



LABOUR MARKET
INTELLIGENCE PARTNERSHIP

International comparative analysis of skills planning indicator systems across national contexts

Cuen Sharrock and Sybil Chabane

LMIP REPORT 12
2015

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Palladian Consulting and KNC & Associates



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This report is published in 2015 by the Labour Market Intelligence Partnership (LMIP), a research consortium led by the Human Sciences Research Council (HSRC), and funded by the Department of Higher Education and Training (DHET).

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Designed, typeset and proofread by COMPRESS.dsl
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ABBREVIATIONS AND ACRONYMS

ABET	Adult Basic Education and Training
ABS	Australian Bureau of Statistics
ANZSIC	Australian and New Zealand Standard Industrial Classification
ATAR	Australian Tertiary Admission Rank
AWPA	Australian Workforce and Productivity Agency
Cedefop	European Centre for the Development of Vocational Training
DEEWR	Department of Education, Employment and Workplace Relations
DHET	Department of Higher Education and Training
DoL	Department of Labour
DWCP	Decent Work Country Programme
ECD	early childhood development
EDD	Employment Development Department
EPS	Employer Perspectives Study
ERINI	Economic Research Institute of Northern Ireland
ESA	Employment Service Area
ESS	Employer Skills Survey
EU	European Union
EURES	European Job Mobility Portal
Eurostat	Statistical Office of the European Union
EVRR	European Vacancy and Recruitment Report
FDI	foreign direct investment
FET	Further Education and Training
GDP	gross domestic product
HE	Higher Education
HRD	Human Resources Development
HRDS-SA	Human Resources Development Strategy for South Africa
HTF	Hard to Fill
ICT	Information and Communications Technology
ILO	International Labour Organization
ISCED	International Standard Classification of Education
JSA	Job Services Australia
KILM	Key Indicators of the Labour Market
LAUS	Local Area Unemployment Statistics
LFR	Labour Force Region
LFS	Labour Force Survey

LMI	Labour Market Information
LMIA	Labour Market Information Analysis System
LMIP	Labour Market Intelligence Partnership
LMIP	Labour Market Information Portal – Australia
LMIS	Labour Market Information System
MoA	memorandum of agreement
MoU	memorandum of understanding
MSA	Metropolitan Statistical Areas
NEET	Not in Employment, Education or Training
NILS	National Institute of Labour Studies
NISR	National Institute of Statistics Rwanda
NOMIS	Office for National Statistics
NSDS	National Skills Development Strategy
NYCLMIS	New York City Labour Market Information System
NZ	New Zealand
OECD	Organisation for Economic Co-operation and Development
PES	Public Employment Services
PISA	Programme for International Student Assessment
R&D	research and development
SALMP	Small Area Labour Market Publication
SERA	Survey of Employers who have Recently Advertised
SETA	Sector Education and Training Authority
SME	small and medium enterprise
SMMEs	small, medium and micro enterprises
SOSD	Sectoral and Occupational Studies Division
SSC	Sector Skills Council
SSFR	Social Security Fund of Rwanda
SSP	Sector Skills Plan
SSV	Skills Shortage Vacancy
StatsSA	Statistics South Africa
TVET	Technical and Vocational Education and Training
UIF	Unemployment Insurance Fund
UK	United Kingdom
UKCES	UK Commission for Employment and Skills
USA	United States of America
VET	Vocational Education and Training
WDA	Workforce Development Authority

PREFACE

The 2009 South African government administration, informed by a results-focused philosophy, identified 12 priority outcomes for the country. Government departments are committed to a ‘joined-up’ approach to deliver on each of the outcomes. Outcome 5 refers to ‘a skilled and capable workforce to support an inclusive growth path’, and the delivery of this outcome is being led by the Minister of Higher Education and Training.

Delivery Agreement 5 consists of three parts, with Output 5.1 committing the Department of Higher Education and Training (DHET) to establish a credible mechanism for skills planning, in collaboration with 20 national and provincial ministries. The DHET commissioned the Human Sciences Research Council (HSRC) to support the DHET in establishing a credible institutional mechanism for skills planning (Memorandum of Agreement between the DHET and the HSRC, February 2012).

To inform the architecture of the skills planning mechanism, the following reports have been written:

- Marcus Powell & Vijay Reddy (2014) *An Architecture for Skills Planning: Lessons and Options for Reform in South Africa*, Report 9
- Marcus Powell & Vijay Reddy (2014) *Roadmap for the Implementation of a Skills Planning Unit*, Report 10
- Marcus Powell, Vijay Reddy & Andrew Paterson (2014) *Approaches and Methods for Understanding What Occupations Are in High Demand and Recommendations for Moving Forward in South Africa*, Report 11
- Cuen Sharrock & Sybil Chabane (2015) *International Comparative Analysis of Skills Planning Indicator Systems across National Contexts*, Report 12
- Vijay Reddy & Marcus Powell (2015) *Indicators and Data to Support Skills Planning in South Africa*, Report 13
- Andrew Paterson, Mariette Visser, Fabian Arends, Menzi Mthethwa, Thembinkosi Twalo & Titus Nampala (2015) *High Level Audit of Administrative Datasets*, Report 14
- Fabian Arends, Sybil Chabane & Andrew Paterson (2015) *Investigating Employer Interaction with the Employment Services of South Africa (ESSA)*, Report 15
- Bongiwe Mncwango (2015) *Public Attitudes Towards Work in South Africa*, Report 16
- Xolani Ngazimbi & Marcus Powell (2015) *Information and Skills Planning for the Workplace: Case Studies of Companies in South Africa*, Report 17
- Lynn Woolfrey (2013) *South African Labour Market Microdata Scoping Study*, Working Paper 2
- Andrew Kerr (2013) *Understanding Labour Demand in South Africa and the Importance of Data Sources*, Working Paper 5

1. INTRODUCTION

A 'labour market indicator' is a statistical measure representing a piece of labour market information. Therefore, the analysis of international labour market indicator systems needs to begin with an understanding of labour market information. The International Labour Organization (ILO) defines 'labour market information' as:

Any information concerning the size and composition of the labour market or any part of the labour market, the way it or any part of it functions, its problems, the opportunities which may be available to it, and the employment-related intentions or aspirations of those who are part of it. (ILO 1999: 8)

This is a very broad term if one considers the large number of potential subjects and activities that would fall under this definition. Therefore, if labour market information represents such a broad scope in terms of content, the potential set of labour market indicators to measure that information is equally broad. As a result, a set of indicators in a planning and monitoring system would be a subset of all potential labour market indicators, and these indicators would be selected according to a set of priorities underlying the system. In other words, each subset of information drawn out of the labour market by a given planning and monitoring system would be influenced by the agenda of the controlling body. The policy focus of government, for example, will define the priorities and objectives surrounding what needs to be measured and, therefore, all indicators, data-collection methodologies and similar structures will be defined by it.

Within the context of South Africa, the Labour Market Intelligence Partnership (LMIP), initiated by the Department of Higher Education and Training (DHET), has identified as one of its objectives the creation of a 'credible mechanism for skills planning' in order to support policy planning and decision-making. There are two key aspects to this objective of the DHET. Firstly, the policy focus is on skills planning, meaning that the indicators selected need to provide the information required to support policy and decision-making within the realm of the supply and demand of skills. Secondly, the LMIP aims to create a mechanism that is 'credible'. It will be useful to unpack what is meant by this in order to guide the process of developing the said mechanism. It is proposed that a credible set of indicators would embody the following attributes:

1. **Consistency.** This refers to the nature of the information provided by the indicators in order to be stable over time. Skills planning includes both short- and long-term horizons; therefore, in order to be effective, the output of the indicator system would need to be consistent.
2. **Accuracy/reliability.** It is important that the information provided by an indicator system be an accurate reflection of the subjects being measured. This, in turn, creates confidence in the reliability of the data that is produced.
3. **Usability.** It is imperative that information that is produced by the LMIP can be linked to decisions and policies relating to skills planning in South Africa. Information that is not used has no value; therefore, the indicators need to be

established in such a way that it is possible to use their outputs for the achievement of the stated goals.

4. **Effectiveness.** This refers to whether or not the indicator system enables the stakeholders to achieve their stated objectives. If the system is consistent, accurate and usable, it will most likely be effective.

This report is one of a number of inputs into a broader selection process to determine the optimal set of indicators for the South African context. The selection of indicators in use within any labour market reflects the local policy priorities where the indicators will be applied. The focus of this study was, therefore, to consider the indicator systems as the primary point of attention rather than how comparable the parent country is with South Africa. In other words, indicator systems were identified in order to highlight an approach or particular policy focus rather than considering economically and contextually comparable countries and what their labour market indicators look like. In this way, the results were not restricted by a preconceived notion of what is possible in South Africa, but rather present a number of potential systems and the rules that underlie them. This input will then be considered in conjunction with other inputs and considerations to define the optimal system that can reasonably be implemented within the South African context.

The report follows an approach of first establishing the local context, followed by a global perspective. The local context is a brief outline of the current and historical approach to skills monitoring in South Africa. This is done so as to better understand what the starting point for the development process will be. The global perspective, on the other hand, examines the parameters of indicator systems that are currently being implemented internationally. These parameters form the framework for deciding on the nature of the indicator system in South Africa.

The purpose of the section on indicators, for example, is not to create an exhaustive list of indicators, but rather to provide indicators that are

illustrative of the various research foci and the associated policies of the systems of which they are a part. The methodology of this study relied on information in the public domain, so it is not always clear how indicators are defined, unless they are explicitly published. As a result, the identified indicators are grouped into themes and represent common measures that are used for the purposes of monitoring, evaluation and skills planning.

It is important to note that there is no universally accepted set of indicators. Rather, there are only ideal sets of indicators for a variety of contexts and objectives. Therefore, the overriding objective of this report is to assist policy-makers in articulating the parameters of an indicator system with the purpose of asking the right questions so that the resulting labour market intelligence provides the right answers.

Approach and methodology

It has been established that the analysis of labour market information does not occur in a vacuum. South Africa has its own history of the use of indicators for supporting skills planning and that context needs to be used as a lens in order to assess the international examples that are presented.

As mentioned previously, the examples from international labour market indicator systems are provided to highlight key themes and represent points for consideration. The analysis aims to be neither exhaustive nor in-depth, but rather provides a high-level examination of a variety of indicator contexts in order to determine the key parameters for selection and how they are affected by the context. The identified examples may not be immediately compatible with the current circumstances prevailing within the South African context, but lessons are drawn from both advanced and less developed systems to inform the choices that can eventually be made regarding the most desirable system for our local conditions.

The methodology for this assignment was based on desktop research and followed two broad approaches. Firstly, the published literature on

labour market information systems and their indicators was analysed and consolidated. Of particular interest were studies in which the development of indicator systems was underway. This meant that the published documents weighed up the pros and cons of the parameters under consideration in South Africa. These lessons, along with the published methodologies of systems that are already being implemented, were consolidated and assimilated into the current analysis.

Secondly, online portals presenting existing labour market information systems were examined. The information on these public websites gave a clear indication of both the nature of the underlying system and the uses to which the information is put. The level of detail provided on the websites varied, but there was always enough to extract themes and lessons that cut across systems and contexts, themes and lessons that will be useful to South Africa. It needs to be noted that only public systems

were included in the analysis and private-data service providers that are available at a fee were not considered.

In searching for comparator countries to South Africa, a key challenge was trying to find sites with sufficient English-language coverage. For example, in the group of newly industrialised countries (including Argentina, Mexico, China, Indonesia, Malaysia, Brazil, India, the Philippines, Thailand, Turkey, Tunisia and Jamaica), there were insufficient instances of English-medium information of sufficient detail to sustain comparison of indicators. Finally, comparative information about the origination, implementation and impact of national skills planning indicator systems was scarce on the Internet. Country websites are primarily concerned with communicating the content of their indicator systems, rather than providing information of a more technical nature about the development of the systems themselves.

2. A BRIEF HISTORY OF LABOUR MARKET INDICATORS IN SOUTH AFRICA

Context

Since the advent of democracy in 1994, the focus of labour market monitoring has been on redress and addressing the structural inequalities that existed historically and which persist to this day. The Department of Labour (DoL) had primary responsibility for planning and oversight of the development of the labour force. This included providing training for unemployed work-seekers and career guidance for school-leavers. The link between labour market information and the provision of training was not very strong. The introduction of the Skills Development Act No. 97 in 1998 brought about a change in focus, with a greater emphasis being placed on demand-led skills development. The aim was to ensure that investments made in skills development were directed at areas where beneficiaries would be more likely to be placed in employment, as they would meet the needs of employers. This shift placed a greater onus on the DoL and its agencies (Sector Education and Training Authorities (SETAs) and Provincial Labour Centres) to identify and monitor trends in the labour market and the broader economy in order to anticipate where demand for skills was occurring, growing or declining. Labour market planning focused on ensuring alignment between demand for skills and the available supply, while ensuring that designated beneficiaries that were previously marginalised were given priority.

In 2009, a decision was taken to create a new Department of Higher Education and Training, separate from the Basic Education portfolio. One of

the considerations relating to this step was to address the widening gap between institution-based further and higher education and other forms of post-school-based skills formation. By bringing the responsibility for both functions under one ministry, the aim was to ensure alignment of education and training programmes with the needs of employers. From a planning and information standpoint, this brought the data generated by employers through submissions to SETAs and that generated by further and higher education institutions under one authority, with the expectation of improved planning and coordination for the post-school sector.

The use of labour market indicators across the various eras has been an evolution with mixed results. Selected aspects are explored in the following section.

Monitoring the National Skills Development Strategy

Since 1999, the National Skills Development Strategy (NSDS) has been the dominant framework for skills development implementation and monitoring. The original strategy launched in 1999 was made up of five objectives and 12 indicators. SETAs, the entities charged with planning and quality-assuring skills development across the various economic sectors, reported against these indicators on a quarterly basis. The DoL, in turn, would consolidate these submissions and present a national picture of the skills landscape. This would be published annually in a comprehensive report detailing the progress from year to year over the life

of the strategy. The NSDS indicators were not the traditional indicators normally tracked for monitoring the broad labour market. Instead, they reflected the state of the skills development landscape with respect to the particular policy changes that the Skills Development Act sought to effect in the workplace. In that respect, they were akin to project-monitoring instruments, rather than labour market monitoring instruments. The second and third NSDSs have maintained a similar narrow focus.

A separate, complementary report based on a comprehensive labour market analysis was published annually, called *The State of Skills in South Africa*. This was a research report produced by the research arm within the DoL itself. *The State of Skills* sought to analyse changes in the demand and supply of skills within the labour market by:

read[ing] off signals about economic and labour market trends, rather than extracting data from econometric or statistical models. Some of the labour market and economic indicators that have the most relevance to skills development are (DoL 2003):

- employment levels and changes in unemployment (usually analysed by occupation and sector and geographic region)
- educational levels of the labour force (usually analysed over a longer time period)
- wage trends as an indication of demand for, and pricing of, skills
- contributions to gross domestic product of economic sectors (as an indication of the volume of sectoral economic activity that could have implications for employment and skill needs).

Information to feed into this report was drawn from a variety of official and other statistical reports. They included the Quarterly Labour Force Survey and the Quarterly Employment Survey published by Statistics South Africa, census data when available, the October Household Survey (which has since been discontinued), and economic reports of the

South African Reserve Bank, along with any other statistical reports available within the public domain.

These publications of the DoL provided both a high-level context on the state of the labour market, as well as a meso-level assessment on the state of skills development in the workplace. In between, SETAs published five-year Sector Skills Plans (SSPs) that are aligned with the NSDS, with annual updates. The SSPs undertake a detailed analysis of the labour market, similar in scope to *The State of Skills*, but focusing on the particular economic sectors within the SETA's jurisdiction. SETAs present a detailed baseline of the level of demand for skills, indicate the available supply of relevant skills to meet that demand, and highlight areas of scarcity that guide planning for resource allocation over the coming five years. Annual updates provide an opportunity to realign the five-year strategy in response to any changes that may occur in the intervening years.

Fifteen years later, significant changes have occurred in the governance and policy environment. The oversight in respect of SETAs has been transferred to the newly established Department of Higher Education and Training (DHET). SETAs continue to prepare SSPs that are aligned with the NSDS. However, SETAs have greater latitude to identify aspects of the strategy that are priorities within their sectors, to align their operational plans to those priorities, and to report accordingly. This kind of reporting is still at the project level, as many of the indicators track the output of specific types of training programmes (learnerships, internships, etc.). In addition, broader requirements have been introduced in NSDS III (2013), which require SETAs to monitor the impact of their interventions in a more structured way, such as through impact assessments, tracer studies and other longer-term evaluations.

The data generated in the course of implementing these three strategies provides some time series information on the outputs of learnerships, apprenticeships, skills programmes, internships, degrees, and Further Education and Training (FET) qualifications. However, owing to the decentralised collection system, and the variation that exists in the

capacities of SETAs, as well as the reconfiguration of the sectors covered by each SETA every five years, the quality and reliability of the information at sector level cannot be taken for granted.

The Human Resources Development Strategy

In 2001, the DoL and the Department of Education jointly developed a comprehensive Human Resources Development Strategy (HRDS). Its scope was broader than that of the NSDS, although the two could be viewed as complementary, with areas of overlap. The declared mission of that early strategy, called the Human Resources Development Strategy for South Africa: A nation at work for a better life, was:

[t]o maximise the potential of the people of South Africa, through the acquisition of knowledge and skills, to work productively and competitively in order to achieve a rising quality of life for all, and to set in place an operational plan, together with the necessary institutional arrangements, to achieve this. (DoE 2009: 7)

While the primary custodian of the Strategy was the Department of Education, the responsibility for implementation lay with all government departments, nationally and provincially, with municipalities, as well as with other parties outside government.

The indicators for monitoring the Strategy (DoE 2009) were as follows:

Objective 1: Improving the foundations for human development

- Levels of early childhood development (ECD) participation
- Levels of Adult Basic Education and Training (ABET) and literacy participation
- Levels of Adult Education participation
- Levels of General Education participation
- Examination pass rates
- Mathematics and Science results

Objective 2: Improving the supply of skills

- Employment placement rates after completing studies
- Labour migration trends
- Higher Education participation rates
- Higher Education enrolments
- Adult participation in Further and Higher Education
- Participation rates at technical colleges
- Enrolments in Science and Engineering fields

Objective 3: Increasing employer participation in lifelong learning

- Changes in the labour market structure
- New skills requirements
- Skills shortages
- Overall unemployment rates
- Youth unemployment rates
- Current and new training requirements
- Public-sector skills needs
- Small, medium and micro enterprises (SMMEs) sector skills needs
- Skills for social-development initiatives

Objective 4: Supporting employment growth through industrial policies

- Research and development trends
- Science–Industry partnerships
- Emergent economic sectors

Unlike the NSDS indicators, this set of indicators is more consistent with standard measures of macro-level labour market trends internationally. The results of the HRDS arise from the combined contributions of government, private enterprise and non-governmental entities with an interest in human resources development. The indicators reflect the policy concerns of the government, encompassing education indicators from early childhood development to higher education; equally, youth unemployment and the needs of SMMEs are also featured as priorities.

The next instalment of the HRD Strategy was published in 2009. HRDS 2010–2030 seeks to build on the achievements of the first strategy, and to

address some of the limitations identified from the first phase. Thus the HRDS encompasses:

- The National Skills Development Strategy (NSDS) 2005–2010 (including the Scarce Skills List 2007);
- The Basic Education Strategic Plans (ECD, schooling, ABET);
- The Further Education and Training (FET) Strategic Framework;
- The Higher Education (HE) Strategic Framework;
- The Immigration Policy; and
- The HRD Strategy for the Public Sector.

Importantly, the HRDS seeks to bring closer alignment between human resource policy and the broader socio-economic development agenda of government. To that end, the range of indicators was broadened to address a broader range of issues, including health, life expectancy, poverty and inequality. The new Strategy, while more comprehensive, makes for more complex monitoring and evaluation. The increased number of indicators makes it more, not less, difficult to tell one coherent narrative regarding any gains or shortcomings arising from implementation of the policy. Complexity is not in itself a deficiency, provided that it does not lead to a loss of focus on the core priorities. It can be overcome by ensuring that measures are put in place to break down the implementation and reporting to facilitate effective management of results.

Other labour market indicators

National-level indicator datasets have a long history and provide very useful and reliable historical trends dating back several decades. Over time, the methods and structures used for data collection have been adjusted due to new developments and improved knowledge. However, these changes have been well documented and, in some instances, data has been adjusted to facilitate historical monitoring between the different phases.¹ For purposes of labour market analysis, three key data sets are maintained by StatsSA – the national Census, the Quarterly Labour Force Survey and the Quarterly Employment Statistics.

The experience of South Africa with the use and application of indicators is variable. It is important to retain and enhance what is working, while at the same time abandoning what is not suitable or useful for planning and decision-making in the South African context. The lessons learnt from the experience of other countries will be useful if taken in the context of both the policy imperatives prevailing in the South African situation and the resources available to support the effective application of those lessons.

¹ The complete details of such clarification can be found on www.statssa.gov.za.

3. BENCHMARKING INTERNATIONAL SYSTEMS

It was discussed earlier that the amount of labour market information is immense and, consequently, the number of possible indicators for measuring the labour market is large. Therefore, indicators are selected to fulfil a specific purpose, driven by the policy focus of the government implementing the system. These priorities and objectives will impact on indicators, data-collection methodologies and similar structures relating to the collection and use of the information. Similarly, the economic structure and the approach to research and regular data collection will also impact on the nature of indicators selected. This is borne out by a review of indicator systems internationally as depicted in Figure 1 on page 9. For example, the indicator sets selected by Ethiopia and New Zealand are very different based on the fact that the purpose behind them is fundamentally different. In Ethiopia, the goal is to measure the progress of the country towards its stated goal of achieving ‘Decent Work’ for all, whereas in New Zealand, the objective of the indicators is to track occupations where there are labour shortages so that Immigration Services can grant the appropriate visas for foreign labour.

The present chapter aims to highlight the types of indicators that are currently in use globally, and the factors that influence their selection. It is by no means an audit of labour market information systems and their indicators globally, nor is it the intention to unpack any system in its entirety, since the amount of information is too great. Instead, key parameters of indicators are examined in order to create a complete picture of what needs to be considered when developing a set of indicators.

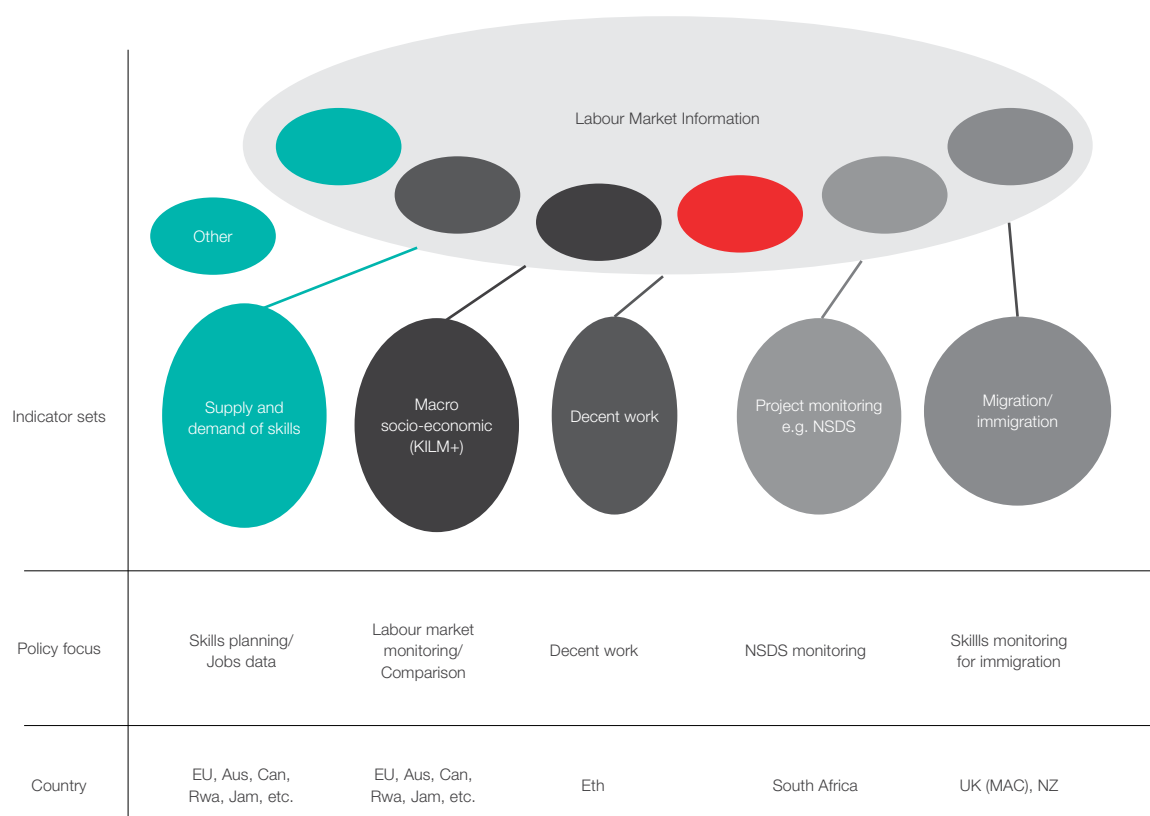
These parameters are:

1. **Approach:** What is the approach to the Labour Market Information System (LMIS) and indicator selection?
2. **Uses:** How is the information used?
3. **Indicators:** Which indicators are included in the system?
4. **Sources:** What are the sources of information?
5. **Geographic disaggregation:** What is the level of geographic detail that the system covers?
6. **Constraints:** What are the constraints to implementation?

Approach to LMIS and indicator selection

Labour markets function through the interaction of workers and employers as they seek to drive economic activity. Historically, as countries sought to enhance economic output, the need to monitor the labour market grew. However, it has already been established that the scope of measurement is as broad as the labour market itself, and investigating the implementation of LMISs globally reflects the nature of the concept. While there are definite areas of overlap between the systems, the practical applications of the systems vary greatly. The final product or output of a series of indicators will reflect the purpose and intention of the stakeholders, the availability of data, and political influences, amongst others. The purpose of this section is to highlight how varied the environment is, and how a thorough understanding of the intended outcomes of the system will determine how the South African system should be structured.

Figure 1: Labour market information and labour market monitoring systems



Broad labour market indicators

At the most fundamental level, countries need to (and almost always do) measure a series of broad labour market indicators. These indicators will be at the macro-level, focusing on various socio-economic variables such as employment, labour participation and unemployment. The primary list of broad labour market indicators is the International Labour Organization's (ILO) Key Indicators of the Labour Market (KILM). The ILO released its first version of the KILM in 1999. It is a set of indicators at the country level that measures 18 key aspects of the labour market. Measurement began in 1980 and extends to the latest available year (ILO, accessed March 2014). The full list of indicators is included as Appendix A. While these are often expanded upon to develop extensive measures of the overarching dynamics of the labour market, one of the greatest benefits is that the wide adoption of the KILM means that country-to-country comparisons are made possible, allowing nations to track themselves against other global players. However, the value of such systems for skills planning is limited, as they

do not specifically deal with the supply and demand of skills.

Rwanda, for example, has an LMIS accessible through a web portal (Rwanda LMIS, accessed March 2014). Their focus is on high-level macro socio-economic indicators, but with more detail than the KILM. Their indicators are grouped into three categories, namely:

- Demographics (Population, Population Growth Rate, Population Density, Labour Force, Life Expectancy, Net Migration Rate, Dependency Ratio, Population Health, Fertility Rate, Rural vs Urban Population);
- Labour Supply (Illiteracy, Primary, Secondary, Tertiary, Technical and Vocational Educational and Training (TVET), Cost of Education, Labour Productivity); and
- Labour Demand (Macroeconomic, Employers (Public, Private, Formal, Informal), Minimum Wage, Private Investments, Public Local Investments, Foreign Direct Investment (FDI))

Singapore has a similar approach, but a far greater scope. Their monitoring is grouped around the following themes (Singapore Ministry of Manpower, accessed March 2014):

- Labour Force;
- Income, Earnings and Wages;
- Employment, Hours Worked and Conditions of Employment;
- Labour Turnover, Redundancy, Job Vacancy and Employment Service;
- Labour Relations;
- Workplace Safety and Health;
- Social Security;
- Higher Education and Skills Training; and
- Key Economic Indicators.

While there are many differences between the systems in Rwanda and Singapore, one of the key differences lies in the sources of information. Rwanda draws all data from government agencies and its Quarterly Labour Force Survey, whereas Singapore has an extensive series of regular research projects to give the country a far broader range of information that is used to develop reports for the various users. The nature and purpose of the research will be discussed further under 'Sources of information' on page 25.

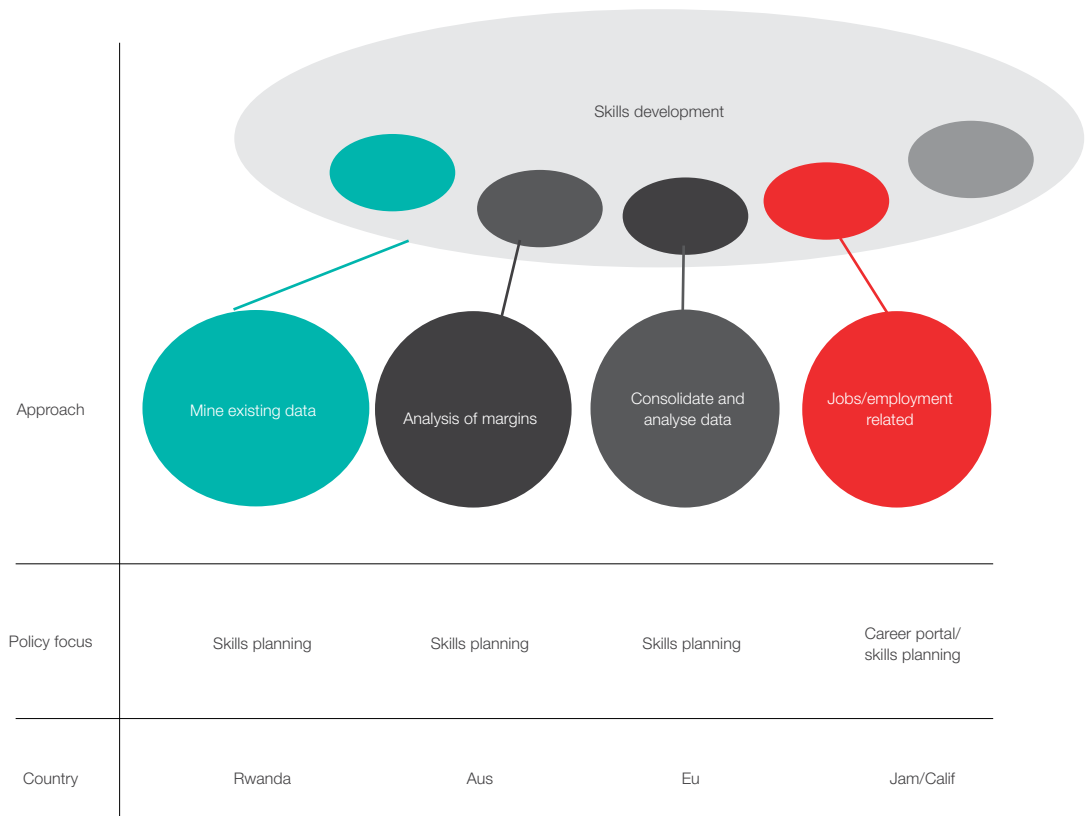
A rather unique approach to the selection of indicators has been adopted by Ethiopia. While the system itself is still in the development stages, the indicators underlying the system have been published. The focus of the entire set of indicators is to measure the concept of Decent Work. The Labour Market Information Analysis System (LMIAS) stems from *The Decent Work Country Program Ethiopia 2009–2012* (Ethiopian Economics Association 2011), which is a framework designed to address country priorities identified by national tripartite constituents. Similar to the monitoring system of the National Skills Development Strategy (NSDS) in South Africa, the government intends to monitor how progress is being made on the stated objectives of the programme. Therefore, the indicators identified for the LMIAS are centred on the definition of what Decent Work is, namely:

- Employment Opportunities (e.g. Employment, Participation Rate, Unemployment);
- Adequate Earnings and Productive Work (e.g. Wages, Working Poor);
- Decent Hours (e.g. Hours Worked, Excessive Hours);
- Combining Work and Family Life (e.g. Maternity Protection, Paternity Leave);
- Work That Should Be Abolished (e.g. Child Labour, Forced Labour);
- Stability and Security of Work (e.g. Number and Wages of Casual/Daily Workers, Employment Protection);
- Equal Opportunity and Treatment (e.g. Occupational Segregation by Sex, Gender, Wage Gap);
- Safe Work Environment (e.g. Occupational Injury Rate, Time Lost Due to Occupational Injuries); and
- Social Security (e.g. Share of Population Aged 65+ Benefiting from Pension, Public Social Security Expenditure as % of GDP).

Monitoring broad labour market indicators is critical for governments to gain insight into the dynamics at play in their respective labour markets, but it does not give a suitable level of information for doing detailed **skills planning**. For example, in a scenario where there is a high level of unemployment but also extensive vacancies that are difficult to fill, a more detailed assessment of **the nature of the skills demanded and supplied** would be required. As a result of these kinds of challenges, monitoring systems have evolved to include a different, more skills-oriented focus. This focus intends to create information that better facilitates the skills planning process.

Possibly the most practical application of accurate information relating to the mismatch between the supply and demand of skills is that of controlling the **migration** of labour. Governments need a basis for approving or denying applications for foreign-worker visas. Ideally, a government aims to import skills to fill gaps but without compromising the local labour market. Therefore, the more accurate the intelligence regarding the skills gaps, the more

Figure 2: Approaches to the measurement of the supply of, and demand for, skills



appropriate the migration of labour will be for the overall labour market. Such is the value of this input that dedicated information systems have been developed in order to gain the required intelligence. Examples include New Zealand’s indicators for migration (Infometrics 2006) and the Migration Advisory Committee’s indicators for skills mismatch in the United Kingdom (Migration Advisory Committee 2008). This reiterates the position that indicator sets are determined by the policies that underlie them. Many of the indicators for the migration of labour relate to the supply and demand of skills and thus will be discussed further in the course of this study.

Skills planning: Supply of, and demand for, skills
The information required to do **skills planning** is complex because the system and forces involved in determining which skills are required and how those skills are formed are complex. In its simplest form, what planners and policy-makers are attempting to

do is *understand the supply of, and demand for, skills so that interventions can be implemented at the points of breakdown, improving the overall efficiency of the labour market*. Figure 2 shows some of the approaches currently implemented worldwide that operate in this space. Through describing and analysing by example how each approach or process works, we are able to reveal how indicators are used to inform or contribute to skills planning.

In December 2009, the **Rwandan** LMIS asked users to detail what they, ideally, would like to gain from the system (Rwanda Development Board 2010). The most significant response was ‘Available and needed skills’. The realisation was that there are many investment decisions surrounding the development of skills and therefore better information is required. The resulting approach adopted by the Rwandan LMIS was to **mine existing sources of information**. These included:

- The Social Security Fund of Rwanda (SSFR);
- The Workforce Development Authority;
- The Technical and Vocational Education and Training (TVET); and
- The National Institute of Statistics Rwanda (NISR).

This methodology successfully produced reports at the occupational level regarding the demand for skills and their current availability. However, there are obvious limitations inherent to this approach. Since the data being used was collected for a purpose other than that of the LMIS, the definitions of fields and upkeep (is the information current and accurate?) were not always ideal. As a result, conclusions would not necessarily be as robust as users may desire them to be. Having said that, the Rwandan experience demonstrates that it is possible to generate intelligence from existing data sources, which is a far cheaper methodology than developing additional dedicated data-collection mechanisms.

The Rwandan example also clearly demonstrates the evolution of labour market monitoring away from KILM-type macro labour market indicators and more towards a skills planning focus. The following examples of indicator systems are drawn from both developed and developing economies. These may currently have limited application to the South African context due to the constraints inherent in our economy. However, optimal approaches to LMIS are determined by what advanced LMISs are able to do so that decision-makers locally can better plan the infrastructure surrounding our own systems.

In **Australia**, the traditional labour market indicators and analysis of the supply of, and demand for, skills are collected by different bodies. The Labour Market Information Portal (LMIP – Australia) is owned by the Department of Education, Employment and Workplace Relations (DEEWR). Its purpose is to provide information for the labour market, the education sectors (basic and higher education), skills development providers and planners, as well as international education and workplace relations. Indicators include unemployment, job seekers, indigenous workers, indigenous unemployment, etc. (Australian LMIP, accessed March 2014).

The collection of information that is focused on the supply of, and demand for, skills in Australia is conducted by the Australian Workforce and Productivity Agency (AWPA), formerly known as Skills Australia. This information on skills needs supports improved policy-making and outcomes through improved participation, productivity and resource efficiency (AWPA, accessed March 2014).

Of particular relevance to this study is the AWPAs approach to measuring skills imbalances. The approach is based on the economic principle that changes at the margins provide a stronger indication of the underlying forces than observing the stock (National Institute of Labour Studies, 2013). The indicators in the AWPAs model were selected based on this principle. What this means for the purposes of monitoring skills is that, instead of monitoring the total supply of, and demand for, skills, the focus is placed where the changes will be seen more sharply. The AWPAs indicators are referred to below in the section on indicators, alongside other indicators. The AWPAs model and an example in practice are included as Appendix B (National Institute of Labour Studies 2013).

A different approach has been adopted by the **European Union (EU)**. The European Commission developed the Skills Panorama as a portal to consolidate all inputs on labour market information and report on all relevant skills-related topics. Research showed that, for a more fluid and efficient labour market in the region, different role players needed to make more informed decisions. However, there was not a singular source for information on skills needs and mismatches. Therefore, the Skills Panorama was created to fulfil this purpose. It is important to note that the Skills Panorama does not produce new data but rather joins together data from different sources and produces new analysis, bridging data from national and European sources, including Eurostat, Cedefop, European Vacancy Monitor, European Sector Skills Councils and Various National Sources (Cedefop 2008).

Information in the Skills Panorama is organised by:

- Countries;
- Sectors;

- Occupations; and
- Skills.

On the face of it, it may appear that the approach of the EU Skills Panorama is not very different from the process undertaken by Rwanda. Both Rwanda and the EU Skills Panorama add value to the skills planning process by compiling and analysing information that is already in existence. The key difference between them is that the nature of the data sources available in the European Union is far more extensive than those available to the Rwandan LMIS. Therefore, with only minor adjustments, the European initiative was able to create a thorough methodology for measuring skills in Europe. It needs to be noted, therefore, that one of the constraints to implementing extensive LMISs for the purposes of skills planning is the existing set of surveys and other projects/methodological approaches utilised to gather targeted data. For example, even though it seems that Singapore does not publish skills indicators, if it were to launch a comprehensive indicator system, its numerous and regular surveys would provide a strong foundation for a robust system to measure the overall supply of, and demand for, skills. Ethiopia, on the other hand, has a number of gaps in the existing labour market information required to support its Decent Work monitoring system and requires additional data-collection mechanisms.

The information required for doing **skills planning** is complex, because the system and forces involved in determining which skills are required and how those skills are formed are complex. In its simplest form, what planners and policy-makers are attempting to do is understand the supply of, and demand for, skills so that interventions can be implemented at the points of breakdown, thereby improving the overall efficiency of the labour market.

Tools for data collection

Regular surveys

The most common structure for collecting skills-related information is scheduling regular surveys to track key indicators. The United Kingdom (UK) has one of the largest and most successful dedicated surveys focusing on skills requirements in the

workplace. The UK Employer Skills Survey (ESS) sits alongside the Employer Perspectives Study (EPS) to produce a pair of surveys that complement each other and are run in alternate years. The ESS is inward-looking and takes a measure of the current skills position and skills needs of the employer.

The 2013 edition of the ESS had two facets:

- Core survey: the main skills survey, covering business strategy, skills gaps and high-performance working (n = 91 279); and
- Investment in training follow-up survey: covering the investment that establishments make in training their staff (n = 13 138).

The UK ESS's sister study, the EPS, collects input from a targeted sample of 15 000 employers across the UK. The survey reveals how employers are satisfying their skills requirements, including engagements with recruitment services as well as their approach to the skills development of their employees. More specifically, the survey looks at how employers conduct their recruitment of employees, how aware they are of skills development initiatives, their use of external training providers, and the use of TVET qualifications and apprentices (UKCES, accessed March 2014).

Labour exchange portal

Another tool that is used frequently as part of an LMIS is the establishment of a labour exchange portal. The portal is a large-scale interface between employers trying to fill vacant posts on the one hand, and job-seekers attempting to find gainful employment on the other. It is an example of an intervention that provides a valuable service for users and creates useful information for skills planning. Provided that the portal has a suitable participation rate, it would be able to produce information that is difficult to obtain through other mechanisms. For example, since it is dealing directly with recruitment, all recruitment-related indicators could be drawn from the labour exchange database. These would include vacancy-related indicators (number of posts advertised, time to fill posts, and identification of Hard to Fill Vacancies), profiling information (are the requirements for a post based on what employers

are asking for?) and supply-related indicators (number and nature of qualifications, skills of job-seekers). Therefore, a labour exchange portal potentially provides value for individuals, employers, and researchers and policy-makers.

It is important to note that the primary activity for some LMISs is a job portal, with data monitoring being a secondary outcome. In these countries (Jamaica for example), there seems to be very little labour market monitoring outside of the employment portal and basic macro-labour market indicators (Jamaica LMIS, accessed March 2014). As discussed previously, the nature and structure of a monitoring system are dependent on the intentions/policy focus of the government.

Job Services Australia (JSA) is an example of a jobs portal that has been integrated into a broader LMIS. It was established on 1 July 2009 and was developed to:

- Provide tailored assistance for job-seekers;
- Provide early assistance for the most disadvantaged job-seekers;
- Meet the skills needs of employers;
- Enhance opportunities for work experience, including work for the DoLe and Green Corps;
- Introduce a more work-like compliance system; and
- Streamline programmes and processes to reduce the burden of administration and red tape, and cut costs for service providers (JSA, accessed March 2014).

The JSA is funded by the government to facilitate the employment and recruitment process and services both job-seekers and employers. Partners also offer personalised support to assist job-seekers to find employment, as well as linking them to relevant government initiatives such as training programmes so that they are able to develop the required skills to find and keep a job.

The information generated by the JSA is used to create a Jobs Outlook website (Jobs Outlook, accessed March 2014). The website is designed as a repository for specific information that assists school learners in their selection of potential

careers, and thus their path of training and education. Detailed job information is presented for over 350 occupations. An example of such an occupation is included as Appendix C. The value this provides for the labour market should not be discounted. In other words, a learner entering the education and training system will make better decisions regarding what to study if he/she knows which jobs will be available to him/her at the time of graduation. Therefore, indicators focusing on the outlook of specific occupations, and which are communicated effectively to users, will improve the efficiency of the labour market.

One of the oldest examples of a government-driven career portal is to be found in **California**. A product of the state Employment Development Department (EDD), the Employment Service is a key component of the delivery system aiming to 'provide universal access to a labour exchange and other services state-wide' (California Labour Market Information, accessed March 2014). The EDD:

- Facilitates the recruitment process by matching employers with job-seekers with the appropriate skills mix;
- Provides services to employers including a web-based system (CalJOBS) that enables employers to advertise jobs directly as well as search, filter and ultimately select individuals from a database; and
- Provides additional services such as job search workshops, case management services, and referral to education, training, and supportive services to client groups with special needs (California Labour Market Information, accessed March 2014).

Owing to the size of the system, it alone has a strong foundation to publish regular, high-level macro labour market statistics for the state of California.

There are a number of examples of similar systems being successfully implemented worldwide (Eures in Europe, the Jamaica LMIS and the UK Career Services Unit). However, the amount of information that is derived from them varies. Regardless of the differences, they all have two features in common:

- The system exists to connect employers and job-seekers; and
- The information is collated and used as labour market intelligence of some kind.

Skills forecasting

One of the key considerations relating to the development of skills is the long lead time that is usually involved. This long lead time creates a complex investment decision, both from the point of view of the individual undergoing education or training and the government/education institution providing it. Therefore, it is a logical extension of the skills planning process to include formalised skills forecasting. Almost all of the formal indicator systems related to skills planning include indicators that examine the nature of the labour market in the future. The methodologies used to estimate future supply of, and demand for, skills vary and include econometric models and Delphi methods. They also use heuristics from occupational data to determine trends and thus make projections on forward-looking labour market indicators. As a result, the subject is raised here as a point of consideration for South Africa.

The Warwick Institute for Employment Research, on behalf of Cedefop, made the following observations in respect of forecasting:

It is not possible to predict the future precisely but everybody can prepare or plan for it;

Individual actors need to make strategic plans and choices and invest in the right areas;

Such plans need to be guided by robust Labour Market Information and Intelligence (LMI), including a forward looking element ...

The work needs to serve a range of audiences, including: stakeholders, social partners, practitioners and individuals – not just policy makers. (Cedefop 2011: 6)

Occupational forecasting models are used in developed economies to predict future skills demand. A study by the Economic Research

Institute of Northern Ireland (ERINI 2008) found that, while mathematical models have become more reliable and accurate over time, the true value of a forecast is that it allows for the data to be interpreted and used by interested parties.

An important consideration is the intended horizon of the forecasting. Different methodologies would be better suited for shorter or longer horizons, and this needs to be factored in when the indicators are selected.

In addition to the occupational forecasting models, some countries are moving towards a sectoral approach to forecasting. This tends to be more effective where the skills development landscape is already organised sectorally by means of Sector Skills Councils (SSCs) or Sector Education and Training Authorities (SETAs). This would include countries such as the UK, Northern Ireland and Australia and will be a relevant methodology for South Africa.

An alternative forecasting methodology would be to analyse the information gained from the labour exchange portals to pick up trends in occupations. The 350 occupations listed on the 'Jobs Outlook' website in Australia, for example, each give users an indication of the future employment prospects for that occupation. Provided that a portal is large enough to be representative of the labour market, there is no reason why this feature cannot also be replicated.

The **European Union** (EU) has expended significant effort on skills forecasting. In 2009, Cedefop released *Skills for Europe's Future: Anticipating Occupational Skill Needs*, which, in turn, influenced *Agenda for New Skills and Jobs*, which is the skills element of the Europe 2020 economic development plan. It emphasises the need to better anticipate and match skills that the labour market needs at an EU level. This is to be carried out in partnership with member states, social partners, employers and education institutions. In addition, the Warwick Institute for Employment Research has developed a framework for forecasting skills needs to be implemented by different states (Warwick Institute for Employment Research 2012).

Table 1 presents the summary of approaches to LMISs and indicators.

Information gaps in access to data for indicator development

In the previous section, ‘Tools for data collection’, sources of data that are frequently employed for skills planning were discussed. These covered survey data, administrative data (e.g. from a government labour exchange), and forecasting techniques. This working paper has exposed significant differences between countries in terms of their access to data for developing indicators. For example, Rwanda uses exclusively government/ administrative data in its LMIS and must focus on innovative ways of mining the available database resources to find variables that are needed to support particular indicators. Indicator system developers encounter information gaps when an indicator is selected, only to discover that the required variables are not available in the national statistical system. The data needs of evolving indicator systems cannot be fully anticipated.

If the gap refers to a straightforward lack of data, possible remedies to this challenge may include:

- Introducing new questions and new variables into existing survey instruments or administrative data requirements;

- Inserting new sections into existing survey instruments on a rotation basis;
- Improved sharing and exchange of official statistical resources through memoranda of understanding (MoUs);
- More effective knowledge about and use of government administrative data;
- Engaging with private-sector labour market intermediaries to share their data; and
- Raising funds to conduct a new survey.

Both existence **and quality of** relevant information are necessary for building indicators. Therefore, the information gap must be understood as a potential quality gap, which could include the data having missing values, or appearing irregularly, or having definitions that are inconsistently applied, or being inaccurate. Where there are real data-quality problems with existing data, to all intents and purposes this represents an effective information gap.

Uses of an LMIS

When defining indicators for measurement, it is important to decide what the primary uses of the information will be. It has already been established that the scope of measurement is very large and, as a result, the framework for indicator selection needs to be clearly defined prior to implementation. This will ensure that the correct data is collected for the

Table 1: Summary of approaches to LMIS and indicators

Approaches to LMIS and indicators	Australia	California	Canada	Ethiopia	Rwanda	United Kingdom	European Union
Broad labour market indicators (macro)	Included in LMIP	Available on LMI	Included in ELMI	Focus on Decent Work indicators	Main focus of LMIS	Widely available	Consolidated under the Skills Panorama. Inputs from Cedefop, Eurostat, member states, National Statistics, European Vacancy Monitor
Methodologies used to develop indicators	AWPA – disaggregated changes at margins – measured at 4th digit of ANZSIC	Not publicly available	Not publicly available	Not considered	Mining existing data sources	Employer surveys to measure skills indicators and perspectives	
Labour exchange portal	Jobs Outlook	LMI – CalJOBS	Job Futures/ Services Canada	Not considered	Includes job market information but no portal	Career Services Unit	
Forecasting	Based on trends from Jobs Outlook and other discrete studies	Based on employment/ recruitment data	Job Futures	Limited within the context of Decent Work	Limited	UKCES	

needs of the labour market. Below are some examples of the type of information generated by the various monitoring systems reviewed for this report. The list is by no means exhaustive and the absence of a given topic in relation to a specific system does not imply that the information is not available, but rather that it is not readily available on the portal or in a regular publication.

1. **Industry/Sector Reports.** All LMISs (with the exception of that of Jamaica) included detailed sector or industry reports. The contents of the reports vary but are usually related to employment, vacancies and other key trends specific to the skills landscape within the sector. In countries such as Australia where the training environment includes Sector Skills Councils (SSCs), the level of detail available at sector level is notably higher. SSCs conduct research relating to the context and industry-specific drivers of change, which augments the quantitative data supplied by the LMIS.
2. **Regional Reports and Small-area Reports.** All LMISs visited allowed the data to be broken down to specific geographic regions. How small a region is that can be drilled down to is dependent on the nature of the data-collection methodology. Australia and California can go down to municipal level, whereas the EU data on the Skills Panorama can only be viewed at the national level of member states. This is discussed further below. There are precedents for the data to be used for planning in cities, and the relevance of this approach should be considered in the development of a South African LMIS.
3. **Labour Exchange Portal.** Discussed under the 'Tools for data collection' section, a labour exchange portal is an online service where job-seekers are able to register their CVs and apply for positions that are advertised by various employers. LMISs may be built around this as a central purpose (for example, Jamaica and California).
4. **Occupational Data.** Usually derived from dedicated employer surveys, LMISs are able to provide very detailed information about trends relating to specific occupations. This has two significant implications for skills mismatches:
 - Individuals are able to make better decisions about their career path and the associated education/training and therefore are, in theory, more effective in generating skills that the future labour market will need; and
 - Regular employer listing of specific skills and competencies associated with an occupation over time will reveal if the requirements for that occupation are evolving. This can be used by training providers to better match the contents of programmes to the requirements of the market, making future graduates more successful.
5. **Vacancy Reporting and Scarce Skills.** Vacancy reports are greatly enhanced by an effective labour exchange portal, but this is not a prerequisite. In Europe, for example, the European Vacancy Monitor (which feeds into the Skills Panorama) is based primarily on Labour Force Surveys.
6. **Migration/Immigration of Labour.** The vacancy and skills mismatch reports assist in identifying areas where there are specific skills shortages. Ideally, this will lead to a list of occupations where distinct shortages are being experienced, and therefore a country can add to its existing labour supply with the right skills without creating imbalances in the local labour market (AWPA, accessed March 2014).
7. **Skills Demand, Skills Supply and Skills Mismatch.** This section is at the heart of skills planning and, ideally, the nature of the skills supply and demand needs to be understood for both the current and future environments. The supply of, and demand for, skills is a strong focus area of the EU Skills Panorama.
8. **Forecasting.** As discussed previously, an indicator set needs to include indicators that focus on the future skills landscape in order for relevant stakeholders to be suitably prepared.
9. **Other.** There are many other examples of reports that can be, and are, derived from the data collated in an LMIS on a regular basis. Examples from the systems examined include (cited in Australian LMIP, accessed March 2014):
 - Workforce Ageing Report. This report contains information relating to industries

where the greater share of the workforce is mature (defined here as aged 55 years and over);

- Remote Jobs and Communities Programme; and
- Disability Employment Service.

10. **Obligations for Reporting to International Organisations.** Although, in most countries, it is mainly the obligation of the Statistician General to fulfil a country's statistical reporting obligations, the situation is often not straightforward. For instance, the national statistical authority may not undertake data gathering that is highly specific to the sectoral mandate of a national department, but which may be required by an international agency. In these circumstances, national labour departments might assume this function by servicing the ILO's needs for country indicator values or data on the Key Indicators of the Labour Market (KILM). However, servicing data/indicator needs of international agencies can present challenges. For instance, the Organisation for Economic Co-operation and Development (OECD) requirements for indicator data on the 'Self-employment rate' create methodological challenges for countries with a large informal sector, or where data-collection frequency in respect of this aspect does not fit the OECD specifications.

The previously mentioned national reports generated by the **EU's Skills Panorama** on the supply of, demand for, and imbalance of skills aim to create as complete a picture of the skills environment as possible. Therefore, where possible, the reports will include the following (EU Skills Panorama, accessed March 2014):

- Past trends;
- Recent trends;
- Current situation; and
- Future trends.

In addition, they identify key areas that require an intervention and draft their 'Analytical Highlights'. These are organised according to:

- Short-term occupations (occupations defined as having a supply/demand mismatch in the short term);
- Medium-term occupations (occupations selected because of medium-term demand trends);
- Sectors;
- Skills; and
- European Vacancy and Recruitment Report (EVRR) fact sheets.

The Analytical Highlights provide details on what identified occupations entail, which skills are required, and where the mismatch is being reported. They also detail the drivers of scarcity and quantify the skills need by way of numbers. An example is attached as Appendix D.

Another use of the output of skills-related labour market information mentioned in the literature relates to the state funding of education programmes. It was proposed that funding for post-school education (both vocational and higher) be directly influenced by the forecasted demand for specific skills. In other words, if there is a growth outlook for lawyers, then funding for the number of posts at state law schools will be increased. It is not clear from the desktop research if this is done based on any of the systems under review, but central control of education in this manner has its merits, provided that there is confidence in the underlying data (National Institute of Labour Studies 2013).

Table 2 provides a summary of the application of selected indicator systems.

Indicator themes

This section identifies examples of indicators and how they are thematically grouped in various labour market information systems (LMISs). The intention here is not to create an exhaustive list of indicators, but rather to provide indicators that reflect the various skills planning foci and associated policies. Since the methodology of this study relied on information in the public domain, which does not necessarily provide complete information, it is not always clear how indicators are defined, unless they are explicitly published. For example, from the different labour market surveys conducted in

Table 2: Summary of the application of selected indicator systems

LMIS output	Australia	California	Jamaica	Rwanda	Singapore	European Union	Comment
Industry/Sector Reports	Y	Y		Y	Y	Y	
Regional Reports	Y	Y				Y*	* EU 'regional reports' refer to national reports
Small-area Labour Report	Y	Y*					* Cal – County level
Employment Portal	Y	Y	Y		Y		
Occupational Data	Individual occupation level	Y	*Hot occupations	Y**		2nd digit	*Jam – Hot occupations defined by vacancy rate Quarterly ** Rwanda – Career guidance and entrepreneurship
Vacancy Report	Y		Y*		Y	Y	* Jam – Hot occupations
Scarce Skills List (Immigration Purposes)	Y						
Skills Demanded Trends	Y*	Y**				Y	* Aus – In progress through AWP **Cal – 'Staffing Patterns'
Skills Supplied Trends	Y*	Y**				Y	* Aus – In progress through AWP **Cal – Included in 'Workforce Indicators'
Skills Mismatch Trends	Y*	Y**				Y	* Aus – In progress through AWP **Cal – Included in 'Workforce Indicators'
Forecasting	Y*	Y**				Y	* Aus Employment Projection Report is annual and reflects 5-year outlook ** Cal – 10-year forecast by industry for small county regions
Workforce Ageing Report	Annual	Y*					* Cal – Included in 'Workforce Indicators'
Remote Jobs and Communities Programme	Y						
Disability Employment Service	Y						

Singapore, it can be assumed that the data would be used to populate indicators, but, without these being publicly listed, it would be mere conjecture as to what the specific measurement variables might be. Therefore, the focus here will be on systems where the complete set of indicators can be discussed and lessons drawn from them.

The relevance of indicators to South Africa may be limited by the availability of local and credible information. There are known gaps in the current level of information and these will need to be addressed to some degree based on the resources that are made available. Having said that, however, examining which information is available in South Africa may allow for a modified version of an indicator that is included herein. Therefore, indicators are not removed from this section based on a current lack of information.

The identified indicators are grouped into themes and represent common measures that are used for the purposes of monitoring and evaluation, as well as for skills planning purposes. The sections leading up to this point have discussed the broad nature of indicator systems and how they are defined by the purposes underlying them. This section now gives examples of how those indicators are fleshed out in reality. The indicator sets included in this summary represent:

- Australia (NILS/AWPA model, not LMIP);
- New Zealand (Immigration/Migration Indicators);
 - The United Kingdom;
 - Migration Advisory Committee Indicators;
- City of London Indicators; and
- The European Union (Skills Panorama).

Four main themes were identified, with multiple indicator types within each. The themes are:

- The state of the labour market;
- Supply of skills;
- Demand for skills; and
- Market response.

State of the labour market

All indicator systems will include some indicators to measure the state of the labour market as the basis for a national benchmark, as well as to aggregate signals for disequilibrium in the market (National Institute of Labour Studies 2013). For example, the extent to which the current stock of skills is being utilised is reflected by the 'Number of Hours Worked'. If the number of hours worked in an occupation is growing more slowly than the overall trend, then it indicates a 'slack' in the labour market based on an oversupply of those skills (National Institute of Labour Studies 2013). In other words, as employers encounter fewer challenges in recruiting suitable employees, job-seekers will find it more difficult to gain employment.

Other indicators relating to the state of the labour market reflect the contextual framework. For example, the scope of access to social-support services is seen as an important indicator to monitor within the UK, and in London in particular, in this example. Therefore, LMISs in the UK are more likely to include these indicators than countries such as the United States of America (USA).

Key indicator types in this section include:

- Employment-related indicators. These relate to the number of people employed and the proportion of those workers to the total population;
- Unemployment-related indicators. This is a widely used measure of the degree to which the labour force is being utilised. Under-employment has been identified as another indicator of labour force utilisation; and
- Time spent working or the total number of hours. This provides an indication of shortage or surplus and tends to move before overall employment, because employers will extend

hours before hiring and, conversely, reduce working hours before retrenchment.

Table 3 presents the state of the labour market indicators.

Indicators on supply of skills

The supply of skills relates to the flow of skills into the economy. Therefore, indicators of the supply of skills will focus on qualifications as well as education and training institutions. The indicator types identified in this section include:

- Stock of skills, measured by examining the level of education of the current labour force. This is likely to include indicators to measure the full range of educational attainment from basic to higher education;
- Key skills. It can be argued that, if there are specific skills that have been identified as critical to the success of the economy, these occupations should be more closely monitored. Again, the nature of what constitutes a key skill is dependent on the context and policies in the country/region under measurement;
- Workplace training and skills development. This is particularly relevant in South Africa. In the late 1990s, there was a lack of mobility within the workforce and there were difficulties for young people and the unemployed even to access the labour market. This led to the promulgation of the Skills Development Act and the incorporation of the SETAs. This point of focus is reflected in many indicator systems where the level of training provided by employers is monitored through workplace training indicators; and
- Labour migration. The fastest way for a labour market to equalise points of disequilibrium is to import skills. Therefore, monitoring the flow of foreign skills is a good indicator of skills gaps in the market. This does not take away from the indicator systems designed specifically to monitor skills mismatches and thus inform migration policies. It merely gives an indication of the degree to which this is happening. What is also important to monitor, especially in a context such as South Africa, is at which occupational level the foreign workers are being employed.

Table 3: Indicators for the state of the labour market

	Indicator (including number for reference purposes)	Country/ region ²	Description
Employment-related	1: Number employed (employment growth)/employment rate	Aus, EU, Lon, NZ	Number of respondents who report being employed
	2: Anticipated change in numbers employed	EU, Lon	Forecasts of employment levels
	3: Change in employment rate (e.g. 2000–2008 and 2009–2011)	EU	Employment rates represent employed persons as a percentage of same-age total population
	4: Absolute change in the proportion of workers in the occupation for less than one year	MAC	Volume-based indicator pointing to the mobility of workers
	5: Change in active workforce	EU	The economically active population (labour force) comprises employed and unemployed persons
	6: Projected change in working age population, 15–64 (2010–2030) (%)	EU	Forecast of 15–64-year-olds
	7: Anticipated change in active workforce, 2010–2020 (%)	EU	Forecast of active workforce. Note: the economically active population (labour force) comprises employed and unemployed persons
	8: Number of residents who are economically inactive Economic inactivity rate	Lon	Labour activity indicators
	9: Number of young people aged 16–18 who are not in employment, education or training (NEET) Proportion of 16–18-year-olds who are NEET	Lon	
	10: Retirements and detachments (exit) from labour market	NZ	Flow of skills out of the labour market
Employment (key sectors)	11: Change in country/sector/occupation contribution to employment	EU, NZ	Numbers employed in country as a proportion of all employed
	12: Change in numbers employed in health and social care	EU	Numbers employed in health and social-care sector
	13: Change in numbers employed in science and technology	EU	Employment levels in the manufacturing industries ranked according to technological intensity (R&D expenditure/value added)
	14: Change in the number of entrepreneurs	EU, NZ	Self-employed with employees
Employment (demographics)	15: Number of male residents employed and employment rate of male residents	Lon	Number and employment rate of working-age residents by gender
	16: Number of female residents employed and employment rate of female residents	Lon	Number and employment rate of working-age residents by gender
	17: Proportion of workforce aged 55+ (%) (Europe is 50+)	Aus, EU	Used to estimate replacement demand due to retirement
	18: Projected change in the old-age dependency ratio (2010–2060)	EU	Ratio of persons aged 65 and older (or 60+) to the number of persons of working age (15–64 or 20–59)
	19: Employment rate by age groups	Lon	Employment by various demographics
	20: Employment rate by ethnicity	Lon	
	21: Employment rate by disability	Lon	
Unemployment-related	22: Unemployment rate/change in unemployment rate	Aus, EU, Lon, MAC	Proportion of unemployed persons in the active population
	23: Change in the long-term unemployment rate, 20–64 age group	EU	Long-term unemployment is 12 months and longer
	24: Change in the unemployment rate, age group 25–39	EU	Proportion of unemployed persons in the 25–39 age group active population
	25: Unemployment rate by specified occupation	MAC	
	26: Claimant unemployment Claimant count as a proportion of working-age population Number of people of working age claiming out-of-work benefits Proportion of working-age people claiming out-of-work benefits JSA claimants (various indicators) Incapacity claimants	Lon	Use and scope of social-support services
Time	27: Total hours worked (% change from previous year)	Aus, MAC	Percentage change in hours worked by full-time employees
	28: Employment: Part-time/full-time	Lon	Split of employment between part-time and full-time employees

² Aus = National Institute of Labour Studies (2013); EU = EU Skills Panorama (accessed March 2014); Lon = City of London (accessed March 2014); MAC = Migration Advisory Committee (2008); NZ = Infometrics (2006).

Table 4: Indicators for the supply of skills in the labour market

	Indicator	Country/ region ³	Description
Stock of skills (secondary education)	29: General Certificate of Secondary Education (GCSE) (5+ A*–C) attainment including English and mathematics Percentage achieving 5+ A*–C grades, including English & mathematics by characteristics	Lon	Secondary education achievement in first language and mathematics
	30: GCSE A-level examination results of 16–18-year-olds Proportion of 19-year-olds qualified to Level 3	Lon	A-level results
	31: Change in early leavers from education and training, 2000–2008 and 2009–2011	EU	Population aged 18–24 having attained at most lower secondary education and not being involved in further education or training in the four weeks prior to the survey
	32: Change in young adults who have completed upper secondary education, 15–24 age group	EU	Proportion of young adults (age group 15–24) who have completed upper secondary education in the overall 15–24 age group (ISCED Level 3)
	33: Low-achieving young people (15-year-olds) in reading, mathematics and science 2009 (%)	EU	'Low achieving' is defined as below Level 2, i.e. capable of completing only the least complex tasks
Stock of skills (tertiary and other education)	34: Change in the proportion of 30–34-year-olds with tertiary education achievement	EU	Graduates from ISCED Levels 5 and 6
	35: Change in students in science, mathematics, computing, engineering, manufacturing, construction fields (ISCED Levels 5–6)	EU	Graduates in the fields as a proportion of all graduates at ISCED Levels 5 and 6
	36: Change in tertiary education graduates	EU	Graduates from ISCED Levels 5 and 6
	37: Working-age population by qualification level and sex Working-age rates by qualification level and sex Qualification levels of those in employment (working age)	Lon	Indicators relating to the qualifications of the population by various demographics
	38: Number of working-age people with no qualifications Proportion of working-age people in London with no qualifications	Lon	
	39: Number of working-age people with Level 4+ qualifications Proportion of working-age people with Level 4+ qualifications	Lon	
	40: Number with no adult learning (working age) Proportion with no adult learning (working age)	Lon	
Stock of key skills	41: Change in the level of computer skills, 16–74-year-olds	EU	'Computer skills' are defined as various tasks carried out using a computer
	42: Change in the level of Internet skills, 16–74-year-olds	EU	'Internet skills' are defined as various tasks carried out using the Internet
	43: Change in high-level Internet skills, by level of education	EU	High-level Internet skills are defined as skills in creating a web page
Training/skills development	44: Received job-related training in last 13 weeks (London) or 12 months (EU)	Lon, EU, NZ	Proportion of employers who offered time off for training as a proportion of all employers. NZ refers to 'training rate', and a period was not specified
	45: Apprenticeship programme starts and achievements Apprenticeship programme starts by level and age Apprenticeship programme achievements by level and age	Lon	The size and scope of apprenticeship programmes, including numbers, throughput by qualification level, and demographic information
Participation in education	46: Change in ISCED Level 3 participation in vocational education and training	EU	Students participating in the vocational education and training as a proportion of all students at ISCED Level 3 (which is lower and upper secondary education). 'Students' are defined as individuals participating in the education covered by the data collection and are counted at the beginning of an academic year
	47: ISCED Levels 3 and 4 attainment in vocational education orientation (2009) (% of all education attainment in the 15–34 age group)	EU	Students attaining in vocational education as % of all students attaining in the 15–34 age group, ISCED Levels 3 and 4
	48: ISCED Levels 3 and 4 attainment in general educational orientation (2009) (% of all education)	EU	Students attaining in general education as % of all students attaining in the 15–34 age group, ISCED Levels 3 and 4
	49: Change in participation in education (students aged 15–24, all ISCED levels)	EU	Students participating in education as a proportion of all people aged 15–24

³ Aus = National Institute of Labour Studies (2013); EU = EU Skills Panorama (accessed March 2014); Lon = City of London (accessed March 2014); NZ = Infometrics (2006).

	Indicator	Country/ region ³	Description
	50: Change in pupils learning two or more foreign languages, ISCED Level 2	EU	Pupils learning two or more foreign languages as a proportion of all pupils at ISCED Level 2 (the lower secondary or second stage of basic education). 'Foreign-language learning' is defined as enrolments in studies of foreign languages generally at the beginning of the school year
	51: Change in adult participation in education and training, 25–64 age group	EU	Adults participating in education and training (in the four weeks preceding the survey) as a proportion of all adults
	52: Change in employees participating in continuing vocational training courses	EU	Employees participating in continuing vocational education courses (in the four weeks preceding the survey) as a proportion of all employees
Labour migration	53: National insurance number registrations of overseas nationals	Lon	New foreign entrants to the labour market
	54: Change in the number of non-nationals in the population	EU	'Non-nationals' are defined as citizens of all countries, except the country in question
	55: Change in emigration rates, by education level	EU, Aus	'Emigration rate' is the proportion of the population that left the country in relation to the overall population of the country

Table 4 lists the indicators for the supply of skills in the labour market.

Indicators on demand for skills

The demand for labour relates to the combined volume of each skills set that is required by employers in order to produce the goods/services in the economy. It is logical that, if there are not enough skills in the labour market to meet the demand, a skills shortage will result. In a skills-shortage scenario, employers will compensate by either:

- Increasing the hours worked by their existing workforce; or
- Trying to attract workers from other areas of production as well as new graduates (National Institute of Labour Studies 2013).

As employers compete for the limited stock of workers with the relevant skills, it would be expected that:

- Wages would rise relative to other skills;
- The duration of unemployment of individuals would decline;
- The proportion of full-time employment and the number of hours worked would increase; and
- The mismatch between skills and jobs would decrease (National Institute of Labour Studies 2013).

The following are key indicator types that are commonly used for the purposes of measuring the demand for skills in the labour market:

- Vacancy-related indicators (National Institute of Labour Studies 2013). These have a logical link to skills shortages, especially when the duration of the vacancy is considered. This can be used to identify Hard to Fill (HTF) vacancies and separate them from other vacancies as a way of identifying skills shortages. Otherwise, too many frictional, temporary vacancies will be misinterpreted as shortages;
- Wage pressure indicators (National Institute of Labour Studies 2013). Economic theory highlights pay increases over time as a good potential indicator of skill shortages. The MAC and NZ systems currently monitor annual percentage changes in mean and median hourly rates of pay. They also estimate the relative wage premium for employees in a given occupation, after controlling for differences in age and region (Migration Advisory Committee (MAC) 2008; Infometrics 2006);
- High-demand occupations. These are specific occupations identified through the analysis of vacancies and other indicators;
- Business activity. This refers to the number of active businesses, new businesses and businesses exiting the market; and
- Skills mismatch. These are composite indicators that calculate or identify key occupations where there is a mismatch between the supply of, and demand for, skills that ultimately results in a skills shortage (EU Skills Panorama, accessed March 2014).

Table 5: Indicators for the demand for skills

	Indicator	Country/ region ⁴	Description
Vacancy indicators	56: Change in the stock of job vacancies	EU, NZ	A 'job vacancy' is defined as a paid post that is newly created, unoccupied, or about to become vacant
	57: Change in the job vacancies	EU, NZ	'EU' refers to vacancies advertised with national public employment services and 'NZ' refers to Survey of Employers who have Recently Advertised (SERA)
	58: Top-growth occupations (by highest number of recent recruits)	EU	Occupations with highest number of recent recruits
	59: Proportion of vacancies not filled after six weeks	Aus, MAC	UK MAC refers to Skills Shortage Vacancy (SSV) but does not specify the period for which the post must be vacant for to be classified as an SSV
	60: Average number of applicants per vacancy	Aus	Strong signal of shortage/surplus of a given skill or occupation
	61: Average number of SUITABLE applicants per vacancy	Aus	
	62: Occupational unemployment rate	Aus	
	63: SSV as a percentage of all vacancies	MAC	Scarce skill vacancies (SSV)
	64: SSV as a percentage of HTF vacancies	MAC	Hard-to-fill vacancies (HTF)
	65: Absolute change in median vacancy duration	MAC	How long is it taking to fill vacant posts?
	66: Stock of vacancies to unemployment benefit claimant count by sought occupation	MAC	Vacancies relative to the social-support claims for the target occupation
	67: Change in employers experiencing difficulties in recruitment	EU	Proportion of employers who reported recruitment difficulties as a proportion of all employers surveyed
Financial	68: Percentage change in median hourly pay	MAC, Aus	Excessive wage growth is used as a signal for skills shortage Does wage pressure stem from demand growth or a lack of competition?
	69: Percentage change in mean hourly pay	MAC, NZ	
	70: Relative wage premium to an occupation, controlling for age and region	MAC	
Top occupations	71: Top 10 occupations (by highest numbers of vacancies registered in the PES)	EU	Vacancies advertised with national public employment services
	72: Top five EURES jobs	EU	Top jobs listed in EURES
	73: Change in numbers employed in knowledge-intensive industries	EU	Knowledge-intensive industries are based on the share of tertiary educated people in each sector of industries and services according to NACE at two-digit level and for all EU 27 member states. A threshold is then applied to rank sectors as knowledge-intensive
	74: Top five occupations experiencing skill bottlenecks (hard-to-fill vacancies) – 2011	EU	Defined using a mix of criteria such as the LFS ratio of job finders to experienced unemployed, national studies, and the Manpower Talent Shortage Survey
Business activity	75: Business demography	NZ	Active enterprises, births and deaths of enterprises. Index and National Indicators
	76: Jobs density	NZ, UK	The numbers of jobs per resident aged 16–64. The total number of jobs is a workplace-based measure and comprises employees, self-employed, government-supported trainees and HM Forces
Skills mismatch	77: Proportion of employed individuals with qualification level not matched to qualification requirement of job, 2010	EU	Proportion of individuals who reported needing further training to cope well with their job duties as a proportion of all individuals
	78: Duration between leaving formal education and starting first job, 20–34-year-olds, 2009 (months)	EU	Length in months between leaving formal education and starting a first job
	79: Proportion of graduates who are unemployed, 2009 (%)	EU	Proportion of graduates who reported being unemployed as a proportion of all graduates surveyed
	80: Skills Mismatch Index (the gap between the average proportion of the low-, medium- and high-skilled in the working-age population and the corresponding proportion unemployed), 2010	EU	Calculated as the difference between the average proportion of the low-, medium- and high-skilled in the working-age population and the proportion of the low-, medium- and high-skilled among the number of people employed.

⁴ Aus = National Institute of Labour Studies (2013); EU = EU Skills Panorama (accessed March 2014); Lon = City of London (accessed March 2014); MAC = Migration Advisory Committee (2008); NZ = Infometrics (2006); UK = Office of National Statistics (2004).

Table 5 provides the summary of indicators for the demand for skills.

Turning to indicators reflecting responses from students and the market, the AWP model places particular focus on the response of students and the response of the labour market. This is designed in order to measure changes at the margins as an amplified signal of changes in the stock of skills (National Institute of Labour Studies 2013). Therefore, while the indicators highlighted in this section could fit into one or more of the previous sections' indicator types, they are listed here to more clearly highlight the approach.

The problem with detecting the response of the economy to skill shortages is that the total stock of skills (demanded and supplied) changes only slowly, which is why this methodology aims to measure changes at the margins. This is achieved by focusing on the experiences of recent graduates seeking to enter the affected occupation (National Institute of Labour Studies 2013).

Table 6 describes the AWP indicators for Australian student and market response

Sources of information

It has been established that the indicators selected are dependent both on what the intended uses thereof are, as well as the policies of the government

implementing the LMIS. However, an indicator only has value if there exists a mechanism for collecting the required information. The purpose of this section is to examine existing indicators and how the information for those indicators is collected in their respective countries/regions. Detailed analysis of data-collection methodology will not be undertaken, but rather the types of sources will be examined and grouped together to give an indication of the practicality of the indicators. Under each theme, the data source for each country is listed.

Existing data sets

Government departments collect, collate and store administrative information relevant to their operation on a constant basis, and conduct regular surveys at a national level. These may or may not be related to skills or even the labour market, but there may be useful information included therein. If indicators are suitably designed, a source of information may be designated to be drawn out of one of these existing data sets.

Census data and Labour Force Surveys usually represent the backbone of most LMISs, providing the basis for the majority of the broad labour market indicators. While the frequency with which the surveys or censuses are conducted varies, all countries examined conducted them and utilise their output for the purposes of labour market monitoring. The labour market indicator systems examined made use of the following data sets:

Table 6: AWP indicators for Australian student and market response

	Indicator	Country	Description
Student responses	81: Average ATAR	Aus	'ATAR' refers to the Australian Tertiary Admission Rank. This, combined with the number of places being filled, acts as a signal for the relative demand for a qualification
	82: Commencements	Aus	
	83: Completions	Aus	Number of graduates entering the labour market with a given qualification
Labour market responses	84: % employed full-time	Aus	University graduates four months after completion
	85: % not employed	Aus	
	86: Mean FT hours per week	Aus	
	87: Mean FT annual salary	Aus	
	88: % with education job match	Aus	
	89: % employed full-time	Aus	University graduates three years after completion
	90: Mean FT hours per week	Aus	
	91: Median annual earnings of FT workers	Aus	
	92: % employed full-time	Aus	VET graduates six months after completion
	93: % not employed	Aus	
	94: Mean FT hours per week	Aus	
	95: Mean FT annual salary	Aus	
	96: % with education job match	Aus	

- Census data;
- Labour Force Surveys;
- Industry/sector studies; and
- Labour exchange portal data.

First and foremost, amongst data derived from operational sources will be administrative data collected from educational institutions. This is an important input into an assessment of the supply of skills into the labour market. Data selected from other sources that are not directly related to skills may prove problematic, since the data was collected for a different reason and thus may not be ideally defined or captured. However, this information can be used to support or supplement skills-planning-related indicators (e.g. the new-business registry). Examples of all of the above include:

- Universities and Colleges Admissions Service Statistical Tables Report (United Kingdom: UKCES, accessed March 2014);
- Administrative data on enrolments of educational and TVET institutions, graduation lists of educational and TVET institutions (Jamaica: Jamaica LMIS, accessed March 2014);
- VAT Registrations and New Business Registrations (United Kingdom: UKCES, accessed March 2014);
- Job-seekers allowance/Unemployment Insurance Fund (United Kingdom: UKCES, accessed March 2014);
- Social Security Fund Database (Rwanda: Rwanda Development Board, 2010);
- Income and data services (United Kingdom: UKCES, accessed March 2014). From this, the annual Pay and Progression for Graduates report is generated; and
- Administrative records from the Ministry of Manpower (Singapore: Ministry of Manpower, accessed March 2014), which includes:
 - Monthly Employment Statistics;
 - Quarterly Graduate Employment Statistics; and
 - Quarterly Re-employment Statistics.

Dedicated skills surveys

As countries move towards a more active skills planning framework, the data available from existing data sources do not provide the level of information

required. Specifically, where indicators relating to the supply and demand of skills are selected and used, it seems that dedicated surveys are unavoidable. Examples of these surveys include:

Employer surveys

The focus of these surveys is on employers and the perspectives that they give on skills. Examples of employer surveys from our sample of indicator systems are:

- National Employers Skills Survey (United Kingdom: UKCES, accessed March 2014);
- Skills Monitoring Survey (Northern Ireland: DELNI, accessed March 2014);
- Skills in Scotland (Scotland: UKCES, accessed March 2014);
- Annual Survey on Conditions of Employment (Singapore: Ministry of Manpower, accessed March 2014);
- European Company Survey (EU: Eurofound, accessed March 2014); and
- Annual Job Vacancy Survey (Singapore: Ministry of Manpower, accessed March 2014).

Wages and salaries

These surveys have always been a key signal for the presence of skills gaps. In an environment where a shortage is being experienced, wages will rise faster in that occupation than the norm. As a result, LMISs tend to have dedicated wages and earnings surveys. However, if a labour exchange portal is suitably big, wages and salaries can be extrapolated from the data generated from within the system. Examples of income-related surveys are:

- Annual Survey of Hours and Earnings (United Kingdom: ONS, accessed March 2014);
- Survey on Annual Wage Changes (Singapore: Ministry of Manpower, accessed March 2014);
- Annual Labour Cost Survey (Singapore: Ministry of Manpower, accessed March 2014);
- Annual Survey on Occupational Wages (Singapore: Ministry of Manpower, accessed March 2014);
- Wages and Salaries Survey (Canada: ESDC, accessed March 2014); and

- Survey of Employment, Earnings and Hours Worked in Large Establishments (Jamaica: Jamaica LMIS, accessed March 2014).

Graduate surveys

Another major focus of dedicated skills-related surveys revolves around graduates and their experiences in entering the labour market. Examples are:

- Survey of Graduate Recruiters (United Kingdom: AGR, accessed March 2014);
- Graduate Follow-up Survey (United Kingdom: HESA, accessed March 2014). This survey examines the first destinations of students leaving higher education institutions; and
- The National Graduate Survey (Canada: Statistics Canada, accessed March 2014).

Other sources of information

Other examples of surveys conducted by the countries included in this study that have a link to skills and skills planning are:

- Establishment-based Training Survey (Singapore Ministry of Manpower, accessed March 2014); and
- ICT usage survey (EU: EuroStat, accessed March 2014).

In countries where there are Sector Skills Councils or SETAs, it is common for the organisations to generate regular sector profiles. These profiles include investigations on the environments and the drivers of change affecting the sector or industry. These sector-specific reports provide a perspective on the central processes to ensure relevance to all elements of the labour market. In Canada, the industry profiles are generated by the Sectoral and Occupational Studies Division (SOSD) in partnership with Industry Canada (Canada Department of Human Resources, Labour and Employment 2007).

Finally, the value of a Labour Exchange Portal as a source of occupation-specific information has been discussed at length.

In conclusion, all of the above sources of information notwithstanding, it is important to define

the information required for specific indicators so that the database underlying the collection systems is able to capture the information in an appropriate manner. For example, if the definition of a Hard to Fill Vacancy is a post that remains unfilled for more than 12 weeks, will the data-collection mechanism be able to determine when a post is actually filled or not? In other words, the selection of the indicators, how they are defined, and the availability of information all need to be considered in attaining the overarching goals of the labour market monitoring system.

Geographic disaggregation of LMIS data to the region and the city

The geographic coverage in this section does not refer to the extent to which all regions are included in data collection, but rather to the level of regional disaggregation of the data. In other words, what is the smallest unit of measurement geographically from which one can draw skills-planning-related intelligence? When deciding on the level of disaggregation, decision-makers need not only to decide on the smallest geographic area that will be represented in the data, but also which indicators will be available at the small-region level. The trade-off in making this decision is that the greater the level of disaggregation, the greater the burden on data collection becomes. Therefore, cost and practicality need to be considered in conjunction with the desired uses of the indicators. This section provides examples of how these questions have been handled in existing systems.

In **Australia**, Employment Service Area (ESA) boundaries have been defined under the 2009–2012 Employment Services Contract and can provide information to the sub-metro level. The produce of this level of analysis is the Small-area Labour Market Publication (SALMP) and Centreline/ Jobs Services Australia (Australian LMIP, accessed March 2014). The SALMP contains estimated rates of unemployment/employment for an estimated 1 400 Statistical Local Areas in Australia. These sources combined allow analysis of the ‘State of the Labour Market’ indicators as well as selected recruitment indicators, which include:

- Unemployment Rate (15+);
- Number of Job Seekers (15+);
- Job-seeker Age;
- Job-seeker Duration of Registration; and
- Working Age Population (15–64) (Australian LMIP, accessed March 2014).

In addition, Labour Force Region (LFR) data includes information on unemployment rates, employment by industry and occupation, and population profiles. The data is demarcated according to boundaries that are determined by the Australian Bureau of Statistics (ABS) Labour Force Survey at the national, state and LFR levels (Australian LMIP, accessed March 2014).

In the **United Kingdom**, the Office for National Statistics (NOMIS) utilises information from the Census, Labour Force Surveys, Employer and Wage Surveys, as well as administrative databases such as claimant counts, business registrations and Job Centre Statistics. All of these data sets include detail at the national, regional, district/county and ward level. An online tool allows the user to extract data at any of the specified levels. The number of indicators that one can choose from is extensive and is therefore not included here. (More information can be obtained via the website <http://www.nomisweb.co.uk/>.)

As can be seen, spatial disaggregation of labour market data at the regional level is quite achievable, depending on the sources of data. One final example will suffice. Twice a year, the Service **Canada** Region Labour Market and Socio-economic Information Directorate develops an Economic/Environmental Scan (Employment and Social Development Canada, accessed March 2014). The purpose of these ‘E-scans’ is to gain clarity on the demographics of the population as well as on labour and economic conditions in the various regions. E-scans are:

intended to support regional Service Canada operations by identifying potential pressures on service and program delivery. However, they may also be of interest to those who seek to know more about the state of a

provincial or regional economy and labour market. (ESDC 2014: 4)

In the realm of skills planning, labour markets within large **metropolitan areas** usually have a national impact on the workforce. As a result, key indicators are often established at a metro level to dovetail with national initiatives. In the section on indicators, the set of indicators used by the city of London is included as an example of this principle. Other major **cities or states** that run their own LMIS include New York City, Liverpool and Toronto.

We have noted that, in the **European Union**, EURES and the Skills Panorama provide labour market information covering 31 European countries. More than 600 000 people live in one EU country and work in another (EURES, accessed March 2014). However, there are limitations on the level of spatial detail the EURES and Skills Panorama can offer. In order to get data disaggregated to levels more specific than the national level, one would have to access the individual nation’s statistical sources (EU Skills Panorama, accessed March 2014).

Table 7 describes the geographic segmentation of labour market information for selected countries or regions.

Table 7: Geographic segmentation of labour market information for selected countries or regions

Country	Geographic disaggregation of data	Indicator types ⁵
Australia	Employment Service Area Labour Force Region	State of Labour Market Indicators Recruitment Indicators
United Kingdom	National Local Authority (County) Ward	Extensive List of Indicators
Canada	National Provincial Territories Local/Community Level	State of Labour Market Indicators Sector-specific
European Union	National	Extensive List of Indicators
City and State Labour Market Information	State, County, Community	Extensive List of Indicators

⁵ The indicators listed here are the indicators that are included in published information. The absence of indicators in this list does not necessarily mean that the LMIS concerned does not include other indicators. All it means is that they were merely not included in the published material reviewed.

Barriers to the implementation of labour market indicators

The scope of labour market monitoring, and thus of labour market indicators, is as broad as the policy environment that underlies it. It has already been established that any set of indicators will be a subset of the entire population of indicators. It needs to be said that developing a series of indicators to fit in with the developmental agenda of a country, state or city is one thing, but whether or not the implementation of those indicators is feasible is another thing entirely. There are barriers that will limit what can and cannot be done in a given territory, and this needs to be considered both in assessing what has been done in other countries and what is planned in South Africa.

The final section of this report is therefore devoted to discussing the constraints in respect of indicator selection and the effect that these constraints have on whichever system is implemented. While there are many barriers that will influence the selection of indicators, the primary constraints will be:

- Resources required in terms of both financial cost and skills;
- Level of existing labour market information; and
- Information and communications technology (ICT) infrastructure.

In terms of financial resources, dedicated skills surveys are expensive to run and the cost will be dependent both on the size (number of indicators) and the geographic scope (to which level does the data need to be disaggregated?). To obtain a statistically significant sample in each area, the cost will obviously increase in proportion to the number of areas that need to be covered.

Furthermore, many indicators require a very high level of technical and statistical skill to be managed accurately. For example, the econometric models for forecasting labour markets require skills that may or may not be present in suitable quantities in order to sustain the modelling process in the long term. As a result, alternative methodologies may be required based on the resources available. The ILO

in Russia utilised lessons learnt in Spain and Italy to inform local policies. These very issues were raised and the following methodologies, and their relative advantages and disadvantages, were highlighted.

Table 8 overleaf presents alternative methodologies for the forecasting of skills.

In 2004, Afristat and the African Capacity Building Foundation conducted research to improve the quality of labour market statistics and to strengthen the management of Labour Market Information (LMI) and Poverty Monitoring Systems in Africa. As part of the research, the barriers to the development of LMISs in Africa were articulated. While they refer specifically to LMISs, many of the barriers will be relevant to the current discussion. These barriers were:

- Limited capacity and instruments to – effectively, regularly and in a timely way – collect, process, analyse and disseminate relevant and reliable LMI;
- Inability to combine information from various sources and particularly the failure to incorporate data collection exercises on the informal economy into the national framework;
- Inadequate resources for statistical programmes and other activities aimed at generating LMI;
- Inability of producers to co-ordinate efforts or share information;
- Inability of users to specify needs and to translate these needs to producers of LMI;
- Information collected is not further analysed to make it relevant to the needs of policy-makers;
- Inflexibility of LMISs – that is, the inability to respond swiftly to emergency situations;
- Weak structural mechanisms to link policy practice with movements in the labour market;
- Lack of a clear mandate on who should do what;
- Lack of a culture of information use;
- Inadequate balance between qualitative and quantitative LMI; and
- Lack of assessment of the relevance and usefulness of information to various users, particularly those outside government ministries and agencies (Afristat 2004: 6).

Table 8: Alternative methodologies for the forecasting of skills

Alternative methods	Advantages	Disadvantages
Formal, national-level, quantitative, model-based projections	Comprehensive Consistent Transparent Objective	Data-demanding Costly Not everything can be quantified May give a misleading impression of precision
In-depth sectoral or occupational studies (combining quantitative/model-based and qualitative methods)	Strong on sectoral specifics	Partial Can be inconsistent across sectors
Surveys and opinion polls to employers or other groups about skills, skill deficiencies and skill gaps	Direct 'user/customer' involvement	Can be very subjective Inconsistent Can too easily focus on the margins (i.e. current vacancies) rather than skill needs within the whole workforce
Focus groups, round tables, observatories; Delphi-style methods; scenario development; foresight	Holistic Less demanding data requirements Direct 'user/customer' involvement	Non-systematic Can be inconsistent Can be subjective (biased)

Source: ILO 2009: 28

One of the barriers mentioned above is 'lack of a culture of information use'. This is critical, as it will be indicative of which data is already available in some shape or form. A comparison was made earlier in the working paper between the establishment of the Skills Panorama in Europe and the move to institutionalise skills planning in Rwanda. The primary difference was the amount of research that was already being done. In Europe, Eurostat, Cedefop, EURES and the European Vacancy Monitor were already collecting and using skills-related information. Rwanda had no such infrastructure in place and therefore, while the agenda was similar, the outcome was very different, which illustrates the centrality of skills for developing an LMIS and for consuming LMISs' data products. These capacity features need to be self-consciously developed. The implication for countries looking to implement a skills monitoring system with a set of labour market indicators is that the absence of existing skills-related data will greatly increase the resources required to develop one.

Finally, an emerging barrier to the successful implementation of a skills monitoring system is the ICT infrastructure in the country or region. There are a number of barriers mentioned in the Afristat (2004) list above that relate to the sharing of information, access to information, and the inflexibility of systems that inhibit the timely response of policymakers to the needs of the labour market. Examining the successful monitoring systems as part of this assignment has shown how the development of sophisticated online systems helps in the dissemination of intelligence to users. Furthermore, the success of tools such as the Labour Exchange Portal is dependent on a high rate of adoption in the market. Since it is a web-based system, access to ICT and the appropriate skills to utilise that access are a prerequisite for successful implementation.

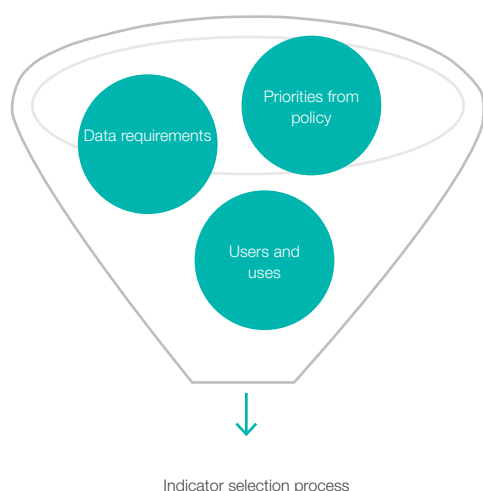
In closing, the listing of the above barriers is not to discount the possibility of developing an effective set of indicators for the monitoring of skills in countries where the conditions are not ideal. The purpose is rather to identify the barriers so that they might be accounted for in the planning process.

4. CONCLUSION AND RELEVANCE FOR SOUTH AFRICA

The current exercise revealed a number of key findings that are relevant to the South African context. First and foremost, it needs to be said that there is no ideal universal set of indicators, but rather only ideal sets of indicators for different contexts. The contexts that influence what constitutes an ideal set of indicators are determined by the nature of the policy underlying the labour market, what the intended purpose of the indicators is, and which information is currently available, or can be generated, in a sustainable manner.

Figure 3 depicts the inputs into the indicator-selection process.

Figure 3: Inputs into the indicator-selection process



The analysis showed that the indicators selected for a system are linked to the purpose that underlies it. A different policy focus will result in different indicators selected for the purpose. In general, there is an evolution, globally, away from broad labour

market indicators at a macro-level to more specific skills-related information that can be used in skills planning.

This is consistent with the process in South Africa, and thus a methodology needs to be developed whereby the outputs of the indicators are able to speak directly to the skills-development imperatives of the economy. Lessons can therefore be learnt from the experiences and methodologies implemented by other countries that have undergone this evolution themselves. Useful examples will be Australia, Europe, Canada and the United Kingdom. These underlying driving policies include:

- International comparison;
- Macro-level monitoring;
- Decent work;
- Project management (specifically related to labour-related policies and legislation);
- Migration/immigration; and
- Skills planning.

Even within skills planning, there were notable differences in the approach to skills planning, to how indicators were selected and to how the resulting systems are deployed. These include:

- Marginal analysis as opposed to analysing overall market conditions;
- Mining existing data or consolidating different data sources to add value for the purposes of skills planning; and
- Jobs-/employment-related focus.

The next key influencing factor relating to the selection of indicators is how the resulting information will be used. Understanding the information needs of stakeholders and what is likely to be required will impact on whether an indicator is selected or not. Some of the uses identified in the literature include:

- Industry/sector reports;
- Localised labour policies (metro/provincial, based on geographic disaggregation);
- Labour exchange;
- Migration/immigration control (scarce skills);
- Investment in skills (funding for specific programmes and qualifications at higher education levels, as well as SETA interventions); and
- Career guidance for learners.

Therefore, in selecting a set of indicators for the South African environment, stakeholders need to be clear as regards the following:

- What implications will current policies and strategies have for labour market monitoring and are those priorities adequately captured by the selected indicators?
- Who will be utilising the information and what are the intended purposes?
- Is the data being generated/captured in a way that will fulfil those purposes? Are these methods sustainable?

The questions above have implications for how the indicators will be made available to various users. The sharing and dissemination of this information would have to be through various media, both electronic and hard copy. However, the Internet would be a central vehicle for that purpose in three possible ways for different levels of user: firstly, via a website that provides free access to static presentation of the indicators in different forms from printable fact sheets to full reports; secondly, by way of access to the website where the user may interact with the data; and thirdly, through access

via the website to the data that is restricted to accredited users from government departments.⁶

It was found that the number and nature of the role players involved in the monitoring system also has an impact on how the indicators should be structured. The Skills Panorama in Europe, for example, is structured on the basis that it consolidates and analyses inputs from 31 member states into a series of outputs that assists the region in developing skills- and migration-related initiatives. The nature of its methodology is therefore very different from that of Australia. Australia implements a system where the Sector Skills Councils (SSCs) provide industry-specific inputs into a central body (AWPA), which is responsible for skills-specific research and monitoring within the Australian labour market. In other words, skills-related research and monitoring is conducted centrally with sector-specific input being provided by the SSCs. This is a structure that resonates with the South African context. It is not being proposed that, in developing the South African indicators, one should discount any systems that do not match the South African context (or overstate those that do). Rather, one should understand how the stakeholders affect the selection of indicators and the development of a monitoring system.

Finally, the sustainability of data collection for the purposes of skills planning needs to be considered. It will have little purpose to design a comprehensive set of indicators that creates a burden of information that cannot be sustained. The burden of information will be influenced by:

- Geographic disaggregation. The greater the level of disaggregation, the greater the burden of information. In the South African context, does the capacity exist to utilise the information at a local level? At which level will the optimum value be derived? It was found in the international literature that large cities have a

⁶ The Roadmap for the implementation of the skills planning unit observes that the decision regarding where the SPU should be located must still be made. This decision may impact on which department takes responsibility for the website hosting the indicators (Powell & Reddy 2014: 12–14).

notable impact on the dynamics of the national labour market, and therefore disaggregation at the level of metropolitan area should be considered a minimum.

- State of current skills information. How far removed are the current methodologies and their resulting information from those that are required from the emerging skills monitoring indicators? The greater the divergence, the greater the burden of information on the system. For example, Singapore and Europe have extensive skills-related surveys in place and, as a result, huge shifts in focus are not required to create a skills portal. Rwanda and Ethiopia do not have these existing sources and therefore other plans need to be made. Rwanda opted for an analysis of existing datasets that are generated for other purposes. The outputs from this are not ideal, but they are sustainable. Ethiopia, on the other hand, defined the indicators and specified the intention to

generate new surveys to fill the information gaps. While the output of this process will be more suitable for the given purpose, the sustainability may be in question in the long term, since the gaps that need to be filled are significant.

- ICT infrastructure and adoption will also have an impact on the sustainability of data-collection systems. Certain tools discussed in the literature, such as a Labour Exchange Portal, assume a base level of ICT penetration and adoption that may or may not be present in South Africa.

In closing, it is clear that global competitiveness will require a more thorough understanding of the nature of the skills required in an economy. South Africa is in a position to combine the lessons learnt from the successful implementation of systems in other countries, while tailoring these to the specific needs of the country.

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APPENDIX A: KILM INDICATORS

In December 2013, the International Labour Organization (ILO) released the 8th edition of KILM, and the 18 indicators included therein are:

1. Labour force participation rate
2. Employment-to-population ratio
3. Status in employment
4. Employment by sector
5. Employment by occupation
6. Part-time workers
7. Hours of work
8. Employment in the informal economy
9. Unemployment
10. Youth unemployment
11. Long-term unemployment
12. Time-related under-employment
13. Inactivity
14. Educational attainment and illiteracy
15. Skills mismatch
16. Wages and compensation costs
17. Labour productivity
18. Poverty, income distribution, employment by economic class and working poverty

APPENDIX B: AWPANILS MODEL FOR THE MEASUREMENT OF SKILLS GAPS

Indicators

Theme	Indicator
State of the labour market	Number employed (employment growth)
	Unemployment
	Total hours worked (% change from previous year)
	Mean FT weekly earnings
	Proportion of workforce aged 55+ (%)
Recruitment experience	Proportion of vacancies not filled after 6 weeks
	Average number of applicants per vacancy
	Average number of SUITABLE applicants per vacancy
	Occupational unemployment rate
Student responses	Average ATAR
	Commencements
	Completions
Labour market entrants	<i>University graduates 4 months after completion:</i>
	% employed full time
	% not employed
	Mean FT hours per week
	Mean FT annual salary
	% with education job match
	<i>University graduates 3 years after completion:</i>
	% employed full time
	Mean FT hours per week
	Median annual earnings of FT workers
	<i>VET graduates 6 months after completion</i>
	% employed full time
	% not employed
	Mean FT hours per week
	Mean FT annual salary
	% with education job match
	<i>Skilled immigration intake</i>
	Subclass XXX – visa granted (as % of new entrants)

Example occupation: Accountants

INDICATOR AND YEAR	2007	2008	2009	2010	2011
State of the labour market					
Number employed ('000s)	159	168	166	168	164
Total hours worked (percentage change from previous year)	7.3	4.1	1.1	-0.7	-2.3
Mean full-time weekly earnings in main job (\$)*	1 415	1 481	1 545	1 535	1 539
Proportion of workforce aged 55 years and over (per cent)*	14	14	15	14	15
Recruitment experience					
Proportion of vacancies unfilled after 6 weeks	55	47	32	17	12
Average number of applicants per vacancy	13.9	12.3	29.3	21.8	27.7
Average number of suitable applicants per vacancy	1.9	1.7	3.4	2.6	4.5
Vacancy rate (percentage of employment)	8.0	8.0	4.6	3.8	4.0
Occupational unemployment rate (percentage of employment)	1.1	1.0	2.0	2.6	2.1
Student responses					
Average ATAR (domestic)	80	81	80	80	-
Commencements (domestic)	4 109	3 690	3 956	3 803	-
Completions (domestic)	3 259	3 164	3 125	2 777	-
Labour market entrants					
<i>University graduates: 4 months after completion</i>					
Per cent employed full-time	96	95	94	93	94
Per cent not employed	13	12	14	16	17
Mean full-time hours worked per week	40.2	39.9	39.8	39.5	39.5
Mean full-time annual salary (\$'000s)	47.9	49.8	52.1	51.4	54.0
Per cent with education-job match	-	78	75	70	71
<i>University graduates: 3 years after completion</i>					
Per cent employed full-time	-	-	-	88	93
Mean full-time hours worked per week	-	-	-	41.4	42.3
Median full-time annual salary (\$'000s)	-	-	-	63.0	65.0
<i>Skilled immigration intake</i>					
Subclass 457 visas granted (as % of all new entrants)	12	16	8	20	-

Note: (*) These estimates are for the ANZSCO minor group, 'Business, human resources, and marketing professionals', which includes accountants. More detailed unit group (four-digit) estimates are available from the ABS on request.

State of the labour market

This is a large professional market. The number employed as accountants peaked in 2008 and has remained almost constant since. The total hours worked increased (at a decreasing rate) from 2007 to 2009 and have been decreasing since. Pay peaked in 2009 and has remained almost constant since. The signals point towards considerable stability with possible modest surpluses.

Recruitment experience

Overview: Fast-filling vacancies and large number of applicants, both increasing strongly; high vacancy rate, but decreasing; low unemployment rate, but increasing.

Present: No signs of skill shortages; possible signs of skill surpluses.

Watch for: Signs of surplus.

Labour market/occupation entry

Overview: Entrants' pay follows the national average and is maintained after three years; mainly full-time employment, but decreasing; moderately decreased three years after graduation; high unemployment and increasing; low matching and decreasing; hours close to the national average and stable; moderately increased three years after graduation.

Present: Entry-level jobs close to average hours and pay; largely full-time employment, but high unemployment.

Watch for: Entry becoming less easy, unemployment rises; pay is holding its ground. Watch for possible surpluses.

Student responses

Overview: ATARs at the national average and stable. Falling commencements and above national average non-completions.

Present: Reduction in student numbers, but not in ATAR requirements.

Watch for: Signs that students are more pessimistic about the future prospects for accounting.

Summary

This is an occupation with strong signs of present surpluses. The sharp deterioration of recruitment between 2010 and 2011 and the increase in the percentage of unemployed graduates four months after graduation suggest that the signs of surplus intensified in the last year, suggesting a continuing trend towards more surpluses. However, the reduction in commencements and completions between 2009 and 2010 will be countering the trend of surpluses.

APPENDIX C: JOB OUTLOOK EXAMPLE

The following example is taken from the Australian Job Outlook website. It is included to show the level of information that can be drawn from effective use of labour exchange portals. The example shows a single occupation but the website covers a total of 350 occupations with a similar level of detailed information for each (<http://joboutlook.gov.au/>).

Barristers

Overview

Barristers plead cases before civil, criminal and industrial courts and other tribunals. The links below provide quick access to basic information for this occupation. Greater detail can be found using any of the page tabs above.

- Job prospects
- Weekly earnings
- Occupation size
- Find vacancies
- Find training
- Browse skills

Tasks

This occupation may include associated occupations with varying tasks.

- receiving written information in the form of briefs and verbal instructions concerning cases from Solicitors, other specialist Legal Professionals and clients
- providing advice and written opinions on points of law
- conferring with clients and witnesses in preparation for court proceedings
- drawing up pleadings, affidavits and other court documents

- researching statutes and previous court decisions relevant to cases
- outlining the facts to the court, calling and questioning witnesses, and making addresses to the court to argue a client's case
- providing opinion on complex legal issues
- may draw up or settle documents

Job Titles

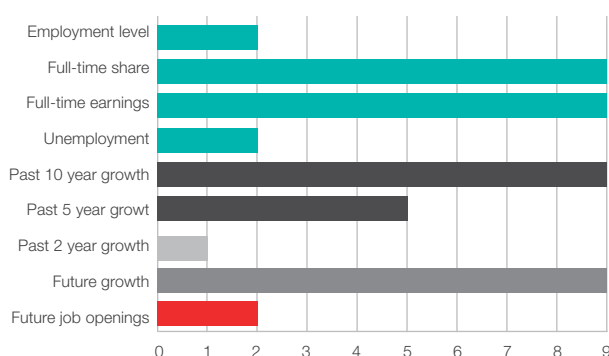
- Barrister

Job Prospects

Data on Job Outlook are updated on a yearly basis and are compiled from national statistics which may not reflect either regional variations or more recent changes in employment conditions.

- Over the five years to November 2017, the number of job openings for Barristers is expected to be **low** (equal to or less than 5,000). Job openings can arise from employment growth and people leaving the occupation.
- Employment for Barristers to November 2017 is expected to **grow very strongly**. Employment in this very small occupation (6,100 in November 2012) rose slightly in the past five years and rose very strongly in the long-term (ten years), although with very small occupations employment estimates can fluctuate.
- Barristers have a high proportion of full-time jobs (91.9 per cent). For Barristers working full-time, average weekly hours are 46.1 (compared to 41.3 for all occupations) and earnings are high - in the ninth decile. Unemployment for Barristers is below average.
- Barristers are mainly employed in Professional, Scientific and Technical Services, Public Administration and Safety and Administrative and Support Services.

Key Indicators



The graph shows 9 key indicators for this occupation - employment size, full-time share of employment, earnings, unemployment, historical employment growth (long-term, medium-term and short-term), future employment growth, mix of industries and job openings. Estimates have been rounded and consequently some discrepancies may occur between sums of the component items and totals.

Indicator	Level	Decile
How many workers are employed in this occupation?	6100	2
How many work full-time (% share)?	91.9	9
What are the weekly earnings for full-time workers (\$ before tax)?	1675	9
How does unemployment compare with other occupations?	below average	2
What has been the long-term employment growth – 10 years (%)?	78.0	9
What has been the medium-term employment growth – 5 years (%)?	2.9	5
What has been the short-term employment growth – 2 years (%)?	-25.3	1
What will be the likely future employment growth for the next five years?	very strong growth	9
What will be the level of future job openings?	low	2

Statistics

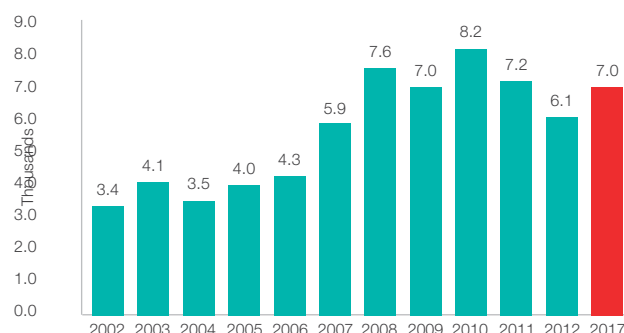
Information for this occupation (presented as charts and tables) includes employment level and growth, age and gender profile, full-time and part-time work, earnings, hours of work, employment by State/Territory and main employing industries.

View Statistics

Select a graph

Employment Level (thousands)
Show

Employment Level (thousands)



The graph shows historical and projected (to 2017) employment levels (thousands) for this occupation. Source: ABS Labour Force Survey, DEEWR trend data to November 2012 and DEEWR projections to 2017. Estimates have been rounded.

Year	Employment Level (thousands)
2002	3.4
2003	4.1
2004	3.5
2005	4.0
2006	4.3
2007	5.9
2008	7.6
2009	7.0
2010	8.2
2011	7.2
2012	6.1
2017	7.0

Knowledge, Skills and Abilities

This page provides data, sourced from the United States Occupational Information Network (O*Net) on skills, knowledge, abilities, interests, job environment, work values, activities and tasks for the best fit O*Net occupation.

View Knowledge, Skills and Abilities

Select an attribute

Show

Skills

Skills are developed capacities that facilitate learning and the performance of activities that occur across jobs. The most important skills for this occupation are shown below.

Skill	Importance (%)	Description
Active Listening	90	Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
Speaking	90	Talking to others to convey information effectively.
Critical Thinking	87	Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
Reading Comprehension	87	Understanding written sentences and paragraphs in work related documents.
Complex Problem Solving	82	Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
Judgment and Decision Making	82	Considering the relative costs and benefits of potential actions to choose the most appropriate one.
Writing	82	Communicating effectively in writing as appropriate for the needs of the audience.
Negotiation	77	Bringing others together and trying to reconcile differences.
Persuasion	77	Persuading others to change their minds or behavior.
Active Learning	75	Understanding the implications of new information for both current and future problem-solving and decision-making.
Coordination	72	Adjusting actions in relation to others' actions.
Social Perceptiveness	72	Being aware of others' reactions and understanding why they react as they do.
Time Management	72	Managing one's own time and the time of others.
Monitoring	70	Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
Systems Analysis	67	Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes.
Management of Personnel Resources	65	Motivating, developing, and directing people as they work, identifying the best people for the job.
Learning Strategies	62	Selecting and using training/instructional methods and procedures appropriate for the situation when learning or teaching new things.
Service Orientation	62	Actively looking for ways to help people.
Systems Evaluation	62	Identifying measures or indicators of system performance and the actions needed to improve or correct performance, relative to the goals of the system.
Instructing	60	Teaching others how to do something.

O*NET™ is a trademark of the US Department of Labour, Employment and Training Administration. The information on this site is derived from the US Department of Labour O*NET Database Version 12.0.

Find Vacancies

To search for vacancies on JobSearch for this occupation, select from the list below or the map of Australia.

Browse by state or territory



Find Training

For information on education and training courses on the myfuture website select from the list below or the map of Australia.



APPENDIX D: SKILLS PANORAMA

ANALYTICAL HIGHLIGHT EXAMPLE

Chemical still and reactor operators

November 2012

SUMMARY	
Overview	- A skilled, manual occupation primarily based in the manufacturing and utilities sector - Skills required for the role include: - Manual and technical skills; - Accuracy, concentration and precision; - Communication and teamworking skills; - Awareness of health and safety issues; - A male dominated occupation with an ageing work force
Demand	- Demand for stationary plant and related operators, which includes chemical still and reactor operators, will increase by 2020 (although the precise demand for chemical still and reactor operators is uncertain) - Demand is primarily driven by replacement demand; however some expansion demand is anticipated, particularly in Italy, Spain and the UK - Technical skills may increase in importance in order for employees' skills to remain aligned with increased automation, changes in technology and regulation affecting their industry
Supply	- On average 395 workers are employed as stationary plant and related operators per 100 000 inhabitants across the EU (the precise share of chemical-still and reactor operators is unknown) - Supply of stationary plant and related operators varies between Member States, ranging from 147 per 100 000 inhabitants in Greece to more than 700 in Latvia and Slovakia and almost 1 000 per 100 000 in the Czech Republic
Mismatch	- Some member states have reported shortages of chemical still and reactor operators (Slovenia) while others have relatively low demand compared to the number of job-seekers (Czech Republic) - Skill mismatches may be due to: - Significant replacement demand (an ageing workforce) – the occupation is not attracting young entrants - High level of special sector-specific tasks required

Analytical highlights headings:

1. Chemical still and reactor operators: a mix of specialist skills and a range of personal attributes; several specialised roles across sectors of economy
2. Increasing drive to automated and ICT based production processes, new technologies and products, and environmental and safety concerns
3. Growing demand in the short and medium term

Growth in recent job finders – chemical still and reactor operators, EU-27, 2007–2010

Main occupational group	Occupations (ISCO-88, 4 digit)	2007–2010 growth in absolute numbers	2007 index	2008 index	2009 index	2010 index	2010 Number of jobs finders
Plant, machine operators and assemblers++	Food and related products machine operators	9 700	100	101	93	104	270 700
	Electronic-equipment assemblers	5 000	100	100	89	112	46 700
	Chemical still and reactor operators	2 900	100	143	120	148	8 900

Source: EVM (2012)

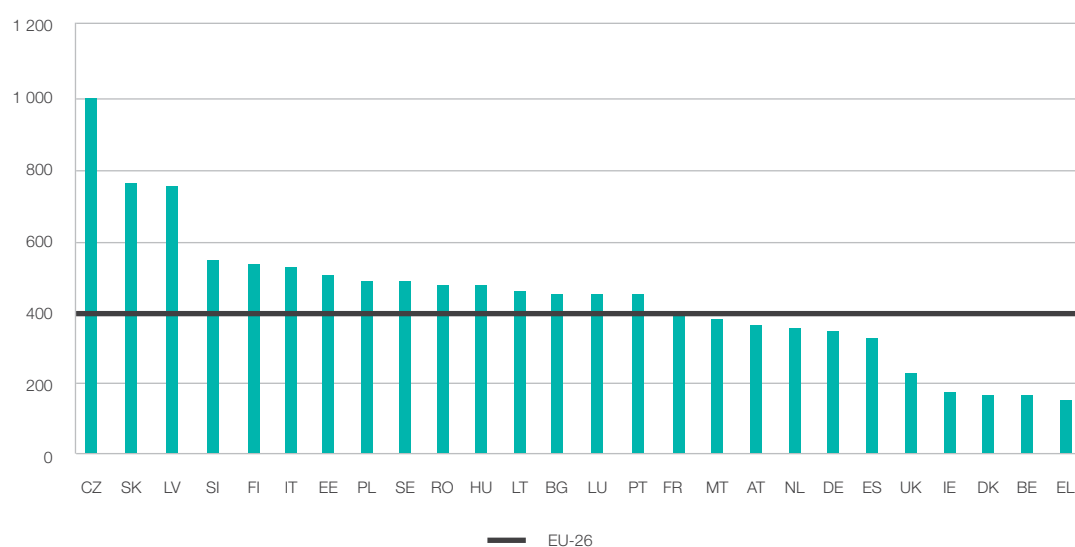
Demand for stationary plant and related operators occupations, 2000–2020

	2000 (000s)	2010 (000s)	2020 (000s)	Change 2010–2020 (%)	2010–2020		
					Expansion demand (000s)	Replacement demand (000s)	Total job openings (000s)
Stationary plant and related operators	2 178	1 978	2 102	6%	124	468	592
All occupations	212 121	223 219	230 847	3%	7 627	72 403	80 030

Source: Cedefop (2012a)

- Size and the relative importance of the occupation differs between Member States; occupation dominated by middle-aged male workers

Employment as stationary plant and related operators (ISCO-08 group 81), per 100 000 inhabitants, 2010



Source: Cedefop (2012a). EU-26 data excludes Cyprus (no data available).

In terms of skill level, the majority of stationary plant and related operators have medium level skills (60%), and one in three were low skilled.⁷ Just 7% of operators in this occupational group have high level skills. This is in contrast to the future trends (see section 3), where a slight increase in medium level skills is anticipated, with a doubling of high level skilled workers and halving of the low level skilled workers.

The age and gender structure in the chemical sector (where large numbers of chemical still and reactor operators work) differs from the average age and gender structure of the working age population.⁸ The basic differences are:

- Young workers (age group 15-24) and older workers (55-64) are less represented in the chemical industry than in the working age population;
- Middle-aged groups are over represented in the chemical industry relative to the working age population;
- In the general working population, around 50% are women; their proportion in the chemical industry is only 30-44%;

The age and gender structure of the chemicals sector workforce in general is likely to pose significant challenges in the context of demographic change and the ageing of European societies. It needs to attract young workers (including women) and ensure that ageing middle-aged workers remain attached to the labour market to offset retiring middle-aged workers who dominate the sector at present. For example, in

Belgium, a key issue for this occupation is that there are too few candidates leaving the education system with good-quality technical education and the right, solution-orientated attitudes.¹⁰ The shortage of suitable candidates is estimated to become more acute in the future.

5. Short-term skills mismatches

- Useful resources
- European level resources
- National level sources

⁷ Ibid.

⁸ Tivig, Eggert and Korb (2010).

APPENDIX E: GLOSSARY

Glossary		
Term	Definition	Ref.
Attrition	Attrition occurs when job opportunities arise as a result of workers leaving the labour market (e.g. when workers resign or retire).	1
Code book (or codebook)	A document used for implementing codes. It reports dictionary information such as variable names, variable labels, value labels, and missing values.	5
Compensation	Compensation is the term used to encompass the entire range of wages and benefits that employees receive in return for their work. These benefits could be both current (e.g. health benefits) and deferred (e.g. pensions).	1
Continuous vocational training	The training in skills and teaching of knowledge related to a specific trade, occupation or vocation, in which the student or employee wishes to participate, that is continuous.	6
Data	A representation of facts, concepts, or instructions in a formal manner, suitable for communication, interpretation, or processing by humans or by automatic means.	2
Database	A logical collection of information that is interrelated and that is managed and stored as a unit, for example in the same computer file.	2
Data consolidation	The act of combining homogeneous data residing in different sources and providing the user with a unified view of these data.	2
Data credibility	The quality, capability, or power of the data to elicit belief.	2
Data dictionary	An integral part of a database holding information on the database itself and the data (or variables) that it stores. A well-designed database must include a data dictionary for database administrators and users. It provides easy access to the type of data that is stored in every table, row and column of the database without actually accessing the database.	4
Data integration	A process of combining heterogeneous data residing in different sources and providing the user with a unified view.	2
Data integrity	The correctness and consistency of data.	2
Data quality	Data quality refers to the degree of relevance, reliability and accuracy exhibited by the data in relation to the portrayal of the actual phenomena.	4
Demographics	Demographics are the characteristics of the population, such as population size, age distribution, births and deaths, geographic location and mobility (i.e. migration).	1
Disaggregation	A process of breaking up of a total (aggregate), an integrated one, or a conglomerate, into smaller elements, parts, or units, usually for easier handling or management or better understanding. In data analysis, it is a process of breaking down an indicator by subcategories or factors which could explain better or in more detail the underlying nature or value of the indicator. It should be noted that over-disaggregation will hamper the degree of accuracy of the results and, thus, the level of disaggregation depends on the initial survey design, including the sample size.	4
Earnings	Earnings are the income that workers receive in the form of wages, salaries and self-employment. Earnings exclude other forms of compensation such as retirement benefits, stock options or expense accounts.	1
Economically inactive	A person is economically inactive, according to the International Labour Organization definition, if he or she is not part of the labour force. So, inactive people are neither employed nor unemployed. The inactive population can include pre-school children, school children, students, pensioners and housewives or -men, for example, provided that they are not working at all and are not available or looking for work either; some of these may be of working age.	6
Employment rate	The employment rate, sometimes referred to as the employment/population ratio, is a measure of the number of employed persons stated as a percentage of the population 15 years of age or older.	1
Equity	A measure of the fairness with which education opportunities, resources, or outcomes are distributed among the learning population.	2
Evaluation	The systematic determination of merit, worth and significance of something or someone using criteria determined against a set of standards.	2

Glossary		
Term	Definition	Ref.
Forecast	A forecast is a labour market or economic prediction of what is likely to occur in the future. A forecast is specific and has a short timeframe. It is based on an analysis of available information to predict current trends and extends these into the future. Forecasts are based on a particular set of underlying assumptions and are therefore only as reliable as these assumptions. Short-term economic forecasts are predictions of macroeconomic indicators for the next one to two years.	1
Hard-to-fill vacancies	Hard-to-fill vacancies are job vacancies that are particularly problematic for employers to fill, or that have been unfilled for a longer amount of time than expected. A vacancy can be hard to fill because there may not be enough applicants; applicants might not have the skills that employers seek; the job may offer unattractive wages, conditions and hours; or the employer may be in a remote rural area.	1
Indicator	A piece of data or information that indicates a state or changes. In this context, it refers to data and information with statistical values that give an indication of the situation with regard to changes in the labour market.	4
Jobs density	The number of filled jobs in an area divided by the number of people aged 16 to 64 resident in that area.	7
Job vacancy rate	The job vacancy rate, in part, reflects the unmet demand for labour, as well as potential mismatches between the skills and availability of those who are unemployed and those sought by employers.	6
Labour absorption rate	The percentage of the population of working age who were employed.	3
Labour demand	Labour demand is the quantity and quality of labour that employers require at given rates of compensation as part of the production of their goods and services.	1
Labour exchange	A government office in a town displaying information and giving advice about available jobs and being involved in the administration of benefits to unemployed people.	5
Labour force	The labour force is the number of people aged 15 years and older in the population who are either employed or unemployed. It does not include those who were unwilling or unable to work (e.g. persons in institutions, retirees, students).	1
Labour supply	The labour supply is a measure of those who are working or are available and willing to work, and the amount of work that workers are willing to provide at the wage level offered by employers.	1
Metadata	Information on the underlying concepts, definitions and classifications used, the methodology of data collection and processing, and indicators or measures of accuracy of the statistical information.	2
Methodological soundness	The application of international, national or peer-agreed standards, guidelines and practices to produce statistical outputs.	2
Monitoring	The systematic collection and recording of information in order to track progress towards the achievement of the objectives of an intervention and identify the need for corrective action.	2
Occupation	An occupation is a collection of jobs or types of work that share similar skills and responsibilities. Employees who perform essentially the same tasks are in the same occupation, whether or not they work in the same industry.	1
Outcome	The intended (or unintended) results of a policy or programme intervention.	2
Participation rate	The participation rate is the number of people working or looking for work as a percentage of the civilian non-institutional adult population (usually 15 years of age and over).	1
Portal	An Internet site providing access or links to other sites.	5
Post-secondary education	Post-secondary education is education beyond the secondary or high school level. It can be attained at universities, public colleges and private training institutions.	1
Quality assurance	All actions taken to ensure that standards and procedures are adhered to and that delivered products or services meet performance requirements.	3
Rate	The amount of something considered in relation to, or measured according to, another amount multiplied by a constant, usually 100 or 1 000 or 100 000, e.g. birth rate.	
Rate of change	The estimate that indicates percentage change in the variables of interest over two different periods of time. It shows the growth or decline in such variables, for instance gross domestic product (GDP) growth rates, rate of inflation, population growth rates, etc.	3
Replacement demand	Replacement demand is the need of employers to hire new employees, usually to replace employees that permanently leave their jobs because they retire. Replacement demand may also arise due to employee resignations, migration between regions or occupations, and death.	1
Retirement	Retirement occurs when an individual permanently leaves his or her job or the labour market, usually between the ages of 60 and 65.	1
Shortage of workers	A shortage occurs in a market economy when the demand for workers for a particular occupation is greater than the supply of workers who are qualified, available, and willing to do that job.	1
Skill	A skill is the ability to perform tasks with a specified degree of proficiency. Skills requirements are the specific abilities, aptitudes and knowledge that are prerequisites needed to obtain employment in an occupational group.	1
Skill gap	A skill gap exists when workers are judged by their employer to not be fully proficient or when an employee feels that they require more skills to perform their jobs.	1
Skill shortages	Skill shortages occur when there is a higher demand for workers with a specific skill type than what exists in the labour market.	1
Tight labour market	A tight labour market is one where the demand for labour (jobs and vacancies) is near or exceeds the supply of labour (employed plus unemployed seeking work).	1

Glossary		
Term	Definition	Ref.
Timeliness of data	The delay between the reference points to which the data pertains, and the date on which the data becomes available.	2
Unemployed	Unemployed is the state of being jobless and actively searching for work.	1
Unemployment level	Unemployment level is a measure of those persons who are not currently employed, but who are actively seeking and willing to work at prevailing wages and working conditions in the labour market.	1
Unemployment rate	The job vacancy rate, in part, reflects the unmet demand for labour, as well as potential mismatches between the skills and availability of those who are unemployed and those sought by employers.	6
Variable	A value that may vary from time to time or from person to person. A variable can also be defined as a storage location capable of containing data that can be modified during program execution. Each variable has a unique name and its data type can also be specified, if necessary.	4
Wage	A wage is usually defined as the amount of money a worker earns on an hourly basis. It is the market price paid for a unit of labour.	1
Wage premium	Above the usual wages; a sum added to wages.	5
Workforce	The labour force or workforce or economically active population, also shortened to active population, includes both employed and unemployed people, but not the economically inactive, such as pre-school children, school children, students and pensioners.	6
Working age	Working-age persons are considered to be all people 15 years of age and older in the population.	1

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International comparative analysis of skills planning indicator systems across national contexts

About the LMIP

The Labour Market Intelligence Partnership (LMIP) is a collaboration between the Department of Higher Education and Training, and a Human Sciences Research Council-led national research consortium. It aims to provide research to support the development of a credible institutional mechanism for skills planning in South Africa. For further information and resources on skills planning and the South African post-school sector and labour market, visit <http://www.lmip.org.za>.