



Mining, Minerals, Energy and Water Resources Sector

Human Resource Development Plan

31 March 2016

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1. EXECUTIVE SUMMARY

This report is effectively a review of the Mining Technical Report of 2013. Its primary goal is to provide a solid foundation for the development of the Mining Minerals, Energy and Water Resources (MMEWR) Sector Human Resource Development (HRD) Plan, by updating feeder information pertaining the developments impacting skills demand and supply, plus the actual demand for skills and type of skills demanded by this Sector, then matching this against the supply side, and finally recommending strategies for dealing with any identified gaps.

Information reviewed confirms that this Sector continues to play a very critical role in the National economy, and will be a key driver for the realisation of the National agenda as articulated in both the National Development Plan and Vision. While Mining remains the key driver of Botswana's economy, both energy and water are very important enablers for every socio-economic activity, and occupy a prominent position in the National agenda because these utilities are in critically short supply.

Skills availability continues to be a strategic matter at both National and Sector levels. The current reality at National level is one of apparent disequilibrium where there are reported skills shortages necessitating the importation of skills, while at the same time there is growing unemployment, even involving graduates. At sector level, there are strategic developments in each of the sub-sectors that have serious implications for skills. In most cases, there will be need for more of the same type of skills, while in other cases new types of skills are demanded.

The supply side is characterised by a noticeable increase of tertiary institutions and students' enrolment and graduation. There are also concerns about the employment readiness of the graduates, which in turn raise questions about the extent to which the supply institutions match the needs of the end-users and about quality issues in the supply system. These concerns are supported by the growing numbers of unemployed graduates in a market that continues to hunger for skills, the low pass rates from pre-tertiary level that feeds the tertiary institutions, the reported inadequacies in infrastructure and equipment especially in public institutions, and a very worrying fact about the use of unqualified and un-accredited lecturers.

Another aspect of the skills availability challenge is the need for a credible, integrated, current and accessible source of information pertaining to both the demand and supply sides. The absence of such information makes HRD Planning at all levels very difficult and inadequate.

Specific recommendations are made, and these relate to;

- The demand-anchored supply of skills, highlighting the roles of various stakeholders and improvements geared to matching supply with demand.
- Ways to improve quality. Here emphasis is placed on the effectiveness of quality assurance bodies, and the need for a 'quality mind set' at the level of the supplying institution.
- Ways in which information availability can be improved.
- Urgent need to institute a separate but dedicated initiative to develop skills forecast in a facilitated manner, and covering all organisations within the sector.

- Imperative for annual review of the skills forecast.
- Effective implementation structures and systems. Points covered include resourcing and capacity building of the implementing agencies, integrative governance structure to ensure alignment between sectors, partnerships between various players, focus on people management as a key enabler for skills attraction and retention at the end-user level, plus relentless management of the whole implementation process, with clear accountabilities and deliverables.
- The imperative to consider the people management aspect within sector member organisations, acknowledging that the effectiveness with which attraction, retention and development of staff are dealt with has a direct impact on skills availability.

2. INTRODUCTION

This Human Resource Development (HRD) Plan for the Mining, Minerals, Energy and Water Resources (MMEWR) Sector seeks to match the demand for labour (employer expectations) with the supply of skilled workers (education and training outputs).

The overall purpose of this initiative is to lay the foundation for a new, improved and macro-level understanding of Botswana's strategic and long term human resource development needs and demands of the Sector and to ensure alignment with the education and skills development system so that it can respond effectively to those needs and demands. It must lead to sufficient understanding of the skills needs, and what is being or can be done to address them, in a dynamic and sufficient manner.

A Technical Report for this sector has been revised and updated. Its primary goal is to provide a solid foundation for the development of the MMEWR Sector HRD Plan, by updating feeder information pertaining to the developments impacting on skills demand and supply, the actual demand for skills and type of skills demanded by this Sector, then matching this against the supply side and finally recommending strategies for dealing with any identified gaps.

2.1 Approach/Framework

The overall framework used is presented in the diagram below, and represents an integrated approach that anchors HRD Planning on the current reality of the sector and uses the understanding gained to establish the skills requirements and priorities for the sector.

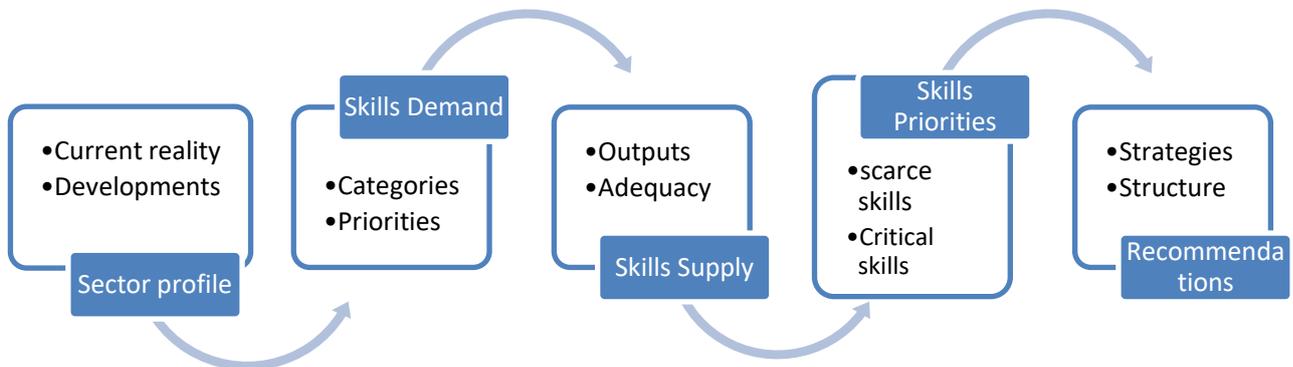


Diagram 1: Framework for Sector HRD Plan

The process involves a number of sequential and related stages that are described below:

- a. **Sector profile:** This is important and forms the foundation for the rest of the plan. It is about understanding the Sector in terms of prevailing factors in its environment both internally and nationally, characteristics of the sector, as well as the Sector's impact in the economy.

It is also about understanding strategic developments within Sector member organisations, and how all these affect skills demand.

- b. **Skills Demand:** Here the focus is to identify the skills in demand based on inputs from each of the three sub-sectors of mining, energy and water. This part also provides an indication of the critical and scarce skills for the sector.
- c. **Skills Supply:** This section investigates supply issues and analyses the degree to which current and future supply will respond to the demands identified earlier. Besides understanding the numbers coming out of the system, it is also about appreciating reasons for identified gaps in the supply.
- d. **Skills Priorities:** Here the focus is on identifying skills gaps, informed by the demand and supply current reality, and using these to determine the priorities for development.
- e. **Recommend a strategic response to the issues:** This part of the Sector HRD Plan develops a strategic response stipulating strategies to be implemented.

2.2 Human Resource Development Approach

Botswana has adopted a human resources development based approach which considers HRD planning from an integrated and holistic perspective, taking into account the progressive stages of human development. This approach seeks to align skills provision with the market and to plan for change, particularly in relation to encouraging the development of human resources in areas that are strategic and can facilitate the government's strategic direction. The approach draws on the lessons of the past, both in relation to the failure of work force planning and the limitations of relying on a market based approach. (Source: Mining Technical Report 2013)

2.3 Key Considerations in HRD Planning

Below are the factors that guided the development of this HRD Plan, in addition to the framework covered above:

- a. **Move away from an approach that chases the market.** In the past, much of the emphasis was given to responding to the needs of the market. However, the lengthy period between the identification of needs and the implementation of a new curriculum, means that industry may have new needs. In this respect, we adopted a more proactive approach that facilitates change, the Labour Market Information and Analysis (LMIA) approach.
LMIA is about examining the best information available regarding the state of the labour market, with a view to understand labour market changes and to make interpretations about the demand and supply for different types of skills. The analysis of the full set of labour market indicators over time provides a comprehensive picture of or signals about the labour market as well as skills trends, which can be used to inform policy development, in conjunction with information on labour market institutions. Thus, the value of such information lies in the extent to which it is used to inform decisions and guide policy action. In keeping with the LMIA approach, the focus is on the impact of the labour market information on skills demand and supply into the future and the emerging trends, rather than assuming a fixed relationship between the various factors and then generating absolute numbers of skills required for the future. In this respect, we used available information to

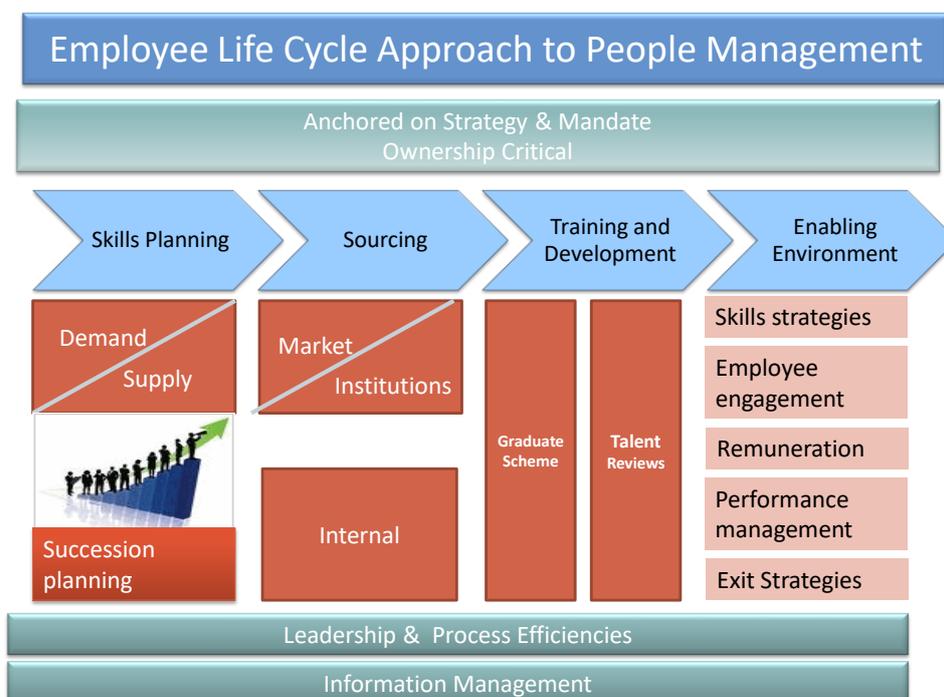
develop plans that address different skills categories, including scarce skills, and critical skills.

- b. Adopt a participatory approach to developing the HRD sector plans. The evidence for the construction of the HRD plans was drawn from the input of key stakeholders who articulated their current reality as well as plans for the future, both on the skills demand and supply sides. The choice of stakeholders was guided by the client’s input.
- c. Adopt a holistic approach to human resource development. This takes into account a continuum of skills development, ranging from early childhood development through to higher education and includes workplace up-skilling. However, the focus in this plan is from tertiary education and workplace level supply. Other related issues addressed include human resource practices and factors influencing or driving the demand for skills, including technology, legislation and management practices.
- d. Take into account the prevailing National Vision and National Development Plan.

2.4 People Management Linkages

Research and good practice attest to the importance of an “Employee Life Cycle” approach in the drive to ensure skills availability in the workplace. In terms of this approach effective people management must be anchored on the strategy and mandate of the target organisation, and then consider all the various elements from the point of skills planning through recruitment/sourcing and to training and development. Another key factor is the relentless drive to create a conducive environment for attracting, developing and retaining skills. This approach is summarized below in diagramme 2.

Diagramme 2: Employee Life Cycle Approach



The following points are highlighted from the above diagramme:

- a. Funding – An essential part of planning for skills is considering the financial implications of the plan so derived. While part of the funding precedes the “employee stage” and takes place at the level of the Tertiary Education Institutions (TEIs), the focus here is provisions for financing the actual sourcing, development and retention of skills. It includes effective utilization of available funds, such as the HRD Fund. In this respect, employing organisations are challenged to ensure that the training levy is optimally utilized such that the training interventions undertaken are primarily focused on priority need areas where the available funds, including the levy claims, can add the most value for the organisation. For example, using the claimed money for other developmental purposes.
- b. Talent Reviews – This is about taking stock of the skills available, profiling them in terms of demographics, qualification, performance and matching them against the skills requirements. It’s about implementing a robust good practice process of intimately knowing available skills and how they match the immediate and future needs of the organisation, and proactively taking action to close identified gaps. It’s a very participatory process with active involvement by the respective line manager, while the HR function acts as facilitator.
- c. Skills Strategies – An essential component of creating an enabling environment is the development of requisite strategies to ensure skills availability. Such strategies include ways of winning the competition for skills by effectively attracting, developing and retaining the requisite skills. It includes skills import strategies, ways of enhancing skills supply such as use of retired experts, ways of using former staff with requisite expertise who may be private consultants, outsourcing arrangements, and strategies for exiting those skills or individuals that must be parted with as dictated by the dynamic needs of the business. The strategies are proactive ways of ensuring business continuity, profitability and sustainability.
- d. Performance Management – The employment contract is essentially about one availing their skills to meet the employer’s needs and thereby contribute towards organisational success. It is fact that performance must be intimately managed for the employment relationship to be rewarding for both parties. This is about clearly defining the role and responsibilities as well as requirements for each position, placing people in jobs for which they are suited in terms of skills, qualifications and competencies, reviewing and evaluating performance, taking steps to address identified improvement areas, and rewarding them as necessary. Thus, the values, work ethic, and ways of working must be covered as part of this process.

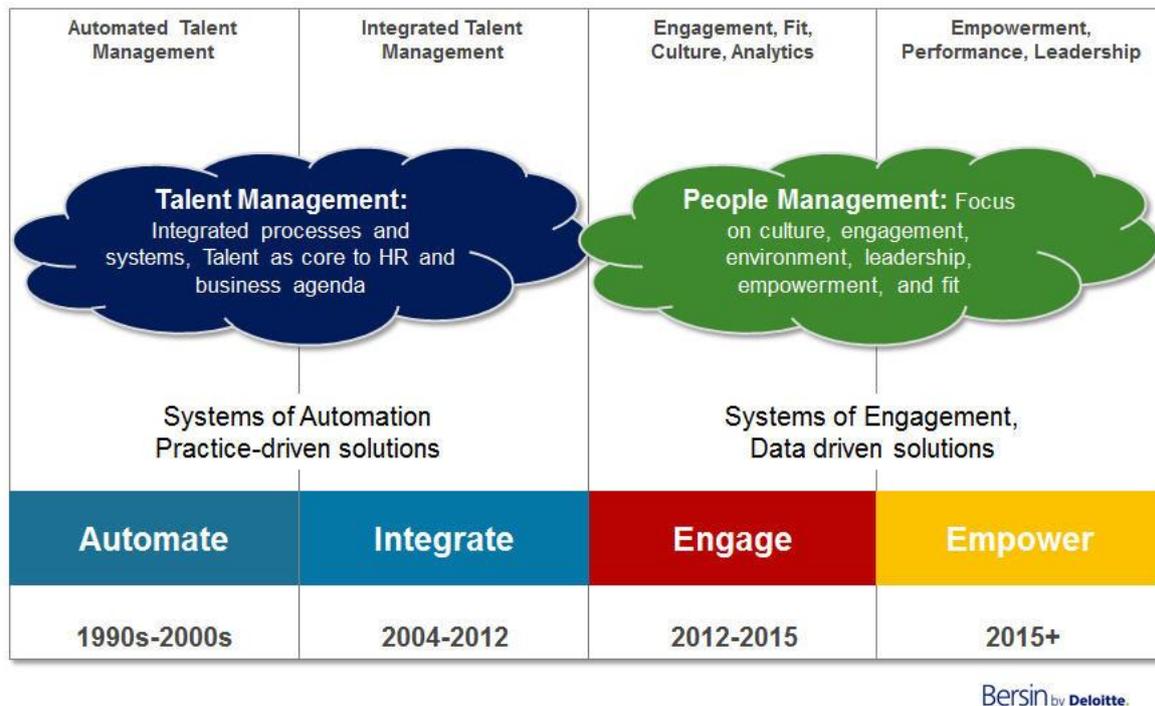
A closer interpretation of diagramme 2 below shows that while the emphasis has moved from automation and integration of people management processes (such as planning, recruitment, training and performance management), these remain important but staff engagement and empowerment have taken priority. Thus while integration of various HR processes is still important, it is no longer the nirvana of people management. There is now a need to consider the whole “ecosystem” of talent issues in our strategies, programs, and systems. The current focus on people management considers all aspects of people, within the context of their environment. Information on people and about people (their needs, preferences, attributes, demographics and business value add) must guide business decisions including the way organisations plan and

manage the people side of their business. The overriding question is what are the business outcomes that people bring, and how can their business value add be increased.

Diagramme 3: People Management Focus

From Talent to People Management

Engagement, Empowerment, Environment



Source: Bersin and Deloitte (2015)

These revelations have influenced the way HRD Plans are put in place and implemented. They highlight the complexity inherent in managing people. In short, HRD planning is inadequate on its own, without relentless and comprehensive management of the people issues throughout the employee life cycle.

Conclusion. Effective HRD planning requires more than just determining the skills demand and ensuring it is matched by supply. Attention must also be given to factors such as relentless end-to-end management of the skills value chain and employee value proposition, with a view to create an environment that enables as well as promotes the attraction and retention of skills.

These developments are taken into account both in the interpretation of information on the sector’s current reality, and in formulating the HRD Plan.

2.5 Challenges and Limitations

The Consultant acknowledges the interest, support, and commitment to this project, shown by all consulted stakeholders. Discussions were typically very open, frank and cordial.

There was a challenge with the supply of promised information, which could in part be an indication of a lack of ready availability of such information to the extent that availing same became a project in itself.

While the stakeholders identified for consultation were carefully selected with the client's input and considered adequately representative, it was clear from the onset that we will be unable to get information concerning all organisations involved on both the demand and supply sides, such as, employment figures and skills priorities as well as peculiarities. As a result available information provided brought indicators which were used with information from other sources.

A limitation exists in respect of scarce and priority skills and this is the absence of commonly held definitions of these classifications. What is regarded as scarce skills may differ from one organisation to another, because of this lack of uniformity in the qualifying criteria. While some assign a numerical or another value denoting scarcity, there is not even a common baseline data to evaluate that against. The numbers justifying a skill as scarce are inadequate on their own. For example, a small number in one occupation may still have a negative impact on the organisation. We are not aware of the existence of a formula that can quantify such impact.

The other limitation relates to the indicative skills requirements forecasts provided at the end of this Plan. These must be understood to be merely indicative figures rather than absolute forecasts. They are based on a sample of employer organisations within the Sector, and extrapolated based on available information. It is therefore recommended that any communication with skills supply institutions concerning skills needs must be based on the types and criticality of skills required within the Sector provided in this report. Any reference to the actual numbers must be qualified.

3. SECTOR PROFILE

The MMEWR Sector encompasses three main subsectors of mining, energy and water resources. Each of the three has a very critical role in the country's economy and society. The mineral wealth generated continues to be the greatest revenue earner, and is expected to remain a key player in the Botswana economic landscape for many more years to come. Water and energy on the other hand are the "life blood" of every aspect of the economic and social system, impacting every sector, both big and small. They are essential services for industry as they are for health and education. Water and energy are also the two services currently in very scarce supply in the country, commanding a great deal of attention at all levels from policy making through to the end-user whether business, public service or household.

3.1 Sub-Sectors and Current Reality

The latest Indices of Mining Production (IMP) show that there is a 4% negative growth due to slow diamond production (5.7%) and gold (49.1%) for the 2014 as compared to 2013. However during the same period soda ash production growth rose by 72.2%. There was a total mining industry production increase of 3.3% in 2014, compared to 17.3% in 2013.

Strategic developments pertaining to this Sector are covered in detail later in this document.

A number of areas will be affected by the developments in this sector, thus desiring focused action to ensure a diversified and sustainable economy. These include

- The need for a strong infrastructure to support the mining sub-sector and related downstream businesses such as those associated with the polishing and marketing of diamonds, and to a lesser extent making jewellery.
- The cleaning and washing of coal, as well as skill areas that help produce methane from coal.
- There will be need for direct accommodation at the operating sites such as new mines and power stations
- The tourism sector is expected to be affected in terms of provision of short-term accommodation as well as be prepared for the attraction of tourists.
- Medical, educational and other social support services will be required for the new operating sites

All of these are also important to ensure the country moves along the path of diversification and sustainable growth. Their development would bring with it the need for skills, some of the skills that will be similar to the ones required by the sector, such as engineering and engineering trades, procurement, IT and finance. Other skills like teaching and medical professions will be specific to the particular sector, such as education and health sectors. It must however be noted that in mining towns such as Orapa, Jwaneng and Selebi Phikwe the mines also provide education and health services.

3.2. Skills Implications

An analysis of the factors affecting skills nationally and globally has revealed significant changes affecting the MMEWR Sector's operating landscape, that have skills implications. These are:

- a. The economic diversification and mineral beneficiation drives are expected to result in more demand for skills, and possibly new skills. Most of the impact is expected to be in the competition for engineering, technician, artisans and project management skills, all of which are already required for current operations within MMEWR.
- b. The transition to a knowledge-based economy compels affected organisations within the sector to have in place requisite skills that will drive such change. Such skills are considered critical to the business, necessitating the development of relevant competencies within existing job roles as well as the establishment of new roles.
- c. Technological advancements will specifically necessitate new skills and competencies. These will mainly relate to technician, artisan and engineering skills areas.
- d. The impact on skills will extend beyond the sector and is expected to affect Government in its regulatory and promotive role, sector organisations as they have to drive these developments as part of their core businesses, and other stakeholder organisations that participate in awareness creation and skills development, or provision of services to the sector. Other sectors include tourism and hospitality, property (short term and longer term accommodation), education and medical support services mainly for new operating sites such as mines and power stations.
- e. Competition for skills is increasingly becoming globalised
- f. Health and safety training will become even more critical as employing organisations are unrelenting in their efforts to minimise the negative impact of their operations.

4. SKILLS ISSUES

One of the Sector's key contributions is in terms of creation of employment. While this can be both direct and indirect employment, the focus in this report is on direct employment.

Employment figures (Table 1) for the sector stands at a total employment of 23 704 for both full time employees (FTEs) and contractors, per various operating mining companies, as at December 2014. Sixty four (64) percent of these are full time employees while 36 percent are contractors. The majority of these positions are localised with only three (3) percent of the jobs held by non-citizens (expatriates), two (2) percent for FTEs. The figure of 685 non-citizens represents a gap in skills required, necessitating importation of such skills. It is also apparent that the number of female employees is relatively low at 3 321 (14 percent) in total, and 1 708 (11 percent) out of 15 114 FTEs.

The fact that the sector's employment contribution compared to total employment falls below five percent is a reflection of its capital intensive nature, especially the mining sub-sector. (Source: CSO Labour Statistics 2007 & 2010).

Table 1: Employment in the Mining Sector – December 2014

Mine	Establishment (Full Time Employees)				Outside Contractors				Totals				Totals
	Batswana		Expatriates		Batswana		Expatriates		Batswana		Expatriates		
	Male	Fem	Mal	Fem	Male	Fem	Mal	Fem	Male	Fem	Mal	Fem	
Mowana	291	53	17	0	278	39	11	0	569	92	28	0	689
BCL	6 093	197	61	1	299	103	6	0	6 392	300	67	1	6 760
Botash	378	53	8	4	0	0	0	0	378	53	8	4	443
Jwaneng	1 587	347	48	12	2 337	594	111	1	3 924	941	159	13	5 037
Morupule	437	73	16	0	8	2	2	0	445	75	18	0	538
Tati Nickel	661	112	24	1	935	67	32	1	1 596	179	56	2	1 833
Mupane	159	35	14	0	145	16	7	1	304	51	21	1	377
OLD Mines	2 174	529	53	6	1 603	578	73	2	3 777	1 107	126	8	5 018
Gope Mine	122	16	6	0	153	21	23	0	275	37	29	0	341
Boteti	82	43	3	0	548	67	58	2	630	110	61	2	803
Discovery Metals	373	39	25	0	293	87	21	0	666	126	46	0	838
DiamonEx	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	12	1	275	24	6 599	1	344	7	19	3 286	648	35	22 677
	357	497				574			735				
Small Mines	53	24	8	0	0	0	0	0	53	24	8	0	85
Quarries	670	188	18	3	58	4	6	0	728	192	24	3	947
G/Totals	13	1	301	27	6 657	1	350	7	19	3 287	651	34	23 709
	080	709				578			737				

Source: Department of Mines

Table 2 below shows that the growth in employment between 2013 and 2014 was 9.4 percent in total, and the increase in expatriate employment was 10 percent. Although the data covers only two years, with the expected expansion of mining operations and new actors entering the arena, some increase is expected but it is likely to fall below 10 percent, given the prevailing economic pressures including the depressed commodities market.

An increase of 64 expatriates employed is also noted, and this may be a further indication of skills shortage in the country. It is however to be expected that these skills can be lost to other markets, rather than returning to their homes.

Table: 2 Comparison Between 2013 & 2014 Employment Figures

	Establishment				Outside Contractors				Totals				Totals
	Batswana		Expatriates		Batswana		Expatriates		Batswana		Expatriates		
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
2013	12 771	1 676	349	30	5 400	1 202	233	9	18 171	2 878	582	39	21 670
2014	13 080	1 709	301	27	6 657	1 578	350	7	19 737	3 287	651	34	23 709

Apart from the mining sector supplementing its skills supply with non-citizens, the level of employment in the sector has been declining over the years and that is a concern from employment creation perspective given the fact that it is the main economic activity in the country. One of the causes of unemployment in the country, which currently stands at 19.8 percent according to Statistics Botswana (2015), is the inability of the country to diversify away from the highly capital intensive mining. The share of mining to total formal employment ranged from 2.6 percent to 3.4 percent during the period 1994 to 2009, furthermore it fell to 3.0% in 2013 (Statistics Botswana BAIS IV, 2013) and then improved again in 2014.

The transferable nature of skills in the sector, particularly for artisan and technician level occupations, means that workers can readily be employed in another sector in Botswana and across the region. However, given that wages in the mining sector tend to be higher than those in other sectors it is more likely that the mining sector will attract workers from other sectors (as opposed to the other way around). Indeed, interviews and the data on vacancies reveal that the water and electricity sub-sectors face difficulties in attracting and retaining low skilled workers simply because they can earn higher wages in the mining sector.

There are a number of important issues related to the demand for energy. First, it is expected that Botswana will become more sustainable over the longer run and the Mmamabula coal field will be used to support a power plant on the same site. The capacity of this power plant is estimated to be around 2,100MW, enough to meet the country's power requirements with some left over for export. It will be important to determine whether the appropriate skills exist within the energy sector to operate this plant, as well as what type of new skills will be required to operate and maintain it. It can be expected that the demand for engineers will increase, especially mechanical and electrical engineers. Similarly, at the plant level there will be an increase in demand for operators, as well as the actual technicians associated with the generation, distribution and monitoring of power. An equally important issue in the energy sector is whether Botswana has the necessary skills to support the transportation and storage of natural gas.

A second important issue relates to how the coal will be transported out of Botswana for export. Currently, indications are a railway line will be built from Botswana to Namibia to facilitate the

export of coal. This is a mega project, with the potential to seriously compete for skills and even attract same away from this Sector.

Table 3: Water Sector Labour Statistics - 2015

TECHNICAL STAFF(CORE)	Number of Staff	Male	Female	AGE GROUP					Nationality	
				-25	26 - 35	36 - 45	46 - 55	56 - 60	Citizen	Expat.
Unskilled	74	46	28	5	24	32	13	0	74	0
Semi-skilled	1042	698	344	15	343	484	191	9	1042	
Skilled	247	232	15	4	39	130	69	5	247	0
Artisans	384	335	49	4	76	209	87	8	384	0
Technicians	443	390	53	8	176	189	63	7	443	0
Engineers	134	125	9	1	14	74	40	5	134	0
Executive Management	6	3	3	0	1	1	3	1	5	1
Departmental Managers	29	17	12	0	2	14	11	2	29	0
Supervisors	427	187	240	1	144	199	78	5	427	0
SUPPORT STAFF										
Clerical	354	105	249	12	170	129	31	12	354	0
Security	11	11	0	0	0	1	6	4	11	0
IT	12	11	1	0	10	2	0	0	12	0
Lab – (Lab Assistant)	12	7	5	0	8	4	0	0	12	0
TOTAL	4794	3380	1414	74	1540	2215	886	79	4793	1

The majority of staff employed within this sub-sector organisation are in engineering and engineering trades. These range from trade C and B levels semi-skilled staff, to skilled level artisans with National Craft Certificate (NCC) qualification or equivalent, through to technician and engineer levels who hold diploma and degree qualifications.

It is also noted that 20 percent of total staff are aged 46 years and above, pointing to a need to plan for their replacement.

Table 4: Employment in the Energy Subsector - 2015

STAFFING LEVELS BY SKILL LEVEL, AGE GROUP, NATIONALITY AND GENDER										
TECHNICAL STAFF	Number of Staff	Male	Female	Age Group					Nationality	
				-25	26 - 35	36 - 45	46 - 55	55 - 60	Citizen	Expat.
Unskilled	114	43	71	18	25	24	35	12	114	0
Semi-skilled	368	297	71	19	111	107	97	34	368	0
Skilled	887	671	216	16	254	362	211	44	887	0
Artisans	456	378	78	11	168	161	98	18	456	0
Technicians	135	122	13	2	24	63	36	10	135	0
Engineers	101	91	10	0	33	37	27	4	100	1
MANAGERIAL STAFF										
Supervisors	483	366	117	3	103	215	124	39	483	0
Departmental Managers	105	82	23	0	10	52	34	9	103	2
Divisional Managers	6	4	2	0	0	0	5	1	5	1
SPECIALISTS										
Safety	22	16	6	0	7	6	7	2	22	0
Nursing	4	3	1	0	1	1	2	0	4	0
Medical	0	0	0	0	0	0	0	0	0	0
Human Resources Management	43	21	22	1	6	19	13	3	43	0
SUPPORT STAFF										
Clerical	723	565	158	24	185	268	189	57	723	0
Security	44	44	0	0	2	12	21	9	44	0
IT	21	14	7	0	7	12	1	1	21	0
TOTAL	3512	2717	795	94	936	1339	900	243	3508	4

Source: Statistics Botswana, 2013

Table 4 above shows a total 3512 employed in this sub-sector, with only four non-citizens. The latter are employed at managerial and professional levels. The 243 employees within the retirement age range of 55 to 60 presents another challenge to skills availability, which is the efficacy with which succession planning exists.

A total 20 percent of staff are artisans, technicians and engineers. This indicates that the sub-sector employs a significant number of engineering type skills. These are the same type of skills employed within mining and water sub-sectors. Female employees account for only 22.6 percent, an indication that this subsector is also comprised of mostly male. It is noted that 32.5 percent of staff are 46 years and above, which points to an urgent need to provide for their succession. Another notable point is that only four members of staff out of a total 3512 are non-citizens.

Table 5: Total Skills for the Sector (Indicative Figures for 2015)

Sub- Sector	Citizens	Expatriates	Totals
Mining	14 789	328	15 117
Energy	3 508	04	3 512
Water	4 795	01	4 796
Overall Total	23 092	333	23 425

The combined total indicative figure for the sector (Table 5) stands at 23 425 full time employees, excluding contractors. It is noted that expatriates only account for one (1) percent. The figures inclusive of contractors are 31 327 citizens, 690 (3 percent) expatriates making a total of 32 017.

5. STRATEGIC DEVELOPMENTS

The sector is undergoing a number of strategic imperatives necessitating deliberate management action to strategically reposition affected organisations within the Sector. Broadly speaking these developments can be categorised into two as follows:

- a. Business Efficiency Improvements – This refers to cases where there are no major business changes but there are operational or business improvements issues requiring attention.
- b. Business Transformation – Here the focus is on major changes within the business, such as expansions, mergers and acquisitions, new product lines, and major changes in operations.

Developments within the sector will be looked at in terms of these two clusters, the ultimate consideration being implications of identified changes for skills.

5.1 Business Efficiency Improvements.

A number of organisations within each of the sub-sectors reported strategic focus areas relating to improving the way they currently run. These include;

- a. Need to develop technical and managerial skills among current staff. For example, Botash artisans lack the requisite skills to diagnose and fix, and their Foremen are unable to guide and develop them. There is apparent disconnect between theory and practice. Control and instrumentation technicians lack diagnosis and programming skills. Similar concerns have been raised by other organisations within the Sector. These skills are very critical in the mining environment, where failure to accurately and speedily diagnosis and resolve problems can have serious impact on production.
- b. Debswana Horizon 1 (H1) focuses on optimizing the profitability of the current open pits. This includes efficiency improvements in the planning, knowledge management, resource management and equipment maintenance.
- c. Need for effective and efficient management of resources, be they monetary, equipment or people. This need was articulated by many organisations consulted.
- d. Need for effective project management and proper planning skills, backed by thorough analytical, research and knowledge management skills.

5.2 Business Transformation.

A number of organisations are undergoing major changes that are necessary to reposition them for the future. One such is Debswana Diamond Mining Company, with its Resource Development Plan (RDP) Strategy, which was alluded to earlier. Horizons 2 and 3 of this strategy fall within the transformation category, as follows:

- a) Horizon 2 (H2) is about preparing for open pits extensions and expansions, including underground mining. Focus areas for Jwaneng mine are Completion of cut 8 (650M deep) by 2029. Cut 8 started in 2010, and will overlap with the resumption of cut 9 (850m deep) in 2016/17. The latter includes relocation of waste dumps. Cut 10 will then follow, but may

be replaced with the start of underground mining. Cut 9 has the potential to increase the life of open pit by ten years beyond cut 8, to 2038, with overall life of mine reaching 2050. Other H2 projects include Orapa mine cut 3 and cut 4, Letlhakane Tailings, Orapa Process Plant and Orapa Tailings.

- b) Horizon 3 (H3) concerns itself with preparing Debswana beyond the life of current diamond resources. This is about searching for new mining operations, and businesses.

A major strategic thrust for BCL is diversifying from a mine to an enterprise through POLARIS II strategy, a growth and diversification strategy in terms of which BCL is exploring diversification opportunities in Botswana and regionally. This strategy has several key thrusts, namely:

- a. Expand nickel business by extending underground operations to 15 years
- b. Build the copper business through – acquiring other resources such as Tati Nickel and Nkomati
- c. Renovating the smelter to increase capacity to handle ore from own mines and other producers regionally, and possibly build another smelter
- d. To turn BCL into a Metallurgical and Chemical Hub, commencing with recycling waste by harvesting the smelter sulphur and phosphate emissions and to manufacture fertilizer
- e. Taking advantage of abundant coal reserves by venturing into iron ore exploration and processing. The first step in this direction has been the acquisition of Pula Steel, a Citizen Entrepreneurial Development Agency sponsored steel manufacturing company.

Morupule Colliery is strategically positioning itself to exploit the huge coal reserves (a la Reserve Development Plan) to support the new power station that is to be outsourced to Independent Power Producers (IPPs), and also to supply other users both locally and internationally. Consequently the mine is moving towards open pit mining, which is a major change. A Strategic Manpower Plan for the open cast MCM 3 Project is being developed by the mine, and a pioneer work stream is already in place.

There are also on-going studies on value addition to coal, including processing coal to liquid, coal to gas and gasification (extracting natural gas from underground).

There are initiatives to establish Morupule as a Power Generation Hub for the SADC region, taking advantage of the huge coal deposits. Efforts are underway to persuade other SADC countries to set up power generation plants in Botswana and export power to their countries which would be cheaper than transporting raw coal. Efforts are also underway to seek sea-borne markets, particularly China and India where the demand for coal is very high.

All these developments will have major implications on skills. For example, the cut 8 projects employed around 3000 at peak, and cut 9 is expected to employ similar numbers. Changes in technology are also expected, and will affect not just Geotechnical skills, but also Operators, Hydrologists, and even a new type of manager as well as support staff. These in turn raise the need for change management skills.

New type of equipment and technology will more likely be required, as the pit gets steeper, and for the developments at Botash mine, Khoemacau, African Copper, etc. This includes new skills at the operator level and new geotechnical and hydrology skills. Underground mining will require even more different skills and mindset.

5.3 Implications on Skills Demand

Developments within this Sector have immediate and future impact on the demand for skills.

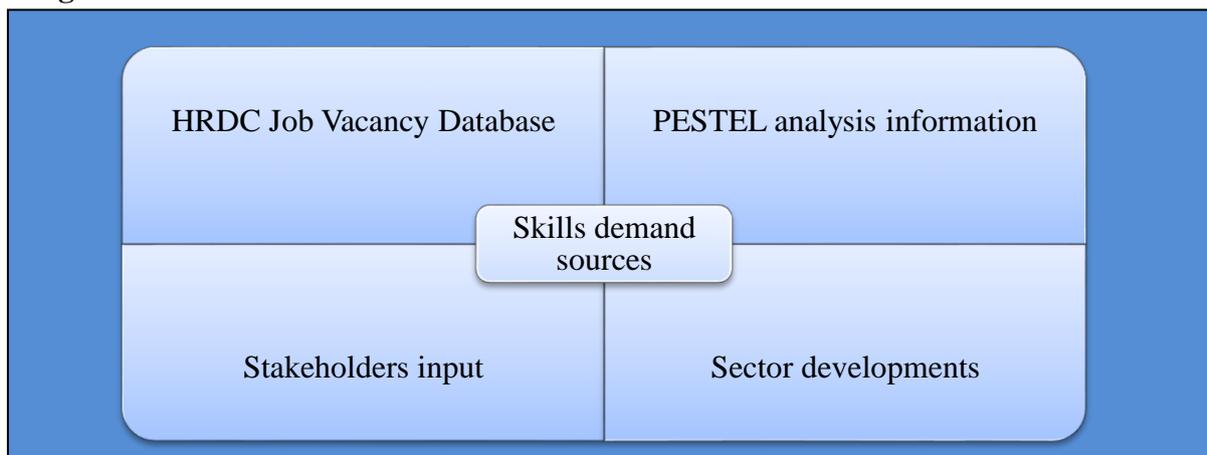
- a. Major projects within the Sector in themselves are going to put a further strain on the already stretched skills supply nationally. These include open pit expansion, plant upgrades and new plant designs.
- b. New technologies, including new type of equipment and machinery are envisaged, (in response to increases in hauling distances, new plant efficiencies and water quality improvements), and will have an effect on skills.
- c. The transition into underground mining will have far reaching skills implications, such as new skills, competencies and mindsets, as well as more of the same type of skills. Thus there will more likely be need for up-skilling, multi-skilling and re-training. Specific interventions to prepare staff for working in a deep underground environment are also envisaged.
- d. Occupational health, safety and environment requirements are expected to become more exacting, For example, air quality monitoring, fire hazards control, and fatigue detection. All these will introduce new demands or emphasis in the workplace, with significant skills implications.
- e. There is also the identified strategic imperative to improve process efficiencies and leadership effectiveness. These are expected to be addressed through processes and systems improvements, attendance of needs focused short courses, and other management interventions.

6. SKILLS DEMAND

The preceding chapters have provided indicators of skills demand within the sector. Now the focus of this chapter is to seek to understand this demand more, and ultimately determine the skills gaps and priorities. We also specifically bring together what are considered to be scarce skills.

Our sources of skills demand information are identified in the following diagram:

Diagram 4: Sources of Skills Demand Information



Given the inadequacies of the manpower planning approach to determining the match between the skills supply and demand, we have used the approach of signaling, in terms of which the four major signals stated in the above diagram were analysed to identify the critical needs including a list of scarce skills for this sector.

This approach is used below and the first signal came from using the PESTEL analysis discussed in the Sector Technical Report. The second signal used information derived from the HRDC's Job Vacancy Database (JVD), the third signal was from the developments impacting the Sector, while the fourth signals were obtained through interviews with key stakeholders.

Information (signals) from these sources was considered through a process of triangulation, in order to identify areas of high demand and those areas that are not in high demand. The first stage to this process involved the construction of the initial list of shortages identified as having a high demand in two or more sources. This list is then checked against the signals from the Job Vacancy Database and other documents. This list was checked again with the original sources and where possible confirmed by those working in the Sector. Such an approach is not valid in statistical terms, but it is valid in terms of confirming those areas that are most likely to be found in the different signals and documents analysed.

PESTEL Analysis. The first signal on human resources in demand was derived from the qualitative analysis using PESTEL. Following is the emerging HRD implications:

- a. The economic diversification and beneficiation drives are more likely going to result in new skills requirements and accentuate certain competencies.
- b. The continued dependence on the mining sector as the key contributor places even more pressure on this sector to deliver in line with this expectation. This will in turn put pressure on the skills requirements, increasing competition especially for the scarce skills.
- c. Technological developments are also expected to impact skills requirements, from software expertise to
- d. There is a problem of graduates who are not work ready, and also inadequately qualified personnel in the workplace;
- e. Those in employment will also need skills upgrading
- f. The current level of unemployment is expected to create sustained political pressure on the economy to generate more jobs and even localize jobs that are held by non citizens.
- g. Growing concerns about the quality of education, including the low pass rates at pre tertiary levels, are expected to create impetus for significant improvements in the education system. The recently announced strategic plan for the Ministry of Education and Skills Development is a critical step in this direction. However, the results of such efforts are expected to take long to become apparent.

JVD Database. The second signal considers jobs advertised as contained in the Job Vacancy Database (JVD), a data base of job advertisements that were collected by staff at the HRDC over a period of time. This gives an indication of the extent of the demand by the end-users, although it is acknowledged that some appointments are in all likelihood made from internal staff or some informal channels without advertising externally.

The focus here is on the last three years, and a total 808 job adverts were identified. 113 of these are in the semi-skilled/ below technician level such as drivers, clerks and operators. Please refer to the table below.

Table 6: Top Three Job Advertisements by Year

POSITION LEVEL	2013	2014	2015
Leadership/senior Management	<ul style="list-style-type: none"> - Chief Geologist - Divisional Manager - Section Manager 	<ul style="list-style-type: none"> - Chief Geologists - Section Managers 	<ul style="list-style-type: none"> - Superintendent Maintenance Manager
Professional/ Middle Management	<ul style="list-style-type: none"> - Safety Health & Environment Managers - Senior Engineers 	<ul style="list-style-type: none"> - Superintendent (Mining & Production) - Hydro geologist - Manager (Mining & Planning) 	
Technician	<ul style="list-style-type: none"> - Artisans (Electrician, Fab/Welder) - Instrumentation Mechanics - Blasting Specialists 	<ul style="list-style-type: none"> - Clerks of Works - Risk Officer - Shift Supervisor 	<ul style="list-style-type: none"> - Mechanics Foreman - Maintenance Technician - Transport Operations Controller
Below Technician/Semi Skilled and Below	<ul style="list-style-type: none"> - Heavy Duty Drivers - Operators 		<ul style="list-style-type: none"> - Dispatcher - Driver - Fireman

Source: HRDC Job Vacancy Database Report 2015

What is immediately apparent from the above table is that the recruitment activity generally cuts across the levels.

It is also apparent that certain jobs such as engineer and Safety Health and Environment (SHE) Manager only appear under 2013. However it would be unwise to conclude that this is an indication of the level of demand, which then suggest there must be other factors at play. For example, some of the vacancies are more likely being filled without any external advertising.

Each of these jobs was found to be more frequently advertised than others at their level.

Jobs such as Chief Geologist and Section Manager appear in more than one year, which may be an indication of their scarcity. The same is the case with drivers, more likely heavy duty ones.

Sector Developments. Strategic developments reported in a number of organisations, such as Debswana’s RDP developments, BCL “Polaris II”, water availability and energy expansion projects will bring about new and additional skills requirements. For example, a new type of machine and plant operator as well as functional leadership will be required for operating an underground mine.

Some of these major developments are in turn expected to generate satellite employment through sub-contracting, outsourcing and support arrangements that will be required to provide goods and services. Some of these are expected to employ similar skills such as artisans required by the main companies.

Stakeholder Interviews. Input from the stakeholders is covered in the applicable areas of this report, such that details concerning strategic developments are covered under that chapter. The focus here is on input relating to skills priorities. Most of the stakeholders interviewed were directly involved on the skills supply or/and end-user side. Thus the skills requirements as well as gaps identified can be directly related to the employment opportunities in the national market. Most of the skills demands are articulated as part of the business improvements or business transformational developments. For example;

- a. Serving employees are lacking practical skills at both technician/artisan and managerial levels.
- b. Graduates entering the workplace are found to be not work ready.
- c. All stakeholders are in agreement that currently there is a serious shortage of people with work-ready skills in the sector. The TEIs curriculum is not aligned with industry skills needs. There is also a concern that even those that have been trained and qualified may lack the right attitude, work ethic, and work experience. As a result the mining industry employs non citizen technical staff to fill the gap.
- d. Where the employment of non citizens is contemplated, it is becoming increasingly difficult to obtain work permits.
- e. While the government is concerned about the influx of non citizens into the country and the growing levels of unemployment, employing organisations (both private and public) continue to find themselves having to import skills in certain areas. When such conclusion is reached to employ non citizens, the process to be followed when applying for a permit is described as cumbersome, exacting, discouraging and uneducative. The latter because often applicants are not sure of the reasons for rejections, when their applications are not successful.

6.1 Emerging Trends from the Sources

The skills in demand within the Sector were categorised into the different sub-sectors, and within each sub-sector further differentiated in terms of core business, scarce skills, new skills and then competencies.

This is reflected in the table below:

Table 7: Emerging Skills Needs from Stakeholders

Sub Sector	New Skills	Core Business Skills	Scarce skills	Competencies
Water		<ul style="list-style-type: none"> • Surveying (hydro) • Computer Technology • Water Engineering • Civil Engineering • Electrical/ Mechanical Engineering 	<ul style="list-style-type: none"> • SAP Specialist (HR & Finance) 	<ul style="list-style-type: none"> • Project Management • Leadership • Project Management • Business Acumen
Energy	<ul style="list-style-type: none"> • Coal & Mining Engineer • Financial Advisor • Coal Expert • Logistics Advisor • Rail/Logistics Expert • Engineer • Ethernet Specialist • Environmental Advisor • Fibre Networking 	<ul style="list-style-type: none"> • Electrician Trading Engineer • Plant Operators • C & I Engineers • Telecoms Engineer 	<ul style="list-style-type: none"> • SAP Specialist • Corporate Planning Specialities 	<ul style="list-style-type: none"> • Leadership • Project Management • Business Acumen • Quality Management • Organisational Design
Mining	<ul style="list-style-type: none"> • Instrumentation Technician • SAP expertise • Underground mining technical expertise 	<ul style="list-style-type: none"> • Process management • Mining Engineering • Machine and plant operator • Technician 	<ul style="list-style-type: none"> • Coded welding • Millwright • Capital drilling. • Software technician • Instrumentation technician 	<ul style="list-style-type: none"> • Leadership • Project Management • Business Acumen • Quality Management • Knowledge Management

Source: Stakeholder Interviews

Some skills such as engineering cut across the three subsectors, while others like process management and mining (mining sub-sector), and Ethernet specialist, fibre networking plus telecommunications engineer (energy) are peculiar to specific sub-sectors. It is expected certain skills such as engineering, may be transferable between the sub-sectors, with some further refinements. Competencies like project management and leadership are common across the sub-sectors.

6.2 Scarce and Critical Skills

There are scarce skills in all three sub-sectors, the type of skills which when advertised for may not be found in the market, or come at a premium.

Table 8: List of Critical Skills and Scarce Skills

Job Levels/Categories	Critical/Core Business Skills	Scarce Skills	Competencies
Leadership/Senior Management	<ul style="list-style-type: none"> • Geology • Engineering 	<ul style="list-style-type: none"> • Geology • Engineering 	<ul style="list-style-type: none"> • Leadership, Knowledge Management • Stakeholder Management
Professional/ Management Mid	<ul style="list-style-type: none"> • Engineering (mechanical, electrical, water) • Mining (Underground and open pit) • Process management • Chemical engineering • Software engineering • Control & Instrumentation Engineering • Environmental Advisory 	<ul style="list-style-type: none"> • Hydrology • Water Engineering • Geotechnical • Occupational Health and Safety • Information Technology • System and Process Design • Organisation Design • Software Engineering 	<ul style="list-style-type: none"> • Planning • Quality management • Knowledge Management • Resource Management • Research and Innovation • Analytical and Business acumen • Project Management
Technician Level	<ul style="list-style-type: none"> • Instrument Technician • Electrician • Logistics Advisory • Telemetry • Drilling & blasting • Health & Safety • Procurement 	<ul style="list-style-type: none"> • Instrument Technician • Coded Welding • Gas Testing • SAP Specialist • Millwright • Drilling 	<ul style="list-style-type: none"> • Diagnosis • Planning • Technical expertise • Project management
Below Technician/Semi Skilled Level	<ul style="list-style-type: none"> • Plant Operating • Driver Operating 	<ul style="list-style-type: none"> • Plant Operating • Driver Operating 	<ul style="list-style-type: none"> • Vigilance • Communication

6.3 Understanding the Skills Categories

It is apparent that there is not a single adopted definition and terminology used to describe the various skills categories, and this presents a challenge for HRD planning.

The definitions adopted in this report read as follows:

- a. Scarce skills are simply put those skills that are difficult to find or recruit for. Examples are coded welders, geotechnical specialists and special needs teacher. The scarcity may be absolute to the extent that people with the requisite qualifications, experience and competencies are simply in short supply. Relative scarcity would apply where there are people with the right qualifications and experience, but they do not meet other employment criteria such as citizenship or unwillingness to work in certain locations or under certain conditions.
- b. Core business skills refer to those that directly relate to the attainment of the mission and/or strategic goal of the organisation. Examples are water engineers and hydrologists for WUC, or geologists and metallurgists in the case of a mine. These include the skills that new entrants to the sector need in order to safely and efficiently support sector production. Core skills also include the additional skills that workers in the sector need in order to stay abreast of changes, for example the impact of new technology developments. Covering all the basic skills, core skill requirements form the bulk of skills needs in the Sector. Depending on the nature of the occupation, these skills can be developed through short courses, learnerships or higher education.
- c. Critical skills are very essential skills for the delivery of a particular job or function or goal. Such function could be the organisational mission, as in the case of mission critical jobs, or at functional level as in the case of a software technician in an engineering department.

A number of factors may result in a particular skill becoming of short supply. Scarcity can be a result of poor succession planning such that there will be no replacement for retirees or those being promoted. It may also be due to inadequate planning for skills in general e.g. inadequate quantities to deal with increased demand for current skills.

The list of scarce skills identified above is a product of the triangulation process that fed from two or more sources identified earlier in this report. Together with the core business skills, they indicate skills priorities for the sector.

It is noted that these skills may be transferable within the sector as well as across sectors. So long as the demand-supply equilibrium is not restored, the problem of scarcity would still persist. Thus the focus must be in either reducing the demand by finding alternative ways of performing the required function, or increasing the supply.

The impact of scarcity may be felt through wages & labour costs. For example, the cost of recruitment where several recruitment attempts have to be made often using various avenues, or where the prospective employer has to pay a premium in order to attract the scarce skill. Some organisations pay scarcity & retention allowances to address this situation. Such a scenario can lead to an over-pricing of the particular skill or even unrealistic perception of self worth by the incumbents. It may even lead to over-focus on winning the competition for the scarce resource, and less on effective selection which seeks to ensure the right job-person fit is attained.

7. SKILLS SUPPLY

7.1 Introduction

A critical component of HRD planning is the development of clear strategies for the supply of the requisite skills, in a dynamic manner so as to meet the ever changing needs of the end-users. While the supply chain of skills starts as far back as early childhood development stages and extends beyond normal retirement age, the focus of this plan is at the post secondary education stages of tertiary education levels onwards.

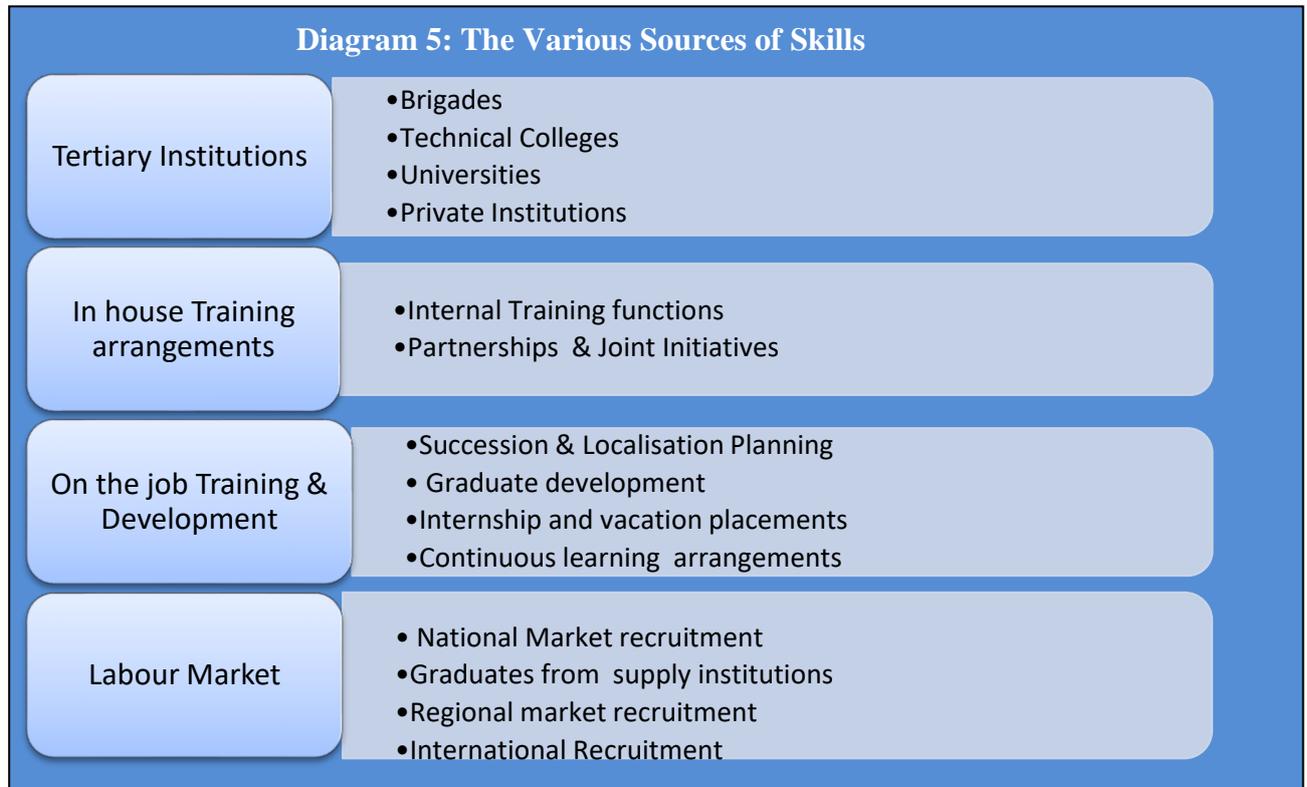
The above notwithstanding, a fully integrated HRD planning process must take into account the availability, adequacy and quality of education at the pre-primary, primary and secondary school levels. These are the stages that build a firm foundation for success later in life, including for the development of skills required by the economy. HRDC as the National coordinating body for the National HR Development Strategy will necessarily have to ensure this backward integration is effected.

Improving the supply of relevant skills is a function of both the quantity and quality of education and training provided. This makes it critical to have in place a robust mechanism of ensuring that the skills needs of the target end-users are fully understood, articulated and taken into account by those institutions responsible for the supply of those skills.

Over the past decade, tertiary education has experienced a proliferation of private institutions offering a range of certificate, diploma and degree courses, particularly (but not only) in business studies, secretarial and computing courses. While a number of these presented themselves to be specialised in particular areas of study, over time they appear to have deviated from their niche areas. This is largely because of the perceived need in the economy. Such deviation has the effect of unnecessary duplication, which is not even informed by empirical data regarding the need in the economy.

7.2 Skills Sources & Their Current Reality

The following diagram 5 contains the various sources of skills considered:



7.2.1 Tertiary Institutions

Tertiary institutions are currently the main source of supply for the type of skills required within the Sector, other than pre-tertiary level skills found at semi-skilled level and below. Employing organisations within the Sector have established internal training arrangements in respect of the re-tertiary level skills such as machine operators, plant operators and semi skilled engineering skills.

There has been a general increase in enrolment (37436) over the eleven year period from 2003 to 2013, and 10834 (23 percent) increase from year 2012 to 2013. This effectively implies an increase in the supply of skills. What is still not certain at this stage is the relevance of these skills to meet the needs of the local and even global market. (*TE at a Glance 2012- 2013*)

The following Table 9 indicates that Technical Colleges account for 4 percent of the total enrolment. The two public universities of UB and BIUST record the highest at 30.7 percent.

While 56.95 percent of the enrolment are females, 42.53 percent for Technical colleges, employment statistics within the sector indicates females only make 16 percent of employees in the mining sub-sector, 23 percent for energy sub-sector and 29 percent for the water sub-sector. If

these trends are going to prevail for the next five to ten years, then even fewer graduates from our TEIs will be absorbed within this sector.

Table 9: Student Enrolment by Type of Institution and Gender – 2013/14

Type of Institution	Female	Male	Total	% Female
Private Institution	15 081	11 239	26 320	57.30%
College of Education	1767	1 092	2 859	61.80%
Institution of Health Sciences	896	671	1567	57.18%
Technical College	1 082	1462	2 544	42.53%
Other Colleges	5 057	3 519	8 576	58.97%
Public Universities	10 535	8 038	18 573	56.72%
OVERALL TOTAL	34 418	26 021	60 439	56.95%

Source: Tertiary Education Institutions Report 2014

Table 10: Student Enrolment share by Type of Qualification and Gender – 2013/14

Qualification level	Female	Male	Total	% Female
Certificate	1 447	877	2 324	62.3%
Diploma	11 922	9 048	20 970	56.9%
Bachelors Degree	16 922	12 980	29 902	56.6%
Masters Degree	982	909	1 896	52.1%
Masters of Philosophy (MPhil)	55	59	114	48.2%
Post Graduate Diploma	137	52	189	72.5%
Doctor of Philosophy (PhD)	26	66	92	28.3%
Professional Courses	2 922	2 030	4 952	59.0%
Grand Total	34 418	26 021	60 439	56.9%

Source: Tertiary Education Institutions Report 2014

Out of an overall enrolment total of 60439, 49.5 percent (29902) were for Bachelor's Degree, followed by Diploma programmes at 34.7 percent (20970), then professional courses with 8 percent (4952), certificates 3.8 percent (2324), and only 3.5 percent (2102) enrolled for Master's and above. This is in line with the sector's employment patterns and would go a long way towards meeting its needs, if the content is relevant.

Table 11: ISECD Groups By Qualification

ISCED Group	Bachelors	Certificate	Diploma	Masters	Prof Courses	Other	Total
Engineering, Manufacturing, & Construction	1 772 (28%)	480 (8%)	3 461 (56%)	46 (1%)	449 (7%)	10 (0.2%)	6 218
Science	7 118 (71%)	114 (1%)	2 372 (24%)	211 (2%)	167 (1.7%)	55 (0.5%)	10 037
Services	1 301 (41%)	477 (15%)	1 302 (41%)	44 (1%)	19 (0.6%)	11 (0.3%)	3 154
Social Science, Business & Law	11 219 (47%)	787 (3%)	6 688 (28%)	734 (3%)	4 317 (18%)	16 (0.1%)	23 761

Source: Tertiary Education Institutions Report 2014

Table 11 above shows that over 50 percent (56%) of enrolment for engineering, manufacturing and construction is for diploma level followed by bachelor's degree at 28 percent. A similar pattern is noted in respect of Services and Social Science categories. A closer look at the above categories in fact indicates that within Engineering, Manufacturing and Construction grouping, only 40 percent (2470) of the total enrolment for this group (6218) is in fact for engineering and engineering trades, without manufacturing and construction.

The key question is the extent to which the graduates satisfy the needs of the Sector as well as the end-users in total. One measure of this is to determine the numbers that get absorbed into fulltime employment, and therefore meet the end-user requirements. While this information was not immediately available, feedback from the end-users as well as the Internship Department shows that many of the graduates are in fact not absorbed into substantive employment.

7.2.2 Conclusion Regarding Demand and Supply

TEIs produce a relatively high number of graduates at various qualification levels. Considering engineering and engineering trades as the most relevant for the Sector's core business skills requirements, it is apparent that only 2470 of the graduates are in this area. When one takes into account the fact that 56 percent of these are at diploma level and only 28 percent at degree level, then the number of graduates in this group is relatively small. This is even before the relevance of the curriculum is investigated.

A comparison of the supply with the demand side shows that there is capacity to produce skills that meet a significant part of the skills demanded by the sector, if only the content matches end-user requirements. Some of the changes that would be needed include increasing the intake of

engineers, TEIs giving priority to those skills identified as critical and scarce, and development of competencies as part of the preparation of graduates for employment.

A number of organisations in the Sector have established their own internal supply facilities, with the immediate benefit of direct link with identified needs plus direct link with the place of work for practical application of learning. Some of these are formal training arrangements for the provision of basic skills and progression training, such as in the case of machine operator and plant operator training at most mines like BCL and Debswana, and semi-skilled trade type training by WUC, BPC and a number of mining companies. These are mainly borne out of the realisation that such core business skills are generally not readily available in the labour market. Thus affected organisations train to meet their immediate needs, including relief cover and also for succession.

Other aspects of the work based training and development arrangements take the form of;

- a. Internship and vacation placements, where candidates are placed within the workplace under close care, support and monitoring. While the vacation placements are generally arranged and to some extent monitored in collaboration with the originating institution, and for a relatively short time period of not more than six months, the internship programme is mainly coordinated by the Department of National Internship Programme (DNIP). However, there are also individually initiated placements. The benefits of these arrangements are to expose beneficiaries to the world of work and also help make them employment ready. It is also a marketing opportunity for both prospective parties.
- b. Succession related training and development. Good practice requires employing organisations to have in place formal arrangements for identification and development of succession candidates who can progress into other levels of responsibility, on a one to one basis. This includes localisation, where employers are required in terms of the Immigration Act to prepare citizens to be able to take over expatriate held jobs, and demonstrate that this requirement is taken seriously when an application is submitted for a work permit. When all is said and done, succession planning is a deliberate and critical action for business continuity.
- c. Graduate development programmes are used to formally prepare an inexperienced but qualified individual for substantive formal employment in a particular line of discipline. A structured development programme is normally put in place with clear work roles related deliverables, and closely managed. Such development may include attendance of short courses on a need basis, plus coaching and mentorship support. They average two years, depending on the area of work.
- d. Continuous professional development arrangements are also commonplace. Their purpose is to enable the employee to keep pace with developments in their profession and work responsibilities. These include development of leadership and business skills in line with identified current and future requirements.

Companies have therefore embarked on initiatives to develop skills for their current and future operational needs.

7.3 Adequacy of Skills Supply

The adequacy of skills required within the Sector is a function of the extent to which the end-user/employer is able to meet their need for skills in line with their strategic demands. This takes into account:

- a. Availability of the right type of skills in the right numbers and at the right time.
- b. Ability to meet future skills requirements, in line with the business plans
- c. The extent to which education and training institutions, as the main sources of skills supply, are able to produce skills in line with the demand.
- d. The end-user's ability to attract and retain the required skills. This includes the efficacy in managing the talent so acquired.

These points are dealt with in detail below.

7.3.1 End –User Perspective

The current reality of the end-user is that;

- a. There are certain skills that are in short supply to meet the immediate operational needs.
- b. Most organisations within the Sector forecast an increasing need for skills. This is in view of the planned strategic developments of existing operations as well as expected new entrants, such as organisations within the mining sub-Sector that are expected to transition from pre production phases into fully fledged mining operations.
- c. Some of the organisations within the Sector are scaling down their operations, or reducing staffing levels through closures, rationalisations, or changes in business operations.
- d. The need for skills within the Sector is expected to increase, in some cases presenting a serious risk to business sustainability.
- e. Many of the types of skills required by this Sector are also required by other Sectors, and therefore not unique to this Sector.
- f. While the majority are more of the same type of skills, there are also indications of new skills requirements emerging.
- g. While education and training institutions continue to produce more graduates, a number of the latter are found to be incongruent with the needs of the end-users. This results in graduates unemployed, while on the other hand skills continue to be imported.
- h. There is generally no apparent and tangible arrangement for interaction between skills supplier institutions and the end-users, purposed to ensure skills relevance (in terms of type, quality and quantity) and employability. However, some notable exceptions have been reported, where institutions have solicited input from industry in the development of curricular, acceptance testing of developed programmes, as well as development of in-house training and development interventions.

The above scenario may at least in part explain the common concern expressed in various national publications such as Tracer Studies and Consultancy reports concerning skills availability and utilisation, that our graduates generally lack practical experience and are not employment ready.

Some of the cited problems include:

- a. Weak relationships between training providers and employers
- b. Small industry base, resulting in limited opportunity for attachments in relevant industries and geographical spread of employers.
- c. Inadequate capacity in industry to supervise and mentor learners effectively
- d. Lack of clear learning outcomes to structure workplace experiences
- e. Importance of attachments is undermined if these are not credit bearing and compulsory
- f. Inadequate supervision of attachments by training providers
- g. Limited co-operation between government departments

(Source: Skills Forecast Report, 2010)

Conclusion. Over 50 percent of employer organisations within the MMEWR Sector find the graduates from our supply institutions nationally to be inadequate to meet their needs now and in the future, unless changes necessary to make the graduates “employment ready” are effected as a matter of urgency. For example, artisans from Public Technical Colleges are said to lack practical skills required to work in mines such as Debswana. Mining and engineering graduates from the local universities are said to lack relevant content to be employed in the mines. As a result most organisations within the sector have resorted to taking their own initiatives to address their skills needs.

The above points have in turn necessitated;

- a. The importation of skills and therefore employment of non-citizens.
- b. Establishment of in-house training facilities such as the Orapa Technical College (OTC), which provides apprenticeship training and artisan development.
- c. Employer-based “self-help” initiatives to provide some critically needed skills internally. Examples of these are in-house training of machine and/or plant operators by organisations such as BPC, WUC, Debswana and BCL. Some of such training provides foundational skills in the particular work area, while the other aspect provides ongoing development of incumbents so as to keep pace with developments in their profession and to prepare them for alternative placement, including higher level appointment. Here is a case of an employing organisation having to run training programmes to alleviate the skills shortages experienced.
- d. Development of talent management interventions to promote the effective management of skills throughout the employee life cycle.
- e. HRD planning at National level, integrated with the various supply sources especially those in the public domain.

7.3.2 Availability in the Market

The key question here is the extent to which skills are available in the market, such that employer organisations can source them in line with their needs.

- Official figures (Statistics Botswana BAIS IV 2013) indicate high levels of unemployment at 19.8 percent nationally.
- A number of these are graduates who have been trained locally as well as those trained at external institutions
- Figures from the Internship Office indicate a total 6000 graduates registered for placement at any point in time, 6000 being the maximum allowable for budget considerations. These are graduates who are not employed, and they are not the only ones.

All the above points to some skills mis-match, which if not sufficiently dealt with, can only worsen in the phase of the developments already alluded to.

7.3.3 Supply by Institutions

We refer to diagram 5 above for the various sources of skills considered in this project.

a. Demand Driven Supply

The current policy is to fund students up to first degree only, or for professional requirements as specified by the respective professional bodies. The level of funding depends on the category of skill studied for. It ranges from 100% loan for low demand skills to 100% grant for scarce skills, and the categorization of skills is reviewed from time to time.

Currently funding is based on the department's perceived priorities/needs, which may not necessarily be aligned to the market demand. Applications for sponsorship are therefore largely driven by the applicant's request rather than a clearly assessed market need. Students are choosing careers without any advice of the future openings or potential job opportunities. Government sponsorship to private institutions is also not based on assessed needs, but guided by the department's perceived priorities/needs.

The above points may result in a mismatch with skills demanded in the market. It is however pleasing to note that this concern is being addressed, and work is already afoot to develop a National Skills Map. Once developed and in place, the various sectoral HRD plans will be used to develop a composite National plan.

Therefore;

- There is no readily available information on the skills map for the country.
- The unit cost of training is lower at public institutions compared to private institutions. This is despite the observation made that public institutions are running below capacity.

b. Utilisation of TEIs

Intake is guided by resource availability, such as teachers and classroom capacity.

- Public institutions are generally running below capacity, and therefore not optimally utilised. This is corroborated by information from the Directorate of Technical Vocational Education and Training (DTVET), which is reported below.
- There is discrepancy among the educational institutions; for example, students cannot transfer their credit hours between institutions.
- On another note, there are Colleges of Education that are affiliated to the University of Botswana. Despite such affiliation, students cannot progress into the UB structure/ programs except into a specially designed program to accommodate them. Therefore, the affiliation does not appear to be taken into account in the design of curriculum.
- Service providers are rapidly growing in number, and though the government has established organisations to monitor compliance and ensure they offer registered and accredited courses, there are still some gaps.
- A number of the institutions operate below capacity, with the total average utilisation rate of 61.5 percent. Eighteen percent of them are below 50 percent utilisation, 33 percent below 60, and 42 percent below 70, while 40 percent are above 80 percent utilisation.
- Some institutions do not have adequate facilities, such as a research department. This causes a major problem, and ultimately affects the quality of education received.
- Currently credit transfer is only possible within DTVET institutions.
- Students are selected on the basis of their grades and then those shortlisted get interviewed.

Table 12: Tertiary Education Outputs over Three Years (DTVET)

Trade	Year of Graduation			Total
	2012	2013	2014	
Auto Electrical	37	25	17	79
Auto Mechanic	107	153	108	368
Borehole Mechanic	12	-	18	30
Electrician	60	80	-	140
Instrumentation Mechanic	18	12	14	44
Fitter Machinist	4	5	1	10
Maintenance Fitter	50	29	48	127
Refrigeration & Air-conditioning	10	17	12	39
Plumbing	35	85	31	151
Welder/Fabricator	47	57	30	134
Heavy Plant	30	33	29	92
Carpentry & Joinery	44	52	28	124
Total	454	548	336	1 338

Source: DTVET Reports

The highest number of graduates are in Auto Mechanics (368), followed by Plumbing (151), Electricians (140), then Fabrication and Welding (134). While some of these figures may be considered low for the whole Botswana economy, especially considering the fact that they are over a three year period, there is insufficient information about the demand out there to make any conclusive statement. The fluctuation from one year to another may simply be a reflection of the lack of a firm basis for determining intake requirements.

Comparison with Demand. DTVET can work closely with the Sector to ensure that apprentices in the Public Technical Colleges get requisite industry experience during their training, such that more of them can be absorbed upon graduation. Enrolment can also give priority to those skill areas that are critical within the sector, such as more heavy plant mechanics, electricians and instrument technicians, in place of auto mechanics. The same priorities must then inform sponsoring bodies.

The intake of JC school leavers limits the scope of employability since the type of operating environment and equipment used in the sector has increased in complexity over time. Hence, the mines now require Form 5 certificate for operator type positions, in addition to apprentices who have had this requirement for years now.

Refer to section 8.5 below for more discussions on the demand and supply factors.

c. Market Approach by Institutions

Each training institution had its niche area, but most have now moved away from same, largely because of the perceived need in the economy. The effect of this is unnecessary duplication, which is not even informed by empirical data regarding the need in the economy.

d. Orapa Technical College as Benchmark

The Orapa Technical College (OTC) is considered a benchmark technical college, which produces exceptional results, with a 100 percent pass rate over the last 11 years. The College has set itself to supply both the quality and quantity necessary to meet the demand of its clients.

OTC differentiates itself in the following ways:

Entry requirements for the apprenticeship programme are a “D” pass in English, plus credit “C” in Math and Science at O ‘level/Form 5/BGCSE level. Shortlisted candidates then undergo psychometric assessment, and then a panel interview for those who passed the psychometric assessment.

Selected candidates undergo a very well structured four years training programme compromised of the following:

- a. Three months classroom/theoretical instruction
- b. A further three months’ workshop based competency based modular training, conducted by experienced accredited trainers using adequately equipped training workshops.

- c. Six months placement in the various workshops, where apprentices get to learn and develop practical skills while at the same time experiencing “the real world of work”.
- d. Assessments are conducted at the end of every stage, followed by a Trade Advisory Committee review, where each apprentice’s performance and conduct are reported on and discussed, and corrective action committed to. This is a very important quality assurance step.
- e. The above training and assessment process is followed for the four years of apprenticeship training. Eighty percent of the training is practical content, and only 20 percent theory.
- f. At the end of the fourth year, apprentices then undergo a trade test, designed and conducted by properly qualified and experienced officials. A 75 percent pass mark is set for the trade test.
- g. The newly qualified artisan is then placed on the job, for a 12 months period during which they undergo structured development inclusive of coaching and mentorship, in a fully-fledged working environment.
- h. Involvement of line management throughout the above process, from selection through to training and then artisan development stage, not only provides the end-user an opportunity to develop the future artisan in line with work demands and cultivate ownership, it also helps create a working relationship very early on in the artisan’s working life.

Out of a total 683 apprentices who set for NCC in 13 different Technical Colleges in Botswana during 2014, only 341 (50%) passed. A half (171) of these were dressmakers, hairdressers, chefs and other non-mining trades. Only 29 of the remaining 170 who did mining related trades were considered employable within the mining industry. All the 29 employable NCC graduates are from the OTC.

e. BCM and MOESD Partnership

The BCM has entered into a partnership with the Ministry of Education and Skills Development (MOESD) for the use of available capacity within identified public technical colleges to provide apprenticeship training in line with the needs of Botswana Chamber of Mines (BCM) member organisations. This partnership is spelt out in a Memorandum of Understanding, in terms of which BCM uses available capacity within the Francistown Technical College and Botswana College of Engineering Technology in Gaborone.

This is an example of the public and private sector partnership, with many other benefits beyond training of artisans for the BCM. Some of the benefits are:

- i. Utilisation of available training capacity rather than duplicate resources while some un-utilised capacity exists elsewhere.
- ii. Improved utilisation of equipment and facilities. Where these are inadequate there is opportunity for private sector (BCM) support to procure required training equipment.
- iii. Skills and knowledge transfer (cross-pollination) between BCM and Government Staff involved. This in turn creates an opportunity to improve the quality of trainers as well as the standard of training.
- iv. Secondment of high calibre trainers from BCM member institutions such as OTC, in addition to those provided by the German technical cooperation company, GIZ. The

latter is working in partnership with BCM, specifically to provide technical expertise and help raise the standard of artisans trained through this arrangement.

- v. Use of the competency based and outcomes focused training model adopted by OTC. This model has strong practical component, and as a result produces high quality artisans.
- vi. The training provided is directly based on the needs of the end-user, both in terms of numbers and training content.

The BCM initiative sets a compelling example of ways in which the quality and quantity of training can be addressed so as to meet the end-user requirements. More of these opportunities can be explored.

f. The University of Botswana (UB)

UB offers a wide spread of disciplines at various levels of qualification ranging from undergraduate through masters to doctorate levels.

The following table shows MMEWR related programmes offered by UB, their respective duration and level:

Table 13: MMEWR RELATED SUBJECTS CURRENTLY TAUGHT AT UB (2015)

SUBJECT	ENROLLMENT	DURATION OF TRAINING	RELATED CERTIFICATION
1.Mining Engineering	43	5	BEng (Mining Engineering)
2.Mineral Engineering	69	5	BEng (Mineral Engineering)
3.Diploma in Mining Engineering	34	3	Diploma in Mining Engineering
4.Diploma in Mineral Engineering	23	3	Diploma in Mineral Engineering
5. Mechanical Engineering	133	5	BEng (Mechanical Engineering)
6.Electrical Engineering	118	5	BEng (Electrical Engineering)
7.Civil Engineering	140	5	BEng (Civil Engineering)

It was not immediately apparent as to how many of the graduates in fact get employed within this Sector. Feedback from the employers, including those in this Sector however still expresses concern about the readiness level of UB graduates for employment. Recommendations on the way forward to address this are covered in the next chapter.

The actual figures for the last ten years appear on the table below:

Table 14: UB GRADUATION OUTPUT (per programme for past 10 years)

Programme Offered	Length	Annual Throughputs										
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	TOTAL
1. Mining Engineering	5					9	12	10	23	30	23	107
2. Mineral Engineering	5	New programme, the first cohort with graduate in October 2015										
3. Diploma in Mining Engineering	3	15	18	18	19	14	22	23	23	25	16	193
4. Diploma in Mineral Engineering	3										6	6
5. Mechanical Engineering	5	23	11	21	24	17	12	28	21	12	16	185
6. Electrical Engineering	5	53	24	23	24	10	16	17	20	19	11	217
7. Civil Engineering	5	33	31	23	26	20	26	12	20	19	24	234
TOTAL		124	84	85	93	70	88	90	107	105	96	942

Source: University of Botswana

A few points are immediately apparent from the above Table 14;

- There has been a significant output over the years, including in the mining, electrical and mechanical engineering fields, which are commonly employed within the MMEWR Sector. Once again, the number absorbed within the Sector could not be established.
- There are apparent fluctuations in the figures over the years. This pattern obtains within as well as across programmes.
- Electrical and mechanical engineering graduates account for 23 percent and 19.6 percent of the UB graduates over the last ten years, respectively. Mining engineering diploma accounts for 20.5 percent. These figures can really only be meaningfully interpreted against the actual needs of the economy, both quantitatively and qualitatively. Most of these disciplines are in fact also common in other sectors besides MMEWR.

All engineering programmes are considered by UB to be in the scarce skills category.

UB reports their main challenge in their drive to provide relevant skills for MMEWR being;

- Inadequate funding to support laboratory development and staffing
- Inadequate qualified staff to teach the programmes
- Inability of the UB to retain and attract qualified staff
- Low industrial base to support training
- Inadequate industry support, where such industry exists.

Following is BIUST’s College of Engineering and Technology undergraduate summary for the year 2014/2015. What is immediately apparent is that most of the programmes listed are in the relevant area of study for the MMEWR Sector. However, the programme content is very crucial and is considered a key point of alignment with the skills end-users.

Table 15: BIUST College of Engineering Undergraduate Summary 2014/2015

Programme	Year 1	Year 2	Year 3	Total
Computer Engineering	32	10	18	60
Telecommunications Engineering	37	31	39	107
Geological Engineering	46	35	36	117
Energy Engineering	41	30	25	96
Mining Engineering	41	35	27	103
Electrical & Electronics Engineering	36	-	-	-
Mechanical & Aerospace Engineering	43	-	-	-
Mechatronics Engineering	45	-	-	-
Measurement & Instrumentation Engineering	42	-	-	-
Civil and Environmental Engineering	46	-	-	-
Industrial and Manufacturing Engineering	70	-	-	-
TOTAL	479	141	145	765

7.4 Concerns about Quality in the Quantities Supplied.

There is a legitimate concern and alarm at the high failure rate among Primary to High school leavers, with questions raised about the quality of education provided. Doubts have been expressed about the quality of teachers and of teaching, about the adequacy of facilities and resources in general. These concerns are further compounded by the number of unemployed graduates in a market that continues to employ non-citizens across various sectors of the economy. All this raises a question about the quality and therefore employment readiness of products of our education system.

It is logical that employing organisations do not absorb available skills from the market and would rather seek to import because what is available does not meet their needs.

The table below considers the extent to which teachers in our TEIs have the requisite qualifications for this role. If they are to design and implement curricular that is suited to the ever-changing needs of this economy, then they must have the requisite qualification, experience and accreditation.

Table 16: The Extent of Lecturers Qualification, by Institution as at End 2014.

Institution	# Lecturers	# Qualified	Not Qualified	% with Teaching qualification
Gabs Technical College	70	41	29	59
Jwaneng TC	43	24	19	56
Maun TC	64	35	29	55
Palapye TC	59	31	28	53
S/Phikwe TC	55	34	21	62
FCTVE	91	0	91	0
BCET	62	37	25	60
Oodi	53	35	18	66
Totals for TCs	497	237	260	48%
Totals for Brigades	752	212	540	28%
Overall Total	1 249	449	800	36%

Source: DTJET Report 2015

Since a key feature of TVET is the practical component, it is a legitimate expectation that staff members responsible for imparting knowledge and skills must themselves have the requisite credentials for their role. It is therefore a serious concern that only 36 percent of the above lecturers have a teaching qualification, that not even 50 percent of those employed in either Technical Colleges (TCs) or Brigades are qualified for the job.

Only 12 percent of the Lecturers have valid accreditation by Botswana Qualifications Authority (BQA).

Conclusion. The concerns about the quality of outputs from the TEIs are certainly justifiable, given the above revelations.

- a. The enrolment figures do not reflect a clear and consistent link with the skills demanded by end-users.
- b. Graduation outputs are, because of the above, not matching the needs of this Sector. For example, the number of graduates within the engineering grouping indicates more certificate and diploma holders than bachelor degree holders.

- c. The concern about employment readiness and about the quality of our TEIs products generally, is considered legitimate given the inadequate levels of resourcing reported above. This situation is even more serious if one takes into account the percentage of lecturers who are not properly qualified and accredited. Only 36 percent of lecturers in the public technical colleges and brigades have a teaching qualification, and only 12 percent have valid BQA registration.

7.5 The Gaps in the Skills Demand and Supply

There is no doubt that there are serious gaps in the skills supply chain. These manifest in numerous ways, with the ultimate effect being the mismatch between skills demand and supply. Such mismatch is likely to worsen as new demands of our developing economy become manifest, while existing demands for skills remain unmet. Gaps have already been identified above throughout the skills value chain, and the following highlights are presented:

- a. **End-users understanding of their needs** – All indications from the available literature and other documents, together with stakeholder interviews are that most end-users do not have full grasp of their skills requirements for the current and more so for the future. It is simply not a straightforward matter to assess skills needs, with the result that even where work force or skills plans are produced, they have to be reviewed annually and quite often significant changes are introduced even between annual reviews. The whole process becomes reactive even where an attempt was made towards proactive advance planning.
- b. **Demand understanding by suppliers** – Supply institutions in the main do not have a robust and deliberate process of soliciting the skills requirements of their target end-users. Even the funding bodies such as DTEF indicate the absence of objective criteria for determining sponsorship requirements and priorities. Some TEIs differentiate themselves through their niche programmes, which invariably get diluted in time, as new programmes are introduced based on perceived demand in the market. Botswana Association of Private Tertiary Education Providers (BAPTEP) corroborated this point.
- c. **Information and knowledge management** – There is an overwhelming cry for credible, current and integrated information/data about the various skills availability variables in our economy. For example, skills demand, TEIs outputs and where they end up, facts and figures about the employment situation, status and trends regarding work permits, knowledge of reports and other documents on skills, and the various skills related studies, plus projects and initiatives obtaining in this small economy sometimes targeting the same stakeholders. This is without doubt another serious gap in the skills value chain.
- d. **Quality of outputs** – A holistic and outcomes based approach to ensuring acceptable levels of quality in the supply institutions was found wanting. Perhaps the most serious gap is in the use of unqualified and un-registered lecturers. Then there is the gap relating to facilities and equipment. These, among others, immediately set the education and training system up for failure.
- e. **Co-ordination and good governance** – We share the observation made by those stakeholders consulted that there is certainly room for improvement in the way

information, standards setting, enforcement and quality assurance, career oriented education, career guidance, curriculum development, entry requirements and selection criteria, as well as supply interventions at various levels and by various organisations are all dealt with. Part of the solution for this is the adoption of a total life cycle approach, in an integrated and dynamic manner.

Yet another crucial point is about ensuring that the various structures are in place and functioning as they are supposed to. It is about relentlessly monitoring and evaluating for effectiveness.

It is also about taking decisive action to remove bottlenecks and creating linkages where warranted. Some of the bottlenecks are said to be at policy level, others in the operationalisation of established standards. An immediate example is the length of time it takes to register a TEI or even for renewals. Another one relates to work permit applications that can take up to six months for a response. It is acknowledged that some improvements are being made in a number of areas. However, their effects are yet to be realised fully.

- f. **Selection criteria** – What became evident during the “current reality assessment” phase of this project is the inconsistencies and varying levels of importance given to the selection for intake into TEIs. Some institutions accept students who did not pass their “pre- qualifying” exams, others such as Debswana demand a certain level of pass in prioritised subjects and then subject candidates to psychometric assessment plus competency based interviews. It makes every sense to ensure that new entrants are in fact enrolled into programmes aligned to their future career, and that they are more likely than not to succeed in their studies and beyond. The system of automatic progression presents a serious challenge to the provision of quality and credible education and training.
- g. **Effective practical input** – The concern about graduates not being employment ready is partly due to the limited practical input most of these have, in preparation for the world of work. The internship programme presents a valuable opportunity to alleviate this gap, so long as it is properly and effectively implemented. There are large numbers of graduates who are finding it difficult to compete effectively in the labour market, while at the same time employers have a serious need to fill vacancies quickly and effectively with well-prepared and motivated citizens.

It is pleasing to note that a model internship programme was recently developed and is available for implementation within this Sector. The goal of this programme is to ensure that the Sector has employable graduates with the necessary attributes, skills and competencies. Its effective implementation would mean that interns actually learn something valuable during their internship, clarify the roles of all parties involved, and provide a quality assurance mechanism.

The full report of this internship model is appended.

- h. **Role clarity** – It is fact that there are many role players in the skills value chain. Some of these are in different government ministries. For example, a different ministry for

work permits, another for the internship scheme, student funding, and HRD planning. Then there are the sector committees responsible for implementing sector HRD Plans. Policy makers must be geared to making enabling policies, and be eager to receive input from interested and affected parties. Finally, there are various end-users who should know best what they need and be prepared to play their part in getting future employees ready for employment even while still undergoing training. To what extent does each of these stakeholders fully comprehend their roles and how they link with other roles, to what extent are they ready to deliver.

7.6 Critical Success Factors and Risks

As we plan for the implementation of the HRD Plan, it is prudent to identify factors likely to impede the process, so they can be mitigated accordingly. (See Table 17).

Table 17: Critical Success Factors, Risks and Mitigation

Critical Success Factor	Risk Description, Impact and Probability	Risk Rating	Action required
Information availability	Information required for planning & execution is not readily available, and is in some cases inconsistent. This gap is likely to continue unless serious action is taken. Information is at the core of HRD Plans.	High	<ul style="list-style-type: none"> • Get the Labour Market Observatory to work as intended. • Integrated information system be implemented, and controls instituted to ensure it is kept updated and accessible.
Funding	The HRD Plan may suffer from inadequate funding, given the number of initiatives to be undertaken, and the number of sectors established.	Medium	<ul style="list-style-type: none"> • HRDC to maintain needs based budget for the sector, however, ultimately the Sector to have its own budget. • Use of the training levy to finance some of the initiatives. • Co-funding of initiatives such as research, by HRDC and the Sector. • Reduce claims turnaround time, so funds can be re-used.
Ownership	There is likelihood of key players not fulfilling their roles post the project phase, resulting in lack of ownership and leadership for delivery by the Sector.	Medium	<ul style="list-style-type: none"> • A sector level secretariat be established and adequately resourced. • Roles and accountabilities of both the Sector and HRDC must be spelt out.
Sustainable implementation	Several sectors are being established within a relatively short time, with the effect of overstressing the HRDC resources needed for take-off, while the Sector Committee is not a full time body that can operationalise the HRD Plan. As a result, there is risk of not driving implementation on a sustainable basis. This is the first for the Sector Committee. For HRDC it is one of the many sectors.	High	<ul style="list-style-type: none"> • Sector HRD planning must be staggered to enable learning from the pilot sectors. • A Sector Secretariat must be established, and performance management framework implemented, and closely reviewed for effectiveness. • Any implementation bottlenecks (including cumbersome procedures) must be removed.
Change management	HRD Planning at National level is a new development, which requires several changes to be effective. It may not become “core business” for some players, such that they default back into their normal core functions. There is likelihood of inadequate change management.	High	A deliberate change management intervention must be instituted as part of the implementation process, to create momentum for change.

8. INDICATIVE SKILLS PLAN

As we consider ways of meeting the skills requirements of the end users, it is acknowledged that there are three main sources of skills, namely the labour market, TEIs and In-house supply. The ability to recruit from the labour market is a function of both availability of the required skill, and the prospective employer's ability to attract and therefore recruit that skill amid the prevailing market forces. This places the spotlight on employer organisations to ensure that their ability to recruit from the market is sufficiently competitive.

In terms of the supply from TEIs, there is a shared responsibility. On one hand, the supply institutions must ensure they produce in line with the end-user requirements. On the other is the end-user, who must fully understand their skills needs and avail the information in time to the supply institutions. Finally, this partnership must also be apparent during the training phase, including in the provision of practical input from the world of work.

In-house supply of skills falls squarely on the employer organisation. Furthermore, it is informed by the assessed requirements for skills. Its focus is mainly on current staff and new recruits into the organisation. It normally takes the form of short courses, or institution based training of a relatively short period not exceeding 12 months, and or on-the-job training.

A number of organisations within the sector provide in-house training for skills categories such as plant operators and machine operators. These have to undergo the full length of training to acquire the requisite skills, and then for progression into high levels of the operator career path. Such skills are not available in the market, making internal planning and training critical. Planning for such skills is relatively easier as all the variables involved can readily be determined and assessed. An additional advantage is that such training takes a relatively short time period. Affected end-user organisations must therefore properly plan and then provide for such in-house training.

Recommendations in respect of these three sources are offered in the next section.

As a general principle three broad reasons for categories of training and development can be identified;

- a. **Current role** – This is where training and development address those needs identified for one to be effective in their current role. For example, for performance improvement, to keep abreast with developments or as part of skills transfer. The latter is common where external resources were involved in some kind of project work.
- b. **New role** – This is about someone being prepared for a new appointment into a new role, such as through promotion, progression of skill or transfer. This would commonly occur as part of succession planning (including localisation) or organisational restructuring. Examples include graduate development, training of successors, often necessitated by the drive for business continuity, and a staff member who is appointed on a developmental position with the understanding that they will transit into their target substantive one. It would also apply in the case of redeployment where some top-up skills are required.

- c. **New requirements** – Here the need emanates from new requirements such as changes in technology, work systems, working methods, or quality standards that are introduced. For example, the acquisition of new hauling trucks may necessitate training of existing operators to meet the skills requirements of the new trucks.

Below is an indicative list of skills required, categorised into critical/core business skills, scarce skills and support skills. (Table 18). These are the skills required for the current business operations as well as planned future developments. They can form the focus for TEIs and sponsoring bodies, and be reflected in their training intake.

Table 18: Indicative Skills Requirements

Qualification Level	Critical Business Skills	Scarce Skills	Support Skills
Degree	<ul style="list-style-type: none"> • Geology • Engineering • Engineering (mechanical, electrical, water) • Mining Engineering • Chemical Engineering • Process management • Software engineering • C & I Engineering • Telecommunication Engineer • Environmental Science 	<ul style="list-style-type: none"> • Geology • Engineering • Water Engineering • System and Process Design • Geotechnical • Occupational Health and Safety • Information Technology • Organisation Design 	<ul style="list-style-type: none"> • Survey • Accounting • Human Resources Management • Medical • Security • Laboratory Science • Physiotherapy • Occupational Therapy • Risk Management • Auditing • Communication & Marketing
Diploma	<ul style="list-style-type: none"> • Mining & Process Foremanship • Artisans • Instrument Technician • Health and Safety • Materials Management • Computer Technology • Telemetry • Drilling and blasting 	<ul style="list-style-type: none"> • Occupational Health and Safety • Instrument Technician • Ventilation Technician • Drilling Technician • Millwright • Rigging • Coded Welding 	<ul style="list-style-type: none"> • Security • Planning • Draughtsmanship • Nursing • Accounting • Human Resources • Laboratory Technology
Certificate	<ul style="list-style-type: none"> • Engineering Semi Skilled • Plant Operating • Driver Operating • Logistics Advisory 	<ul style="list-style-type: none"> • SAP Specialist 	<ul style="list-style-type: none"> • Firemanship • Clerical

Table 19 below provides indicative numbers of skills required.

In keeping with the LMIA approach, these are indicative numbers rather than a quantitative labour forecast. It is therefore not possible to make a projection of the numbers required over a period of years. This is also partly because a sampling approach was adopted during the data gathering stage, such that we do not have information on all employing organisations within the Sector. However, these figures will be useful in considering priorities for training.

In light of the above points, it is recommended that,

- A separate exercise be embarked upon to help employing organisations determine their skills forecast for the target period, and then avail the forecast for use by the Sector Committee.
- Such exercise must target all organisations within the sector, rather than use a sample.
- The benefits of such an initiative include being able to solicit the required information in a systematic and comprehensive manner as well as standardise on the job titles used, and thereby form the basis for the integrated information management system recommended in the next chapter.

Input from Statistics Botswana should be solicited to ensure that the resultant information meets end-user requirements, as well as matches international standards to enable the necessary comparisons and analysis.

It would further be vital going forward to refresh the forecast annually until the process of determining skills requirements becomes more refined. This would also inform the actual numbers to be trained, including reasonable projections over a couple of years. However, given the volatility of skills requirements in a dynamic business environment, it is to be expected that the numbers will be subject to change every now and then. Hence the need for regular updating, although on a less frequent basis once the situation has stabilised, or the LMIA approach is fully embraced.

8.1 Indicative Skills Forecast

The following points are noted regarding the indicative numbers stated in Table 19 below:

- These are indicative quantitative skills requirements, rather than absolute figures.
- The list is based on a sample of organisations, as not all were targeted in terms of the project scope.
- Only the skilled level positions are covered while semi-skilled and below levels are left out. In terms of qualifications, the positions covered require diploma level qualification and above.
- All three categories of critical skills, scarce skills and support skills are included.
- The figures reflect the discipline rather than job level
- Training positions have been excluded
- Some figures appear rather small even for the sample used. This may be a reflection of the alternative sources of skills used, such as in sourcing or use of other types of contracted services.

Table 19: Indicative Numbers Required (Skilled Levels)

Skills Area	Indicative Numbers		
	2015	2020	2025
1. Geology (includes Geotechnical Engineering)	78	78	78
2. Engineering (mechanical, electrical, water, Controls & Instrumentation)	531	535	535
3. Mining	123	138	140
4. Process management	77	83	83
5. Chemical Engineering	116	116	116
6. Production Management	45	45	45
7. Information Technology	141	145	145
8. Occupational Health, Safety and Environment	170	170	170
9. Survey	10	10	10
10. Human Resources Management	300	300	300
11. Organisational Development	8	8	8
12. Accounting	228	228	228
13. Audit	21	21	21
14. Project Management	25	26	26
15. Materials Management	224	224	224
16. Medical	203	253	253
17. Nursing	159	159	159
18. Laboratory Science	42	42	42
19. Security & Risk Management	315	315	315
20. Communication & Marketing	30	30	30
21. Draughtsmanship	8	10	10
22. Heavy Plant Mechanic	85	105	106
23. Planning	22	24	25
24. Electrician	385	395	396
25. Rigging	10	15	15
26. Instrument Technician	203	208	210
27. Ventilation Technician	4	6	6
28. Auto Electrician	8	14	14
29. Fitting	511	548	550
30. Coded Welding	4	6	6
31. Auto Mechanic	15	25	25
32. Fabrication/Welding	226	244	246

Considerations Made:

The following considerations guided the figures in the above forecast, based on available information:

- The prevailing economic conditions will continue to place pressure on this Sector to contain and where possible reduce labour costs. As a result, the net skills numbers increase due to strategic projects will be lower than would have otherwise been expected. For example, strategic plan implementation for Botash, BCL (POLARIS II), Debswana (RDP), Morupule expansion, Energy Supply Strategies, and water Master Plan Implementation.
- Debswana projects will increasingly be delivered in-house, and 'Cut 8' to be insourced in 2018.
- Jwaneng mine open pit life extended to 2038, which is outside the current forecast period.
- Khoemacau will resume production within the next five years. This accounts for a significant amount of the changes reflected under 2020 and beyond, in the production related disciplines.
- Khoemacau has taken over Discovery Metals (Boseto), and has considered this in its 2016 – 2020 skills forecast.
- Mupani mine has closed down.
- The current drive to increase energy supply, including renewable energy drive plus the operation of 'independent power suppliers', are expected to result in more skills required. However, no provision has been made for this, as there was no information to guide the forecast.
- Implementation of the 'Water Master Plan' is expected to require more skills. However, no provision has been made for this, as there was no information to guide the forecast.

9. RECOMMENDED STRATEGIES

The table below contains the key strategic issues that have been identified and prioritised from the long list of issues and opportunities for improvement within HRD planning as it affects this Sector in particular. These recommendations are grouped into two time horizons in the Technical Report recommended Strategies, those that can and must be implemented within the immediate to short term period of 12 months, and those whose implementation may require more time, but must be implemented within 36 months. The focus in this plan is primarily on the short-term strategies.

It is expected that the Sector Committee as the key custodian of the Sector plan and main implementing agent, will drive implementation going forward. The ultimate goal is to promote skills availability for the Sector's various end-users.

Table 20: Recommended Initiatives and Indicators per Strategies

No	Initiatives	Indicators	Parties
Strategic Area 1: Demand anchored supply of skills			
Rationale: <i>The end –user skills requirements are not matched by supply, resulting in reported skills shortages by employing organisations against the background of growing unemployment. This challenge cuts across all job levels from semi-skilled through to professional and leadership levels. Therefore, there is need to ensure TEIs and sponsoring bodies are informed by the needs and priorities of end-users.</i>			
1.1	<ul style="list-style-type: none"> a. Skills demand and priorities must be used as first point of reference when deciding supply intake and sponsorships b. TEIs ensure programmes are of right standard and BQA quality assured c. Regularly update the scarce and critical skills list for use to prioritise supply by suppliers and for work permits d. Public TCs adopt a comprehensive training system with strong practical component, benchmarked with private TCs. OTC and BCL be considered as case studies 	<ul style="list-style-type: none"> a. Percentage TEIs outputs employed within the Sector b. Percentage programmes quality assured post accreditation. c. Up-to-date scarce and critical skills list submitted to HRDC regularly d. Scarce and critical skills given priority by TEIs and for HRD Funding. e. Scarce and critical skills given priority for work permit purposes. f. Percentage TCs outputs employed within the Sector. 	<ul style="list-style-type: none"> a. Sector members/ TEIs/ HRDC b. TEIs & BQA c. Sector members/ HRDC d. HRDC/ BQA
1.2	<ul style="list-style-type: none"> a. Factors impacting TEIs graduates employment readiness be identified and resolved. b. Work readiness skills be inculcated into pre-tertiary school curricular onwards, and assessed during industry placement 	<ul style="list-style-type: none"> a. Percentage of graduates employment ready within the sector 	BQA/HRDC /Sector members

No	Initiatives	Indicators	Parties
Strategic Area 2: Quality Outputs from TEIs			
Rationale: <i>There are serious concerns about the quality of outputs from supply institutions from primary through secondary to tertiary institutions level. Factors such as teachers/lecturers credentials, facilities and equipment have been found wanting. This in turn affects the employability of graduates, and points to an urgent need to scope the factors involved and to resolve them.</i>			
2.1	<ul style="list-style-type: none"> a. BQA initiate an audit to quantify QA status (lecturer credentials, leadership, QA structures, facilities & equipment,) with Sector Committees involvement, & institute remedial action. b. BQA implements a ranking system for institutions. The system be linked to international ranking standards. c. Quality assurance (QA) bodies augment their resources through in sourcing from the market. d. An independent investigation of processes involved in registration, accreditation, work permit applications, internships and tertiary education funding is undertaken to remove all bottlenecks, and results are implemented. 	<ul style="list-style-type: none"> a. Implement targeted interventions to upgrade TEIs Lecturers/Teachers who are not fully qualified. b. Ranking register for institutions c. QA bodies adequately resourced and achieving their mandate d. Reduced turnaround time for funding, levy claims, registrations, accreditations and applications affecting skills supply. 	HRDC/ BQA
2.2	<ul style="list-style-type: none"> a. TEIs implement targeted training interventions to ensure all teachers/lecturers are qualified in accordance with adopted international best practice. MOESD to facilitate. 	<ul style="list-style-type: none"> a. Percentage teachers/lecturers qualified and registered 	BQA/HRDC
2.3	<ul style="list-style-type: none"> a. MOESD to implement measures to improve Primary and Secondary level education output quality, and career oriented curriculum. b. Criterion based progression system be introduced, with remedial support for those who fail. 	<ul style="list-style-type: none"> a. Pass rates at primary and secondary education levels b. Percentage of TEI level candidates who meet entry requirements. 	HRDC
Strategic Area 3: Availability of credible information			
Rationale: <i>Information required for HRD Planning is not readily available, and where it is available it is often dated and in some cases inconsistent. This affects the credibility of the planning process and outcomes, and other national initiatives, such as establishment of businesses, which require</i>			

No	Initiatives	Indicators	Parties
information on skills. There is also no single source of skills information. Therefore a determined action is urgently needed to avail information in a comprehensive, systematic and timely manner.			
3.1	<ul style="list-style-type: none"> a. An integrated skills information system be put in place, to ensure availability of credible labour market and skills supply information. Get the Labour Market Observatory to work as intended. b. Sector Committees through HRDC submit skills requirements periodically c. Skills returns be institutionalised and submitted as part of annual returns to organisations such as BURS, with incentives for compliance d. BQA must maintain a credible students database, linked to HRDC job seekers database, and accessible by students and potential employers. e. A database of “retirees with special expertise” be maintained 	<ul style="list-style-type: none"> a. Availability of credible and integrated information on skills demand and supply. b. Reported satisfaction with information availability and quality, by various users. c. An integrated information system is put in place to maintain database relating to labour /skills market and education & training. HRDC has custody of such system. d. Increased Work permits applications success rate e. Availability of expertise to serve as mentors, coaches and undertake special projects. 	HRDC/BQA/ Sector Members
3.2	<ul style="list-style-type: none"> a. HRDC enters into an MOU with Statistics Botswana for latter to provide more current and credible information and national reports on a centralised basis. b. Tracer studies and labour status studies be undertaken regularly, in collaboration with Statistics Botswana 	<ul style="list-style-type: none"> a. Operational MOU signed between HRDC and Statistics Botswana. b. Availability of requisite information 	HRDC
Strategic Area 4: Effective implementation structure			
Rationale: Sector based HRD Planning is a new development in this country, and the Sector Committee as the implementing agent will need to develop its capacity to effectively carry out its mandate on a sustainable basis. Similarly, HRDC’s capacity to provide technical support and facilitate implementation across the various Sectors in operation will be tested. A proactive step is needed to establish a suitable implementation structure.			
4.1	<ul style="list-style-type: none"> a. Sector Committee be adequately resourced for effective and sustainable implementation of the HRD Plan b. MMEWR Sector Committee establishes secretariat to deal with sector issues on full time 	<ul style="list-style-type: none"> a. Sector Secretariat established and fully functioning b. Availability of implementation standards. c. Adherence to implementation plan 	Sector Committee/ HRDC

No	Initiatives	Indicators	Parties
	<p>basis. The secretariat becomes the “Chamber of the Sector”.</p> <p>c. Right calibre HRDC resources are seconded to the Sector, accountable to the designated Sector Manager</p> <p>d. Implementation standards be developed/adopted.</p>		
4.2	a. Change management is effectively implemented. Risks are timely identified and mitigated.	a. Proactive identification and mitigation of any risks to the implementation process	Sector Committee
4.3	<p>a. Use an effective scorecard framework to strategically manage implementation.</p> <p>b. HRD Plans implementation must be closely monitored & evaluated for effectiveness.</p>	a. Attainment of the plan (percentage)	Sector committee
<p>Strategic Area 5: Effective people management</p>			
<p>Rationale: HRD Planning is all about ensuring availability of required skills, and this is affected by many other factors such as those concerning the management of people in employment. Thus, an effective plan may not yield expected results unless factors such those concerning the attraction, development and retention of skills. These must be dully addressed.</p>			
5.1	<p>a. A sector-wide survey is conducted to establish good practices for skills attraction and retention, across the employee life cycle. The results provide reliable information on factors affecting skills availability, as well as a baseline.</p> <p>b. Conduct regular external audits of implementation process, and implement results</p>	<p>a. Availability of survey results.</p> <p>b. Audit results</p>	Sector Committee
5.2	a. Key people management indicators are established and monitored at sector level	a. Regular reporting on key people management indicators	Sector Committee
5.3	a. HRDC and VTF refunds includes skills audits, needs assessments, strategies and other key initiatives directly contributing towards quality of skills supply.	<p>a. A comprehensive refund system in place</p> <p>b. Refunds paid within shorter time period and ultimately within a day.</p>	HRDC

No	Initiatives	Indicators	Parties
	b. Refunds are processed within a shorter time period to enable re-use of funds		
5.4	a. The Sector Model Internship Programme must be fully adopted by the current DNIP Directorship and implemented within the Sector.	a. Model Internship programme implementation within the sector (percentage of organisations implementing). b. Graduates employment rate	HRDC/ Sector Committee
Strategic Area 6: Effective Partnerships			
Rationale: Various stakeholders are involved in the skills availability drive. These range from government Ministries and Departments, public and private training providers, sector member organisations, to other sectors and skills end-users. Effective partnerships among the various stakeholders are critical for success in the Nationwide HRD Planning drive.			
6.1	a. Roles of various players including Sector Committee and Government Departments be clearly streamlined, and understood by the stakeholders	a. Role clarity and effectiveness	Sector Committee/ HRDC
6.2	a. TEIs to partner with industry to enhance graduate employability. This includes; - Joint program development - Industry based mentors	a. Availability of Industry based mentors for targeted students while on their study programme.	Sector Committee / HRDC
	b. Provide career guidance to inform career choices made and align latter with industry needs. This also serves to market the Sector as a major employer.	a. Skills needs of the Sector matched with TEI students career choices.	HRDC/ Sector Committee
6.3	a. Collaborative initiatives (e.g. with Ministry of Health) be undertaken to promote employee health and wellness, and ultimately skills productivity	a. Sustained employee productivity	Sector Committee
6.4	a. Collaborative approach be adopted to ensure availability of critical infrastructure, such as ICT and training and education, to create enabling business environment	a. Availability of critical infrastructure	HRDC/ Sector Committee
6.5	a. Engender active participation by the three sub-sectors in sector level activities.	a. Delivery of sector level goals, by each sub-sector	Sector Committee
6.6	a. Develop research capacity to facilitate skills planning.	a. Availability of critical skills planning information b. Sector co-funded research	HRDC / Sector Committee

No	Initiatives	Indicators	Parties
6.7	<ul style="list-style-type: none"> a. Implement 'unemployed graduate development programme' jointly with HRDC, targeting critical and scarce skills. b. A grant be set up for use by employers who provide development for unemployed graduates as per above. This could initially be funded from training levy. 	<ul style="list-style-type: none"> a. Number of unemployed graduates finding employment b. Availability of unemployed graduates development grant. 	Sector Committee / HRDC

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