farmers to use, human-wildlife conflict, lack of appreciation of the production and marketing process, poor record keeping, bureaucratic red tape, changing population dynamics, weak or defunct farmer associations, and part-time or weekend farming. Some of these factors are discussed in Section 3.

Government expenditure for agriculture, accounted for about 8 to 10 per cent of total public expenditure from 1980 to 1988. A steep decline was observed from 10 per cent in 1988 to 2 per cent in 2009, implying loss of priority on agriculture over time. Recent estimates of about 4 per cent (in the 2000s) fall far below the SADC commitment of 10 per cent (AU, 2003). Within the Sector, development expenditure lost priority to recurrent expenditure, meaning that infrastructural and human skills development was not accorded much priority. There is a need to rethink and increase expenditure in agriculture and target human capital skills development and training for agriculture. In general, while the country has broad policies, strategies and programmes to develop and support the agricultural sector these policies have not been accompanied with adequate training and skills development in agriculture to drive the sector. Furthermore, skill and capacity building for monitoring and evaluating government support programmes is needed. This will enable government to properly measure the efficiency of support programs in raising agricultural productivity and enable evidence-based policy recommendations to be made about how support programmes can be better refined and targeted to enhance their impact on agricultural productivity.

Agriculture is not attractive to the youth partly because of its low return to investment and the relatively poor working conditions which is partly responsible for the poor work ethic in the agricultural sector. The sector is the least paying even in terms of minimum wages that were introduced by the Government in 2005. Moreover, some of the legal provisions from the Employment Act are not applicable in agriculture, given the nature of the work and there is low level of knowledge about employment and labour relations matters among the farmers and agriculture employees. This is also not helped by the inadequate numbers of labour inspectors from the Department of Labour who should ensure that legal provisions are adhered to and workers accorded the required protection by law. There is therefore need to provide education and training on labour matters among the farmers and employees and also increase human resources trained on employment and labour relations matters.

## Section Three: Key Skills Issues

### 3.1 Introduction

This section examines the main factors accounting for changes in the agriculture sector and the corresponding impact on the scarcity of skills in the agriculture sector. Such factors have the potential to strengthen or threaten the HRD Plan for human capital development and skills training for agriculture. Since many factors affect the agriculture sector in one way or another, only the critical factors are discussed.

### 3.2 Agriculture Policy

Botswana's National Policy on Agricultural Development (NPAD) was first formulated in 1991. The aims of the policy include: improving food security, diversifying the production base, increasing output and productivity, increasing employment, providing a secure and productive environment for producers and conserving agricultural land resources for future generations. Thus, there has been a shift in the agriculture policy paradigm, from the food sufficiency approach (requiring domestic production of food grains at all costs) to the food security approach (encouraging import of grains that can be produced more economically by trading partners). The policy on agricultural development affords the opportunity of combining various strategies into a single effective means of food delivery, including domestic production, importation and maintenance of strategic reserves.

On face value, to the extent that under the NPAD part of domestic production has to be imported, it can be argued that the NPAD encourages exporting of jobs and the consequence would be lower agricultural output and employment. In this regard, the more food items are imported on account of the unfavourable natural conditions in Botswana (frequent droughts, nutrient-deficient soils, and limited irrigation capacity), the less would be the significance of the import-dependent sub-sector of the agricultural sector. However, the NPAD aims to improve the productivity of the agriculture sector through the use of measures that ensure commercialisation<sup>1</sup>, market access and participation of disadvantaged groups (women, youth and disabled) and encouraging production along the value chain. As commercialisation of the agricultural production progresses, more women, youth and the disabled (not just the elderly people who are currently engaged in agriculture) participate and production along the whole value chain takes hold, the contribution of agriculture (in terms of output, incomes and employment) would rise.

Recognising the potential contribution of the agricultural sector to the economy, the upcoming HRD Plan for the sector will play an important role through the provision of necessary skills to support the commercialisation of the sector and production along the value chain based on consumer demand (particularly agribusiness industries that engage in food processing and manufacturing using the by-products of primary agricultural production). Further, as more and more skilled women and young people engage in agricultural activities, and/or agribusiness industries operate along the value chain, there will be a rise in the demand for more biotechnologists, molecular and plant technologists, food processors/manufacturers, food scientists, animal product processors, etc.

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<sup>1</sup> The commercial subsector of agriculture, which is much more productive than the traditional subsector, is currently small.

However, the potential benefits arising from the implementation of the HRD Plan may be limited by existence of factors such as the lack of and/or high cost of inputs, including green houses, as well as inadequate funding<sup>2</sup>, and lack of infrastructure (roads, communication, irrigation canals, electricity, including the use of renewable energy). Moreover, farmers need to be trained in marketing strategy and identification of demand changes. These have skills implications for the HRD Plan, such as planners, economists and engineers.

In addition, the HRD Plan would achieve much more if supported by harmonisation of government arms in coming up with harmonised policies that will serve farmers. Thus, policies should be formulated and implemented, and accompanied by monitoring and evaluation, by experienced staff, with support provided by the technocrats from Ministry of Agriculture.

### **3.3 Economic Diversification**

For a long time (since the 1980s) the Government of Botswana has had plans to diversify the economic base away from its heavy dependence on diamond export revenues, particularly since (i) the mining sector is capital intensive (so it does not generate much employment) and (ii) the demand, as well as the prices for diamonds are subject to the vagaries of global economic performance. In fact, the introduction of the Financial Assistance Policy in the 1980s was the most comprehensive public initiative to diversify the economy. This need for diversification was further strengthened by the global financial and economic crises of 2008 which resulted in the closure of mines and decline in Botswana's total output. The agriculture sector has been targeted as one of the sectors for facilitating the process of diversification. This reflects the fact that agriculture is a major source of livelihood for about 70 percent of Botswana's rural population.

Meanwhile, the National Master Plan for Arable Agriculture and Dairy Development (NAMPAADD), established in late 2002, has the objective of making agriculture commercial, competitive and sustainable; reducing agricultural imports; creating employment, and improving the contribution of the sector to the nation's economy. NAMPAADD focuses on providing technical guidance and advice to rain-fed agriculture, irrigated agriculture (mainly horticulture) and dairy farming.

### **3.4 Technology**

The use of technology can play a major role in agriculture. Technology can contribute towards increasing productivity, improving access to market information (and hence reduction in transactions cost), new technologies and financing opportunities, particularly for the youth who are more literate in technology.

However, given that the youth in Botswana are not attracted to the agriculture sector, adoption of technology has major skills and human resource implications. Appropriate skills development and training will be needed to enable the adoption of existing technologies to achieve the above-listed advantages. This implies that training in various aspects, to improve productivity, should be made available for farmers and/or workers to undertake. The various

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<sup>2</sup> In this context, finance institutions, particularly commercial banks, need to be capacitated to understand the economic conditions of farming so as to better finance farm projects.

aspects include programmes relating to husbandry, crop protection, livestock management, agro-mechanics, literacy and numeracy (including computer literacy), etc.<sup>3</sup>. There is also a need to rebrand agriculture through the use of technology so that it becomes more attractive to the youth.

It is also noted that several factors have effect on whether or not the new technology would be adopted. In this regard, an important factor is that technology or innovation is not free, rather, it generally requires investment, which could be in cash, labour or in learning. Thus, farmers tend to adopt new technology when there exist secure markets and/or stable prices for their products. The reason is that rational farmers grow crops or produce livestock which are in demand in order to make a living. Orr and Orr (2002) noted that in Malawi, unreliable maize markets lock many farmers into inefficiently producing as much of their own grain needs as possible, rather than innovating with new crops. In addition, the chances of farmers adopting new technologies improve in the presence of supporting infrastructure (such as roads needed to transport inputs and output, irrigation, etc). This, for example, was a major factor in Asia's successful Green Revolution.

In the circumstances, there is need for research that would bring about appropriate applied technology that would be used in production by farmers. It is important that appropriate technology be available even to smaller farmers. This calls for existence of skills to evaluate the appropriateness of technology to the context of Botswana.

### **3.5 Environment**

In order for Botswana farmers to use suitable farming practices and get the best possible results, there is need to understand the natural ecological system of Botswana. This is important since farming in Botswana is mainly undertaken by traditional farmers who largely rely on the environment, such as rainfall and grazing. The country is being affected by climate change which culminated into shorter growing seasons that are even drier and hotter. The effects of climate change mean that Botswana needs to conduct research and development into crops that are drought tolerant and also require a shorter growing season. Similarly, environmental factors relate to soil conditions. Understanding soil fertility is important; poor soil means lower outputs or larger inputs of fertilisers, which have cost implications and affect profits (see DFID, <http://dfid-agriculture-consultation.nri.org/summaries/dfidwp4.pdf>; <http://revisionworld.com/gcse-revision/geography/agriculture/factors-affecting-farming>).

There is therefore need for training of more Botswana with research capacity who should assist the farmers to adapt survive in the new environment. A change in behaviour or adaptation is required which will lead to farmers investing in rain harvesting technologies and switching to climate smart technologies and green energy instead of waiting for rain to fall, electrification and carbon fuels to generate much needed energy on farms.

The foregoing point towards the need for soil scientists (physicists, biologists, etc), irrigation specialists, seed technologists, feed producers, recycled water or grey water use engineers, and agro-meteorologists to advise farmers on climate adaptation and change, as well as train farmers

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<sup>3</sup> Broadly defined, agricultural technology includes the products of plant and animal breeding (including biotechnology); the introduction of new crops; improved management practices relating to crops, livestock and fisheries; mechanisation; infrastructure development; external inputs (including chemicals, biocontrol products and veterinary products) and local inputs (soil amendments, mulches, etc) (DFID, <http://dfid-agriculture-consultation.nri.org/summaries/dfidwp4.pdf>).

to understand weather patterns. Moreover, there is need for involvement of Government in stabilising agricultural output prices, training, building of road infrastructure and drainage.

### **3.6 Education and Training**

The agriculture sector is also affected by the education and training system of the country. The poor performance of the sector could be attributed to the general lack of education and/or skills by farmers and workers. Thus, there is need to improve education in order to meet the skills requirement. The education should be delivered by people who are passionate about agriculture so as to change the attitudes of people towards agriculture. The education system should avoid emphasising on academic qualification in agriculture, and focus on practical skills – technician and artisan levels training should be emphasised in agriculture, taking advantage of TARGET 20000 and Multiple pathways Projects and the movement to revitalise TVET. The education and skills development should be accompanied by skills audit so skills development can respond to industry demand, particularly the sub-sector value chains and avoid the current situation of inadequate and irrelevant training, and relevant people not receiving the relevant education.

In this context, the skills development process should deliver graduates and extension officers with practical skills since the agriculture industry needs people with practical skills.

### **3.7 Mentorship Programme**

A mentorship programme should be established. This should aim to (i) determine how to deal with the general lack of passion in students involved in agriculture and (ii) encourage farmer to farmer mentorship. In order for the programme to be effective, a database of good mentors should be kept. In addition, mentorship should be extended to schools through career guidance.

## Section Four: Skills demand and Supply and Skills Mismatches

This chapter focuses on skills demand and supply and identifies mismatches in terms of both skills shortages and surpluses. The skills mismatches are identified in terms of two levels. One level is what employees are required for certain jobs/occupations that are in high demand. The second is in terms of skills gaps which are inadequacy in skills required from a workforce in the agriculture sector. An example is additional training skills for animal handlers to do things like maintenance of fences, learn how to vaccinate animals and how to properly milk cows. The information for making this analysis is from review of existing data, analysis of agriculture reports that have information on agriculture employment, information from focus group meetings with key informants such as Ministry of Agriculture, BCA staff, and lastly a workshop with stakeholders for final feedback.

### 4.1 Skills in Demand

Data from Botswana's labour market indicates that Agriculture is the largest single employer of labour in Botswana at 30 percent. These include field crop and vegetable growers, diary and livestock producers, poultry producers, subsistence agricultural and related workers. Within the agricultural sector, a majority of these are agricultural workers at 84 percent, with the second largest being what are classified as elementary occupations at 14 percent. In terms of education, a greater proportion of workers in the sector at 36 percent had only primary education. This is followed by those who never attended school at 35 percent. What this indicates is that in general, currently most employees in the agricultural sector have low levels of education. This is because most of the agriculture in Botswana is at a subsistence level with low levels of productivity. These workers will therefore need basic training on key areas that will need to transform the sector to a high productivity sector. This is in addition to skills required to commercialize the sector in all the key subsectors and at all levels of the value chain. Agriculture also employs workers in other disciplines to support the sector in its key functions. These skills such as Engineering will be required to support the sector in its transformation to high productivity and value.

As indicated in Table 4.1, the currently employed in the agricultural sector are mainly Subsistence Agriculture and Related Workers (14,951 workers)<sup>4</sup>. As indicated in Table 4.2, traditional agriculture generally dominates employment. Apart from commercial crop farming and commercial poultry farming, none of the other categories employed more than 1000 workers in total. It should also be noted that most of these are not trained workers and have no relevant skills or very limited skills relevant to agriculture. These large numbers will require relevant short term training to be effective in raising labour productivity in agricultural sector.

Table 4.3 indicates the number of individuals trained in various agricultural fields from the 2005/06 LFS<sup>5</sup>. The largest numbers are trained in Animal Health/Veterinary Science, general programmes in agriculture and horticultural programmes. The Table also indicates the number that was unemployed from those with various types of training –the largest unemployed group was those with horticulture training, followed by animal health/Veterinary science and forestry programmes. The unemployment could be a result of low demand for such skills, or a problem of a skills mismatch, which could be due to poor quality of the programmes or a general

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<sup>4</sup> These workers include those in the self-employment in the sector and not necessarily just workers.

<sup>5</sup> The 2005/06 LFS is the latest labour force survey available for Botswana as it is currently produced every 10 years. The other data such as census do not produce such detailed labour market information.

problem of lack of relevance due to inadequate practical training. This group of unemployed graduates will require support in terms of retraining and targeted mentoring from programmes such as those offered through LEA and CEDA to assist them access funding opportunities to start their own agriculture related activities. For the more recent ones, retraining should be accessed through the national internship programme among other initiatives.

**Table 4.1: Number of Employed Agricultural Workers by Occupation**

Occupation	Number
Field crop & veg growers	115
Dairy & livestock prod	199
Poultry production	61
Forestry workers, loggers, charcoal burners & related workers	148
Fishery workers, hunters& tappers	437
Market oriented skilled agric. & related workers not elsewhere classified	68
Subsistence agric. & related workers	14951
Cattle Herders	687
Farm Labourers	161
Forestry Labourers	103
Fishery, Hunting & Trapping Labourers	58
Agriculture & Related Labourers Not Elsewhere Classified	48

**Source:** 2005/06 LFS

**Table 4.2: Workers employed by Agricultural Industry**

Industry	Number
Traditional or subsistence agriculture	35255
Commercial crop farming	966
Commercial livestock farming	451
Commercial poultry farming	1207
Commercial mixed farming	287
Agricultural and husbandry services e.g. artificial insemination	62
Hunting and trapping	255
Forestry (all)	154
Meat and meat products	464
Dairy products	35
Grain mill products	467
Veterinary activities	182

**Source:** 2005/06 LFS.

Table 4.4 present a summary of the job vacancy data. In normal circumstances, the job vacancy data (JVD) measures the extent of unmet labour demand. It could be viewed as ‘providing a monthly picture’ of the level of unoccupied positions, job vacancy rates and unemployment-

to-job vacancies ratios. Consequently, the JVD contributes to the understanding of trends in filled and unfilled job demand in the labour market, and identify areas of human resource shortages. However, as Statistics Canada suggests, the JVD provides only part of the story on human resource shortages. The complete picture comes from analysis presented by four interrelated surveys (the Labour Force Survey; the Survey of Employment, Payrolls and Hours; the Employment Insurance Statistics; and the Job Vacancy Data). The JVD suggests that the most required workers, based on advertisements, are farm labourers, cattle herders, and those in subsistence agriculture, in that order. However, such workers do not need to acquire much education or skills to do the jobs; it is argued that their positions are not necessarily at risk of experiencing shortages. These may require short term training to provide the skill required for effective performance.

In addition, except for commercial poultry farming, not too many people have been employed in commercial farming. Thus, as more commercial farming is encouraged in the era of HRD sector plan for agriculture, and the thrust of the policy is to transform the currently large subsistence agriculture to a commercially oriented sector, then it should become clearer that vacancies that require more education and skills will be experiencing more shortages.

In fact, after removing the distorting effect of the farm labourers, cattle herders, and those in subsistence agriculture, the resultant picture indicates the relative importance of jobs that require more education and skills. As can be seen, the following vacancies have become noticeable: small business managers & supervisors, Market-Oriented Skilled Agriculture and Related Workers, Company Directors, General Managers & Non-Government Chief Executives.

**Table 4.3: Number of People Trained in Various Agricultural Fields**

<b>Subject of Training</b>	<b>Number of trained people</b>	<b>Unemployed</b>
Agricultural Engineering	160	
General Programmes in Agriculture	1393	166
Crop Breeding/Husbandry Programmes	42	0
Crop Protection Programmes	86	0
Horticulture Programmes	1070	323
Range and Pasture Management Programmes	227	0
Livestock Management Programmes	377	0
Animal Health/Veterinary Science Programmes	1613	236
Animal Health/Husbandry Programmes	765	109
Irrigation Programmes	47	0
Agro-mechanics programmes	54	0
Forestry Programmes	454	181
Beekeeping Programmes	177	44
Wildlife Protection and Management Programmes	319	62
Fisheries Programmes	113	0
Other Programmes in Agriculture	567	28

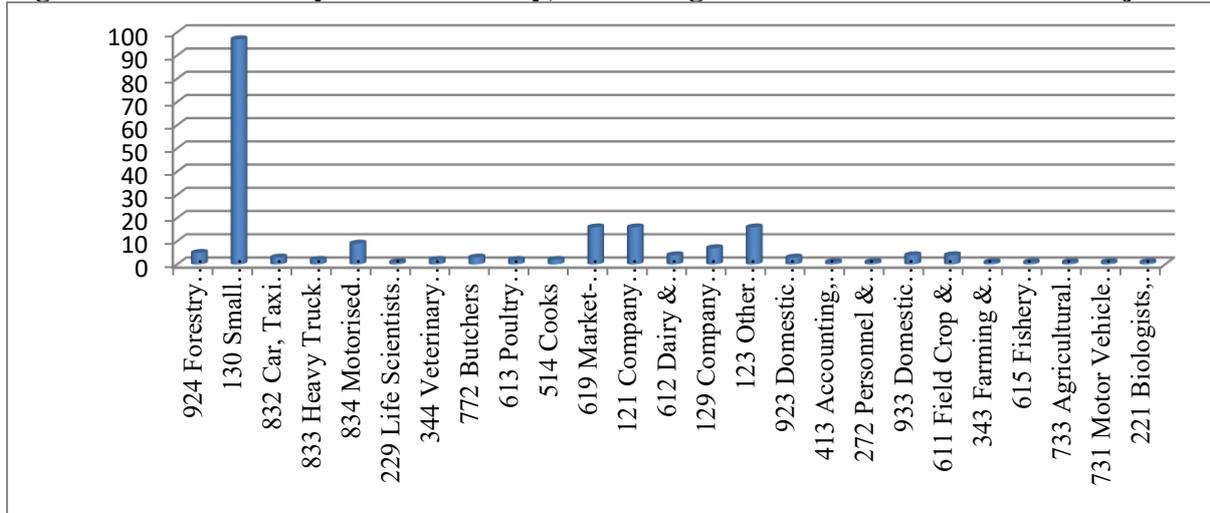
Source: 2005/06 LFS.

**Table 4.4 Job Vacancy Data Summary**

<b>Code &amp; Occupational Classification</b>	<b>Observations</b>
Cattle Herders	730
Farm Labourers	1321
Subsistence Agricultural & Related Workers	113
Agriculture & Related Labourers Not Elsewhere Classified	97
Forestry Labourers	5
Small Business Managers & Managing Supervisors	97
Car, Taxi Van, Motorcycle & Bus-Drivers	3
Heavy Truck & Lorry Drivers	2
Motorised Farm & Forestry Machine Operators	9
Life Scientists Not Elsewhere Classified	1
Veterinary Technicians	2
Butchers	3
Poultry Producers	2
Cooks	2
Market-Oriented Skilled Agriculture and Related Workers	16
Company Directors, General Managers & Non-Govt Chief Executives	16
Dairy & Livestock Producers	4
Company Directors & Corporate Managers Not Elsewhere Classified	7
Other Department Managers	16
Domestic Gardeners	3
Accounting, Bookkeeping, Statistical & Finance Clerks	1
Personnel & Occupational Specialists	1
Domestic Maids & Related Helpers, Cleaners	4
Field Crop & Vegetable Growers	4
Farming & Forestry Advisors	1
Fishery Workers & Hunters Trappers	1
Agricultural Industrial machinery Mechanics	1
Motor Vehicle Mechanics & Fitters	1
Biologists, Botanists, Zoologists & Related Professionals	1

**Source:** JVD, HRDC. January 2012 – February 2013.

**Figure 4.1 Job Vacancy Data Summary, Excluding Vacancies for Low skills level jobs**



Source: JVD, HRDC. January 2012 – February 2013.

## 4.2 The Supply of Skills for the Agricultural Sector

There are three main sources of supply to meet the demand for skills in the Labour market:

- The current labour market, including both qualified people who are unemployed and the skills developed in employed people through workplace up-skilling and re-training programmes
- Graduates from the formal education system; and
- Graduates from tertiary education.

### 4.2.1 Supply of Skills among the Employed Labour Force in Agriculture

Table 4.5 summaries the traditional farm workers by level of education from the most recent annual agricultural survey. Most of these workers have primary education or less making 84 percent of the total labour force employed in traditional agriculture sector. Table 4.6 shows the number of Commercial farm Workers by level of education. Just like the workers in traditional agriculture, most of the employees in commercial agriculture have primary or lower levels of education. These make up about 74 percent of the total, with a higher proportion of male employees with primary or less education levels. The proportion of those with primary or less levels of education is however less in commercial sector than in traditional agriculture (74 percent compared to 84 percent). What the tables indicate however is that Botswana employees in both traditional and commercial farming are of low education levels. This implies that most of the farm employees in both sector s would require short term training to upgrade their skills to increase productivity and graduate to commercial production. This could be achieved by short term retraining programmes that can be provided through training institutions such as the Barolong Vocational Training Centre (BVTC) at Pitsane, Ramatea Vocational Training Centre, MOA Rural Training Centers in Sebele, Impala in Francistown, Pelotshetlha and Mahalapye.

The employment of the Ministry of Agriculture (MOA) as is currently composed will also need more specialized and technical skills in different areas of specialization to support the development of agriculture especially towards commercial agriculture. As shown in Table 4.7, the Professional and Technical staff only make up about 9 percent of the total establishment of the Ministry of Agriculture. A majority of the workers in the MOA are those classified as Industrial workers making about 66 percent of the staff on post. Moreover, most of the technical/extension staff are generalists and will therefore require specialized skills to impart useful knowledge to farmers and industry. These will therefore also need some retraining to keep up with the required changes in the sector.

Feedback from stakeholders in the sector indicates that there is a serious concern over the quality of skills that can readily be applied in agriculture employment, both from recent graduates and the unemployed group. In some occupations there is adequate supply of skills and indeed, an over-supply of some skills. Like in other sectors it appears the number of employees is not the central issue for the agriculture sector in the supply of skills especially at the lower levels. The main concern is the quality of the skills and their knowledge of application of the theory in the workplace. There is a general concern that graduates are more theoretical than the practical. There is also a shortage of technical skills that used to be produced from the certificate and diploma programmes at Botswana College of Agriculture (BCA). Those certificates and Diplomas are no longer being produced currently and yet still highly demanded in the agricultural sector.

**Table 4.5: Traditional Farm Workers by Education Attainment**

Education	Male	Female	Total
Primary	10616	464	11080
Secondary	4145	157	4302
No Formal	33	4	37
Never attended	11641	541	12182
Total	26435	1166	27601
% Primary and below	84.3	86.5	84.4

**Source:** Annual Agricultural Survey Report, 2014.

**Table 4.6: Commercial Farm Workers by Education Attainment**

Education	Male	Female	Total
Primary	885	127	1012
Secondary	521	136	657
No Formal	4	0	4
Never attended	823	89	912
Total	2233	352	2585
% Primary and below	76.7	61.4	74.6

**Source:** Annual Agricultural Survey Report, 2014.

**Table 4.7: MOA Establishment by Job Category and Area**

Job Group	District/Area									
	Central	Chobe	Ghantsi	Kgalagadi	Kweneng	N/East	N/West	S/East	Southern	Total
Admin	93	28	19	26	34	41	33	280	76	637
Artisan	176	28	24	22	53	40	40	108	81	572
Industrial	1,530	174	121	209	407	451	515	675	727	4,809
Technical	136	31	12	27	40	46	50	163	70	575
Professional	115	27	17	39	29	40	35	268	62	633
Total	2,050	289	193	323	563	618	673	1,494	1,016	7,226
% Professional and Technical	6%	9%	9%	12%	5%	6%	5%	18%	6%	9%

**Source:** Data from Ministry of Agriculture, February 2014.

Notes:

Professional = with a university degree; Technical = with certificates and diplomas; Industrial = fence patrols, drivers, messengers, cleaners

MOA Headquarters are included in the South East District.

Numbers include the Department for Agricultural Research.

## 4.2.2 The Formal Education System in Botswana

### 4.2.2.1 Early Childhood Care and Development (ECCD)

The importance of early childhood education and development (usually from 0 – 4 or 0 – 5 years) is evident with the introduction of either mandatory or optional formal kindergarten or pre-primary programmes in many countries<sup>6</sup>. The evidence is also clear that quality in the basic education years (especially with pre-school experience added to it) is essential as a platform for later educational achievements, expanding occupational choices and improving the quality of life.

Early childhood care and development still remains the part of Botswana's education system that has the lowest participation rates (estimated nationally as 17% in 2007 and still less than 20% in 2013<sup>7</sup>). This is partly due to the fact that education policy and support has not made this level a priority for rapid expansion in the way that was done with the primary level about 30 years ago and the secondary level in the past few decades. NGOs and the private sector effectively run the ECCD sector. The *RNPE* (1994) charged government with the responsibility of developing mechanisms for the coordination of this sector. Government, through the MoESD, is assuming the responsibility for developing curriculum materials and providing specialised training and professional development of teachers. Further initiatives are planned, but need funding for implementation to occur. To prepare for this Government has recently approved a roll out for teaching of pre-school teachers to increase the supply of qualified teachers for this level of education. This is also in preparation of roll out of comprehensive pre-school to all children in Botswana to improve education quality in the country. Pre-school education has an impact on skills for the agriculture sector in as far as it affects the quality of graduates from primary and subsequent levels due to weak education foundation.

<sup>6</sup> UNESCO's EFA Goal 1 is *Expanding and improving comprehensive early childhood care and education, especially for the most vulnerable and disadvantaged children.*

<sup>7</sup> EPER (2007) and current MoE estimate for 2013

#### **4.2.2.2 Primary education**

Botswana has made rapid strides in the past decade to provide opportunities for all children to have free access to primary education. This has required an enormous effort to deliver trained teachers, support services, a revised curriculum (introduced in 2010) and facilities, equipment and learning materials to meet the increased numbers that responded to free access to primary education.

The seven years of primary education culminate in the Primary School Leaving Examination (PLSE)<sup>8</sup> that provides an assessment of seven subjects undertaken by each student.<sup>9</sup> Whereas previously the PSLE served as a selection tool for deciding which students should progress to secondary education, this is no longer the case as all of students make the transition<sup>10</sup> from primary to junior secondary school. The effect of this transition is also evident with increased numbers (in percentage terms) entering the lower secondary phase of schooling for each cohort of students.

What is not as clear is the quality of the knowledge and skills of learning for each cohort of students. The most likely indicator is the allocation of grades (from A to E), with a C Grade generally regarded as the minimum for a “pass”. The 2012 PSLE results show a large group of students (35.1%) who did not achieve a C grade. The percentage has also been showing a downward trend as it fell to 32.4 percent in 2013 and 31 percent in 2014. Despite the declining trend however, it is highly likely that this large group of low performing students in primary schools will also struggle with the more sophisticated and abstract learning demands of secondary schooling. This contributes to the prevailing issue of increased access also affecting the quality of learning outcomes throughout the system. These poor results affect the quality of the workforce ultimately supplied to the agricultural sector and other sectors. On agriculture in particular this is also made worse by the lack of practical training in agriculture given that there are no longer gardens in most primary schools and agriculture is not properly emphasized in career guidance making it unattractive to young students.

#### **4.2.2.3 Junior secondary education**

The junior secondary phase of schooling in Botswana spans a three year period (Forms 1 – 3) that culminates in the Junior Certificate of Education (JCE) at the end of Form 3. Until the 2012 JCE, the assessments were norm referenced in that grades were mainly allocated on a similar mean score and standard deviation each year. Therefore, in those years, there is little variation between the numbers of grades (A – E) allocated each year.

The introduction of the revised curriculum in 2010 also provided an opportunity to revise the assessment system for the JCE and it is now a more criterion referenced test, with grade allocation less tied to a fixed distribution, according to the number of students at the levels of grades. The 2012 JCE is the first year that has examined students on the content of the revised curriculum and the results therefore cannot be compared with previous years. The 2012 results were very poor, with only 41% of students receiving an average grade of C or better i.e. on the usual basis of a C grade being regarded as a “pass”, 59% failed. The trend has however been

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<sup>8</sup> Administered by the Botswana Examinations Centre (BEC).

<sup>9</sup> The PSLE subjects that are assessed are Setswana, English, Mathematics, Science, Social Studies, Agriculture and Religious & Moral Education.

<sup>10</sup> *Education Statistics*, CSO, 2008.

worsening as in 2013 it was 35.2 percent and in 2014 recorded only 34.63 percent of the candidates that obtained a Grade C or better. The poor quality of results are also reflected in performance in agriculture, sciences and mathematics, making it difficult to get an adequate supply of well qualified students to specialise in agriculture at a later stage.

While explanations can perhaps be provided for the declining results (e.g. teacher and student lack of familiarity with the curriculum and the possible relative difficulty of the examinations)<sup>11</sup>, there is one other overriding issue. Of major concern to some Batswana is the suggestion (made in the press) that students who did not receive at least C grades in the majority of their 7 JCE subjects, be allowed to proceed to Form 4, wherever places existed, i.e. make the transition to senior secondary schooling. If in fact this is occurring, this would have the effect of treating the JCE in a similar way to the PLSE i.e. limiting its role in the merit-based selection of students to be allowed further progress in the education system. The significance of this issue cannot be understated, particularly in relation to whether children who are less academically capable should be provided with alternative streams of education and training, as part of the formal education system e.g. school-based TVET.

#### ***4.2.2.4 Senior secondary***

While Junior Certificate results have remained weak, the transition rate between junior and senior secondary education has been increasing steadily over years, rising from 52 percent in 2001 to 69.7 percent in 2008 before declining to 64 percent in 2012. This reflects both the increase in secondary places available for students and the increased transition possible with less emphasis being placed on the PSLE. Fewer students are dropping out of the secondary system although the numbers are still relatively high. The increased numbers in senior secondary have provided challenges to the education system including the need for more teachers, extra facilities and equipment and school management issues such as class sizes and double shifts. The improved access for students is welcomed, but the issue of quality of provision and improving learning outcomes remain as a difficult issue for government, educators and employers.

The main measure of student performance is the grades allocated to students on the BGCSE. Generally a C Grade is considered to be a “pass”. Figure 4.2 show the trend in terms of proportion of students awarded a C or better grade. The trend is clearly one that shows deterioration in performance in the last five years. It is impossible to ascribe these results to any single factor, but it may well be an expression of the difficulties in coping with extra numbers seeking and being allowed access – at the expense of quality of outcomes. It could also be a function of the examinations themselves, but this is unlikely given the steady fall over the five year period. As explained in the analysis of the JC results, the introduction of scaling to assess the relative difficulty of examinations to allow more meaningful comparisons may assist the process.

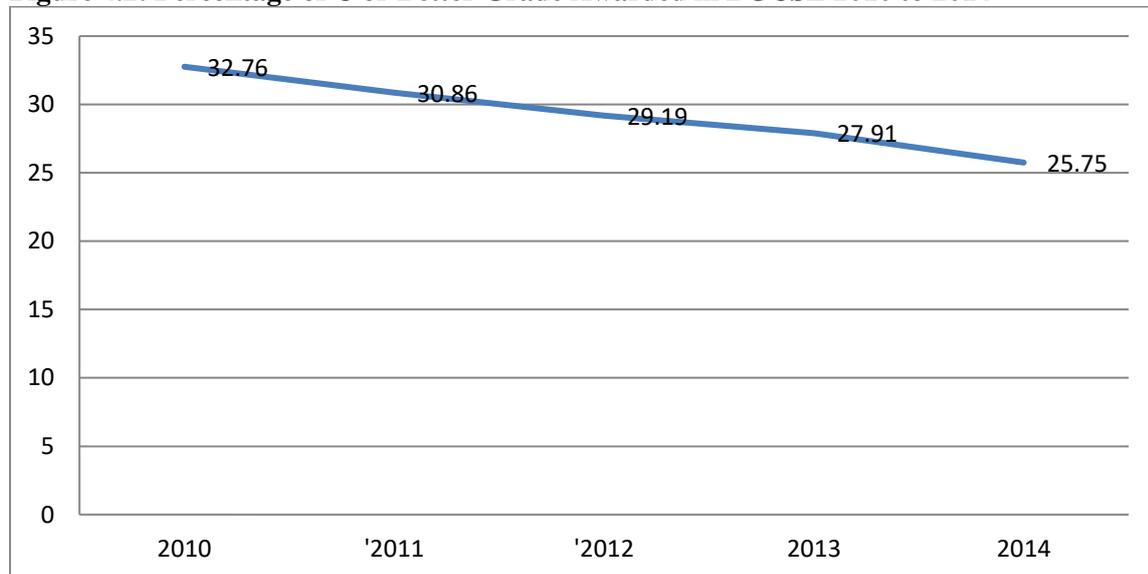
Educational measurement techniques to link assessments to provide comparisons between the relative difficulties of examinations from year to year are within the current capacity of BEC. However, it will require additional funding to achieve this important emphasis on quality

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<sup>11</sup> It is not possible to establish the relative difficulty of the JCE or BGCSE exams in different subjects and overall grades because no statistical linking techniques (e.g. Rasch scaling) are used.

through adding value or showing improved comparative performance by schools. The development of a criterion referenced approach to the JC is one such effective change.

**Figure 4.2: Percentage of C or Better Grade Awarded in BGCSE 2010 to 2014**



**Source:** Botswana Examination Council Website.

In Botswana agricultural education and skills training opportunities exist at secondary school level, tertiary level and at vocational training institutes. But the existence and availability of these learning and training opportunities have not translated to higher agricultural productivity on farms and this may be due to a mismatch or inadequacy of what is offered in terms of training at the institutions.

The need for clear pathways of learning leading to occupations and careers in agriculture is an improvement that the education and training system could make. Agricultural education and skills training needs to be integrated into the Botswana school curriculum from primary school and into junior and senior secondary courses. This will assist in developing knowledge, skills and attitudes so that children and youth develop an appreciation of the role agriculture can play in transforming and empowering their lives.

While agriculture is included as a subject at secondary school level, there tends to be more focus on theory with fewer resources devoted to practical applications. This is a critical omission because more often than not, students have no understanding of farm life and the challenges and decision making that takes place on the farm on a daily basis. This is particularly true for students residing in urban areas.

#### ***4.2.2.5 Development of a TVET stream within secondary schools***

TVET in Botswana has been quite separate from the formal school education system and has often been regarded as a deficit system without defined pathways, perceived negativity, and poorly articulated with labour markets demands (MoESD, 2013). As a result, many of the products from the TVET suffer from unemployment while the economy is in great demand for artisan skills. This demand is similarly found in the agricultural sector which has been made worse by the discontinuation of the certificates and diploma programmes at BCA. There is however ongoing efforts to revitalize the TVET system to amongst key issues provide

alternative pathways for the system and generally make it an attractive pathway for career choices for young Batswana. The Botswana Credit and Qualifications Framework addresses a number of important issues that were important concerns to the supply of skills. The BGCSE spans Level 3 (Form 4) and Level 4 on the BCQF. The importance of this is the *equivalence* of the BGCSE with the early levels of both the NCC and the BTEP i.e. they equate to a school level qualification. It also suggests that certificate level courses being provided by TEIs have equivalence to the BNVQF at Levels 1 and 2. This is important, as the location of the awards is not prescribed by the BCQF. Presumably this means that the equivalent TVET awards could be offered at a school, at a Brigade, at a private TEI, in the workplace (i.e. National Vocational Qualifications) or in a combination of these locations. It should also be of interest to the agricultural sector that workplace qualifications (NVQs) are not only restricted to low skills training. The private sector is a key partner in agricultural human capital development and to this end has established two vocational training institutions: the Barolong Vocational Training Centre (BVTC) at Pitsane and the Ramatea Vocational Training Centre (RVTC) in Kanye. Given that BCA is no longer producing certificate and diploma level skills, there is a need for some of the Vocational Training Centres and Brigades to close that gap and start offering some of the agricultural courses.

#### **4.2.2.6 Tertiary Level Skills Development**

The skill level of the agricultural labour force in Botswana as indicated in the previous section is very low, particularly in the area of crop production which is mostly made up of small scale farmers.

Botswana College of Agriculture (BCA) is the main institution responsible for producing agriculture and related disciplines. During NDP 9 the college increased its student enrolment in crop production, husbandry and animal science from 841 students in 2002 to 1 022 in 2007. Throughout the planning period a total of 1, 556 trainees graduated from the college in various aspects of agricultural training and allied subjects. The increase in enrolment is attributed to the growth in facilities including up-graded curricula that the College has developed in recent years.

The MoA is also involved in the training of agricultural personnel through its in-service programme. During NDP 9 MoA trained a total of 19 employees at graduate and post graduate level in various aspects of agricultural disciplines at different universities worldwide. Furthermore, the MoA through its farmer training centres namely the Danmen, Pelotshetlha, Mahalapye, Impala and Nxaraga rural training centres, has trained farmers in different crop and livestock husbandry and application techniques.

It is necessary for MoA to continue to promote agriculture as a career of choice and move towards the development of agricultural industry ready human resources through the provision of relevant and focused tertiary training programmes in NDP 11 and beyond.

BCA offers tertiary education in a wide range of disciplines in agriculture. Table 4.8 shows the BCA enrolment by programme at three points in time: for 2011, for August 2014 and for January 2015. Between 2011 and 2014 the enrolment remained almost stagnant with noticeable changes to reduce offering of diploma programmes and increases in some degree programmes. The largest enrolments for the latest figures (January 2015) are in the areas of Soil and Water Conservation Engineering, BSc Agricultural Education, BSc Agricultural Economics, BSc Animal Science, BSc Crop Science and BSc Agricultural Mechanisation. Most of these students are funded by government through the Department of Tertiary Education Finance

(DTEF). A few are those who are in-service officers are sponsored by their respective departments, mainly under the Ministry of Agriculture. There are also a very small number of students who are self-sponsored. Given the fact that most students are publicly financed there is a major scope for focussing support on skills development in priority areas through the sponsorship route and also through a tertiary education financing system that rewards institutions that enrol more students in the priority areas.

The enrolment numbers over time indicate that BCA is producing more qualified graduates than can be absorbed by the labour market, especially given the current small commercial sector. One expressed concern is that the graduates may not be adequate for emerging areas such as horticulture and bee keeping. It is also apparent that the practical applications of theory in courses are not adequate. This may explain why a significant number of graduates remain unemployed and also do not venture into self-employment in the agricultural sector.

It is anomalous that the academic year at BCA is not properly aligned with the cycle of the farming year. As a result of this misalignment students do not get adequate time to acquire agricultural field experience that could be gained if they were placed as interns on actual farms before they graduate from BCA. Instead students do practical exercises in an artificial environment that is not representative of the day-to-day reality of farm life. There is a need to develop effective training and opportunities for practical farm training for youth enterprise development particularly in value added activities such as food processing and packaging.

Some countries (e.g, Australia, Canada and Fiji) have developed Enterprise Education (EE) programmes which operate in both primary and secondary schools. Under EE, students engage in group and later individual projects where they develop a small scale school-based enterprise under the supervision and support of the teachers. They follow through the stages of enterprise development, learning each of the important skill sets in activities such as product design, required starting capital and equipment, production methods, quality assurance, marketing and product delivery (including some value added activities). In undertaking poultry raising (for example) this builds an appreciation for agribusiness development and the various activities that form the agricultural commodity value chain. The EE programme develops the knowledge, skills and attitudes necessary for entering the world of work, so that upon graduation the students are in a position to see how the skills they have learnt can be applied in a real world setting.

The Junior Achievement Botswana (JAB) programme provides the essential skills and practical activities in entrepreneurship and work readiness required by school leavers as they enter the world of work. JAB currently operates at secondary school level, with plans to extend this into primary schools. It gives practical application to business courses in the secondary curriculum. However, it is a voluntary programme, which means that not all learners are exposed to its skill development. Consideration needs to be given to making JAB, or its equivalent, more central to the curriculum so that all students are included in its practical activities and introduction to entrepreneurship.

One recent development in the agriculture sector is that the BCA is now being transformed into a University of Agriculture and Natural Resources. This should add to the supply of relevant skills that are needed in the market. The proposed University will be in a better position and better resourced to offer more specialised programmes to assist the country in transforming its agriculture sector.

Figure 4.9 shows the enrolment projections for the planned university from 2015 to 2021. The projected annual increase is 28.6 percent per annum reaching a total enrolment of almost 7,000

students by 2022. This is a substantial increase from the current enrolment of about 1200 students and this poses a particular challenge. If the absorptive capacity of the sector in terms of employment is not able to increase, these extra numbers of graduates will likely lead to increased unemployment for the graduates. This underlines the need for the relevance and responsiveness of the curriculum to address the required high demand skills for growth. It is also apparent that all courses need to include a focus on providing skills for self-employment in the agriculture sector.

**Table 4.8: BCA Current Enrolment by Programme**

Programme	2011	August 2014	January 2015
DIPLOMA IN AGRICULTURAL EXTENSION		59	59
HIGHER DIPLOMA IN ANIMAL HEALTH & PRODUCTION	80	46	44
HIGHER DIPLOMA IN FORESTRY & RANGE ECOLOGY	58	30	23
HIGHER DIPLOMA IN AGRICULTURE	58	30	28
BSc IN AGRICULTURAL ECONOMICS	91	118	112
BSc IN AGRICULTURAL EDUCATION	81	143	123
BSc IN AGRICULTURE	120	81	75
BSc IN ANIMAL SCIENCE	162	140	130
BSc IN CROP SCIENCE	118	88	81
BSc IN AGRICULTURAL MECHANISATION	132	83	80
BSc IN SOIL & WATER CONSERVATION ENGINEERING	131	169	164
BSc IN FOOD SCIENCE & TECHNOLOGY	79	124	113
BSc IN AGRICULTURAL EXTENSION	30	76	73
Total	1140	1187	1105

Source: BCA Academic Records.

**Table 4.9: Enrolment Projection for Botswana University of Agriculture and Natural Resources**

Level	2016	2017	2018	2019	2020	2021	2022
100	415	534	890	1145	1472	1766	2066
200	353	454	757	974	1253	1503	1758
300	316	406	677	871	1120	1344	1572
400	260	334	557	716	921	1105	1292
Total	1344	1728	2881	3706	4766	5718	6688

Source: Final Draft of Physical Master Plan.

### 4.3 Skills in High Demand

The various methodologies generated a list of skills that are in high demand for agriculture sector by level<sup>12</sup>. We have also provided indicative numbers for each of these occupations in

<sup>12</sup> The indicative numbers were generated through a variety of methods that included labour market information collected from a Job Opportunity Index (JOI), discussions with key stakeholders and other key labour market information and signals. There is no single

high demand. Most of the skills under Table 4.10 are to be provided by BCA. At the higher level what is required is training and masters and PhD level to provide evidence based policy reforms for the sector. PhD training should no longer be treated as a luxury but a necessity for the sector.

**Table 4.10: Skills in High Demand for Agriculture Sector- High Level Skills**

<b>Legislators, Administrators and Senior Managers (Masters with research)</b>	<b>Indicative Numbers per annum</b>
Veterinarian	30
Agronomist	40
Crop Scientist	20
Animal Scientist	20
Soil scientist	20
Food Scientist	20
Irrigation specialists (hydrologist)	50
Agricultural Engineer	20
Agricultural Economist	50
Range Ecologist/Manager	20
Research Scientist	20
Rural Sociologist	20
Feed Manufacturers/Producers	20
Animal Product Processors	20
Molecular Biotechnologist	20
Climate change specialist	20
Waste management Specialist	20
Bio Technologist- food processing	20
Software Developers and Information Management Specialist	20
Pharmacologist	20
Transport Economists	40
Planners/ Policy Analyst	20
Trade Negotiation Specialist	10
Education Specialist	20
Plant Breeder	30
Soil Physicist	30
Plant Nutritionist	30
Soil Chemist	30
Soil Biologist	20
Seed Technologist	20
Weed Scientist	30
Florist	40
Apiculturist/ beekeepers	40
Geneticist	30
Biometrician	30
Manufacturing Engineer	20
Recycled water Engineer	40
Business Management	30
Renewable Energy Engineer	40
ICT engineer	20

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scientific method of generating these indicative numbers in the absence of a comprehensive survey of those engaged in the sector.

Land Use Planner	20
Soil Conservationist	20
<b>Skilled Technicians and Associated Professionals</b>	
Plant pathologist	100
Food scientist	100
Animal breeder	80
Animal nutritionist	60
Dairy scientist	80
Greenhouse Technician	80
Agricultural Extension Worker	150
Small business manager	60
Farm supervisor	60
Poultry Breeder Producer	100
Ostrich Breeder	50
Dairy Processor	50
Livestock Producer	50
Field crop producers	50
Vegetable producer	50
Fruit Producer	50
Meat Inspector	40
Entomologist	60
Animal Transporters	60
Feed Producers	80
Feed Processing and Manufacturing	50
Life Animal Exporters	50
Bee keeping processors	60
Farm Mechanisation	60
Irrigation Specialist	60
Post-Harvest Technologist	60
Business Management (Entrepreneurship)	100
Lawyers (to deal with legal aspects of the land use issues and labour law)	20
Industrial Relations	40
Labour Economists	20

**Source:** Authors generated from labour market indicators, JVD, enrolment, etc.

The skills in Table 4.11 are mainly skills that are at the operational level that can be offered at the certificate or diploma levels. The Certificate and Diplomas in these areas should be offered by the Vocational Training Colleges and Brigades. Some of these skills can also be acquired through short courses offered by BCA and other training institutions such as Land Based Training. Some of these can be offered through modular programmes to avoid long absence from work by the employees. The programmes will require to be accredited by BQA for proper quality assurance and conformity to qualifications framework.

**Table 4.11: Skills in High Demand for Agriculture Sector-Semi and Low level Skills**

<b>Skilled Agriculture and Related Workers, Plant and Machinery Operators</b>	<b>Indicative Numbers</b>
Market Oriented Agriculture Worker	200
Horticultural Worker	300
Agricultural Industrial Machinery Mechanic	300
Motorized Farm Machine Operator	200
Food Packager Technician	200
Bookkeeper	100
Abattoir Worker	50
Maintenance Worker(irrigation, farm machinery)	100
Artificial Inseminator	150
Dairy Equipment Technician	100
Lab Technician	100
Information Dissemination	100
Lay Extension Workers	300
Borehole Mechanic	200
Tractor and Farm Implement Mechanic	200
<b>Elementary Occupations</b>	<b>Indicative Numbers</b>
Animal Handlers	1000
Cattle Herder	1000
Subsistence agriculture and related worker	1000
Horticultural Labourer	1000
Crop Farm Labourer	1000
Food Packager	200

**Source:** Authors generated from labour market indicators, JVD, enrolment, etc.

#### **4.4 Skills required for skill upgrading and workforce development**

A number of employees in the agricultural sector and farmers lack some of the basic skills that can be provided through short term training by BCA and other training institutes. Some of these require providing workers with practical skills such as ability to mend a fence, knowing how to milk a cow, do proper vaccination of animals, etc.

For low level workers, the following skills are to be provided through short terms training:

- Literacy and numeracy;
- Farm Record keeping;
- Fence erection and maintenance
- Animal vaccination
- Animal feeding and care
- Honey handling
- Inputs procurement and management
- Application of fertilizer
- Provision of specialized skills for the current extension workers.
- Labour and Employment Relations

Most of this training could be provided on short terms basis and farmers can utilize the HRD Fund after the contributors have made their claim. Training may also be done on the farms to enhance the practical knowledge of the workers.

For the high level employees and farmers, short term courses in the following areas should be offered to close the skills and knowledge gaps:

- Project management,
- Organisational development,
- Marketing
- Value addition and product diversification
- Understanding legislation (labour laws) and industrial Relations,
- Health and safety at the work place
- Evaluation skills,
- Report writing,
- Financial management, HIV and AIDS management

These skills can be provided mainly by BCA and other related training institutions such as the Faculty of Business and Faculty of Social Sciences at the University of Botswana on a short terms basis.

For all the workers, there is need for provision of work readiness skills. Given Botswana's problem with work ethic issues in all the sectors, these are skills that can be provided to employees in all sectors and not just for the agricultural sector. Part of these work readiness skills should be imparted in the formal school system to change the work attitude at a relatively young age for the future workforce.

## Section Five: Cost of the Plan and Funding Strategy

### 5.1 Introduction

A human resource development (HRD) plan has to be accompanied by other important related parts – one of which is the funding strategy.

- A funding strategy for the plan comprises the cost structure relating to the provision of the skills that are required in the HRD plan (i.e., the cost of the plan), and the various options that can be used to source the funding (funding strategy options) needed for the requisite training. The cost of the agriculture plan is presented in terms of unit costs because it is intended to show how much the training of one person would cost. It is not a financial plan or fiscal budget, which show the distribution of financial resources among different priorities.
  - Unit costs have been defined for the various short courses and module courses offered by the Botswana College of Agriculture. In addition, unit costs are shown for the University of Botswana as it supplies some of the skills that will be required in the agricultural sector – viz., law.

### 5.2 Cost of Plan

The Botswana College of Agriculture (BCA) offers short courses to farmers and/or workers that last a week. Although BCA is an associate institution of the University of Botswana (UB), it is responsible for the development of its own short courses, which it offers through its Centre for In-Service and Continuing Education (CICE)<sup>13</sup>. The broad titles of the short courses, along with the cost per person, are presented in Table 5.1. The specific courses under each title are listed in Annex C table.

**Table 5.1: Unit Costs for Botswana Agricultural College Courses**

Short Courses (Title)	Course Fees				
	Per week without accommodation	Per week with accommodation (standard sharing)	Per week with accommodation (executive sharing)	Per week with accommodation (standard single)	Per week with accommodation (executive single)
Animal Production/Management & Feeding	P1,515.00	P2,877.00	P3,077.50	P3,190.00	P3,665.00
Agribusiness	P1,515.00	P2,877.00	P3,077.50	P3,190.00	P3,665.00
Crop Production/Horticulture	P1,515.00	P2,877.00	P3,077.50	P3,190.00	P3,665.00
Soil, Water & Machinery	P1,515.00	P2,877.00	P3,077.50	P3,190.00	P3,665.00
Information Technology & Research Methods	P1,515.00	P2,877.00	P3,077.50	P3,190.00	P3,665.00

**Notes:** 1. The duration of the courses is 5 days.  
2. Source: BCA Centre for In-Service and Continuing Education 2015 Courses.

<sup>13</sup> CICE is an outreach department of the Botswana College of Agriculture that is responsible for promoting, coordinating and delivering short courses in agriculture, rural development and related fields.

In addition, BCA, as an associate institution of the UB, has been offering degrees and higher diploma programmes in Agricultural Sciences (in addition to the certificate courses). Table 5.2 shows the various programmes and courses that BCA offers together with the associated unit costs.

**Table 5.2: Botswana College of Agriculture Courses and Fees**

Programmes	Fees 2013/14	Proposed Fees 2014/2015	
	ANNUAL FEE (estimate)	ANNUAL FEE (estimate)	FEE For One Credit
<b>UNDERGRADUATE PROGRAMMES (Resident – citizens, tax payer, SADC student)</b>			
<b><u>CERTIFICATES</u></b>			
Science & Engineering Faculty Courses	P28,080	P30,890	P1,030
Other Faculties	P21,100	P23,210	P774
<b><u>DIPLOMAS</u></b>			
Science & Engineering Faculty Courses	P28,080	P30,890	P1,030
Other Faculties	P21,100	P23,360	P779
<b><u>BACHELORS</u></b>			
Science & Engineering Faculty Courses	P28,080	P30,890	P1,030
School of Medicine	P30,950	P34,050	n.a.
Other Faculties	P21,100	P23,210	P774
<b>POSTGRADUATE PROGRAMMES (Resident – citizens, tax payer, SADC student)</b>			
Postgraduate Diplomas	P18,300	P20,130	P839
Masters Programmes	P24,810	P27,290	P1,137
MBA programme	P28,520	P31,370	P1,307
School of Medicine	P27,270	P30,000	n.a.
Other Faculties	P19,710	P21,680	P903
MPhil Science & Engineering	P24,810	P27,290	P1,137
Other MPhils (Other Faculties)	P19,710	P21,690	P903
PhD Science & Engineering	P9,350	P9,350	P390
PhD (Other Faculties)	P9,350	P9,350	P390
<b>PART-TIME PROGRAMME</b>			
Diplomas (DABS) (excluding cost of book)	P3,040	P3,340	n.a.

**Source:** 1. BCA Handbook (Updated 2013/14)

2. n.a. means data not provided.

It should be noted that BCA, through the Meat Industries Training Institute, also offers a Certificate in Meat Inspection course in Lobatse – this is a 6-months long course that is offered on full-time basis. The unit cost for certificate courses are shown in Table 5.3.

**Table 5.3: Botswana College of Agriculture MITI-Courses Prices**

MITI SCHEDULE OF FEES	SADC/RESIDENT STUDENTS	PER DAY RATES
FEEDING (Breakfast, Lunch, Dinner and Two Tea-Breaks & Snack) for six months	P5,980	P33
ACCOMMODATION: (Two sharing) for six months	P3,880	P21
TUITION – 35 CREDITS @P851.00/credit for SADC Students	P43,680	
Laundry Fee – for six months	P413	
Identity Card Fee – flat charge	P55	
Student Life – for six months	P67	
Application Fee – flat charge	P260	
<b>TOTAL COST</b>	<b>P55,011</b>	

Source: BCA Handbook (Updated 2013/14).

Meanwhile, the unit costs for the University of Botswana's Bachelor of Arts programme are, within which lawyers are trained, presented in Table 5.4.

**Table 5.4 University of Botswana's Cost of Degree Programmes (Pula)**

Programmes	Actual Fees (2014/2015)		Proposed Fees (2015/2016)	
	Annual Fee	One Credit	Annual Fee	One Credit
Undergraduate Programmes				
<b>Bachelors</b>				
Science & Engineering	30890	1 030	33 900	1 130
Other Faculties	23 210	774	25 500	850
<b>Other Fees</b>				
Graduation fee			200	
Application fee			320	
Late application fee			470	
Student life fee			940	
Late registration fee/day (returning students – max=14 days)			190	
Late registration fee/day (new students – max = 14 days)			110	
Transcript fee			44	
Identity Card fee			66	
<b>Accommodation fee</b>				
Undergraduate full-time student/annum			7 040	
Laundry fee/annum			750	

Notes: 1. Based on normal load of 30 credits for undergraduates  
2. Source: University of Botswana, Department of Finance

## **Training by Ministry of Agriculture**

The Ministry has training efforts that are administrated by the Training Section of the Department of Crops within MoA. MoA provides training, through short-term courses to the farmers (both livestock and crop farmers). The training is provided through the Rural Training Centres (RTCs) of MoA. The RTCs include Mmathethe, Lobu, Ramatlabama, Pelotshetlha, Denman spelling, Mahalapye, Impalaand Nxaraga. The RTCs provide free-of-charge (in respect of the cost food, venue, etc.) training in all the disciplines of agriculture, except at few RTCs that specialize in training for the particular in which they are located – e.g., Lobu provides training for small stock farmers.

In general, the logistics of providing training involve the extension workers at MoA identifying the knowledge gap among farmers. In response to this, the MoA then identifies a resource person, within MoA, who is then assigned the task of providing the requisite training to the farmers at one of the RTCs. However, if MoA does not have a resource person, farmers can be sent for the short-term training to CICE at the Botswana College of Agriculture, with the cost of such training incurred by MoA. It is important to note that MoA emphasized that the Ministry tries to encourage farmers to pay for their training in respect of CICE's short-term training, in order to discourage the spirit of dependency syndrome.

In terms of providing short-term training to farmers, it is encouraged as the Agriculture HRD Sector Plan is implemented, that the University of Botswana, through the Faculty of Business and the Department of Economics should also contribute to such short term training. Also, given the synergy that already exist between the training activities of MoA and BCA, through CICE, and that going forward all training will be provided in terms of HRDC Sector Plans, it is recommended that when the Agriculture Sector Plan is implemented, the training activities of MoA be assumed by the Farmers' Associations and HRDC.

## **Training Budget Summary**

Given the information on unit costs, the information on the anticipated student enrolment at the 'BCA' in Table 4.9, and the indicative numbers on the skills that are in high demand in the agricultural sector (presented in Tables 4.10 and 4.11), calculations have been done with respect to the budget for sponsoring the expected student enrolment, as well as the budget for training people with skills in high demand. The estimated budget for training high level workers in demand by BCA for the agricultural sector during NDP 11 is about P622, 217, 270 in total (i.e., about P622 million – the details on the calculations are presented in Annex D). This however is not realistic given that the enrolment projections are not demand driven. Using the demand driven figures, the estimated amount of money needed to train workers at the various skills (in high demand) is about P65, 952, 120 per annum and is broken down as per appendix A2 and A3 with the detailed costing(the details on the calculations are presented in Annex D).

## **5.3 Funding Strategy Options**

The plans to devolve more responsibility to Sector Committees (SCs) (through the HRDC) will require new legislation and operational procedures, as well as budgetary adjustments to current agriculture funding arrangements.

The creation of SCs as key vehicles for leading and supporting the agriculture sector plan, as well as aspects of Botswana's HRD Plan, provides an opportunity to devolve more

responsibility (and accompanying funding responsibilities) to SC's. This will require initial support and capacity building for SCs to work effectively under the umbrella of MoA and the HRDC. It is also anticipated that new forms of funding arrangements could result through a more devolutionary budgetary strategy e.g. grants mechanisms, further devolution to include farmer and commodity associations. This will require legislation (or at least, policy) and financial management support.

The devolved funding strategy will also require clear reporting lines and accountability arrangements to be in place. It is anticipated that current financial management and accountability procedures will apply, but these may need adjustment, given the different relationships and reporting procedures that will apply e.g. the SCs reporting to HRDC as an intermediary, or directly to the MFDP: agreement and arrangements are needed.

There is also the issue of recurrent and development funds management, with the SCs not currently having financial officers included as part of their committee structure. These officers can of course be added, but if the HRDC is to provide these financial management services, the roles and responsibilities will need careful and clear determination.

The new governance arrangements involving SCs is an exciting and progressive development for Botswana's HRD planning. It also signals the need for judicial and accountable planning to maximise the benefits of devolved responsibility for decision making and management of the sector.

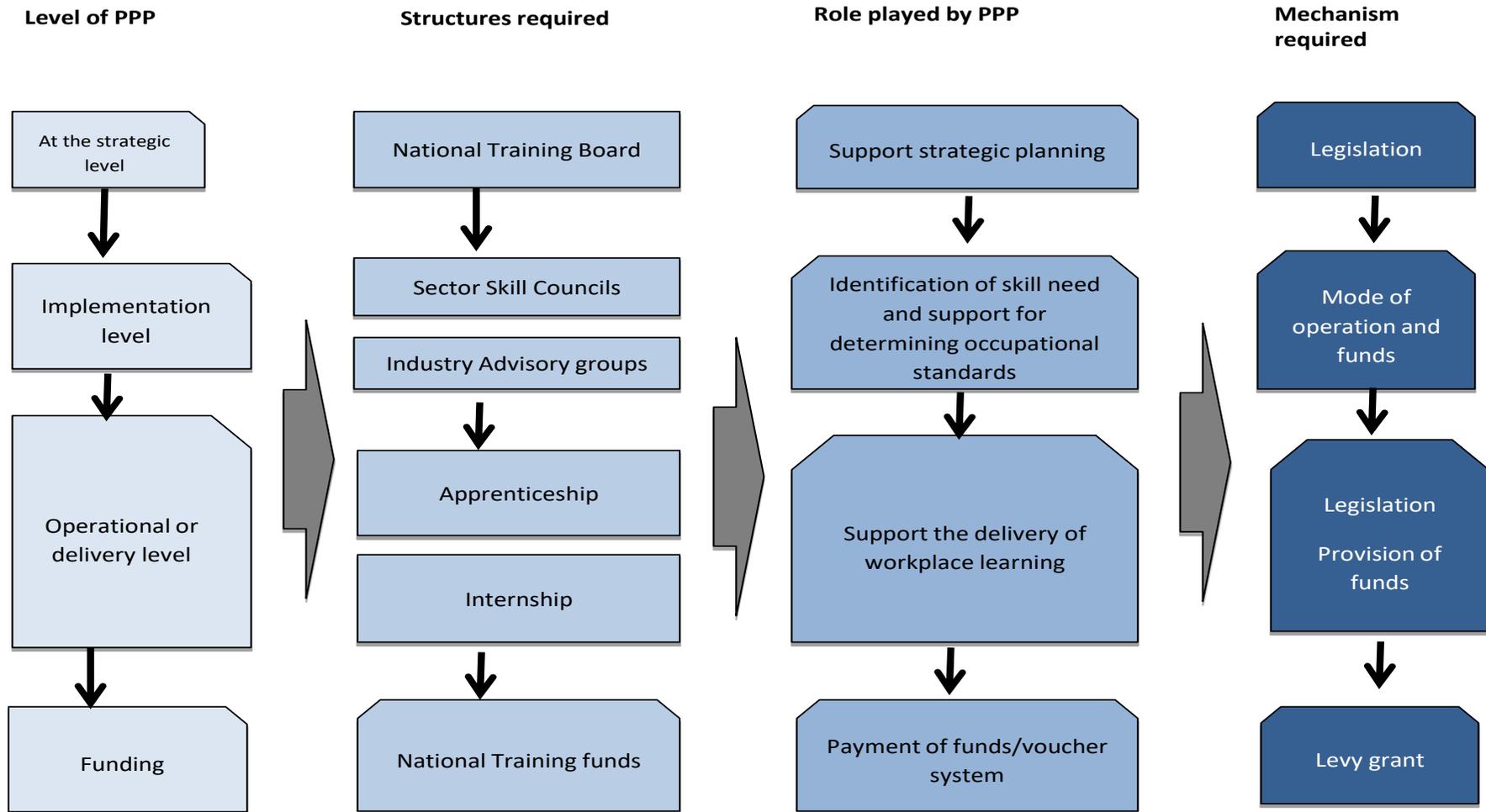
### 5.3.1 Public-private partnerships (PPP)

A **public-private partnership** (PPP) is variously defined, but usually means a government service or a private business venture which is funded and operated through a partnership of government and one or more private sector companies. There is reluctance in many countries to use PPPs to raise capital investments for skills development because financial markets are undeveloped and the costs of borrowing are often much higher. In many countries the private sector is also less likely to engage in such PPPs because the risks far outweigh the benefits (Powell, 2014).

Figure 5.1 provides an overview of how PPPs operate and support skills development. As Powell (2014) notes, the diagram may be an oversimplification, but it provides an understanding of the issues and levels of operation of PPPs. Some of the terminology in the Figure is different to that used in Botswana e.g. National Training Board equates to the roles covered by the Botswana HRDC and also the BQA: SSCs equate to the Sector Committees in Botswana.

In the context of agriculture in Botswana, the focus is mainly on the implementation level and the role played by SCs (SSCs in the diagram). Figure 5.1 highlights the many dimensions associated with PPPs and how they can influence directly or indirectly the functions of SSCs.

**Figure 5.1: A conceptual approach to understand how PPPs can support skills development (Powell, 2014)**



The main reason for recommending **the use of PPPs as part of a broader funding strategy** is to provide opportunities to increase the funding pool for training, research and project-based activities in agriculture. It is also a key means of providing industry involvement and employer engagement in partnership with government and other stakeholders.

Considering PPP within the context of agriculture in Botswana, this is most likely to mean private employer/ producer led schemes working in partnership with and facilitated by the public sector. These arrangements can include partnerships to develop policy, support systems (e.g. for projects, training, research and development), improve delivery and to supplement funds for agriculture. A different form of PPP applies to the non-formal sector where not-for-profit NGO's and community groups assume a leadership role with government support. For example, the *Junior Achievement Botswana* (a not-for-profit organisation) is currently providing entrepreneurship programmes (called *Enterprise Education* in many countries), on a voluntary basis, in secondary schools. This is an important programme that should be offered to all students (with different formats at primary – secondary – tertiary levels). Providing government or private funds to support the programme's expansion (particularly into the skills required in agriculture enterprises) would be an investment in skills development and provide valuable promotion for agriculture as a career of choice.

**The importance of Farmers' Associations in their work with education and training bodies** has scope for expansion in agriculture in Botswana. Their involvement in (for example) curriculum development, work readiness programmes, mentoring of students, standards setting, monitoring and evaluation and research projects can be achieved through the use of PPPs. Recognition of Farmers' Associations as partners in development of the agriculture industry is a critical step in both directing and managing change. These partnerships provide a valuable mechanism or structure for the two-way sharing of knowledge, where government wishes to implement changes to current practices. This also provides an important vehicle for the capacity building of the Farmers' Associations through access to training and professional development that has both relevance and ownership through their involvement. Building trust and mutual respect through opportunities to shape future directions in agriculture will ensure the support and expertise of the associations for new initiatives and the accompanying policy and funding support.

Ideally, members of the Farmers' Associations provide the Trainers in a train-the-trainer model of capacity building and information dissemination of improved practices. The existing association structure provides a cost-effective means of both developing capacity and implementing initiatives (e.g. delivery of projects, government programmes and sub-sector trials). There is much further potential for government (e.g. MoA, MoESD) and private providers to partner with the associations for both general and specific (i.e. sub-sector) development in agriculture.

At the heart of all forms of levels of PPP is an enhanced leadership and decision making role for the private partners (e.g. Farmers' Associations). It is suggested that some modest funds are set aside from the agriculture budget to explore and create possible platforms for PPP (including the following grants mechanism) to occur. While capacity building needs to be the primary outcome, it will be important to include private partners in decisions about sector directions through decision making opportunities in all aspects of education and training.

### **5.3.2 Grants mechanism**

A further potential funding strategy is to develop a form of grants mechanism that links skills development to improvements in productivity. This could comprise a group or cooperatives of farmers with small holdings coming together to submit a proposal for this grant. The grant could support technology, improved access to markets, facilitation of supply chains and be linked to skills development. The criteria for the awarding of grants would need to be developed, with more detail added on what productivity links are to be applied: this needs sector-wide discussion and agreement.

Based on the previous experiences of agriculture projects in Botswana, effective communication needs to be provided to farmers to inform them about the grants, and how to put together proposals for the funds. It is anticipated that the SC and Extension workers would have the primary management, communication and support roles for this scheme.

### **5.3.3 Human Resource Development (HRD) Fund (formerly the Vocational Training Fund (VTF): workplace up-skilling and re-training of employees**

In October 2008, Botswana introduced regulations to establish the Vocational Training Fund (VTF) which was administered by BOTA until 2014 and then transferred to the HRDC. The HRD Fund includes two main components:

- 1) **A tax based on an employer's turnover** which is collected and put into the HRDF, with the express purpose of reimbursing the employer the costs of training its citizen (Botswana) employees. The amount of levy is based on the annual turnover of any Botswana company that is registered under the VAT Act or is liable for VAT at the following rates:
  - Companies with an annual turnover of less than P500 000 no levy is payable;
  - Registered companies with an annual turnover of P500 000 to P2 billion the levy equals 0.2% of turnover; and
  - Registered companies with an annual turnover of more than P2 billion, contribution is 0.2% of turnover for the first 2 billion and 0.05% for any amount in excess of the P2 billion.
- 2) **A training grant**, which is a reimbursement of training costs already incurred by the employer in training its low skilled and unskilled<sup>14</sup> employees. This reimbursement is paid from the HRDF.

The levy is collected by the Botswana Unified Revenue Service (BURS) through the VAT returns. Slightly less than 12 000 private sector companies contribute to the HRDF and since the fund's inception in 2008, a cumulative figure of just over 1000 companies have made claims for reimbursement for training they have conducted. This cumulative figure includes companies that have only claimed once, some on several occasions and some companies that are regular claimants. While a precise breakdown is not possible, the regular claimants include, in particular, companies from sectors such as retail, mining (especially the large companies), banking, tourism and hospitality.

There are also arrangements made for non-contributory *special groups* (e.g. NGOs, faith-based organisations and SMEs) to use the HRDF for reimbursement of training to a limit of P7 million

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<sup>14</sup> The level of training that receives reimbursement through the VTF currently only applies to certificate level. This effectively includes only low skilled and unskilled employees.

in 2012. However, many do not claim and in the current year 2014 - 2015 only 27.9% of available contributions were claimed as recoups. This represents a total of 1428 companies seeking recoups for training. It is worth noting that there has been a small increase each year in the percentage of funds claimed, probably due to the growing awareness of the purpose and usefulness of the fund.

However, since the inception of the VTF (now HRDF) there have been continuing concerns regarding the underutilisation of the available funds for training purposes i.e. applying for the reimbursement of funds used for training. This is evident in Table 5.4 which shows the two key aspects of the HRDF:

- The contributions received between October 2008 and February 2015 (the life of the programme thus far);
- The claims made by companies seeking reimbursement for training costs in the same time period.

Table 5.4 indicates a continuing trend of underutilisation of the fund, although the last 11 months (April 2014 to February 2015) of the fund's operation show a slight increase in claims for previously conducted training. There is also a trend evident of increasing usage of the fund over time.

**Table 5.5-4: VTF/HRD Fund Contributions and Claims since inception**

<b>Time period for contributions</b>	<b>Yearly contribution (all contributors)</b>	<b>Amount claimed (recoups) for training</b>	<b>%age Claimed as recoups for training</b>
Oct. 2008 – March 2010	P268m <sup>15</sup>	P18m	6.71%
April 2010 – March 2011	P203m	P40m	19.7%
April 2011 – March 2012	P220m	P35m	15.9%
April 2012 – March 2013	P231m	P59m	25.5%
April 2013 – March 2014	P263m	P64m	24.0%
April 2014 – to date (2 March 2015)	P222m	P62m	27.9%
<b>TOTALS</b>	<b>P1407m</b>	<b>P278m</b>	<b>19.0%</b>

**Source:** HRDF funds from HRDC.

The most important measure of utilisation is the number of participants who have received training through the use of the HRDF. Given the importance of this training for providing the supply of employers' skill needs, the results are most disappointing. Approximately a total of 73 600 participants<sup>16</sup> have been registered for VTF/HRDF courses in the past six years.

<sup>16</sup> HRDF figures: as of 11 March 2015

However, this figure also includes repeat trainees i.e. those who will have attended multiple courses in some cases. Given the total workforces of the 12 000 private sector companies contributing to the HRDF, the repeat attendees and the six years of operation of the VTF/HRDF, the total participants' figure is very small.

Also disappointing is the fact that there are very few companies that contribute towards the HRDF from the agriculture sector – these include fertilizer and agriculture machinery companies. Moreover, the few that contribute do not use the HRD Fund for training; i.e., they have made no claims, probably because of too much paperwork and administration involved with the process. Another factor inhibiting the participation of the agriculture firms is that most of the agricultural businesses are too small – i.e., in terms of their turnover – to need to contribute to the Fund. Yet, another problem is that some of the key stakeholders are not aware of the processes relating to the HRDF. For example, the Training Department at the MoA expressed lack of knowledge about the HRDF processes.

A review of the VTF was conducted by BOTA in 2011, primarily because of the concerns relating to the underutilisation of the fund for training purposes. The review included a survey of both the contributing companies and the staff administering the VTF. A report was then issued in September 2011.<sup>17</sup> There were some notable achievements attributable to the VTF mentioned in the survey (e.g. empowerment of staff, improved employee motivation, encouragement for companies to train) but the focus on underutilisation also revealed some issues requiring attention. BOTA, as the administrators of the scheme at that time had concerns with both the low usage of the fund generally (i.e. low number of companies seeking reimbursement for training) and also the high usage by some others. The exorbitant costs claimed for some training was also an issue.

Following is a **summary of the employers' main concerns with the VTF** raised through an analysis of the survey's responses (in 2011):

- Limited scope of the VTF i.e. does not cover degree level or professional training courses;
- Lack of awareness of the VTF;
- “Administrative” concerns – procedures and documentation for accessing the fund too cumbersome: delays in payment; and
- Some concerns expressed about training people who then leave the company i.e. a waste of the funds.

While all the issues listed above are important, the question of the scope of the fund is particularly germane to the issue of increasing the supply of skills through appropriate training. Previously (under VTF regulations), if a company contributed to the fund the training it provided was restricted to Certificate level training (i.e. artisan and initial technician level training). It is now possible under the revised HRDF regulations to provide training to a larger pool of employees across a broader range of levels i.e. professional and managerial level training.

Many countries have faced the reality that government cannot alone be responsible for providing the support necessary for industry sectors to develop and prosper. This has resulted in attempts to form partnerships where funding from private sources are also incorporated into the funding pool to address needs and priorities. This particularly applies to the development

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<sup>17</sup> *Survey on the utilisation of the Vocational Training Fund*, BOTA, September 2011

budget for a sector where human resource development (HRD) and infrastructure development are required for economic growth.

This has meant the formation of different relationships and responsibilities for managing sectoral development. For example, leadership roles may reside with private firms or not-for-profit organisations, with government playing a facilitating role in adding value. It also means more complicated planning and organisational arrangements, with multiple players in funding arrangements (e.g. associations, NGOs, parastatals, private employers, etc.).

## **Conclusion**

This section has indicated the various courses (short courses and module programmes) that are offered by the BCA that would be utilised to provide the requisite training for the workers and farmers in the agricultural sector.

However, it is important to note that the training should be such that it provides enablement for some of the graduates to be in a position to start their own businesses to provide employment for themselves and others. This requires introduction of more practical training topics such as training in entrepreneurship, business etiquette, leadership, business organisation, finance planning and management, etc. Moreover, there would be need for attachment of students in industries so that they can gain practical experience and the confidence needed to start a business. Also, in order to bridge the entrepreneurship skills gap, the training institutions (both at secondary and tertiary levels) should involve use of incubator units that provide support and resources for start-up businesses, as in done in Australian institutions (see the Situational Analysis Report for the Agriculture Sector of 2015).

## Section Six: Skills Transfer Strategy

### 6.1 Introduction

*Skills transfer* is defined as the transfer of skills or competencies from one work context to another. It can also apply to the practical application of institutional learning to workplace learning. The emphasis is on using knowledge and skills in new contexts. In the context of agriculture in Botswana, skills transfer is considered to be important for **all of the following**:

- **the providers of education and training** (e.g. teachers, lecturers, extension workers and Farmers' Association representatives in their role of Trainers in a train-the-trainer model) who need current knowledge and skills to be effective: and also;
- **students in practical situations or graduates** who are ready to enter the workforce;
- farmers who require skill upgrades from section workers or via other short courses: in many cases their skill development and upgrading needs are as pressing as their farm workers. **Both farmers and their workers need to be targeted for skills development and its transfer.** Using the Farmers' Associations as the vehicle for this training has been discussed in Section Five. This has implications for the funding strategy and also the instructional/mentoring arrangements between section workers and farmers and their workers.

There have been expressed concerns about the quality of training as this applies to both the development of technical skills (i.e. skills specific to an occupation) and work readiness skills (i.e. those skills that prepare entrants to the workforce to contribute as an effective employee – skills such as a good work ethic, cooperation and team work, communication and good work habits).

Skills transfer can be planned for through formal programmes of education and training (e.g. learnerships, structured workplace learning, internship programmes, train-the-trainer programmes and mentoring schemes). Good training practices include skills transfer as an integral part of the programme, often with a staged exposure to skills and their development. In its simplest form, skills transfer occurs based on the rubric:

- **“I do”** where the trainer demonstrates and models the skill for the learner in the training (both non-work and work) environment;
- **“We do”** where the trainer allows guided “hands on” practice to occur while supporting the learner; and
- **“You do”** where the trainer allows more independent application of the skills by the learner, often in an applied workplace context and where assessment follows

The **methodology for skills transfer** has its foundations in the master – apprentice relationship, which in more recent times has come to be described as **competency based training**. Vocational education and training, in its best form, uses competency based training or instruction – often referred to as CBT (or CBI). This is a different form of

learning than academic or knowledge based learning. Success in CBT is assessed by the ability to actually perform tasks under workplace situations and to agreed industry standards. The teacher or trainer provides the required learning in a real or simulated workplace to maximise competency levels and to ensure skills transfer.

In spite of a long discussion over many years in Botswana and a continuing call for competency based training and assessment it is evident that in many training institutions this is still not occurring. There are many reasons for this situation, including a lack of appropriate facilities, equipment and materials. However, it is also evident, that in some cases, there has been an unwillingness to change to a methodology that emphasises the demonstration and assessment of knowledge and skills as the most important focus. This needs to be a priority for all sector plans, including agriculture.

Several of the main formal approaches to skills transfer are outlined below. Some of these approaches are not yet formally applied to training in agriculture in Botswana. On-going professional development and training for staff to develop skills that are based on workplace learning is discussed first and then the formal arrangements for skills transfer for learners (i.e. teacher upgrades, as well as students in training: farmers and farm workers) follow.

## **6.2 Staff (employed trainers, teachers and lecturers) development programmes to promote skill transfer**

An on-going difficulty for all training staff is to maintain currency of specific industry skills and standards and their application to their education/training of learners (school, college and university classrooms and workshops). Stakeholder feedback and concerns related mainly to outdated knowledge and skills, a focus on book learning and a lack of awareness of modern equipment, processes and practices in the agriculture sector. This is not unique to the sector, but given its economic importance, it is an issue that needs immediate and on-going attention.

Teacher refresher courses, through placement in industry, were run at one time by some sectors (e.g. mining) with government support. However, the funds were withdrawn and the scheme discontinued. It is worth reconsidering this scheme for agriculture as there is a major need for teachers/trainers to continually update their knowledge and skills to make their instruction more relevant to the needs of agriculture. The HRD Plan contains a priority that a Teacher in Industry Placement Scheme (TIPS), or a similar scheme, is developed using HRD funds to supplement its implementation and operation. Teachers with current skills provide a direct and lasting benefit through mentoring to the development of skills in learners at all levels of the education and training system.

## **6.3 Skills Transfer programmes for students**

The following group of programmes promotes work-based learning that assists with the transition from institutional to workplace learning.

### **6.3.1 Work experience programmes**

These are short term “taster” programmes, included as part of a school, college or university course and designed to give students experience of the work environment prior to their transition from education to full-time work. Work experience programmes are dependent upon an industry partnership with an education/training institution and often include a formal assessment of a student’s performance.

Some countries and regions have had difficulties in finding sufficient work experience placements for students and have been required to offer simulated practice instead of the real workplace experience. The BTEP programme that was offered in DVET institutions in Botswana experienced this difficulty unfortunately. Industry partnerships are very important in ensuring work experience programmes are relevant and realistic.

### **6.3.2 Learnerships**

A learnership is a programme that leads in Botswana to a BNCQF registered qualification. Learnerships are available for young people who have completed school, college or learning at other training institutions. There are age eligibility rules that apply to being accepted for a learnership (e.g. in South Africa this is over 16 and under 35 years old). Learnerships have essentially replaced apprenticeships in many countries, mainly because of the cost and extended time period that was required for apprenticeships. Learnerships also have more flexibility in their ability to adapt to changing working standards and conditions.

Learnerships require the completion of a theoretical course as well as a practical training component, which is done at a workplace, in order to graduate. The workplace component of the qualification involves hands-on, practical learning under the guidance of a mentor, while the theoretical component is provided by an education and training provider. Together they form an integrated and comprehensive learning programme.

Learnerships are directly related to an occupation or field of work, for example, electrical engineering, hairdressing or project management. Learnerships are usually managed by industry sector bodies e.g. in South Africa (SETA’s) and Australia (Industry Skills Councils). They are supported by government funds to help skill learners and to prepare them for the workplace.

Learnership programmes help students to gain the necessary skills and workplace experience that will open up better employment or self-employment opportunities. Learnerships are based on a legally binding agreement between an employer, a learner and a Training Provider. This agreement is intended to spell out the tasks and duties of the employer, the learner and the Training Provider. It is designed to ensure the quality of the training and to protect the interests of each party.

A learnership requires that a learner enter into a fixed term employment contract with the company whilst studying towards a qualification registered on the National Qualifications Framework (NQF), which is in line with the learnership (the cost of the qualification falls to the Company). Once the qualification is completed, the learnership will also end. Learnerships promote access to education and training and they allow a student to get started on a career while also studying for an educational qualification.

In the South African and Australian training systems, SETAs and ISCs (respectively) oversee learnerships and ensure that they offer qualifications related to a specific occupation or sector of the economy. In Botswana, the BQA has developed many BNCQF-aligned programmes that allow students to gain recognised qualifications while getting on-the-job experience. It is anticipated that the Sector Committees in Botswana will play a more significant management role in ensuring that both the qualifications and the work component are related to high demand skills. Some of the advantages of learnerships for students include:

- Better employment opportunities after completing a learnership;
- There is a fixed-term employment contract for the duration of the learnership;
- Learnerships improve on the job performance as they focus on relevant aspects of jobs;
- At the conclusion of the learnership a successful student has a nationally-recognised qualification that is relevant to the sector; and
- A learner allowance is paid for the duration of the learnership.

### **6.3.3 Structured Workplace Learning (SWL)**

Structured Workplace Learning (SWL) is on the job learning, during which a student is expected to master a set of skills or competencies, usually related to an accredited course e.g. a National Certificate in Horticulture which is listed at Level 3 of the BNCQF. It is similar to a Learnership (see 6.3.2) in this regard.

SWL is important because with ongoing and sometimes rapid changes in many industries, employers are often faced with difficulties finding skilled and experienced employees. Accepting SWL students is one way employers can contribute to training Botswana's and their own future workforce. SWL also facilitates better links between employers, educational institutions and the community.

Students benefit (in the best forms of SWL) through guided practice to skills development. They also learn what is expected in the workplace i.e. the responsibilities, routines and their rights as employees (e.g. duty of care, OH&S requirements and induction programmes). Employers also benefit from SWL by:

- Having the opportunity to preview students' abilities and to assess them as future employees (first pick of the best!);
- Promoting an interest in their industry by contributing to the development of the future work force;
- Influencing young people's career choices;
- Gaining a greater understanding of the education and training system;
- Developing their own employees through the coaching and mentoring of young people; and
- Increased confidence in attracting quality staff in the future.

### **6.3.4 Apprenticeships**

Apprenticeships are still a feature of some occupations in Botswana, although this does not apply directly to the agriculture sector having apprenticeships in training who are attached to farmers as their employers. Nonetheless there are apprentices in training in related occupations to agriculture e.g. plant operators, mechanics and different occupations related to water treatment. Most of these occupations are placed at the technician level and so provide workers

who are considered to have low to middle levels of skills. The Madirelo Training and Testing Centre (MTTC) provides most of the support and assessment for apprenticeships in training.

It will be important for the Sector Committee to monitor the need for related agricultural occupations as potential employees for agriculture, particularly as mechanisation and technological skills become more important in the future. It will also be important to promote agriculture as a career choice for apprenticeships in training, to encourage them to make the transition to agriculture once they are qualified tradesmen.

### **6.3.5 Internships**

A key challenge facing Botswana are the large numbers of graduates who possess the necessary academic and technical knowledge to be employed, but are finding it difficult to compete effectively in the labour market and move into and remain in work. There is also a need for employers to fill vacancies quickly and effectively with well prepared and motivated citizens. The recently revised National Internship Programme (NIP) provides one positive means of responding to these challenges. Botswana's National Internship Programme (NIP) receives substantial funding from the Ministry of Youth Sports and Culture to assist unemployed graduates gain valuable work experience through internships that is hoped will lead to employment (the programme reported in 2013 that 35% had achieved employment).

The NIP funding mechanism is valuable in enhancing the supply of skills, especially the important work readiness skills. Other internship and work experience programmes exist in most education and training institutions, as well as the workplace-based apprenticeship programme administered by BQA through MTTC. The Youth Empowerment Scheme (YES) is another initiative receiving Government of Botswana funds through the Department of Youth. All programmes have the potential to contribute to the development of required skills, especially where there is industry involvement and support.

The number of interns with agriculture-related qualifications waiting to be placed in 2012 was 294. In 2014 this number had grown to 500 with 250 enrolled. The revised programme is still developing the required roles and responsibilities but a summary of these (ideally) for parties involved in the Internship programme indicates the value of this programme in responding to the demand for and placement of skilled people, especially at the technician and technologist levels of occupations.

The National Internship Programme within the Ministry of Youth Sports and Culture provides an administrative role for the NIP. Their role includes:

- Providing the list of graduates with agriculture-related trades and the selection process;
- Undertaking joint monitoring and evaluation of the interns;
- Providing Tables/Forecasts that indicate the number of interns that are coming into the system for placement as well as those that are exiting either through completion or permanent employment into employer organisations;
- Acting as the administration centre for the intern through being responsible for:
  - Welfare of the intern
  - Discipline of the intern
  - Ensures the right attitude among the interns
- Providing oversight mechanisms/ feedback mechanisms to ensure that the programme goes accordingly.

- Responsible for the insurance of the intern
- Development of a workbook that will be used to track the development of the intern during the period of the internship.

**Placement organisations/ Employers** roles include:

- Providing a dedicated mentor;
- Ensuring work-based and generic training is done;
- Developing an integrated programme that is approved by HRDC;
- Documentation of programme (work log book);
- Signing a memorandum of agreement with the Department of National Internships; and
- Assuming responsibility for the health and safety of the intern.

**The Intern**

- Registers with the department of national internships;
- Signs a ‘temporary employment’ contract with the placement organisation detailing all relevant information and working conditions;
- Commits to and executes the internship programme to the best of their ability.

**The Sector Committee** is responsible for:

- The quality assurance of the programme;
- Acting as advocates and lobbying companies to take up interns;
- Identifying present and future opportunities and use established networks to get “buy in” and commitment from all parties involved.

### **6.3.6 Preferred methodology for skills transfer**

Skills transfer, for both students and adults, occurs most successfully when there are key elements included in the learning processes. These elements include modelling, guided practice, support that is gradually phased out to allow more responsibility, and different forms of mentoring. There is also a clear statement from employers about wanting workers (including graduates) who are work ready. This means having a well-developed range of both technical and generic or cross cutting skills e.g. ability to work in teams, good work habits, communication, willingness to accept responsibility, etc.). Both technical and generic skills need to be directly taught and also assessed in workplace settings prior to the transition to work.

Two key skills transfer methodologies are outlined below:

#### ***Competency-based instruction***

In the Introduction (Section 6.1) to the Skills Transfer discussion, mention was made of competency based instruction (CBI) as a preferred methodology for ensuring skills transfer. CBI contains all the skills transfer elements listed above. While CBI is often considered as applicable only to artisan and technician level training, this is not necessarily the case. For instance, surgeons are trained to perform operations using CBI. The principles of CBI can apply in most training where demonstrated competence to perform tasks in realistic situations is the requirement. In all degree level courses (with the possible exception of Philosophy!) there should be an element of competence or applied skill transfer. It may not be called CBI, but it involves the same principles of transferring the skill to an applied setting and under realistic (usually work-based) conditions. The preparation of new farm workers and the development

of new skills in current farmers are best done with skills transfer in mind and a competency based approach would be the preferred model.

### *Train-the Trainer approach*

The Train-the-trainer approach (T-t-T) is also an effective method of mentoring where skills development and transfer requires skilled instruction to occur as close to the action as possible. T-t-T aims to place people with the required skills in areas where there are few people with the desired skills. This is an essential approach for Extension Workers to use – particularly in working with farmers’ and commodity associations. The plan for skills transfer is to work through a trained intermediary who can continue to model and give guided practice when the Extension Worker is no longer in the area. For example, the use of Farmers’ Association representatives in a T-t-T model is a cost-effective method, with the necessary available support built into it. The development of new skills (e.g. use of technology, new sub-sector skills and processes) and their transfer is best supported by a combination of T-t-T and competency based instruction. Extension Workers also require this form of skills training that is regularly updated and continually supported.

### **6.3.7 The central issue of the quality of skills and experience**

Access to tertiary education is increasing and the budget for education and training has been shown to be very high in Botswana through international comparisons. While there is no apparent shortage of funding, it appears then that the main issue is the quality of the education and training system, with a resultant trade-off occurring between increased access and lower quality. In the opinion of most people who have been interviewed and in most written reports, it is a question of the quality of the people that the education and training system is producing in terms of their knowledge, skills and competence. The quality issue extends beyond producing only the technical skills to also developing cross cutting skills as well. This underlines the need for an education and training system that produces quality graduates (at all levels of occupations) while also being flexible and responsive to the Agriculture sector demands for both technical and work readiness skills.

This is a difficult issue to deal with as there are a number of different elements of quality that require attention in education and training. Given that they interact and overlap elements of quality need to be dealt with in combination, as well as individually, if there is to be sustained and continuous improvement. **The elements of quality that require attention** (as this applies both to the Agriculture sector and more generally) include:

- The leadership provided at the education and training system and institutional levels;
- The knowledge, skills and relevant experience of lecturers, teachers and trainers;
- The teaching and training methodology;
- The curriculum in terms of its content, relevance, structure and degree of flexibility to address the demand for particular skills;
- The assessment and examination of knowledge, skills and competence;
- The level and type of qualifications available to meet required needs; and
- The availability and accessibility of relevant and current Labour Market information.

## Section Seven: Monitoring and Evaluation Strategy

### 7.1 The HRD Plan's function as a monitoring and evaluation tool

**The Agriculture HRD Plan (Table 8.1)** contains the necessary elements for the monitoring and evaluation of the plan to occur regularly and purposefully. Each of the (five) Broad Reforms in the Agriculture HRD Plan includes:

- the priorities;
- the related activities to address the priority;
- the expected outcomes;
- the indicative targets; and
- the agencies responsible for the priority.

The *outcomes and the indicative targets* provide the means and measures for monitoring and evaluating a particular priority in the HRD Plan. Timescales are also included within the targets to allow comparisons of progress over time. It will therefore be important to align the data collection (of both quantitative and qualitative data) to the HRD Plan's outcomes/targets to monitor and evaluate the progress towards each priority. This need for alignment of data will require communication with organisations such as Statistics Botswana and MoA (and providers) to ensure that meaningful information can be used to report progress.

A feed-back mechanism needs to be a feature of the monitoring and evaluation framework for the Sector Committee, working in conjunction with the HRDC. The results of the HRD Plan (i.e. the progress towards the outcomes and targets) needs to be regularly monitored and fed to the HRD committee, allowing them to make adjustments to the initiatives and strategies to reflect changes in emphasis. The Implementation Plan (example included as Table 8.2) also provides another level of monitoring and feed-back to ensure the effectiveness of activities included in the plan.

It is therefore anticipated that the HRD Plan will also provide *a reporting format* for the HRDC and the Sector Committee. To achieve this evaluative function, regular reporting (e.g. every 6 months) needs to be a feature of the plan. Directly reporting on progress towards the agreed targets is possible with the linkages between the different elements of the plan i.e. priority----> activities---> outcome--> target. The responsible agencies are clearly defined and part of their mandate needs to include reporting on the priorities within the HRD Plan.

### 7.2 Implementation Plan's function in monitoring and evaluation

The HRD Plan needs to be operational if **implementation** is to occur. The implementation plan (included as Table 8.2: *Time table for implementation of priority reforms for HRD and skills development reform*) focuses on the activity level of the HRD Plan. The elements for effective monitoring and evaluation of progress and ongoing implementation are also included in the implementation timetable. Each discrete activity can be monitored and evaluated, with

information also provided on the timescale for each activity. This information at the activity level also assists with determining overall progress towards a priority.

Because the HRD plan extends over a five year period it includes activities that are dependent on a series of annual budgets, priority allocations and national planning documents. **The time frame is aligned to the expected implementation of NDP 11 in 2017.** In addition, the imminent Agriculture Public Expenditure Review (PER) report will add further guidance to the broad reforms and priorities that form the focus for future activities. The HRD Plan needs alignment with both the NDP 11 (to be developed in the next year) and the Agriculture PER.

### **7.3 Quality assurance of the planning processes: the development of a performance management framework for the HRD Plan**

At the heart of monitoring and reporting on progress of the HRD Plan is a performance management framework that provides quality assurance at different stages of the plan i.e. at the entry, during implementation and at the end of the planning period. This assumes that quality data and other information are available at all stages of the plan's implementation. This has not been the current situation at the commencement (entry) of the Agriculture HRD Plan. Consequently the following steps to assist project design and quality have been employed and further suggestions for improvements have been included.

#### **7.3.1 Quality at entry**

- Providing a broad, open and stakeholder-based review of project activities and targets;
- Designating defined roles and responsibilities of stakeholders involved in the plan's management and implementation;
- Strengthening understanding and application of participatory planning;
- Giving greater priority to collecting baseline data, monitoring of programme interventions and on-going and evaluation of outcomes; and
- Outlining expected standards of different types of intervention.

#### **7.3.2 Quality during implementation**

Management information systems, and by implication monitoring and evaluation systems, have the potential to become very expensive, unmanageable systems due to the temptation to attempt the collection and analysis of too much data. A manageable number of key performance indicators (priorities and targets) will be used and wherever possible they will be observable and measurable.

It is useful to define key words used in monitoring frameworks. The most essential quality to measure is *impact*. This refers to long-term, sustainable benefits as evidenced by improvements in system level performance indicators. It should be noted that these benefits will not be noticeable in the short-term and it is likely that an extended period of some 8-10 years of sustained interventions will be required to record significant improvements in such indicators of system performance. However the strategic nature of the interventions wherein outputs/outcomes are strongly aligned to the central purpose and goal are expected to produce incremental and perceptible changes within the current five-year life of the Agriculture HRD Plan.

**Effectiveness** of the HRD Plan's interventions refers to the degree to which the interventions achieve the stated outputs/outcomes and contribute to the attainment of the plan's purpose and goal.

**Efficiency** is directly related to inputs and measures the degree to which inputs contribute to the attainment of the intervention outputs. The following describes how system, programme and input level monitoring will be undertaken.

The Agriculture HRD Plan will contribute to **system-level monitoring** through its alignment with NDP 11 (this remains to be done in the next year or so). This will enable realistic assessment of the *impact* of interventions in the HRD Plan on system performance. The durability of changes and the improvements over time will assist future planning.

**Monitoring and reporting are also required at the input level.** The key inputs outlined in the HRD Plan are primarily technical assistance (e.g. policy development, training programmes, LMIS) and procurement (e.g. funding for research). Each technical assistance activity is defined, although a further detailed scope of services/terms of reference will be required. The monitoring and reporting requirements at the input level are based on the outputs to be accomplished by responsible parties based on indicative targets within a specified timeframe. It is anticipated that the Sector Committee, supported by the HRDC, will sign off on final outputs/outcomes and also provide ongoing and final reports.

### **7.3.3 Quality at Exit**

Ultimately the HRD Plan needs to be reviewed to determine the improvements (quality) at the conclusion of the planning period. Some interventions will undoubtedly be completed within a relatively short timeframe (e.g. short term training activities), possibly less than a year. In such cases longitudinal monitoring should be undertaken to establish the sustainability of benefits post implementation. At the completion of the planning period (five years) an HRD Plan Final Report should be prepared that clearly demonstrates achievements with respect to *impact*, *effectiveness* and *efficiency* based upon the accumulated knowledge and body of evidence built up during the five years of performance monitoring. Evaluation will identify lessons learnt and scope for further improvement in subsequent planning periods.

## Section 8: Strategic Issues for Implementation of the HRD Plan

### 8.1 Introduction

The situation analysis of agriculture provides an extensive review of the literature, trends and issues in the agricultural sector. It also documents the issues, barriers and opportunities that comprise the agriculture sector. Wherever possible, data collection and its analysis have been used to inform the nature and **extent of the demand for and supply of skills in the agriculture sector**. This is the main focus of the HRD plan.

The next stage of the plan focuses on identifying broad HRD reforms and priorities and giving attention to these through a strategic planning approach, presented in the form of a strategic framework. The framework provides:

- Five overarching broad reforms that are identified based on the information contained within the analysis of skills needs;
- Each of these broad reform areas have a number of sub-components that will need to be implemented. It will not be possible to implement these sub-components at the same time. Some of these sub-components will be more important than others. It should also be noted that some of the sub-components can be implemented within a short space of time while others require a longer time. A time-table has been developed to guide implementation and to identify the time period in which the strategies will be implemented for the different sub-components
- Each of the sub-components consists of a number of activities. These are defined in the strategic framework. In turn, the expected longer term outcomes achieved from implementing these activities are also identified. Indicative Targets for achievement in the medium term (3-5 years) are set for each of the sub-components: these have been determined wherever possible in consultation with stakeholders who have responded to the broad reform areas; and,
- The agencies or parties with responsibility for the actions are designated within the plan: this includes individual and shared responsibility for the actions.

### 8.2 Strategic Planning framework

The strategic planning framework (i.e. Table 8.1, with other Broad Reform areas included as Annexes A and B) includes the elements listed above to provide a map for addressing issues that are currently affecting the demand for and supply of skills. Some of these issues are directly affecting demand (e.g. changes in required skills for different jobs) and supply issues (e.g. the quality of education and training for both teachers and learners). There are also complementary issues that indirectly affect demand and supply in the agriculture sector and these include, for example, insufficient data collection and analysis: the image of agriculture as a chosen career: and, the level of cooperation between stakeholders. Both direct and indirect issues that are

affecting demand and supply are included below in the broad reform areas and the priorities within these.

It is important to emphasize that some of the *broad reforms areas in the strategic planning framework are directly focused upon improving a match between the demand in the agricultural sector and quality of supply coming out of the education and training system (priority areas of reform)*. **This is the focus of Broad Reform One**. The rationale for this reform area is on ensuring that high demand skills are supplied through a responsive education and training system that adjusts to the sector's needs. The list of high demand skills (leading to qualifications) provided previously (in Sections 4.3 and 4.4) is the starting point for relevant education and training in agriculture to occur. This work includes a focus on the quality of skills development and on providing attention to skills gaps or mismatches where there are changing priorities in agriculture e.g. meeting the need for diversification and commercialisation of agricultural products and services. The development and delivery of relevant and required skills needs to be done by education and training providers in cooperation with other stakeholders.

**Table 8.2 provides an implementation time frame** for the different sub-components under Broad Reform One. Each of the activities included in this reform area are listed with an indicative timeframe provided for each. The agency/stakeholder with responsibility for the activity is included in Table 8.1 and this also applies to Table 8.2

### **8.3 Complementary broad reform areas (long term reforms)**

*There are other broad reforms that are complementary to the skills development focus of Broad Reform One which need to be done in the long term. These reforms are focused upon improving data and research to inform decision making processes, as well as facilitating partnerships to ensure that priority reforms takes place (i.e. secondary reform areas)*. **This description refers to Broad Reform areas 2, 3 and 4 which are included in Annex A**. The rationale for these reforms is that current data collection, analyses and reporting in the agriculture sector are inadequate as a basis for informing stakeholders of the current skills demand, the skills gaps and for the supply of skills to meet signalled demand. Data collection is irregular and not providing the information needed for effective decision making and to help determine actions that can respond readily to high demand sector needs. The linkage between demand and supply is dependent on accurate and timely data that is shared widely amongst stakeholders to provide an evaluation of current provision and to assist planning for future interventions. The education and training system requires specific information to change existing courses and qualifications as well as having a rationale for creating new ones to address the demand for new skills at the different levels of occupations in the sector.

Another important aspect of the rationale for reforms relates to the lack of public-private partnerships in agriculture in Botswana. This is partly due to a limited number of large employers in the private sector in agriculture. The larger private employers are focused mainly on agricultural machinery and equipment, as well as supplying fertiliser and ancillary

agricultural support services. The sponsorship arrangements (e.g. learner scholarships and structured workplace learning) evident in many other national agricultural systems are not widespread in Botswana. There are limited learnerships, internships and mentoring arrangements that have been developed through partnerships between agricultural stakeholders. This is not only due to the size and number of private enterprises in Botswana, as there are other agencies that could also work in partnerships to share resources and expertise (e.g. farmers' associations, NGOs and parastatals). Much greater cooperation and sharing of resources is required and possible, through partnerships that bring expertise and support together with funding and strategic planning activities.

#### **8.4 Reforms to improve investment and productivity capacity within the agriculture sector (Annex B)**

*A final set of reforms are more concerned with demand and focus upon improving investment and productivity capacity within the agriculture sector.* Many of these issues are outside of the HRD and skills domain, but have an influence on the demand for skills and employment within the sector. **This refers to Broad Reform Five which is included in Annex B.** The rationale for this set of reforms is complex and relates to the significance placed in Botswana on subsistence agriculture. While many people rely on subsistence farming for their living, there are also many other people who regard farming (particularly raising beef cattle) as a hobby or enjoyable past-time that has some status value, but has never been seriously regarded as a commercial venture. This situation requires planned and widespread change if agriculture is to harness and further develop these latent skills as an important contributor to the economy, as was the case in pre-independence days. This need has been accentuated by the anticipated decline in diamond revenue and the need for diversification of economic activity.

**Given the need within an HRD Plan to focus upon priorities that concern improving supply in response to signaled demand, emphasis should be given to Broad Reform One** (see Table 8.1). An implementation timetable of the various sub-components under Broad Reform One is outlined in Table 8.2. The sub-components are listed as key actions that need to be undertaken to achieve the outcomes stated in Table 8.1. A suggested timing of the activities (many of which are concurrent) is provided in Table 8.2.

The other Broad Reform areas (2, 3, 4 and 5) and their sub-components are located in Annex A. A similar implementation timetable (with stakeholder involvement) should be developed for each of the other Broad Reform areas to provide a sequence of strategic activities, necessary to achieve the stated outcomes.

**Table 8.1 HRD Plan: A planning framework for the development and delivery of skills in the Agriculture sector**

**Broad Reform Area 1.0: The education and training system is responsive to the situation analysis of the agricultural sector, including improved coordination and the development of new qualifications based on identified need**

**Focus One: Current workforce (farmers, investors and workers) develop high demand skills in agriculture**

No.	Objectives	Activities	Outcomes	Indicative Targets (due dates)	Responsible party (ies)
1.1	Farmer associations/sub sector committees are capacitated	<ul style="list-style-type: none"> <li>Self -audit and development of sub sector strategic plans</li> <li>Harmonization of sub sector strategic plans</li> </ul>	Sub sector strategic plans are developed and harmonized	<ul style="list-style-type: none"> <li>Strategic plans are developed by 2015/2016</li> <li>Strategic plans are harmonized by 2016/2017</li> </ul>	<ul style="list-style-type: none"> <li>Sub sector committees</li> <li>Agriculture HRDC Sector Committee</li> </ul>
1.2	Niche programmes (in sub-sectors) are created, particularly at the technician and technologist levels. Farmers' Associations contribute to curriculum development and are actively involved in work readiness programmes (e.g. mentors). Workers and farmers are given training and education on labour relations for enhancing productivity issues in agriculture	<ul style="list-style-type: none"> <li>Identification of niche programmes by sub sectors/ associations</li> <li>Design and develop a skills plan for each sub sector.</li> <li>Train workers, farmers/ investors and youth on the identified niche programmes and labour relations</li> <li>Accreditation of Programmes, Institutions and Assessors</li> </ul>	<p>Workers, Farmers/ Investors and youth have both hard and soft skills required by the industry, including those to go into self-employment.</p> <p>Accredited Programmes, Institutions and Assessors</p>	<ul style="list-style-type: none"> <li>Sub sector niche programmes to be identified by 2015/2016.</li> <li>Sub sector skills transfer plan is developed by 2015/2016</li> <li>BQA Certified programmes are developed and offered by 2016/2017</li> <li>High demand niche programmes should be complemented by the programmes at BCA/UB for 2016/2017.</li> </ul>	<ul style="list-style-type: none"> <li>Sub sector committees/ Farmers Associations</li> <li>BQA</li> <li>Training Institutions (BCA/ UB/ DVET/ RTC) Farmers Associations, LEA &amp; CEDA to offer the training.</li> <li>HRDC to provide logistical/ financial support.</li> </ul>
1.3	A flexible and responsive training system is developed to provide industry required skills.	<ul style="list-style-type: none"> <li>Audit agricultural skills development and training at</li> </ul>		<ul style="list-style-type: none"> <li>Audit of agricultural skills development and</li> </ul>	<ul style="list-style-type: none"> <li>HRDC and BQA to audit the training programmes</li> </ul>

		<p>primary, secondary and tertiary levels.</p> <ul style="list-style-type: none"> <li>• Audit agricultural skills development at DVET, brigades &amp; RTC's.</li> <li>• Realign and coordinate training programmes under MOA and MOESD to meet industry skills requirements.</li> </ul>		<p>training is achieved by 2017/2018.</p> <ul style="list-style-type: none"> <li>• Training programmes under MOA and MOESD are coordinated and realigned by 2017/2018</li> </ul>	<ul style="list-style-type: none"> <li>• MOESD, HRDC, BQA, MOA &amp; Agriculture HRDC Sector Committee to coordinate and realign training programmes</li> </ul>
1.4	Learning skills pathways are developed for agriculture	<ul style="list-style-type: none"> <li>• Cluster and create linkages between different training institutions (programmes) and workplace to show skills acquired</li> <li>• Cluster and create linkages between different training institutions (programmes) and work place to allow progression between institutions</li> </ul>	<ul style="list-style-type: none"> <li>• A pool of skills is created to inform farmers and investors on what is available</li> <li>• A pathway is created linking progression between training institutions and workplace.</li> </ul>	<ul style="list-style-type: none"> <li>• A pool of skills and progression pathway is created by 2017/2018</li> </ul>	<ul style="list-style-type: none"> <li>• MOESD, HRDC, BQA, MOA &amp; Agriculture HRDC Sector Committee</li> </ul>
1.5	A targeted mentorship programme in Commercial Agriculture is developed	<ul style="list-style-type: none"> <li>• Develop a database of unemployed graduates (certificate, diploma &amp; degree holders)</li> <li>• Unemployed graduates (certificate, diploma &amp; degree holders) retrained and mentored</li> <li>• Attach unemployed graduates to approved local and regional commercial agriculture enterprises. <ul style="list-style-type: none"> <li>• Promote agriculture entrepreneurship for formal</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>• Database of unemployed graduates developed by 2015/2016</li> <li>• Database of retrained and mentored graduates by 2016/2017</li> <li>• Database of commercial attachment by 2016/2017</li> <li>• Database of entrepreneurs by 2017/2018</li> </ul>	HRDC, LEA, Agriculture HRDC Sector Committee and CEDA

		employment and self-employment			
<b>Focus Two: Continuing and professional development for teachers/lecturers</b>					
	<b>Objectives</b>	<b>Activities</b>	<b>Outcomes</b>	<b>Indicative Targets (due dates)</b>	<b>Responsible party (ies)</b>
2.1	Teachers/lecturers with relevant and current “hands on” experience particularly on the identified niche programmes (see 1,2)	<ul style="list-style-type: none"> <li>• Audit of skills on teachers on the niche programmes (See 1.2)</li> <li>• Development of hands on experience on relevant skills</li> </ul>	A database of Teachers with industry relevant skills	<ul style="list-style-type: none"> <li>• Database of Agriculture teachers and lecturers developed by 2016/2017</li> <li>• Database of teachers with industry relevant skills developed by 2016/2017</li> </ul>	<ul style="list-style-type: none"> <li>• MoESD, MoA &amp; BQA</li> <li>• HRDC and Agriculture Sector Committee</li> </ul>
<b>Focus Three: Develop and transfer practical skills</b>					
	<b>Objectives</b>	<b>Activities</b>	<b>Outcomes</b>	<b>Indicative Targets (due dates)</b>	<b>Responsible party (ies)</b>
3.1	Align attachment programmes with peak season agricultural operations (see item 1.5)	<ul style="list-style-type: none"> <li>• Develop a database of peak season agricultural operations.</li> <li>• Align attachments (item 1.5) to schedule of peak season operations.</li> <li>• Send mentees to attachment programmes.</li> </ul>	<ul style="list-style-type: none"> <li>• Database of peak season agricultural operations locally and regionally.</li> <li>• List of mentees eligible for attachment.</li> <li>• List of graduate mentees.</li> <li>• Skilled workers, farmers and agripreneurs.</li> </ul>	<ul style="list-style-type: none"> <li>• Database of peak season agricultural operations developed by 2016/2017.</li> <li>• List of mentees developed by 2016/2017.</li> <li>• List of graduate mentees developed by 2017/2018.</li> <li>• Skilled workers, farmers and agripreneurs identified by 2017/2018</li> </ul>	<ul style="list-style-type: none"> <li>• HRDC</li> <li>• Farmers Associations</li> <li>• Agriculture Sector HRD Committee</li> <li>• MoA</li> <li>• Training Institutions</li> <li>• Agribusiness Enterprises</li> </ul>



1.3.1	• Audit of agricultural skills development and training is achieved by 2017/2018.																		
1.3.2	• Training programmes under MOA and MOESD are coordinated and realigned by 2017/2018																		
1.4	Learning skills pathways are developed for agriculture																		
1.4.1	• A pool of skills and progression pathway is created by 2017/2018																		
1.5	A targeted mentorship programme in Commercial Agriculture is developed																		
1.5.1	• Database developed by 2015/2016																		
1.5.2	• Database of retrained and mentored graduates by 2016/2017																		
1.5.3	• Database of commercial attachment by 2016/2017																		
1.5.4	• Database of entrepreneurs by 2017/2018																		
2.1	Teachers/lecturers with relevant and current “hands on” experience particularly on the identified niche programmes (see 1,2)																		

<b>2.1.1</b>	• Database of Agriculture teachers and lecturers developed by 2016/2017																				
<b>2.1.2</b>	• Database of teachers with industry relevant skills developed by 2016/2017																				
<b>3.1</b>	Align attachment programmes with peak season agricultural operations (see item 1.5)																				
<b>3.1.1</b>	• Database developed 2016/2017																				
<b>3.1.2</b>	• List of mentees developed 2016/2017																				
<b>3.1.3</b>	• List of graduate mentees developed 2017/2018.																				
<b>3.1.4</b>	• Skilled workers, farmers and agripreneurs 2017/2018																				

## Annex A: Complementary Broad Reforms 2, 3 and 4

### Broad Reform Two: Systemic measures for determining the demand and supply of skills are developed and are regularly communicated to all stakeholder

No.	Priorities	Activities	Outcomes	Indicative Targets (examples only)	Responsible party (ies)
2.1	Policy and procedures are established to determine the required data collection, analysis and reporting of skills required for the agriculture sector.	<ul style="list-style-type: none"> <li>• Policy on LMIS for agriculture is developed</li> <li>• Information and knowledge is gathered by the agriculture sector and other data processing agencies;</li> <li>• Quality information gathering and sharing is a feature of agriculture</li> </ul>	Improved information to inform decision making process over investments for skills development.	<ul style="list-style-type: none"> <li>• A draft LMIS for agriculture is developed in 2016, providing consolidated information to inform planning in 2017</li> <li>• Annual reports are produced on agriculture LM and workforce development information from 2017.</li> </ul>	<ul style="list-style-type: none"> <li>• HRDC provides the necessary facilitation and policy development;</li> <li>• <i>Statistics Botswana</i> is involved in development work</li> <li>• SC gathers and disseminates data.</li> </ul>
2.2	The Agriculture SC encourages farmer and commodity associations to contribute information on skills and workforce planning needs	<ul style="list-style-type: none"> <li>• Pro forma is developed for data collection</li> <li>• Farmers trained in use of pro forma.</li> </ul>	Data collection occurs annually.	Each agriculture sub-sector undertakes the proposed data collection exercise and reports on planning needs by the end of 2017.	<ul style="list-style-type: none"> <li>• SC/ MoA develops pro forma</li> <li>• Extension Workers train farmers and collect data.</li> </ul>
2.3	Funded projects and other initiatives undertake evaluations as part of their establishment rules.	All projects submit annual report showing progress against established indicators/targets	Annual reports are produced regularly	<ul style="list-style-type: none"> <li>• Annual reports are compiled, circulated and reviewed</li> <li>• Reports include information on outcomes achieved, financial acquittal and targets for next planning cycle.</li> </ul>	<ul style="list-style-type: none"> <li>• HRDC/SC review</li> <li>• Stakeholders comment on reports and contribute to future planning.</li> </ul>
2.4	Information and knowledge is used to improve performance and to inform HRD planning in the sector.	<ul style="list-style-type: none"> <li>• Performance information is used for ongoing planning;</li> </ul>	Improved performance information provides improved target setting for agriculture.	Plans include performance information and indicators that inform targets.	HRDC works with SC for planning and evaluation purposes.

		<ul style="list-style-type: none"> <li>Benchmarking of performance is developed and clear indicators provide measures of progress.</li> </ul>			
2.5	HRD plans are regularly updated and shared with stakeholders.	Plans are updated based on performance data and feedback and shared with all stakeholders.	Improved communication occurs between stakeholders in agriculture.	Plans are widely communicated and explained for all stakeholders e.g. sub-sector plan in Beekeeping.	HRDC works with SC to develop effective reporting and communication methods.
<b>Broad Reform Three: Through improved research and information on high demand areas, innovative support programmes/projects are established with sustainable finance and accountability for expected outcomes</b>					
No.	Priorities	Activities	Outcomes	Indicative Targets (examples only)	Responsible party (ies)
3.1	The Agriculture SC provides advice and guidance in the design of projects in agriculture	<ul style="list-style-type: none"> <li>A research policy provides clear guidelines on research conduct, practice and procedures</li> <li>Research focus areas and priorities are established for 2016 – 2020</li> <li>Research partnerships are established</li> <li>Potential funding sources are identified</li> </ul>	Improved research is used to inform decision making process over investments for skills development.	<ul style="list-style-type: none"> <li>Research policy, focus areas and priorities are determined by 2016;</li> <li>Available research funds are identified by 2016</li> <li>At least one research partnership is established by 2016.</li> </ul>	<ul style="list-style-type: none"> <li>SC (SC) commissions research policy</li> <li>SC and HRDC determine research focus areas and priorities</li> <li>HRDC provides support for identifying research funding.</li> </ul>
3.2	Research projects include learners wherever possible,	Research projects are developed and funded based on critical skills needs	Research projects are linked to high demand requirements.	Institution-based research projects are established and successfully completed by 2018.	SC provides coordination for projects design, funding and evaluation.
3.3	Projects have a capacity building focus that leads to practical applications of skills	<ul style="list-style-type: none"> <li>A pool of trained researchers is developed in the Agriculture sector</li> </ul>	Greater numbers of participants engage in more relevant research.	<ul style="list-style-type: none"> <li>Priority projects are established (by 2018) at the sub-sector level.</li> <li>Participants receive credit for their involvement in projects</li> </ul>	<ul style="list-style-type: none"> <li>MoA, UB, BCA and DVET work with Steering Committee to provide research</li> </ul>

		<ul style="list-style-type: none"> <li>Cooperative research arrangements are established</li> <li>Funding is provided for mentoring and farmer-led research that incorporates indigenous knowledge.</li> </ul>		that link to further study opportunities – by 2018.	and funding arrangements
3.4	Scholarships are awarded to learners to undertake courses of study in areas identified as providing high demand skills in the sector.	<ul style="list-style-type: none"> <li>The DTEF scholarships are based on better information to target courses that meet high demand skills;</li> <li>Other scholarships at artisan, technician and technologist levels of skill development are created.</li> </ul>	Improved access and greater responsiveness of learners to high demand courses and qualifications.	Scholarships and/or subsidised support arrangements are developed by 2018.	Steering Committee works with DTEF to provide high demand skill needs and to identify funding for further scholarships.
3.5	Projects are required to undertake continuous monitoring and reporting	The Monitoring and Reporting strategy is applied to the sector plan	Improved reporting of project outcomes and future research focus areas.	<ul style="list-style-type: none"> <li>Annual reporting is a feature of all agriculture funded projects by 2017</li> <li>Ongoing funding is contingent on effective reporting and sharing of information</li> </ul>	The HRDC ensures compliance with monitoring requirements and reports on progress.
3.6	Innovative approaches to employment and training are developed for labour hire and seasonal workers.	Ongoing skills development is a feature of the Agriculture sector.	More highly skilled workforce.	<ul style="list-style-type: none"> <li>Labour hire policies are trialled by two sub-sectors during a two year period (e.g. 2017 – 2018)</li> <li>Staff turnover in agriculture sector employment is reduced by 10% by 2019.</li> </ul>	MoA works with HRDC and SC to develop appropriate legislation/ policy for labour hire.
<b>Broad Reform Four: Effective partnerships are established amongst agricultural sector stakeholders based on clear roles and responsibilities</b>					
<b>No.</b>	<b>Priorities</b>	<b>Activities</b>	<b>Outcomes</b>	<b>Indicative Targets (examples only)</b>	<b>Responsible party (ies)</b>

4.1	The current MFDP policy for the creation of and support for public-private partnerships (PPP) is implemented	MFDP legislation/policy and guidelines is implemented for the establishment of PPP in agriculture	Improved engagement between the public and private sector	The PPP legislation/policy is reviewed by the end of 2018.	The MFDP works with agric. stakeholders to implement appropriate policy for PPP.
4.2	Taxation concessions and incentives are developed to  Encourage industry involvement in partnerships with agricultural agencies and education and training providers (NB focus on workforce skills development).	Legislation is developed to create taxation concessions and incentives for industries engaging in partnerships in the agriculture sector  Funding provided for competency based training (CBT) and T-t-T using Farmer's associations representatives as Trainers (wherever possible)	There is greater industry involvement  With education and training providers in agriculture.	The legislation to create taxation concessions and incentives for  Industries are developed by 2017.	BURS (with stakeholder support) develop  Appropriate legislation for taxation concessions and incentives for industries engaging in partnerships in the agriculture sector.
4.3	The HRD Fund provides support for projects in agriculture that provide training supported by partnership arrangements	HRD Fund provides access for training in agriculture where partnerships are a feature of the programme.	More training occurs with more predictable ongoing funding.	Legislation/policy developed for agriculture stakeholders' access to the HRD Fund approved by 2017.	MoA works with HRDC and SC to develop appropriate legislation /policy for access to the HRD Fund.
4.4	Funding support is provided to commodity associations and NGO's to enable them to form partnerships with other agencies.	Farming/commodity associations and NGO's have created partnerships to support agricultural training in approved programmes.	Entrepreneurship programmes are a feature of education and training in Botswana	<ul style="list-style-type: none"> <li>• <i>Junior Achievement Botswana's</i> entrepreneurship programme receives funding support in 2017</li> <li>• Partnership arrangements are developed with private entrepreneurs and government parastatals</li> </ul>	MoA works with HRDC and SC to develop appropriate legislation/policy for farming and commodity associations to have funds

4.5	Capacity is developed within the agriculture industry to work with education providers on identified skill priorities.	Industry-education partnerships are delivering identified skill priorities	Occupational (unit) standards for all agriculture sub-sectors are developed	The Agriculture SC demonstrates a leadership role in industry-education partnerships	SC provides coordination for involving industry in partnerships with education and training
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**Annex B: Broad Reform Five: Priorities within the agriculture sector are reviewed with targets established for each sub-sector**

No.	Priorities	Activities	Outcomes/	Indicative Targets (examples only)	Responsible party (ies)
5.1	The imminent Agriculture Public Expenditure Review (APER) investigates the current levels of funding support provided for agriculture	Priority sub-sectors are identified based on productivity and economic contribution.	Improved investment occurs in priority sub-sectors	Broad stakeholder representation is evident in consultation, review and implementation of APER recommendations.	MoA involves all stakeholders in contributing to the implementation of APER
5.2	Recommendations from the agriculture impact study are considered for funding and implementation to support agriculture sub-sectors during NDP11 and subsequent plans.	NDP11 includes funded medium to longer term strategy for providing infrastructure support to agricultural sub-sectors.	Priorities are determined for infrastructure support areas.	Recommendations from the impact study are funded and implementation strategies are planned prior to the development of NDP11.	SC submits findings to Ministry of Finance for consideration in NDP11.
5.3	Emphasis is given through funding and training programmes to develop and extend value chain products and services in priority sub-sectors.	Increased enrolment occurs in the 4 selected priority sub-sectors.	Increased employment occurs in the 4 priority sub-sectors.	<ul style="list-style-type: none"> <li>• At least one new product or service is developed in each of the 4 priority sub-sectors by 2017</li> <li>• Enrolment in skills development courses increases by 2018.</li> <li>• Employment in the 4 priority sub-sectors increases by 2019.</li> </ul>	MoA in liaison with SC and wider consultation with other providers (BCA, VTCs).

5.4	Improve individual access is provided to skills development programmes	Access and induction programmes in agriculture are created for mature age individuals/groups wishing to enter agriculture industry.	Increased numbers are catered for in high demand skill areas.	Improved access is evident in increased numbers undertaking both short courses and formal qualifications across all levels of skills development by 2019	MoA in liaison with SC and wider consultation with other providers (BCA, DVET).
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## Annex C: BCA Short Courses Offered by CICE

COURSE TITLE	WEEK
<b>ANIMAL PRODUCTION/MANAGEMENT &amp; FEEDING</b>	
Pig production	1
Sustainable dry season feeding	1
How to establish a dairy production unit	1
Sheep and goats Production/Small Stock	1
Indigenous chicken and Guinea fowl production	1
Beef production management systems	1
Broiler chicken production	1
Fish farming and management	1
Layer chicken production	1
Rabbit production and management	1
Fodder production	1
Dairy goat production	1
<b>AGRI BUSINESS</b>	
Business proposal	1
Farm records and Accounts	1
Marketing of agricultural products	1
Extension techniques	1
<b>CROP PRODUCTION &amp; HORTICULTURE</b>	
Nursery seedling and tree production	1
Vegetable production	1
Agro chemicals management	2
Introduction to fruit production	1
Chainsaw operation and management	1
Landscaping	1
Diagnosis and management of vegetable pests and diseases	1
Designing with indoor plants and management	1
Flower arrangement	1
Mushroom production	1
Lawn establishment and management	1
Citrus production	1
Bee-keeping	1
<b>SOIL, WATER &amp; MACHINERY</b>	
Borehole siting, drilling, equipment and maintenance	1
Irrigation with treated waste water	1
Soil and rainwater management in agriculture	1
Introduction to irrigation management and scheduling	1
GIS applications in agriculture, natural resources and EIA	1
Advanced irrigation management and scheduling	1
Implementation of irrigation projects	1
Design of irrigation systems	1
Tractor maintenance	1
<b>INFORMATION TECHNOLOGY &amp; RESEARCH METHODS</b>	
Practical application and interpretation of SPSS	1
Data analysis using SAS and SPSS	1
Epidemiology of infectious disease: Qualitative and quantitative methods.	1

**Source:** BCA Centre for In-Service and Continuing Education 2015 Courses.

## Annex D: Budget for Training

### Budget for Training Agricultural Students

The following budget estimate was prepared using the unit cost for BCA (as shown in Table 5.2), together with the enrolment projection numbers for Botswana University of Agriculture and Natural Resources in Table 4.9.

Table A1 shows estimated amounts that would be required to sponsor the training of students in the various agricultural fields of study over the period 2015 to 2021. In preparing the budget, several assumptions had to be made. The first assumption pertains to estimating the number of students that would be enrolled in Diploma and the numbers that would be enrolled in the Degree programme. The assumption was based on the information in Table 4.8, which shows the number of student enrolment in Diploma (15 percent of the total) and the number of enrolment in Degree (85 percent of the total). The other assumption pertained to the unit cost to use in calculating the amount of money that would be required for Diploma students and the amount of money required for Degree students. This assumption is needed because the unit costs differ, depending on whether the course is offered by the Science and Engineering Faculty, or by a different Faculty. The assumption used is that the courses would be offered by the Science and Engineering Faculty. This has the effect of using the highest unit cost – it was considered that the entailed overestimation of cost is acceptable, given that costs may go up, not down.

On the basis of the foregoing information and assumptions, the estimated training budget is P622, 217, 270 in Table A1. This shows the training budget that reflects the current enrolment plans of BCA, and associated cost, before the implementation of the HRD plan for the agricultural sector.

**TABLE A1: TRAINING BUDGET FOR BCA'S EXPECTED STUDENTS<sup>18</sup>**

<b>(Pula)</b>							
Year	2,016	2,017	2,018	2019	2,020	2021	<b>Overall</b>
Students	1,344	1,728	2,881	3,706	4,766	5,718	<b>Total Cost</b>
DIPLOMA	202	259	432	556	715	858	
Unit Cost	30.890	30.890	30.890	30.890	30.890	30.890	
Cost	6,227,424	8,006,688	13,349,114	17,171,751	22,083,261	26,494,353	
DEGREE	1,142	1,469	2,449	3,150	4,051	4,860	
Unit Cost	30.890	30.890	30.890	30,890	30.890	30,890	
Cost	35,288,736	45,371,232	75,644,976	97,306,589	125,138,479	150,134,667	
<b>Total Cost</b>	<b>41,516,160</b>	<b>53,377,920</b>	<b>88,994,090</b>	<b>11,4478,340</b>	<b>147,221,740</b>	<b>176,629,020</b>	<b>622,217,270</b>

<sup>18</sup> Total costs are likely to change as unit costs change annually.

## Budget for Training Agricultural Farmers and/or Workers

A budget estimate was also prepared for the training of agricultural farmers and/or workers. This entailed the use of information on unit cost for short courses in Table 5.1, schedule of fees in Table 5.2 and indicative numbers on skills in high demand from Tables 4.10 and 4.11.

In terms of training on semi and low-level skills, the budget was prepared using the unit cost information on short courses since what is required is not a formal diploma or degree, but a short period of training. In preparing the budget, it was assumed that those farmers who would attend the relevant workshops, they would want to use single standard accommodation, as opposed to the more expensive alternative (executive single). Similarly, it was assumed that when farmers send their workers to the workshops, they would want them to stay in standard shared accommodation, and not in the expensive single accommodation. Table A2 shows the budget estimate for short course training, which totals to P25, 037, 020.

**TABLE A2: BUDGET FOR TRAINING SEMI-SKILLS & LOW LEVEL SKILLS (Pula)**

<b>Skilled Agric &amp; Related Workers, Plant &amp; Machinery Operations</b>	<b>Numbers</b>	<b>Single</b>	<b>Sharing</b>
Market Oriented Agriculture Worker	200		575,400
Horticultural Worker	300		863,100
Agricultural Industrial Machinery Mechanic	300		863,100
Motorized Farm Machine Operator	200		575,400
Food Packager Technician	200		575,400
Bookkeeper	100	319,000	287,700
Abattoir Worker	50		143,850
Maintenance Worker(irrigation, farm machinery)	100		287,700
Artificial Inseminator	150	478,500	431,550
Dairy Equipment Technician Lab Technician	100	319,000	287,700
Information Dissemination	100	319,000	287,700
Lay Extension Workers	300		863,100
Animal Transporters	60		172,620
Borehole mechanic	200	638,000	575,400
Tractor and farm implements mechanic	200	638,000	575,400
<b>SUB-TOTAL</b>		<b>2,711,500</b>	<b>7,365,120</b>
<b>Elementary Occupations</b>			
Animal Handlers	1000		287,7000
Cattle Herder	1000		287,7000
Subsistence agriculture and related worker	1000		287,7000
Horticultural Labourer	1000		287,7000
Crop Farm Labourer	1000		287,7000
Farm produce Packager	200		575,400
<b>SUB-TOTAL</b>		<b>0</b>	<b>14,960,400</b>
<b>GRAND TOTAL</b>		<b>2,711,500</b>	<b>22,325,520</b>

**Note:** --- means no information available.

With respect to the budget for high level skills, it was assumed that the legislators, administrators and senior managers would require Master's degree, while the skilled technicians and associated professionals would require only Bachelor's degree. In addition, it was assumed that degrees such veterinarian and animal scientist would be obtained from the Faculty of Medicine, while the other science-based courses would be obtained from the Science and Engineering Faculty.

On the basis of these assumptions, the resultant budget estimate is as given in Table A3. The table shows that the total cost of training at the high-skill level per annum sums up to P40, 267, 700 (approximately P40.3 million).

**TABLE A3: BUDGET FOR TRAINING HIGH LEVEL SKILLS (Pula)**

<b>Legislators, Administrators and Senior Managers</b>	<b>Numbers</b>	<b>Fee</b>	<b>Cost/person</b>
Veterinarian	30	30,000	900,000
Agronomist	40	27,290	1,091,600
Crop scientist	20	27,290	545,800
Animal scientist	20	30,000	600,000
Soil scientist	20	27,290	545,800
Food scientist	20	27,290	545,800
Irrigation specialists( hydrologist)	50	27,290	1,364,500
Agricultural engineer	20	27,290	545,800
Agricultural economist	50	27,290	1,364,500
Range ecologist/manager	20	27,290	545,800
Research scientist	20	27,290	545,800
Rural sociologist	20	27,290	545,800
Feed manufacturers/producers	20	27,290	545,800
Animal product processors	20	27,290	545,800
Molecular biotechnologist	20	27,290	545,800
Waste management specialist	20	27,290	545,800
Bio technologist- food processing	20	27,290	545,800
Software developers and information management specialist	20	27,290	545,800
Pharmacist	20	30,000	600,000
Planners/policy analyst	20	27,290	545,800
Trade negotiation specialist	10	27,290	272,900
Education specialist	20	27,290	545,800
Plant breeder	30	27,290	818,700
Soil physicist	30	27,290	818,700
Plant nutritionist	30	27,290	818,700
Soil chemist	30	27,290	818,700
Soil biology(Microbiology)	20	27,290	545,800
Seed technologist	20	27,290	545,800
Weed scientist	30	27,290	818,700
Florist(flower specialist)	40	27,290	1,091,600

Geneticist	30	27,290	818,700
Biometrician	30	27,290	818,700
Business management	30	27,290	818,700
Land use planning	20	27,290	545,800
Soil conservation	20	27,290	545,800
SUB-TOTAL			<b>24,204,900</b>
<b>Skilled Technicians and Associated Professionals</b>			
Plant pathologist	100	30,890	3,089,000
Food scientist	100	30,890	3,089,000
Animal breeder	80	30,890	2,471,200
Animal nutritionist	60	30,890	1,853,400
Dairy scientist	80	30,890	2,471,200
Greenhouse technician	80	30,890	2,471,200
Agricultural extension worker	150	30,890	4,633,500
Small business manager	60	30,890	1,853,400
Farm supervisor	60	30,890	1,853,400
Poultry/Ostrich producer	100	30,890	3,089,000
Dairy processor	50	30,890	1,544,500
Livestock producer	50	30,890	1,544,500
Field crop producer	50	30,890	1,544,500
Vegetable producer	50	30,890	1,544,500
Fruit producer	50	30,890	1,544,500
Meat inspector	40	30,890	1,235,600
Entomologist	60	30,890	1,853,400
Feed producers	80	30,890	2,471,200
Feed processing and manufacturing	50	30,890	1,544,500
Life animal exporters	50	30,890	1,544,500
Beekeeping processors	60	30,890	1,853,400
Farm mechanisation	60	30,890	1,853,400
Irrigation specialist	60	30,890	1,853,400
Post-harvest technologist	60	30,890	1,853,400
Business management(Entrepreneurship)	100	30,890	3,089,000
Lawyers	20	32,370	647,400
SUB-TOTAL			<b>16,710,200</b>
GRAND TOTAL			<b>40,915,100</b>

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