2020

Rapid Evaluation of the 2018 National List of Occupations in High Demand

Labour Market Intelligence research programme

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List of acronyms

CFE	Call for evidence
DHET	Department of Higher Education and Training
DHA	Department of Home Affairs
DoL	Department of Labour
ILO	International Labour Organization
JIPSA	Joint Initiative for Priority Skills Acquisition
LMIS	Labour Market Information System
NCAP	National Career Advice Portal
NQF	National Qualifications Framework
NSF	National Skills Fund
OFO	Organising Framework for Occupations
OIHD	Occupations in high demand
PCA	Principal components analysis
PQM	Programme and qualifications mix
PSET	Post-school education and training
QLFS	Quarterly Labour Force Survey
SETA	Sector Education and Training Authority
SIP	Strategic Integrated Project
SSP	Sector Skills Plan
TVET	Technical and vocational education and training

Executive summary

A general comment on the OIHD list

Overall, the evaluation finds that a robust approach and methodology were used to derive the 2018 National List of Occupations in High Demand (OIHD), although it does identify various potential areas of improvement that should be explored. Moreover, the usage and potential impact of the list are undermined by a number of factors. Most crucially, the exact concept behind the list (i.e., what the list is and is not) and its exact purpose (i.e., its primary intended usage) are not well understood among most potential users, largely as a result of inadequate advocacy and dissemination. For these and other reasons, the list has thus far only been used in very limited and non-systematised ways and has not yet reached its potential as a tool for long-term skills planning in the post-school education and training (PSET) system.

More recently, it has been decided that additional lists – serving distinct purposes – will be created as part of the overall Labour Market Intelligence research programme that the Department of Higher Education and Training (DHET) is developing for, *inter alia*, policy and planning purposes. These additional lists have the potential to meet more focused objectives (such as signalling which occupations should be placed on a list for the issuance of skills-related visas) and, in this way, will attempt to respond to the challenges that the 2018 OIHD list has faced in trying to meet too many objectives. However, the generation of additional lists comes with its own challenges and creates the risk that users will not understand the differences between the various lists. It is thus important that issues surrounding the intended usage and scope of the OIHD list and other potential lists be clarified by the DHET, which would allow the methodology to be improved and stabilised over time. This would also improve the value of and buy-in for such occupational lists and would form the basis for the institutionalisation of the lists over the foreseeable future. In this regard, it is worth noting that several countries, including Australia, are moving towards the development of more than one list, with each list serving a different purpose.

A brief methodological breakdown

This evaluation assesses the 2018 OIHD list across the following dimensions:

- **Concept:** A review of the conceptualisation of the OIHD, where "concept" refers to the specific construct that the OIHD list is attempting to define (i.e., what the list is and is not).
- **Approach:** An analysis of both the quantitative and qualitative approaches followed to obtain the OIHD list as it is.
- **Dissemination, communication, and structure:** A discussion surrounding the current messaging and aesthetics of the OIHD list, as well as how these aspects of the list can be improved upon.
- **Usage:** An analysis of the actual usage patterns surrounding the OIHD list.
- **Suggested amendments and extensions:** A comment on the feasibility and appropriateness of potential amendments to and extensions of the OIHD process.

Conclusions and recommendations

The concept of the OIHD list

CONCLUSION 1

Definitions and terminology have changed across the 2014, 2016, and 2018 iterations of the OIHD list. While the terminology has improved over time, it is important that the definitions be further sharpened (to be more easily understood by a wider audience) as well as stabilised over time.

RECOMMENDATION A: The terminology and definitions used in future iterations of the OIHD list need to be finalised between the creators of the list and the main stakeholders within the DHET, and then kept constant if possible.

CONCLUSION 2

The DHET has a high-level understanding of the primary purpose and use of the OIHD list, but this purpose is not well known among other potential users of the list, who range from the general public to universities and technical and vocational education and training (TVET) colleges.

CONCLUSION 3

Given the wide-ranging and diverse geographical and socio-economic contexts in which the OIHD list is expected to be used, the list will most likely be used as a signalling tool for planning, rather than as a strict, prescriptive policy tool.

CONCLUSION 4

There is an understandable desire to create a list that can be flexibly used for several purposes, and avoid anchoring the list to a very specific purpose, but this has created challenges for the developers of the list across its iterations. The intended creation of additional lists should help in this regard, by making it easier to specify the primary purpose of each list.

RECOMMENDATION B: The DHET should define the primary purposes for all the lists that emanate from the OIHD process. The lists could still be informed by secondary purposes, but stating each list's main purpose makes it easier for users to understand the context within which the lists were created. The decisions made in this regard should then be clearly stated in the list documentation and communicated to stakeholders.

CONCLUSION 5

There is debate around whether to include National Qualifications Framework (NQF) Level 1 and 2 occupations in the OIHD list, so as to be more inclusive of a large number of workers who might still need to know whether their skills are in demand.

RECOMMENDATION C: It is recommended that the OIHD list continue to focus on occupations that require a qualification equivalent to NQF Level 3 or higher, although data on NQF Level 1 and 2 occupations could perhaps still be used internally by the DHET if this is deemed useful.

CONCLUSION 6

There is an apparent need to segment the level of occupational demand according to various classifications, with the authors choosing to segment demand by means of high, higher, or highest demand intensities. While there is nothing objectionable about this split, the choice was not guided or prescribed by any specific or stated purpose and was not seen as useful by the users interviewed.

RECOMMENDATION D: The use of the high–higher–highest ranking should be rethought. However, some form of ordering might still be useful. The DHET, in collaboration with the designers of the list, should specify which format(s) would be most useful and easiest to digest. Ranking criteria that could be considered include the size of the index value; the number of vacancies available per occupation; or other means deemed fit for the specific audiences.

The OIHD quantitative methodology

CONCLUSION 7

The 2018 OIHD quantitative methodology appears generally robust, appropriate, and in line with best practices for estimating labour market information.

CONCLUSION 8

The weighting of indicators is currently done in a relatively arbitrary way. Weighting sensitivity checks were conducted, but a more objective approach could be considered.

RECOMMENDATION E: While the current approach to weighting can still be used in future iterations of the OIHD list, the use of principal component analysis, or similar data-driven approaches to weighting indicators, should be incorporated, in order to at least understand the impact of the weighting choices made.

CONCLUSION 9

Other potential indicators could also be considered within the analysis, although the benefit of any additions should be balanced against the need for stability within the methodological approach adopted.

RECOMMENDATION F: While the qualitative methodology already includes some forward-looking elements, the use of occupational or labour market forecasts and expectation decompositions in the quantitative methodology should be considered, so as to make the analysis more suitable to a medium- to long-term planning perspective.

RECOMMENDATION G: Current data (on wage or employment pressure per quarter, for instance) could be used as a means of creating other indicators and incorporating them into the analysis, while also controlling for occupational seasonality and the persistence of occupational demand.

CONCLUSION 10

The current methodology focuses on estimating the demand intensity for each occupation and does not attempt to estimate supply intensities – except, to some extent, through vacancy indicators and, perhaps, wage pressure. This is an understandable methodological choice, given the difficulties of reliably estimating the supply of occupations. However, this choice means that supply and demand factors cannot be disentangled, which might be a significant weakness of the methodology where some occupations are concerned.

RECOMMENDATION H: We recommend that the authors of future lists explore the potential of incorporating supply signals into the methodology, as part of either the quantitative or the qualitative methodology. This might not be possible for some occupations (since qualifications often do not map directly onto occupations), but it could be very useful for others. For example:

- Qualitatively, structured or standardised interview questions and/or other evidence could be used to gauge whether the signals for specific occupations are predominantly driven by occupational supply or occupational demand at the six-digit level.
- Quantitatively, the authors could investigate whether it is possible to include a comparison of supply and demand per (four- or six-digit) occupation as an additional indicator. This comparison should ideally be relatively forward-looking, given that prioritisation and planning are about current *and* future skills needs and are not just present-value-orientated exercises.

The OIHD qualitative methodology

CONCLUSION 11

The 2018 OIHD qualitative methodology also appears generally robust, appropriate, and in line with best practices for estimating labour market information. This is in spite of the limited time available for concluding the analysis.

RECOMMENDATION I: The qualitative analyst must, in future, be allocated sufficient time, to allow for wider and more detailed interactions with a variety of stakeholders. This should include room for, *inter alia*, validation workshops with various stakeholders and individual semi-structured interviews with employers, via Sector Education and Training Authorities and professional bodies.

CONCLUSION 12

While the call for evidence (CFE) administered by the DHET was useful in assisting the qualitative analysis, the CFE asked only one very broad question and did not provide guidance on what format submissions should follow or exactly what information was required (e.g., on which occupations).

RECOMMENDATION J: CFE questions should be informed by the analyst(s) in charge of the OIHD qualitative analysis (as was arguably the case in the new CFE that went out in 2019), and they should potentially be deepened to obtain answers that can more easily be analysed and compared across occupations.

The dissemination and communication of the OIHD list

CONCLUSION 13

Given that different stakeholders have varying potential uses for the OIHD list, the dissemination of the OIHD list has been far too generalised, focusing only on sending users a link to either the full report or the government gazette. The language and format of the list are also not particularly user-friendly: for example, the list is not necessarily easy to interpret for a person not familiar with Organising Framework for Occupations codes or with the definitions of specific occupations.

RECOMMENDATION K: The format of the list (as gazetted) should be amended to ensure that it is easier to consult, understand, and use. Additionally, different formats of the list could be created for different users: for instance, an online version could be produced, or the list could be broken down into different dimensions for different audiences.

CONCLUSION 14

It is apparent that the OIHD list itself has not been communicated appropriately to most of the relevant stakeholders, who, in some instances, had to find out about it through a Google search, as opposed to being informed through formal channels.

RECOMMENDATION L: Workshops and public information forums should be held with various stakeholders to discuss the list, in terms of both its purpose and actual content. This process should include a discussion on how institutions (e.g., TVET colleges) could and should use the list, rather than leaving them to surmise and decide this on their own.

The usage of the OIHD list

CONCLUSION 15

The actual usage of the OIHD list is more limited than its originally intended usage, especially at the institutional level. According to a survey undertaken by the DHET in 2019–2020, though, the OIHD has been used by the following entities: the National Skills Fund, as an input on how to allocate resources; the Quality Council for Trades and Occupations, as an input on how to prioritise the development of occupational qualifications; the DHET, as an input on supporting enrolment planning at PSET institutions; the DHET's international scholarship programme, as an input on the prioritisation of international scholarships; and the DHET's Career Development Services, as an input for its National Career Advice Portal.

This usage pattern is confirmed by most semi-structured interviews, which suggested that participants did not use the list explicitly, but rather at a glance, as a broader input in their day-to-day decisions. That said, it appears as though the list is being used to some extent by the DHET and the National Skills Fund as a tool for planning and funding programmes – although, again, this usage is still somewhat haphazard and fairly limited.

Additional lists as part of the OIHD process

CONCLUSION 16

There is currently appetite for various additional OIHD-type lists: for example, national and provincial OIHD lists, a list of priority occupations, and a critical skills list. Creating additional lists, for distinct purposes, appears to be a sensible approach, as a single list would not be well suited to all these different potential uses. It is, however, important that the purposes of, and differences between, these lists be clearly defined and communicated, to mitigate the risk of confusion among potential users.

Provincial OIHD lists

CONCLUSION 17

Although it may be feasible to create provincial OIHD lists, the outcome might not be practical, especially if provincial lists differ substantially from national lists of a similar nature. If, however, there is sufficient overlap across national and provincial lists, this would foster policy cohesion between national and provincial labour markets regarding employment and the importing or home-growing of various skills and occupations.

RECOMMENDATION M: While it is useful to utilise data as a means of creating a four-digit list, it is recommended that – due to the sparsity of the data – a more qualitative approach be employed in obtaining provincial OIHD lists. A possible solution would be to create the national OIHD list using Quarterly Labour Force Survey data at the four-digit level, as before, and then, for each province, to run through the same qualitative process that was followed when extending the list to the six-digit level.

Priority occupations and critical skills lists

CONCLUSION 18

A decision has been made that, in future, the OIHD process will also involve the creation of a priority occupations list, which will allow for focused programmatic interventions co-ordinated by the DHET, and a critical skills list (really an occupational shortages list) for the Department of Home Affairs.

RECOMMENDATION N: It is the evaluator's opinion that the creation of a list of priority occupations and a list of critical skills is sensible, as these lists could be valuable additions to the OIHD process. However, before these lists are generated, extensive consultations should be undertaken to ensure that the purpose, scope, and usage of each list are agreed upon and can be maintained for a reasonable period of time.

RECOMMENDATION O: Because the establishment and communication of the purposes of previous OIHD lists have posed a challenge, it stands to reason that this challenge could be amplified with the creation of more lists. This complexity, while necessary, needs to be dealt with in a consistent manner, and the establishment and communication of each list's purpose need to be carried out on the basis of wide stakeholder discussions and clear advocacy.

PART 1

Introduction

In an attempt to strengthen skills development and supply planning, the Department of Higher Education and Training (DHET) has been publishing a national list of occupations in high demand (OIHD) on a biennial basis since 2014, with the most recent version of the list having been published in 2018. OIHD, as defined in the 2018 list, refer to "those occupations that have shown relatively strong employment growth, and/or are experiencing shortages in the labour market or which are expected to be in demand in the future" (DHET, 2018, p. 2).

As a means of obtaining an independent review of the usage of the OIHD list and the approach used in its generation, DNA Economics ("DNA") was commissioned to undertake a rapid evaluation of the 2018 OIHD list. Primarily, the scope of this evaluation involves a (rapid) review of the conceptual and methodological approach, communication, dissemination, and use of the 2018 OIHD list. In addition, the evaluation comments on the value and appropriateness of certain methodological or scoping changes that have recently been discussed in relation to the 2020 and future lists. Finally, based on the findings of the 2018 list and considerations of the proposed changes, the evaluation comments on the ways in which the 2018 list's methodology and implementation (including dissemination and usage) can be improved upon in future lists.

The report is structured as follows: Section 2 briefly outlines the evaluation methodology and the limitations thereof; thereafter, Sections 3 to 7 present the findings of the evaluation in detail, structured around the main research questions, as set out in Table 1 below; Section 8 closes by highlighting the main conclusions and recommendations of the evaluation.

TABLE 1: Research questions and report structure

AREA	QUESTION(S)	SECTION
Concept	How appropriate is the notion of OIHD for the planning needs of the post-school education and training (PSET) system?	3
Methodology	What are the strengths and weaknesses of the methodology used to create the 2018 OIHD list? How might the methodology be improved upon in future?	4
Dissemination and communication	How well (i.e., clearly and effectively) is the list being documented, communicated, and disseminated?	5
Usage	How and by whom is the list being used? Is the OIHD list meeting the needs of those who are using it?	6
Possible extensions	1. Should the list be extended to include lower National Qualifications Framework (NQF) levels than NQF Level 3?	7.1
	2. The 2018 OIHD list used three categories of demand to rank occupations (high, higher, highest). Was this ranking effective/ helpful? What alternative options could be considered?	7.2
	3. There have been recent calls for provincial-level OIHD lists. Is it feasible to create such lists, in the context of the current availability of data and information? If so, what should the link between national and provincial OIHD lists be?	7.3
	4. There is currently a proposal to create three national OIHD lists: an OIHD list; a list of priority occupations; and a critical skills list. Is this approach sensible and advisable? Which factors and challenges should be considered when following this approach?	7.4

PART 2

Evaluation methodology

The evaluation findings and recommendations are based on five main activities:

1. Document reviews of the 2014, 2016, and 2018 OIHD lists, as well as other documents provided by the DHET relating to the use, dissemination, and understanding of the 2018 list (e.g., stakeholder feedback on previous lists).
2. A literature review of parts of the national and international body of knowledge on the conceptualisation, existence, and usage of, and best practices surrounding, such lists.
3. Semi-structured interviews with:
    - Representatives from the skills, planning, and technical and vocational education and training (TVET) branches of the DHET;
    - The authors of the 2018 list;
    - A representative from the Human Sciences Research Council;
    - A representative from university planning;
    - A representative from university career counselling;
    - A representative from the Sector Education and Training Authority (SETA) system;[1] and
    - A representative from the National Skills Fund (NSF).
4. The creation and analysis of an online questionnaire, disseminated to various university and TVET college planning agents, as well as to representatives from a handful of professional bodies.
5. Attendance at a two-day workshop on the broader aspects of the OIHD list.

As is the case in any rapid evaluation, the analysis is limited by the magnitude of our stakeholder engagement discussions as well as by the response rate of the online survey.[2]

1 While a handful of SETAs were contacted, the only formal semi-structured interview conducted within the SETA system was with a representative from the Local Government Sector Education and Training Authority.

2 The survey was sent to a total of 40 respondents, of whom only 8 responded. This low response rate is despite reminders to complete the survey being sent out twice by DNA and once by the DHET over May and June of 2019.

PART 3

A conceptual review of the OIHD approach

This section considers how the OIHD list has been conceptualised in recent years, with a particular focus on the 2018 list. It does so by, first, providing a short background to the OIHD list in South Africa; second, describing the purpose of the list; third, setting out the definition of OIHD adopted; fourth, reviewing similar approaches in other countries; and, finally, discussing the appropriateness of the OIHD list for the skills planning needs of the PSET system.

The "concept" of the OIHD list refers to the construct that the list is attempting to define (i.e., what the list is and is not), which follows directly from the purpose of the list. The concept of the list therefore differs from the methodology used to estimate the list, which is discussed in Section 4. Note, however, that there is not always a clear distinction between concept and methodology, as these areas are closely linked, with changes in one area affecting the other area. Therefore, some brief references to the methodology will also be made in this section where necessary.

3.1 Background to South Africa's OIHD list

The concept of OIHD, although relatively new in the form of the DHET's OIHD list, has for a long time been explored in different ways by the DHET and other governmental departments, as well as by governments in other parts of the world.

The current version of the OIHD list was influenced, in part, by previous lists created by the DHET, the Department of Labour (DoL), and the Department of Home Affairs (DHA), as well as by the need of the DHET, the DoL, and the DHA to more deeply understand the underlying labour market dynamics (i.e., what jobs are expected to be in demand and what the signals for this demand are) in South Africa.

Prior to the first publication of the OIHD list in 2014, the DoL began compiling some of the earliest lists relating to scarce skills in South Africa in 2007 (DoL, 2007). This annual undertaking attempted to understand the supply dynamics of labour in the country, with a focus on which skills households brought to the labour market and which existing skills gaps were in need of being filled.

Although for a different purpose, the DHA began penning similar lists in 2009 (DHA, 2009). The DHA's lists were aimed at understanding which skills could not be "homegrown". As such, they tended to inform the DHA's decisions about whether to grant so-called "critical skills visas" to immigrants looking for professional employment in South Africa.

One of the purposes behind the creation of the DHET in 2009 was to allow more centralised skills planning to take place, which would be facilitated by the establishment of a Skills Planning Unit within the DHET (DHET, 2013). For such planning to be effective, national-level research was required to determine which skills and/or occupations were in high demand both currently and in the future. The DHET was therefore mandated, as per the 2013 White Paper on Post-School Education and Training (DHET, 2013), to produce output regarding occupational demand, and the department chose to undertake this research over a two-year cycle (see DHET, 2016). Subsequently, lists have been published in 2014, 2016, and 2018.

3.2 The purpose of the OIHD list

Interviewed DHET representatives[3] stated that the main purposes of the OIHD list in its current form are:

1. To inform enrolment planning and guide education and training institutions' Programme and Qualifications Mix (PQM);
2. To act as an input for career advising, including via the DHET's National Career Advice Portal (NCAP) website;
3. To act as a basis for the (re)prioritisation of funds distributed by the DHET (and potentially other bodies) to education and training institutions;
4. To act as a basis for the prioritisation of funding into specific focus areas (for example, qualification development in priority occupations, in line with the national government's strategic priorities); and
5. To inform the structuring and creation of programmatic interventions by various stakeholders, aimed at specific qualifications that are in relatively high demand in comparison to supply.

As will be discussed in more detail later in the report, the use of the OIHD list for the above purposes is often informal or aspirational, with the result being that the list cannot be said to have a clear primary purpose.

In particular, semi-structured interviews have revealed that a contributing factor to this mismatch between perceived use and purpose centres on understanding. Most interviewees reported understanding the purpose of the OIHD list at a high level, usually emphasising that it was expected to be used in enrolment planning and PQM development, as well as in career guidance. Understanding of the list's purpose was clearest within the DHET, although very few DHET respondents were clear on exactly how and by whom the list should be used. Outside of the DHET, responses were even more vague. Interestingly, some interviewees suggested that the list should already be in use as an input on visa approvals (which is currently not the case). This indicates that, although some of the purposes of the OIHD list are understood outside of the DHET, there are also some misconceptions surrounding what the list can and cannot be used for.

Indeed, one of the challenges in formalising the OIHD concept and list since 2014 has been ongoing uncertainty and instability around what its primary purposes are. While in theory these purposes can be articulated, as in the list above, the OIHD list has in practice been developed in parallel with the development, definition, and clarification of the DHET's planning structures and processes.

3 Interviews were conducted between end May and mid-June 2019.

There is also an understandable desire to create a list (or lists) that can be flexibly used for several purposes – and therefore avoid anchoring any list to a very specific purpose – but this tendency has created significant challenges for the developers of the OIHD list across its iterations. The concept and methodology of an OIHD list or equivalent list should follow from the purpose (or use) of the list, since no single approach will be optimal for all purposes. It is thus not possible to design a single list that exactly fits the needs of a wide variety of potential users, according to their different contexts. The intended creation of additional lists should help address this issue by making it easier to specify the primary purpose of each list.

This lack of clarity also creates a challenge for evaluation, however, as it makes it difficult to assess the degree to which an OIHD list is well suited to its specific purpose or purposes. The present discussion on the suitability of the approach of the 2018 OIHD list is therefore kept quite broad, in acknowledgement of the fact that this approach is expected to be relatively flexible.

3.3 The definition of OIHD

The 2018 list defines OIHD as "those occupations that have shown relatively strong employment growth, and/or are experiencing shortages in the labour market or which are expected to be in demand in the future" (DHET, 2018, p. 2).

Partially as a result of the issues mentioned in the previous section, the definition of OIHD has undergone some changes across the 2014, 2016, and 2018 iterations of the list. The 2018 definition of OIHD makes use of the word "shortages", which is an improvement on the potentially confusing earlier definition found in the 2014 iteration (DHET, 2014).[4] Although the 2014 list clearly focused on occupations, it still referred to the concept of "scarce skills" in its definition of OIHD (DHET, 2014). Including this concept in the definition was perhaps sensible, given the historical context that the OIHD list emerges from, but the move away from referring to "skills" in the later (2016 and 2018) iterations of the list appears sensible. The 2018 definition of OIHD also appears clearer than the 2016 definition (DHET, 2016), as it makes the linkages to the demand for occupations explicit.

While changes to the definition of OIHD are sensible as a means of refining and strengthening the process that generates the list in its early iterations, continual changes are likely to be detrimental to the credibility and usefulness of the list. When the conceptual definition is changed across iterations, it is not possible to be sure whether changes in the list of occupations are the result of labour market changes or definitional (and associated methodological) changes. Some have already expressed confusion or uncertainty as to why the list has changed from one iteration to the next. The definition and methodology used should ideally be stabilised in future iterations of the list. This process would embed and institutionalise the list's purpose and increase its value for users.

4 The 2014 iteration of the OIHD list refers to occupations that are vitally needed or that represent a "scarce skill" in terms of socio-economic growth and development. There is, theoretically, a difference between a skill and an occupation, and it is our view that the 2014 definition was perhaps slightly convoluted and could have confused some readers. In essence, though, it is our understanding that the 2014 definition was referring to those occupations that were deemed extremely important for socio-economic growth and development.

The 2018 OIHD list focuses on measuring demand, rather than shortage (in other words, demand *and* supply), which is somewhat at odds with comparable approaches in other parts of the world, as will be discussed in the next section. A number of caveats should be kept in mind with this comparison, however. Firstly, demand is fundamentally one side of any shortage, and hence any demand indicator will likely be correlated with the level of shortage (or undersupply) of a specific occupation. Secondly, the current OIHD list does include vacancy indicators, which are viewed as rough signals of shortage. Finally, some of the international approaches mentioned in the next section are used for migration purposes and hence should in some ways be expected to be different from the OIHD list's approach. Despite these caveats, it is still informative to compare the OIHD list to similar international initiatives.

3.4 The conceptualisation of OIHD in the international literature

While the South African OIHD list focuses primarily on demand signals from the perspective of employers, many other countries focus on estimating occupational and skills shortages by reviewing the supply side of the labour market as well.

This trend is seen specifically in Italy, France, Germany, and other European countries, which attempt to forecast skills levels and model skills supply over the short (six months to two years), medium (two to five years), or long (more than five years) term (OECD, 2017). In general, these lists tend to be used as a means of better understanding the mismatch between those skills found within the countries' borders and those skills needed by the labour market. This then informs immigration policy and also hones policy measures that attempt to develop certain skills within a given country (ILO, 2018).

This is not to say that there is no precedent for a list that is demand-driven in nature. In particular, both Canada (Thomas, 2015) and the United States (ILO, 2018) have attempted to model not only the supply of labour per occupation and sector but also the demand from the private and public sectors for various occupations and skills.

The Canadian approach goes a step further than the American aggregated demand–supply estimation by disaggregating the demand for labour into two distinct parts: expansionary demand for labour (linked to improvements in national economic outcomes) and replacement demand for labour (linked to retirements, deaths, involuntary firings, and so on) (ILO, 2018). This disaggregated picture is then able to aid policy that seeks to reprioritise funds or improve qualifications otherwise not offered at an adequate level to meet the demand of employers. If a sector experiences changes in expansionary demand, policy could look at growing the skills base at home, while problems relating to retirement might require a reconfiguration of retirement policy in the interim until sufficiently skilled labourers are able to replace the potential retirees.

Brazil, a closer comparator to South Africa in terms of country context, also models occupational demand (as well as occupational and skills supply). The Brazilian methodology aims to answer two very broad questions:

1. How many workers, by occupation and industry sector, will be demanded in the near future?
2. What changes to the professional profile will be needed in terms of knowledge, skills, and abilities?

From here, a short-term forecast of skills and occupational demand is created through the use of an amalgam of quantitative methods as well as qualitative consultation with academics and private sector leaders. This forecast is used to help prioritise expenditure in high-demand occupational areas, especially in Brazil's TVET system, in an attempt to improve the matching of the skills produced by the education and training system with the needs of the job market (ILO, 2015).

3.5 An assessment of the South African conceptualisation of OIHD

3.5.1 Should supply and shortages be explicitly estimated?

In line with the definition of OIHD adopted in the 2018 OIHD list, the list's methodology simply involves creating an index that does not estimate the number of occupations demanded but rather estimates the net demand intensity for particular occupations, broken down by their respective Organising Framework for Occupations (OFO) code. The 2018 methodology also does not include any means of measuring supply pressure (i.e., how many occupations, per OFO code, are being supplied to the economy by households). This approach is in line with the stated intention of the DHET to use the OIHD list as a signalling tool – rather than a manpower-planning tool – and reflects a deliberate decision to not focus on the exact size of demand or shortage.

While estimating demand is necessarily an important task, in the international literature it is only a portion of the task that is accounted for and considered important. Those countries (America, Canada, Brazil, and various countries in Europe) that estimate demand tend to estimate the supply of workers as well. These two variables are essentially subtracted from each other to measure whether an occupation is in oversupply (surplus) or undersupply (shortage) (ILO, 2015). It is this determinant (shortage or surplus) that tends to influence policy aimed at changing qualifications and reprioritising funds, and not so much solely demand pressure.

This raises a potential challenge in terms of the core uses of the OIHD list itself: given that it is only a demand-based tool, the expectation that the list should be able to inform curriculum planning, the prioritisation of funds, programmatic interventions, and so on may be too broad a mandate. Thus, although the OIHD list is a necessary input when it comes to delivering on this mandate, it is perhaps not sufficient on its own.

An alternative would be to explicitly estimate both the demand for and the supply of each occupation, including looking at the intensity of demand and supply signals (i.e., how large the demand and/or supply index value is) and at the actual number of occupations demanded versus that supplied.[5] If the size of the demand and supply indices were available, the DHET could make judgement calls on which occupations should be prioritised. This could then feed into PQM discussions and discussions surrounding the reprioritisation of funds. Furthermore, if the quantum indicators of both demand and supply were available, the DHET could potentially estimate shortages for particular occupations. Estimating shortages has a direct impact on which careers need to be counselled for and has a further impact on whether a direct intervention is needed in an occupation in order to bolster staff numbers in the country.

In short, if these four dimensions (the quantum of demand and supply and the intensity of demand and supply signals) could be reliably estimated, the OIHD list might provide a much more informative picture.

However, it should be noted that the DHET and the designers of the OIHD list decided not to take this approach for several reasons. The reasons cited in the interviews include the following:

1. Given that there is no linear (i.e., one-to-one) pathway between qualifications and occupations, it can be challenging to reliably estimate the difference between supply and demand.
2. Since the OIHD list is a national list and shortages are often localised, it was felt that it would not necessarily be helpful or prudent to put too much emphasis on national-level shortages. This is also a key reason behind the list's intended use as a signalling tool, rather than as a prescriptive, manpower-planning instrument.

Despite these valid reasons, however, it is still our opinion that the lack of data on supply weakens the potential usefulness of the list. Future iterations of the list could thus explore methods and data sources that allow for the explicit comparison of supply and demand data for specific occupations. One option would be to retain a focus on demand in the quantitative component of the OIHD methodology but expand the qualitative component to look at supply data in more detail – particularly for occupations that are closely matched to specific qualifications (e.g., teachers).

3.5.2 Are occupations the correct metric to focus on?

In this section, we look more holistically at the decision to focus on occupations (as opposed to skills or tasks). Irrespective of any issues related to labour demand and supply, there is an important distinction to be made between the focus on occupations versus a possible shift towards a focus on skills (and, subsequently, tasks). A skill in the 2018 list is defined as "the ability to carry out the tasks and duties of a given job" (Reddy, Rogan, Mncwango, & Chabane, 2018, p. 10). An occupation, meanwhile, is defined as "a set of jobs whose main tasks and duties are characterised by a high degree of similarity (skills specialization)" (Reddy et al., 2018, p. 10). Clearly, while the two concepts are interlinked, there is a difference in how the two concepts can be used.

5 In line with this, it is our understanding that the 2018 list is expected to be expanded into a list that estimates shortages, as well as a list of priority occupations. This is a step in the right direction, and one that is necessary if the OIHD is to be used to its full potential.

More informally, skills can be seen as the *means* of performing an occupation effectively, while occupations are the *end* that need to be fulfilled by the appropriate skills in South Africa at the moment. While measuring skills and skills scarcity is extremely vital for the functioning of a thriving employment landscape,[6] occupations link more directly with employment in South Africa from an internal perspective. Hence, focusing on occupations likely makes sense in this case. A number of arguments support this view:

1. The output of graduates from tertiary institutions (i.e., those who obtain qualifications) links directly to the attainment of occupations. Put more simply, colleges or universities generally see themselves as helping students enter occupations through specific qualifications and not (only) through the acquisition of sets of skills. As such, a list of occupations is likely more useful for the public, as it is tied more closely to qualifications.
2. In South Africa, for the most part, employers hire candidates for particular occupations. This becomes clear when assessing job listings, which typically include occupation names (for instance, "economist" or "data analyst"). It is under the broader term "occupation" that the employer then defines which skills are needed. While there is an inherent overlap between the skills required across different occupations (i.e., proficiency in Stata might be required for a data analyst and an economist position alike), occupations themselves are a relatively distinct set (i.e., there is a clear difference between a data analyst and an economist, based on the tasks performed).
3. Combining the previous two points, it is thus likely that employers, planners, and students would find it easy to understand the process for increasing the supply of specific occupations, whereas the process for acquiring skills could be less clear. There will undoubtedly be cases where a skill could have been more efficiently or quickly acquired than through a full qualification, so there is a potential inefficiency trade-off being made with this approach, although this outcome does seem partially unavoidable.
4. Occupations are already segregated into OFO codes. Creating a list that estimates skills demand as opposed to occupation demand, while intrinsically useful, would require a deeper measure of skills (particularly, one that could be mapped to the available data), which would act as a kind of "OFO list for skills". Such a measure does not currently exist.

Thus, while skills are inherently important – and, in some sense, represent what employers are really "looking for" – the use of occupations might ultimately be most appropriate, given the South African setting currently. More research is required to assess, for example, whether it is appropriate to continue with occupations alone or whether there is a need to link occupations to skills (and then to tasks) as a means of adding texture and detail to the OIHD list, which would allow the system to provide potential labour market entrants with a clearer indication of what is required of them.

Whether the OIHD list will achieve its objective of enabling improved skills supply planning will largely be determined by the credibility and robustness of the methodology used in creating the list. As such, the next section discusses the list's quantitative and qualitative methodologies in detail, while also positing possible improvements to these methodologies.

6 This is particularly true if skills are scarce or deficient in a certain area, which could inform the importing of skilled workers from overseas, as well as directly inform the ways in which skills gaps are plugged through tertiary education.

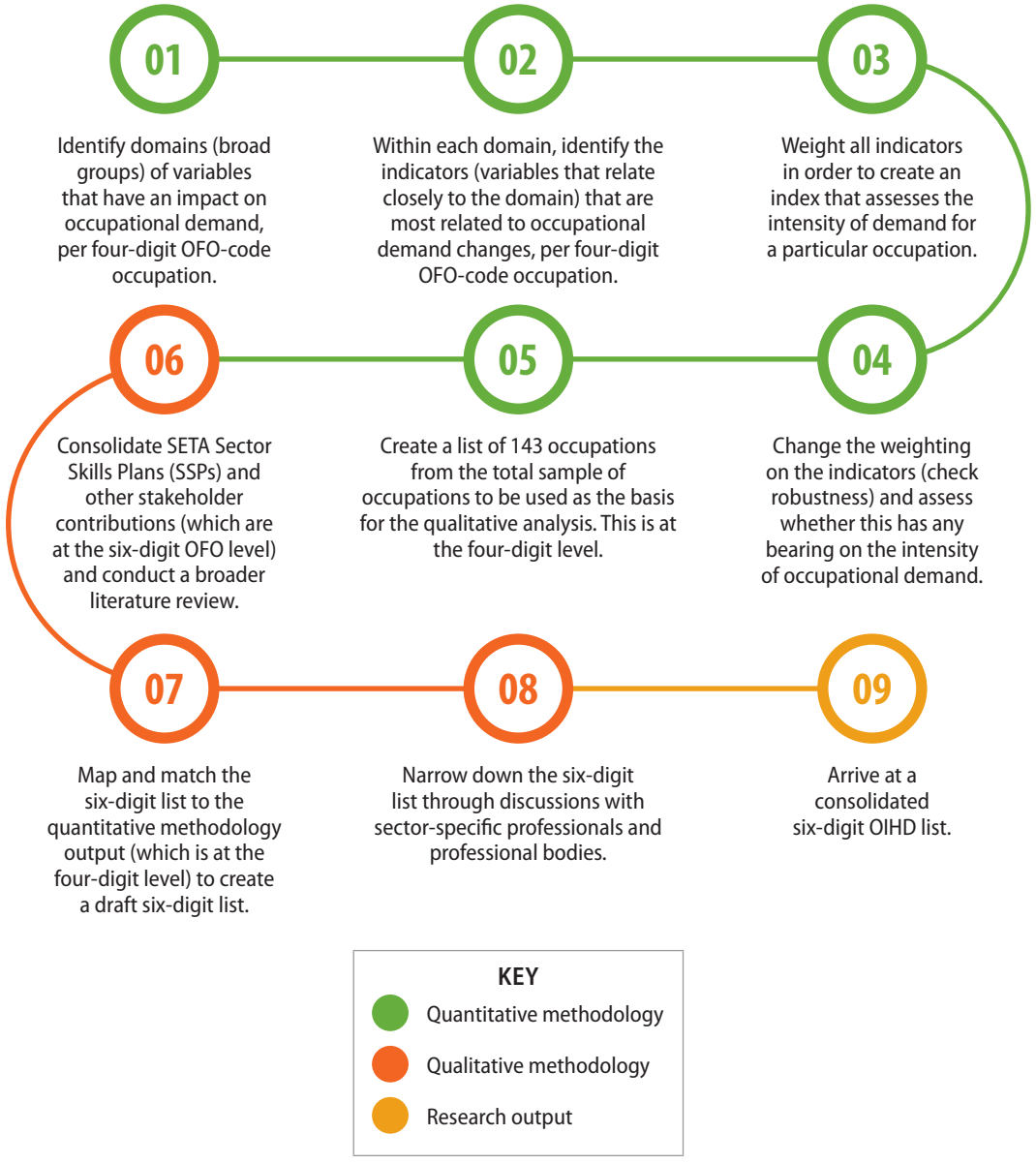
PART 4

A review of the OIHD list's methodological approach

4.1 An overview of the 2018 OIHD methodology

As background to the rest of Section 4, Figure 1 breaks down the methodology followed in the 2018 iteration of the OIHD list. In summary, the list was created through a combination of qualitative and quantitative methodologies. The quantitative methodology, which forms the foundation of the overall approach, estimates four-digit OFO occupations that are considered to be in high demand, based on a list of domains/broad categories and indicators that signal changes in labour demand specifically. From this list of four-digit OFO occupations, the qualitative methodology takes the list to the sixth digit, justifying either the inclusion or the exclusion of specific occupations among all the six-digit occupations that make up a four-digit occupation. The qualitative approach therefore does not add any occupations that are not already in the four-digit list but only decides which six-digit occupations should be included. This decision is made using a degree of subjective judgement but largely relies on experts in each occupational area and other available data. This entire process is encapsulated in Figure 1.

FIGURE 1: Summary of the 2018 OIHD methodology



4.2 The evolution of the OIHD methodology over time

Before discussing the 2018 methodology, and its appropriateness, it is useful to compare it to what was done in previous lists, given the changes in the methodology over time. These changes are part of the reason for the confusion surrounding the list's intended purpose, and part of the reason that there appears to be relatively inconsistent treatments of the concept of the OIHD list.

Table 2 thus provides a high-level summary of the purpose and methodology of each of the lists.

TABLE 2: The OIHD list over time

ITERATION OF THE LIST	STATED PURPOSES OF THE LIST	BRIEF OVERVIEW OF THE METHODOLOGY USED TO GENERATE THE LIST
2014	• Enrolment planning and qualification development • Career guidance • Prioritisation and reprioritisation of funds • Programmatic interventions • Attraction of skilled persons from outside of South Africa	• Various sources were used qualitatively, such as SETA pivotal lists and SSPs, Strategic Integrated Projects (SIPs), the Joint Initiative for Priority Skills Acquisition (JIPSA), and so forth. • Given these sources, a points-based approach was used, with an occupation scored out of 100 (based on SETA identification, appearance in the SIPs and the JIPSA, the number of associated vacancies, etc.). • This created a list of occupations (at the six-digit level), which was then validated and added to by a large set of private and public sector participants.
2016	• Enrolment planning and qualification development • Career guidance • Prioritisation and reprioritisation of funds • Programmatic interventions	• Data from the Quarterly Labour Force Survey (QLFS) and the Job Opportunity Index were analysed in order to assess occupational growth and job vacancy trends. • Forecasts (up to 2025) of occupational growth were made and then used to ascertain the top 20 job prospects in the country. • Various sources (such as SETA pivotal lists, the SIPs, the DHET's CFE, literature in South Africa, etc.) were used qualitatively. • These findings were amalgamated and presented to various private and public stakeholders for validation (although the sample of "validators" was far smaller than the sample used in the 2014 list).

ITERATION OF THE LIST	STATED PURPOSES OF THE LIST	BRIEF OVERVIEW OF THE METHODOLOGY USED TO GENERATE THE LIST
2018	• Enrolment planning and qualification development • Career guidance • Prioritisation and reprioritisation of funds • Programmatic interventions	• Data from the QLFS and Career Junctions was analysed, and a four-digit OFO-coded list was produced. • Various sources (such as SETA pivotal lists and SSPs, the SIPs, the DHET's CFE, literature in South Africa, etc.) were used qualitatively, so as to turn the four-digit list into a six-digit list. • This list was validated by a limited number of stakeholders in both the private and public sectors.

Source: DHET (2014, 2016, 2018)

The following observations emerge from the table:

1. Some data sources found in the 2014 list were not used in either the 2016 or the 2018 iterations of the list. According to the DHET officials interviewed, some of these data sources were deemed outdated and hence not used again.
2. The purpose of the list has been narrowed from 2014, with the 2016 and 2018 lists not being used to inform immigration policy.
3. While the data sources used in 2014 were largely qualitative, the methodology became more quantitative over time.
4. Relatedly, the data used in 2016 appeared to be more forward-looking than the data used in 2018.
5. The number of validating agents (i.e., those contacted to verify or comment on the list during the process of its creation) included in the process has decreased over time.

Overall, this suggests that the approach has become increasingly data-driven and quantitative over time. A significant qualitative component remains, but the number of interviews conducted has been reduced. This reduction is, however, partially the result of there being a limited amount of time for such interviews in 2018; thus, it does not necessarily represent a purposeful decision to reduce the qualitative component of the methodology. On the whole, though, it appears that the methodological approach has become more robust and objective over time.

It should be noted that the stated purposes of the OIHD list have also changed over time. This change could have added to the inconsistency regarding what the perceived purpose of the list is currently versus what it has historically been. For example, in 2014 the DHA wanted the list to be usable for immigration purposes, which naturally affected the choice of methodology. Overall, while there are similarities across the three iterations, it is the differences in approach and purpose that drive the uncertainty surrounding the trajectory of the list. The current expectation (based on the interviews conducted as part of this evaluation) is that there will be a more consistent purpose and approach across the 2018 list and future lists, which should result in the list's methodology and use becoming more institutionalised.

4.3 Comparing the 2018 OIHD methodology to international approaches

Beyond comparing the 2018 OIHD list to its predecessors, it is also important to contrast the list with estimations of similar lists in other countries.

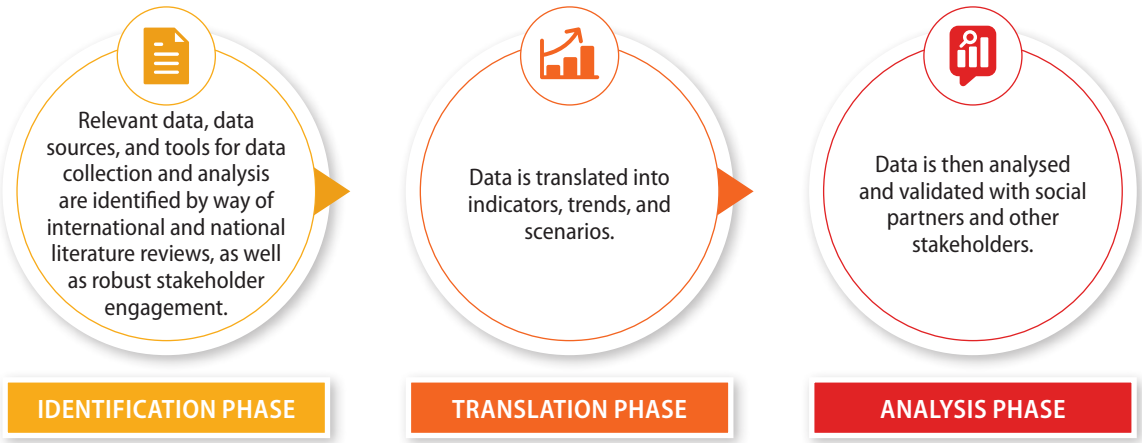
From a methodological perspective, it appears that most occupational demand (and/or supply) lists are created through the use of a very consistent methodology (although the inputs for that methodology might vary significantly across countries).

As the International Labour Organization (ILO) (2015) points out, most labour market information systems (LMIS) need to follow a standard protocol in order to improve co-ordination between those who supply labour and those who demand it. It notes:

> It is crucial to understand that the mere production of information on current and future skills needs is necessary, but not sufficient, for effective skills anticipation and matching. The concept of anticipation is broader, requiring not only the production of results from analytical models, but the analytical expertise to interpret and validate them, and the capacity then to translate them into the development of practical policies. Both these steps require agreed and coordinated responses by a range of stakeholders. (ILO, 2015, pp. 3–4)

The ILO approach has been adapted the world over (with varying degrees of success). The ILO suggests that an occupation–skill needs anticipation assessment should consist of three broad tennets. These are shown in Figure 2.

FIGURE 2: Broad approach to any occupation–skill needs anticipation assessment



Source: Adapted from ILO (2015)

Of course, depending on the country, this analysis will yield different results. This variance is due to the different available sources of data, as well as the different levels of interaction and feedback experienced in each country when implementing the methodology. Nevertheless, this general methodology is widely followed across various assessments of both labour demand and labour supply in an array of countries.

While the broad methodology tends to be closely followed, the approach to each phase may differ in its nuances. Specifically, vast differences in approach may emerge across economies in the analysis phase, and this has a direct bearing on the quality and accuracy of the subsequent output. While most economies (South Africa included) utilise versions of a labour force survey and an employer survey, the vast majority of these occupational demand or supply assessment exercises also include a forecasted element in their data analysis, which the 2018 iteration of South Africa's OIHD list did not do. To be cautious, forecasts could be added to the OIHD list's quantitative model but given a smaller weight to avoid overreliance on the forecasting assumptions made. Alternatively, if it is decided to keep the quantitative component of the model stable over time (which is likely advisable), an element of forecasting, or at least forward-looking analysis, could be added to the qualitative methodology. This could be as simple as adding a question to the CFE that asks respondents to forecast demand in the future (and provide evidence or reasoning for their choice).

The 2018 version of the list did, however, draw inspiration from various other international sources. Accordingly, Table 3 outlines some of the actual (and potential) influences that international approaches have had (or could have) on the South African OIHD list.

TABLE 3: Actual and potential international inputs for the OIHD methodology

SOURCE	PURPOSE	ACTUAL INFLUENCE ON THE SOUTH AFRICAN OIHD LIST
OECD (2017)	• Creating awareness/ advocacy for prospective students • Useful as a tool to review and update training and qualifications	• Helped with the identification of dimensions to include in the OIHD list • A method of creating an index to rank occupational demand • A starting point in terms of the list of signals[7] that are important for indicating occupational demand
The Migration Advisory Council (2013)	• The identification of skills shortages for the purpose of issuing skills visas	• Integration of qualitative and quantitative approaches in modelling occupational demand • A weighting approach to the indicators • Further embellishment of the list of signal variables chosen • The inclusion of a CFE in the process

7 Simply put, a signal is defined as "an indication – or information – passed passively between participants in a market" (Business Dictionary, 2019). For instance, increasing wage inflation (the signal variable) indicates (signals) a possibility that employment demand *may* have increased (for, if an employer's demand for labour increased because that employer needed to employ a worker of a particular kind, the employer would be willing to pay this worker more in order to meet the company's staffing needs).

SOURCE	PURPOSE	POTENTIAL FUTURE INFLUENCE ON THE SOUTH AFRICAN OIHD LIST
International Labour Office (2015)	• A broad analysis of the ways in which occupational forecasting and modelling can be done	• Potential to adapt the framework found in this paper as a means of robustly including longer-term data[8] • Potential to adapt the framework found in this paper as a means of modelling occupational supply, especially when using the same methodology found in the OIHD list
Australian Department of Home Affairs (2019)	• An estimation of the actual quantum of shortages, per occupation, across various sectors in the Australian labour market, as a means of informing visa regulations	• Potential to adapt the use of more medium-term and long-term government planning documents (including, but not limited to, the SIPs document) as a means of filtering occupations expected to be in high demand over a longer time horizon

From the above table (and the preceding analysis), a few key points can be extracted that may strengthen and validate the 2020 iteration of the OIHD:

1. The literature points out that occupational demand (and/or supply) lists are predominantly used as a means of determining which skills need to be imported from other countries. As discussed in more detail in Section 3.5.1, the OIHD list, given its express purpose, is a tool that focuses on measuring demand rather than shortage (although some of the demand measures can be seen as rough measures of shortage). As such, it is important for any adaptations from the literature – in terms of both methodology and concept – to talk directly to estimating demand, and not shortage.[9] This distinction, arguably, needs to be more clearly shown in future OIHD list iterations, especially in terms of how estimating occupational demand differs from occupational supply and shortage.
2. Although forecasts are often imprecise, it is important to note that most of the literature on the estimation of occupational demand includes some forecasts of the general macroeconomic climate and/or of occupational demand variables. Past employment and labour market trends do tend to influence employment dynamics, but assessments (both qualitative and quantitative) of future labour market possibilities speak directly to how an economy and its labour market will evolve. To a limited extent, such assessments make the resulting list "future-proof" and may be able to point to the ways in which technological (and other) advancements might change the labour market landscape. Furthermore, creating graduates takes a sufficiently long time, and in some instances the content in the list might become obsolete from the time that a graduate registers for their first year of studies to the time they subsequently graduate. This makes the need for a more forward-looking methodology quite pressing.

8 Canada's *Guide to Essential Skills Profile* (Government of Canada, 2015) is also a useful source in terms of understanding how technology can influence labour demand over time. This perspective could help either narrow down or broaden the list of occupations obtained from the quantitative exercise in the OIHD methodology.

9 Here it is important to stress that, irrespective of measuring occupational supply or demand, the methodology used will most likely remain the same at a high level (i.e., creating an index and using weights). What could be different are the indicators used, and their interpretations as signals. For instance, while wage growth could signal an increase in demand for a particular occupation, it could also signal a possible decrease in the supply for that particular occupation. If, in fact, it turns out that an indicator relates to supply rather than demand, the inclusion of this indicator overstates the value of the indicator as it pertains to measuring demand. Qualitative analysis should be done to assess whether the signal variables used are truly demand shocks or supply shocks with respect to a particular occupation.

3. It is, perhaps, important to unpack the source of the demand signals that are being sent, as this tailors policy more adequately to the needs of the labour market. More specifically, and although data in South Africa is relatively limited, an approach utilising qualitative assessments per sector can be taken so as to gauge whether changes in demand are expansion- or replacement-based in nature.

Overall, it is likely that the learnings and adaptations from the aforementioned literature have been extremely useful. The Migration Advisory Council (2013) methodology is particularly useful in formulating an objective and simple method for assessing labour demand indicators. More nuanced comment should, however, be made regarding the quantitative methodology itself. This, along with a deeper analysis of some of the abovementioned points, can be found in the following section.

4.4 A review of the 2018 quantitative methodology

4.4.1 The analysis and selection of labour demand data

From a data analysis perspective, the methodology appears to have been robustly implemented. Generally, we find that the labour market indicators used in the OIHD list are in line with those used in other countries (ILO, 2015, 2018; OECD, 2018). Again, the caveat is that it is not straightforward to disentangle whether a signal is demand- or supply-based.

Nevertheless, it should also be mentioned that the generally accepted best practice for creating a portion of labour market knowledge was adhered to quite rigorously. More specifically, the method of moving from the identification to the translation to the analysis phases (as per Figure 2) was strictly followed. Specifically:

1. Most potential data sources (most notably, historical data) were identified and utilised;
2. A wide variety of literature was referenced, inspiring a well-formulated use of the various tools and methodologies available for analysing the data;
3. The data itself was then robustly translated into indicators that were relatively useful and usable; and
4. The data was validated by means of an in-depth qualitative analysis (discussed in more detail in Section 4.5).

It is our opinion, however, that there are still some avenues yet to be explored that may improve the quantitative methodology, depending on the data that is available. Importantly, the data sources used by the developers of the 2018 list were relatively exhaustive, given the extent of South African data, and, as such, the following improvements may only be feasible as or when the sample size of the data is improved.

In concise terms, the signals that were modelled for (various facets of wage pressure, vacancy pressure, employment pressure, and priority/strategic demand) tend to describe a relatively large portion of

the variation in occupational demand (DHET, 2018).[10] Potentially, though, some of these variables that signal a change in demand might signal a change in supply as well. The authors of the 2020 OIHD list should be cognisant of this conflation, and should perhaps seek to qualitatively assess the sources of the growth or decline in the chosen signal variables, so that some signals can be ruled out if they are predominantly supply-drivers rather than demand-drivers.[11]

Furthermore, and considering that the demand for various occupations can fluctuate greatly over time (e.g., given changes in technology), the inclusion of a forward-looking component in the model could be considered. This could take one of two main forms:

1. Forecasting; or
2. Expectations decompositions/latent factor modelling.

The Box 1 overleaf discusses these two forward-looking approaches in more detail. While the two methods are similar in many ways, we would recommend that expectations decomposition be used, if possible, for the reasons mentioned.

Box 1 Contrasting forecasting and expectations decompositions

Forecasting is an attempt to model the future trajectory of variables based on past data points (i.e., the future trajectory of employment/wages per occupation based on previous wage or employment levels). Expectations decompositions/latent factor modelling – while very similar in that it also utilises past data points – also updates its predictions after every forward-looking forecast,[12] making the data estimation more precise into the future.

For instance, if a chef's wages are forecast/expected to increase, that signals that the occupation of "chef" might be in higher demand in the future. Similarly, an increase in forecast/expected employment for chefs may signal that, in the future, there will be a move towards filling these positions – a signal that the occupation was in high demand and will be filled in the future.

Although, theoretically, expectations decompositions and forecasts provide similar occupational demand signals, their estimation is quite different. Forecasts, in particular, only focus on past levels of occupation-specific wages and employment. As such, they are backwards-looking estimates of some future variable, which tend to be relatively inaccurate in small samples. Furthermore, because of technological advancements, past employment and wage levels may not accurately indicate how future employment and wages might change.

Instead, expectations decompositions (focusing on both past and "future" levels of wages and/or employment) may be more useful. From a technical perspective, something like a Kalman filter (a particular expectation decomposition) updates after every observation, making the estimate of future wage and employment pressure relatively more forward-looking than forecasts. Importantly, we qualify this recommendation with the fact that all estimations are based, in some way, on past data. Given the ever-changing employment landscape in South Africa, this may not be a particularly robust way to map changes very far into the future.

10 This is because, in most instances, the list of indicators used in the demand-driven approaches found in the literature is relatively sparse in comparison. In particular, only six indicators are used in the OECD (2017) methodology, which is considered quite robust. By contrast, the 2018 OIHD methodology uses more than these six indicators, and also takes into account more than one signal for various dimensions, whereas the OECD methodology would have only accounted for one signal variable or indicator.

11 Again, it is important to reiterate that using a supply-side driver in an occupational demand estimation might increase the occupational index value of a particular occupation. This is an upwards bias, and does not truly isolate occupational demand signals, but rather a mixture of supply- and demand-side factors.

12 On a more technical note, if we are trying to create an expectations decomposition for Quarter 4 2019 from a dataset from 2000 to 2018, the algorithm would first use the data from Quarter 1 2000, create a forecast for Quarter 2 2000, incorporate the information from both actual and forecast levels in Quarter 2 2000, and then update its prediction. This iterates through the time series, with the algorithm working forwards and backwards through the data, essentially learning from its past forecasting errors, and then predicting more accurately based on what it has "learnt" (Kalman, 1960; Durbin & Koopman, 2012).

It may also be useful to consider adjusting for seasonality in occupations in future iterations – an aspect the 2018 authors do not account for. For instance, an entry on the list such as a retail worker may only be in high demand during the festive season; the research team would need to account for this in order to assess whether demand signals were transient or longer term. This analysis would have to be driven by discussions with various SETAs and other stakeholders who are intimately aware of the seasonality and cyclicality of occupational demand.

Furthermore, discussions across the various platforms and workshops run by the DHET during May and June of 2019 have suggested that it is important to include whether or not an occupation was on the previous iteration of the list. This could involve the creation of a variable that could be used as an indicator to signal whether the occupation was included in a previous OIHD list. In some sense, this measure addresses whether the demand for each occupation has been met by employment or not, while also trying to ascertain whether the change in occupational demand was only temporary or consistent over a longer time horizon. This process can, however, only be followed robustly in the event that the methodologies are consistent over time and across iterations of the list.

What may be more useful is an analysis of why particular occupations fall off the OIHD list. To this end, it is possible to conduct a focused qualitative assessment of the reasons selected occupations appear in previous iterations of the OIHD but not in the current version. This assessment could be added as an appendix, or even created as a stand-alone report that gives more insight into the trajectory of certain occupations.

Finally, it has been suggested multiple times at workshops and in semi-structured interviews that the quantitative methodology should be able to push its output from a four-digit OIHD list to a six-digit OIHD list. One of two data characteristics would need to be true, however, before such a suggestion could be implemented:

1. The dataset would need to be extremely large in terms of time periods and number of individuals; and/or
2. The dataset would need to show sufficient variation in occupations at the six-digit level.

In relation to the first point, data is used from 2010 and 2015, implying that there are only 20 quarters' worth of observations for close to 30,000 households (Stats SA, 2019).[13] Although appearing to be large, this is actually a relatively small sample with a relatively small time period from which to draw data, in comparison to other countries' labour market analyses. Regarding the second point, although DNA has not accessed the data from which the OIHD list was estimated it is probable that this data is most detailed and most accurate at the four-digit level. This is because, for the most part, it is easier for the public to define their broader occupation, as opposed to their specialisation. It is understood that some Career Junction data on vacancies is available at the six-digit level, but confirming the quality and potential value of such data was beyond the scope of this evaluation.

13 It should also be pointed out that it is not actually 30,000 household observations that are used. Because the OIHD list focuses on occupations that require NQF Level 3 or higher, this sample might decrease drastically depending on the average level of qualification across the sample.

As such, it is our belief that, for the moment, the quantitative methodology should continue to produce output at the four-digit level. Having said this, *if* the QLFS time period sample that was used in the OIHD list's analysis were extended, and *if* occupational data were at the requisite level for obtaining reliable data for six-digit occupations, then it would be possible for the output of the quantitative analysis to be extended to a list of six-digit occupations, which would then be validated by the qualitative assessment.

4.4.2 The aggregation of the data and the construction of an index

In order to measure demand, the authors of the 2018 OIHD list estimated a composite index of important signal variables that could signal a change in the demand for occupations. This was done by first collecting indicators across various dimensions for the sample of available QLFS data. From this, a weighting matrix was chosen across dimensions and indicators in order to estimate an index for occupational demand. Box 2 describes the way in which weighting was done in simple terms.

Box 2 **A discussion of the weighting approach found in the 2018 OIHD quantitative analysis**

The OIHD research team employed an "equal-weighting-across" approach, where, in order to come up with the index value, all of the four dimensions received an equal weight of 25%. If there were two indicators within a particular dimension, then weights on those indicators were chosen as 12.5% each, so as to add up to 25% for the dimension in total. Similarly, if 10 indicators were found in a dimension, each indicator would be weighted at 2.5%, so as to add up to a total of 25% for that particular dimension as well.

This index is directly related to occupational demand, ensuring that, as the index (in less formal terms, the occupational demand score) increases, so too does demand for a particular occupation. This is extremely useful because, apart from pooling various sources of information in one easy-to-understand tool, it is also easier to make comparisons across various occupations. Particularly, instead of comparing mean hourly wages across occupations (which might differ too vastly across occupations in the way that they are set), an index ensures the comparison of like with like, especially given that the methodology is consistently used across occupations. Furthermore, the authors of the paper perform a multitude of robustness and sensitivity checks, making sure that the list is robust to various changes in the weighting of signal variables.

There are, however, some drawbacks to the approach used in the paper. In particular, weighting for these variables was assumed in a relatively arbitrary manner (based on studies conducted in other countries). Although weighting sensitivity checks were performed, it may also be useful to weight variables by means of principal components analysis (PCA)[14] or a similar approach (Joliffe, 2011). Instead of being relatively arbitrary, the weights associated with the output from a PCA tend to be relatively more objective. The caveat is that, upon using PCA or similar techniques, the weighting calculations might appear to be a black box, with no input from the statistician or econometrician, who might deem it fit to perform sensitivity and robustness checks with different weights for theoretical reasons.[15]

14 This is, itself, a data-centric approach, which attempts to use the variation in the underlying data for each variable and ascribe weights to each variable based on its inherent contribution to (in this case) occupational demand in totality.

15 If, for instance, the researcher were led to believe that strategic demand and, *ipso facto*, the SIPs list or another such output were of extreme importance for the national government, they might place more weight on variables relating to strategic demand. This weighting of strategic demand, more so than other areas, might not be the output from the PCA, which does not focus on policy, but rather on the underlying structure of the data that is available.

As such, a suggestion would be to pursue both "subjective" (i.e., those found in the 2018 OIHD report) and "objective" (i.e., PCA) weighting methods, and include them both in the 2020 iteration of the OIHD list, along with the various existing sensitivity checks. Overlaying and comparing these differently weighted lists might be a valuable exercise, especially as a means of understanding how sensitive the list is to different weighting specifications. These insights can then be discussed in an appendix or in the body of the report – depending on the needs of the DHET and the authors.

Finally, it is important to note that certain occupations may have come out as contentious at the four-digit level. These occupations were estimated to be in high demand based on the data and were only listed first based on their OFO code (which the list was ordered by). In particular, government management positions were seen to be high demand, a finding that was met with scepticism, perhaps due to the sheer scope of public sector employment already present.

Although this may be the case, it is important to realise that government-based positions do have very high vacancy levels, often because it may not be necessary to fill a particular position rapidly. Thus, including the vacancy variable when defining government-based occupations may bias results somewhat, and there may be room for further sensitivity analysis (the reweighting of vacancy pressure in particular). Alternatively, it may be possible to use the qualitative portion of the methodology to clarify why certain positions appear to be in high demand. This clarification can then inform the structure of the final list sent out for public consumption. It is this qualitative methodology that is discussed in the following section.

4.5 A review of the 2018 qualitative methodology

The qualitative methodology of the 2018 list acts as a buttress for the quantitative methodology. Instead of being an isolated output, it uses the quantitative findings as its starting point, homing in on the nuances attached to various occupations. This process is executed through the combined use of the DHET's CFE results, various SETA pivotal lists, the SIPs document, some literature in the South African skills analysis space, and telephonic interviews with potential employers and industry bodies. It is through the qualitative methodology that the four-digit quantitative output is fleshed out, refined, and finalised in the form of a validated six-digit list of OIHD.

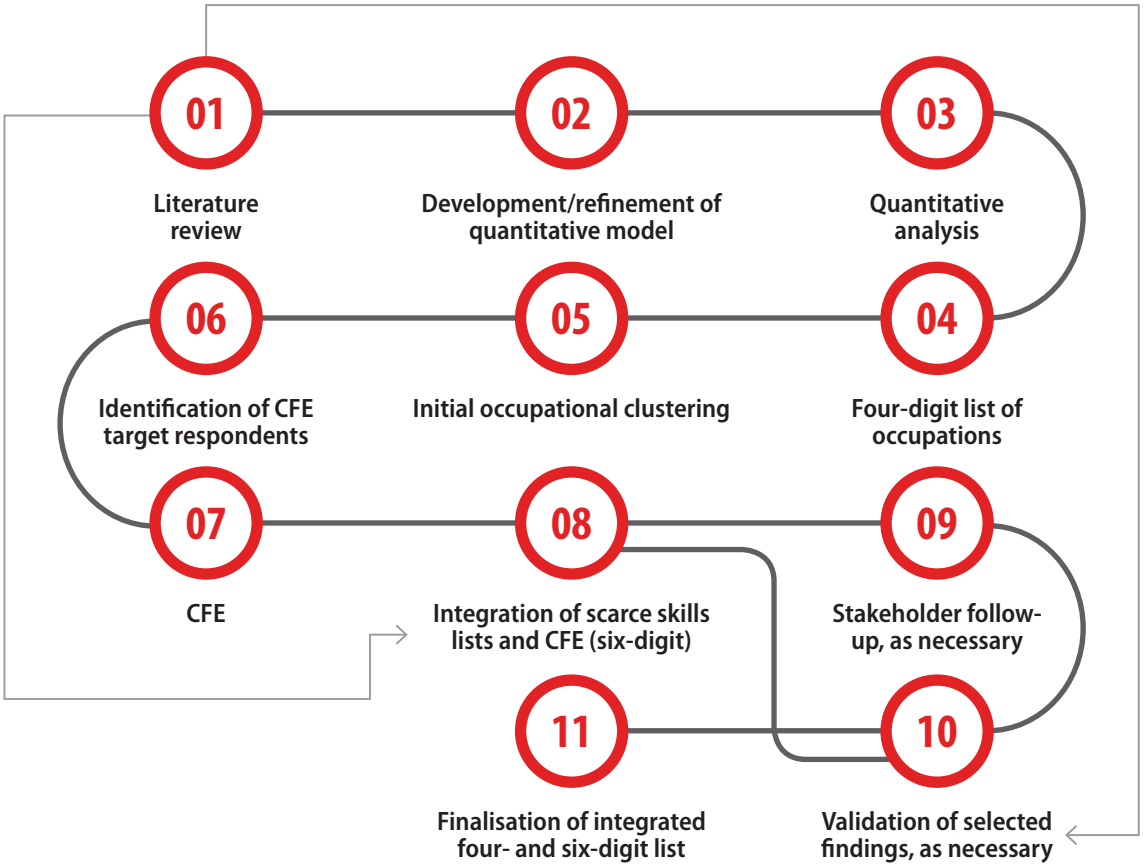
Based on the 2018 qualitative methodology, a handful of comments can be made:

1. The international literature (ILO, 2018; OECD, 2018) points to the fact that a larger array of documentation should be used to bolster skills anticipation analyses. Particularly, any and all research that is done in a country by a reputable source in the field of occupational demand could be used to support the qualitative findings of the analysis. This guideline was followed in the case of the 2018 OIHD list, but to a limited extent. The literature review component could thus be extended in future iterations, although naturally such an exercise might be time- and cost-consuming. Such a review could perhaps be limited to occupations that have either "fallen off" or been added since the previous list. More generally, the possibility of using a systematic-review-style approach (which combines some elements of both quantitative and qualitative analysis) could also be considered – but more thought would be required as to whether the available evidence is sufficient for such an approach.

2. Upon review of the inputs on the CFE from the various stakeholders for the 2018 OIHD list, the authors (interviewed between end May and mid-June 2019) noted that responses tended not to be detailed enough to draw robust conclusions on occupational demand. They further noted that it was in telephonic interviews with the various stakeholders that the nuances of occupational demand were more easily fleshed out.
3. Relatedly, these telephonic interviews were done over a short period of time, between December 2017 and January 2018. This part of the qualitative analysis was a particular stop-gap for the authors, considering the short timeframe for concluding the interviews. Due to the small number of stakeholder interviews, it is possible that the six-digit list suffers from small-sample bias (where the voices of only a handful of stakeholders might not represent the actual truth behind occupational demand across sectors). In order to achieve a more informed and accurate six-digit list, there is a need for robust and consistent stakeholder validation and consultation.

As part of the 2018 list document, the authors proposed a roadmap for how the sequencing of the methodology could be improved in the future. This roadmap is reproduced in Figure 3. We broadly agree with this proposal and suggest that an approach of this kind be considered.

FIGURE 3: Roadmap to an improved qualitative analysis for the OIHD list



Source: Reddy et al. (2018)

Of particular interest in this roadmap is the move from "Identification of CFE target respondents" to "Finalisation of integrated four- and six-digit list" in the qualitative portion of the paper. In general, the structure of this improved qualitative approach is similar to the original methodology followed by the authors, although it is admittedly more detailed and allows for a wider range of stakeholder engagement.

First, the identification of target respondents for the CFE should be discussed. Particularly, there is a possible need to separate SETAs from this list of respondents. Due to the fact that pivotal lists are, in essence, SETAs' response to questions pertaining to occupational demand and supply, the inclusion of SETAs might be a duplication of information and effort in the process. To add to this, it appears as though the CFE needs to be made into a more formalised and informative tool, one that is better able to generate useful information for the authors of the paper. This improvement of the CFE can be supported in two major ways:

1. Consultations surrounding the content of the CFE should be arranged between the authors of the paper (who know what evidence is needed) and the DHET (which is able to elicit responses from the correct parties, on account of its position); and
2. The CFE should be organised in such a way that more stakeholders are notified (and held to account in the event that they do not respond).

In these two ways, the CFE can be more easily worked into the qualitative methodology, as a more widely consultative process that gathers crucial information for the authors of the paper. As far as DNA understands, it has been agreed that, going forward, the CFE will be made public through a government notice, which should help in achieving greater public inputs.

Beyond the CFE process, the four-digit list, estimated as a quantitative output, is an input for the qualitative process of the research. The qualitative analysis is used predominantly to refine the four-digit list into a more detailed six-digit list. This is appropriate, especially given the data constraints (in terms of the quality of occupational data at the six-digit level, as well as the smallness of the QLFS sample over time). Given that these data constraints are not expected to be improved upon in the short to medium term, it may be useful in future lists to maintain the 2018 process of using the qualitative approach as a refinement of the quantitative approach (from four to six digits).

Another important set of inputs for the qualitative aspect of the current methodology, beyond the CFE and the expanded literature review, is stakeholder consultation. As mentioned, this process was rushed due to the lack of time available to the authors; given adequate time and higher correspondence rates among a wider variety of stakeholders, future iterations of the six-digit list could be both more robust and better validated.

This draft list could then be further validated and workshopped with all SETAs and available sector experts, until the list is at the level of quality and accuracy required for publication.

PART 5

The dissemination, communication, and structure of the OIHD list

Given that the intended audience of the OIHD list is quite broad, this section aims to discuss the current messaging and aesthetics of the list, and how these aspects could be improved. Particularly, it focuses on three broad and interrelated categories: dissemination, communication, and structure.

Here, it is important to note that the list is of interest to three major parties:

1. Internal users, whom we define as the DHET, and potentially also the DHA and the DoL;
2. Inputters and validators of the list, whom we define as SETAs and private sector stakeholders such as Career Junction (and, in the event that the list becomes provincialised, various provincial planning branches); and
3. External users, whom we define as university and TVET course planners, the Quality Council for Trades and Occupations, the NSF, SETAs, provinces, and (occasionally) individuals who are trying to decide on what to study.

Importantly, each audience has a different need, and communication needs to be tailored to these needs.

Currently, the list is only communicated to the public through either the full report or the government gazette. The list of occupations is presented in order of OFO code, and occupations are grouped according to index score (i.e., "high", "higher", or "highest").[16]

It is particularly important that the full technical report be sent to all those within the internal user space. This full technical report could maintain a ranking system of some form, although the current high–higher–highest system appears somewhat arbitrary and not based on any specification used by the DHET or any other user. It might also be worthwhile to include a rank by index score as opposed to OFO code, as this really signals the intensity of occupational demand, which is useful from a planning perspective.

Given that the inputters (SETAs in particular) have an intimate understanding of each sector, it stands to reason that they would use the list for triangulation or accuracy-checking purposes only. Communicating the list through the gazette may therefore make the most sense for such users. Furthermore, it is at this level that the most accurate validation of the four- and six-digit version of the list can take place. As such, it is these stakeholders who should be widely consulted on the content of the list.

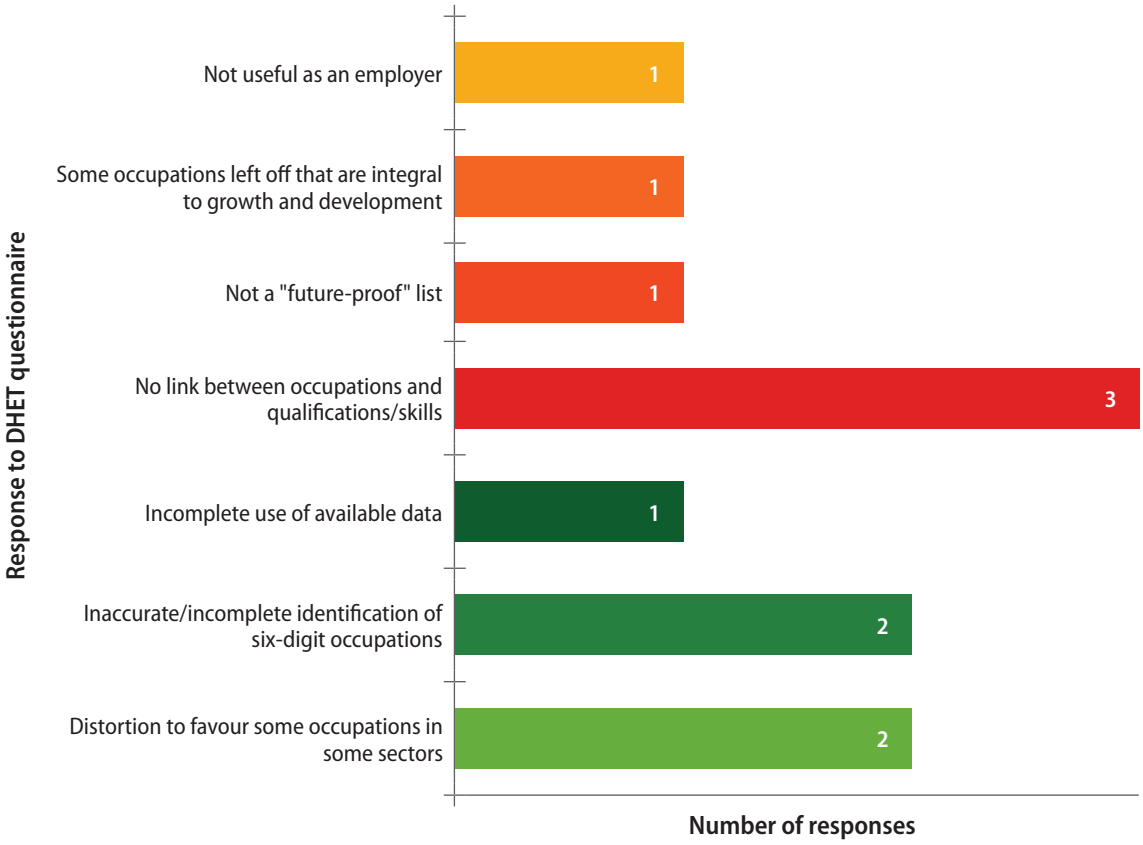
For external users, it seems likely that neither the current technical report nor the gazetted report is easy enough to use. For example, definitions of occupations are not included and the current ordering is not particularly intuitive to those not familiar with the OFO code system. Recommendations on ways to improve this aspect of the OIHD list are found in the final section of this report.

16 This designation, instead of "low", "intermediate", and "high", was selected to ensure that an OIHD that appears on the list would not be misunderstood as being in "low demand" relative to all other occupations.

Furthermore, general awareness of the list is relatively poor, particularly among stakeholders outside of the "internal user" or "inputter" space. This became apparent during the semi-structured interviews conducted with representatives from various universities between end May and mid-June 2019, as well as discussions with the TVET branch of the DHET, which suggested that learners and staff alike had only stumbled on the list by chance or through a Google search. Marketing or advocacy of the list is thus extremely important, and the DHET should make a concerted effort to run workshops and presentations on campuses across the country regarding the list itself (and not solely the methodology).

Finally, and perhaps most importantly, the DHET sent out a brief questionnaire to prospective users and inputters of the list. Generally, the responses touch on many of the matters raised thus far in this report, but with a more specific set of problems emerging in relation to the 2018 list. These nuances are teased out in Figure 4.

FIGURE 4: Responses to the paraphrased questions "What is your view on the usefulness of the OIHD list? What are some of the problems associated with the OIHD list?"



Source: Own analysis of data from responses to questionnaire sent out by the DHET in 2019

Various SETAs and professional bodies have raised their concerns around, *inter alia*, how the 2018 list relates to qualifications, how (inevitably) some occupations are left off the list, and how (perhaps) some occupations set out in the list are biased towards particular employer preferences.

It is this sort of communication between users and producers of the list that is extremely informative, and that can aid in the improved content, structure, and dissemination of the OIHD list going forward. The communication and dissemination of the list should thus be carried out more effectively and in a more targeted way in the future if the list is to achieve its intended purposes.

PART 6

The usage of the OIHD list

This section analyses the usage patterns of the 2018 OIHD list. The views expressed in the section are drawn from a mixture of semi-structured interviews held with the list's various stakeholders and responses to the survey drawn up by DNA. Importantly, given the relatively small number of consultations undertaken in this rapid evaluation, the findings should be seen more as anecdotal evidence of the list's usage than as a robust analysis of the usage patterns behind the list.

In general, it was found that usage of the list has not, as of yet, become institutionalised. This is true for the most part, with the exception of the NSF, which appears to use the list as an input on the prioritisation of funds for learning outcomes.

Furthermore, it appears that, instead of being a direct input for discussions surrounding the PQM, the list is looked at more out of interest by those external parties that are expected to utilise it. On this point, DNA has engaged with a small number of university planners and career guidance professionals and has ascertained the following:

1. The list is not, at this stage, used as a major input on curriculum and enrolment planning (although, as one respondent to the survey suggests, their organisation uses it as "a basic guide for enrolment purposes").
2. Although there is some potential to use the list from a career advice perspective, we do not believe the list is currently being used effectively in this regard. For example, while the NCAP website marks OIHD as such (including whether they were identified as having "high", "higher", or "highest" demand) and allows the user to filter by demand level, it is not at all clear how the user should know what OIHD are, how they were derived, or how to interpret the high–higher–highest split. At the time of writing, the link to the full OIHD list on the NCAP website was also broken – and, as discussed previously, the format of the list is not user-friendly enough to be well understood by a non-technical audience even if it were accessible. The choice of high–higher–highest as a metric was also not designed with career advice in mind and could be confusing. More generally, several interviewees expressed the view that the OIHD list is too long in comparison to other career advice instruments (and also too "generic", according to one respondent), although it is arguable whether a short list would be appropriate in this case.

Particularly, we find that, because institutions offer qualifications and curricula based on the funding that they receive, there is no particular incentive for university planners to move towards a more list-focused set of offerings. At the TVET level, this situation may be slightly different, given that the training and qualifications offered through the TVET system tend to be less rigidly defined, while the curricula offered through universities have been institutionalised and inculcated based on historical practice and historical industry needs.

From the perspective of internal use (i.e., use at the DHET), we also find that the OIHD list is being narrowly consulted from a planning and prioritisation perspective but does not, as of yet, explicitly drive which programmes are funded. This, however, only speaks to the set of uses that the DHET has already actioned. From consultation with both the TVET and Skills Development branches of the DHET, it appears as though there is a desire to use the OIHD list (perhaps not in its current form) as a means of planning the PQM at a centralised level, especially in the TVET system, where the current enrolment mix is not aligned to the skills needs of the country. However, DNA understands that, more recently (i.e., in the time since the interviews took place), the TVET branch has decided not to use the OIHD list mechanistically for centralised planning but rather to add the OIHD status of each occupation to the TVET qualification register and use this as one signal (alongside other factors) to determine qualification offerings and funding disbursements for colleges.

Finally, there is a discrepancy between the expected versus the actual usage of the list from the perspective of SETAs. It is our opinion that the DHET had envisioned that the various SETAs would use the list more widely, but instead we find that the list is itself only being used as a tool for the triangulation of SETAs' own processes.

More recently, the DHET has called for additional lists to be generated for specific purposes as part of the OIHD process. This development is discussed in more detail in the following section.

PART 7

Suggested amendments to the 2020 list

At the time of writing, preparations were underway for the creation of the 2020 OIHD list iteration. A number of discussions surrounding changes to the scope of the OIHD list or the creation of possible additional lists as part of the OIHD process are being considered. While these changes or additions do not fall within the core scope of the present evaluation of the 2018 list, and hence are not discussed in great depth in this report, the evaluation team has been asked to comment on the feasibility and appropriateness of the proposed amendments.

The primary extensions being considered, and discussed in turn in the rest of this section, are:

1. The creation of provincial lists (Section 7.3);
2. The creation of a critical skills list for the DHA (Section 7.4); and
3. The creation of a priority occupations list (Section 7.4).

However, before moving to these points we will first discuss two other elements of the list that were frequently raised in the interviews: whether the list should be expanded to lower levels of the NQF, and whether the list should continue using levels of demand (i.e., "high", "higher", and "highest" in the 2018 list).

7.1 Expanding the list to include lower NQF levels

Currently the OIHD list only focuses on occupations relating to qualifications at NQF Level 3 or above. There have been some calls for the list to be extended further to NQF Level 1- and NQF Level 2-based occupations. This would have the benefit of extending the dataset that would be usable, given that some of the QLFS sample has occupations pertaining to only NQF Levels 1 and 2 and was thus excluded previously. On a more inclusive note, there is also room to bring into the analysis those labourers who have little to no education given their socio-economic context. The result could be a valuable information source for assessing where these members of society could potentially look for work.

However, in the evaluator's opinion, it is sensible to keep the OIHD list restricted to NQF Levels 3 and above. The mandate of the DHET focuses on post-school qualifications, which are generally at higher NQF levels (although community education and training colleges do offer some NQF Level 1 and 2 qualifications). Creating a list at NQF Levels 3–10 thus seems most in line with the DHET's primary focus. Furthermore, the inclusion of Levels 1 and 2 would have to be informed by strategic policy stances from the national government: for example, if there is expected to be a focus on lower-skill occupation expansion, then this might be a worthwhile addition to the next iteration of the list. More likely, though, and given that the government aims to improve the technical skills of the people within the nation, it stands to reason that future priorities should lie in occupations that necessitate at least an NQF Level 3 qualification.

7.2 The ranking of occupations by level of demand (high–higher–highest)

There are mixed views on whether the high–higher–highest ranking is useful or not. Many respondents expressed the desire for a breakdown of the level of demand, as they believed this would help them use the list more purposefully and make prioritisation decisions more easily.

However, the choice of three levels (high, higher, highest) was clearly somewhat arbitrary, and not based on any particular specification by the DHET or any other user. This again relates to the lack of a very narrow or specific set of uses for the OIHD list, which makes it impossible to select a single way of segmenting the data into different levels that will be suitable to all feasible uses.

A few options are available in terms of segmenting the data into levels. One could create different levels for different purposes, making clear which levels were created for which purposes. An alternative is to simply rank all occupations numerically using the quantitative data, thereby allowing users to segment this ranking further as they wish; this, however, does not allow for the qualitative data to be incorporated into the ranking. Alternatively, if the quantum of demand is estimated, each occupation could be listed in order of the number of vacancies estimated.

The short-term compromise could potentially be to circulate the list with this quantitative ranking but also create one or two segmentations based specifically on the needs of the main users of the list (who must specify their criteria). This would all depend, though, on the audience being communicated with and is likely something that needs further discussion within the DHET.

7.3 Provincial OIHD lists

A provincial OIHD list is a list of OIHD that, instead of being produced at the national level, is produced at the provincial level for each province in the country. Because each province has its own mandate and own developmental targets, it is likely that there is significant variation in occupational demand across provinces. Thus, it is theoretically plausible that a provincial list could be used as a means of prioritising funds at the provincial level and also driving programmatic interventions that would help to address province-specific economic and social issues, as well as provincial government mandates.

It stands to reason, however, that using the quantitative methodology (as it is) at the provincial level would be unfeasible and would result in a list that is far less robust than the national OIHD list. This is largely due to the fact that the sample for the national labour force survey data is relatively small in comparison to that of other countries. Disaggregating this data further into provincial data might make for an extremely inaccurate provincial list that leaves out crucial OIHD purely due to small-sample biases.

As a result, a far more qualitative process would be needed for the creation of a provincial list. Given that each provincial government arm has very different monitoring and evaluation capacities and structures, there will most likely be large variation across the different provincial lists – especially seeing that provincial-level data for employment has a wide variance in quality, scope, and coverage. This, as well as the different sources of data being pooled together, might provide further bias in the creation and estimation of the list, especially if wage pressure (or any other indicator) in one province is measured differently to in another province. Thus, it would not be consistent to use provincial data directly, and this is something that the authors of the 2020 paper need to be cognisant of.

Nevertheless, with a standardised and robust qualitative methodology, this problem may be somewhat circumvented. This methodology could include, among other things:

1. A literature survey of each provincial development plan;
2. Dialogue with provincial governmental agents responsible for occupational planning;
3. Analysis of the data that is available at the provincial level;
4. Triangulation of the various provincial plans with National Development Plan outcomes;
5. SETA-based discussions about provincial needs and economic drivers;
6. Interviews with the Department of Trade and Industry, which would have knowledge of the potential investment flows into the various provinces; and
7. More robust and widespread discussion with employers, across sectors.

It may be useful, at the outset of the provincial list process, to draw on existing synergies at the provincial level. Similar analyses have been done in the Western Cape and KwaZulu-Natal (from what we can see), and these would be a natural starting point in terms of creating a robust methodology at the provincial level. Furthermore, when trying to understand the ways in which the data collection processes differ between provinces, it may be important to first cross-check each available province's databases and methodology. This could inform strategies for standardising the methodology going forward.

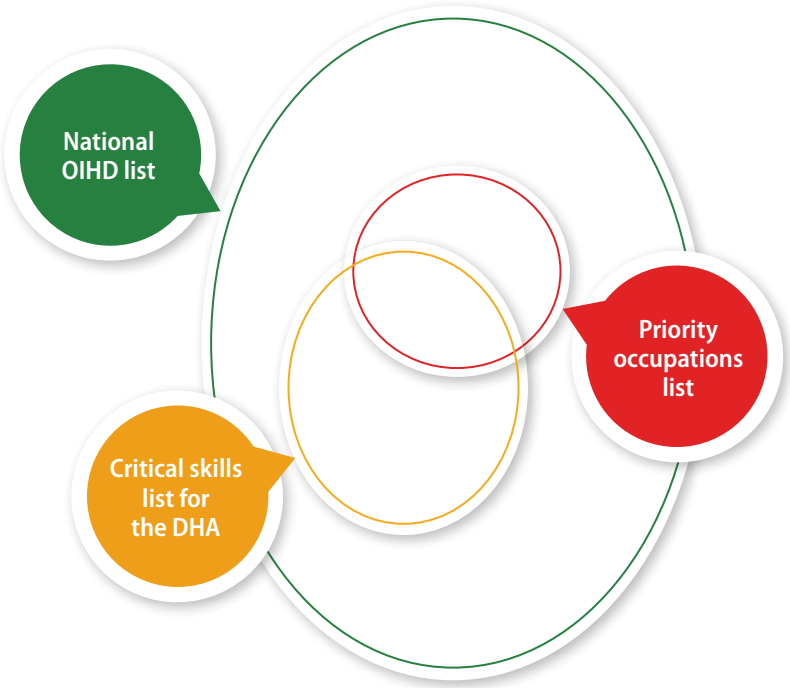
This overview, however, glosses over an inherent challenge involved in creating provincial lists: will a provincial OIHD list be a subset of the national OIHD list alone, or will the provincial list not necessarily be completely subsumed by the national list? If the former were to be the case, it may be that certain province-specific variations in occupations in demand would be left out simply due to data manipulation processes. In the latter case, the provincial list could theoretically be completely different to the national list: this could cause problems in terms of prioritisation and coherence between national and provincial government policy. The approach taken for the creation of provincial lists, then, depends entirely on the intended purpose of these lists. This purpose should be made clear well before the authors of the OIHD document are expected to conceptualise such lists.

7.4 Additional lists stemming from the OIHD process

The OIHD list itself consists of approximately 370 occupations that are estimated to be in high demand in the country. The list is very broad and, as such, may not be appropriate for more narrow uses: for example, focused programmatic interventions. For this reason, it has been suggested that, as part of the OIHD process, additional lists be created to meet different specified needs.

As Figure 5 shows, the DHET sees the list of priority occupations and the critical skills lists for the DHA as subsets of the national OIHD list.

FIGURE 5: Potential overlap of the various lists



Source: Interpreted from Rogan and Chabane (2019)

Conceptually, the list of priority occupations is an extremely narrowed-down OIHD list that will include approximately 25 occupations. These occupations will be selected to reflect "both the country's public and private sector investment priorities as well as occupations which are in high demand in the South African labour market" (Rogan & Chabane, 2019). It is our understanding that the priority occupations lists will be used primarily by the DHET.

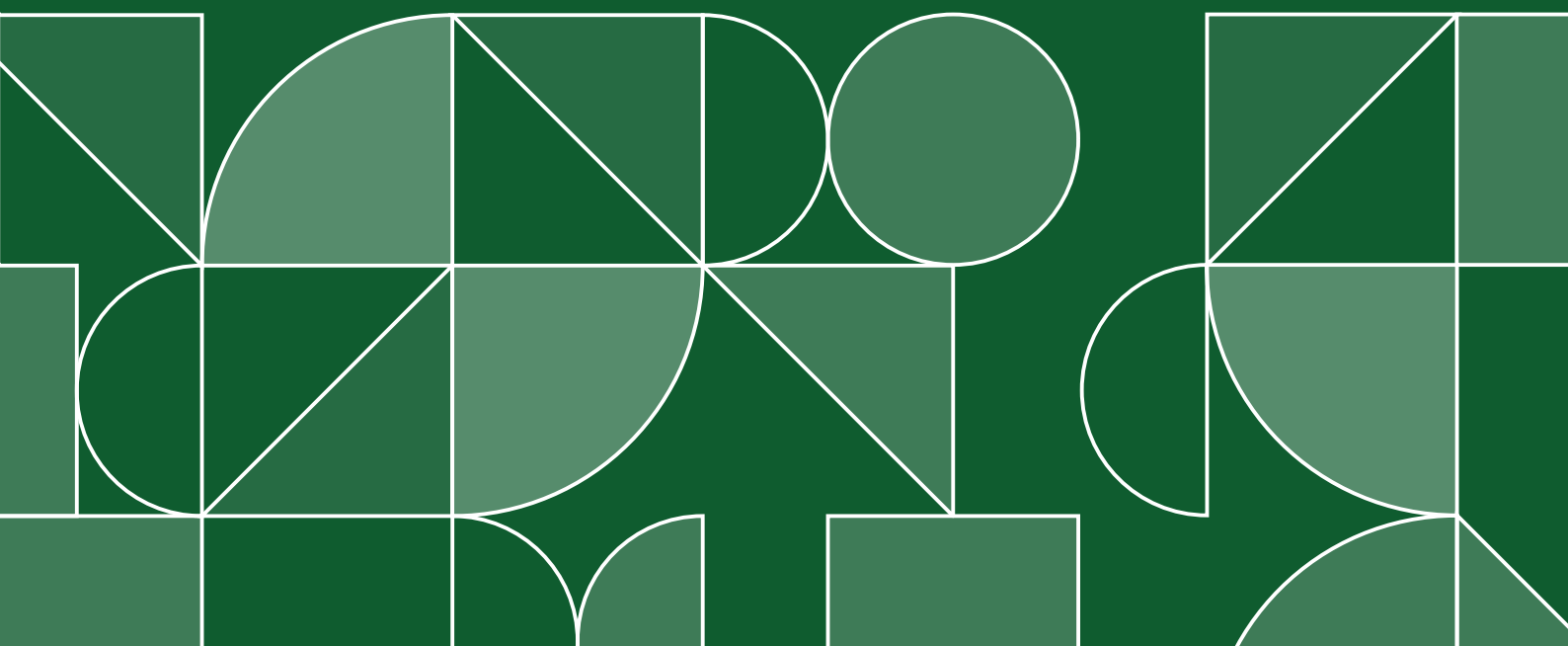
The critical skills list is intended to be "a short list of occupations for which there is high demand and evidence that the country's immigration system is a sensible way to address this demand" (Rogan & Chabane, 2019). While the name of the list refers to "skills" to align with the terminology familiar within the DHA environment, this list would actually be made up of occupations where demand significantly outstrips current or immediate future (South African) supply, such that allowing immigration by those working in these occupations would be beneficial to South Africa. Thus, this list is expected to inform the DHA in terms of the issuance of work visas and permits.

It should be added here that, although it is important to split the lists by function (given that one list is not able to achieve all intended purposes), doing so may bring about additional confusion for the public, who might not understand the differences in how the lists were generated or what their respective purposes are. It is thus vital for the DHET to clearly define each list's purpose and communicate these purposes effectively and unambiguously to all stakeholders.

Please note that this section has been shortened significantly from the version that was included in the first draft of this report. This is because some of the discussions contained in the earlier draft are no longer relevant given changes to the scope, focus, and methodology of the additional lists discussed above. We also do not believe that commenting on the draft methodologies for these lists would be helpful at this stage, since these are still subject to change.

PART 8

Conclusion and recommendations



This section summarises the main findings from each of the evaluation topics (and main report sections) and, for each topic, provides recommendations on how the OIHD list can be improved in the future.

Overall, the evaluation finds that a robust approach and methodology were used to derive the 2018 OIHD list, although it does identify various potential areas of improvement that should be explored. Moreover, the usage and potential impact of the list are undermined by a number of factors. Most crucially, the exact concept behind the list (i.e., what the list is and is not) and its exact purpose (i.e., its primary intended usage) are not well understood among most potential users, largely as a result of inadequate advocacy and dissemination. For these and other reasons, the list has thus far only been used in very limited and non-systematised ways and has not yet reached its potential as a tool for long-term skills planning in the PSET system.

More recently, it has been decided that additional lists – serving distinct purposes – will be created as part of the OIHD process. These additional lists have the potential to increase the value and usefulness of the OIHD process but come with their own challenges and create the risk that users will not understand the differences between the lists. It is thus important that issues surrounding the intended usage and scope of the OIHD list and other potential lists be clarified by the DHET, to allow the methodology to be improved and stabilised over time. Such stabilisation improves the value of and buy-in for occupational demand lists and forms the basis for institutionalising the lists over the foreseeable future.

8.1 The concept of the OIHD list

At a high level, it is apparent that those in the DHET who have been directly involved in the creation of the OIHD list (as well as closely related stakeholders) have a relatively clear understanding of the concept of the list. That said, this understanding has not been translated to all other parties and some specifics around the concept should be further clarified. This section discusses the problematic elements of the OIHD list's conceptualisation, along with possible ways to improve on these.

8.1.1 Definitions and terminology

The definitions and terminology across the 2014, 2016, and 2018 iterations of the OIHD list were not particularly consistent. While the terminology used in the 2018 list was clearer than that used in both the 2014 and the 2016 lists, it is important that the definitions employed in the OIHD list be further sharpened (to be more easily understood by a wider audience) and stabilised over time.

RECOMMENDATION A

The terminology and definitions used in future iterations of the OIHD list need to be finalised between the creators of the list and the main stakeholders within the DHET, and then kept constant if possible.

This measure will likely lead to a better understanding of what needs to be accomplished by the research team because it will provide clearer guidance on how their output needs to be defined.

Furthermore, it would aid in improving the consistency of the OIHD list over time. With a more consistent set of definitions that are carried across iterations, there is an opportunity to compare lists over time as a means of assessing the evolution of the South African labour market in terms of demand.

Note that much of the work required for Recommendation A has already been undertaken as part of the 2020 version of the list, but this recommendation is retained for the sake of completeness.

8.1.2 Defining the primary use of the OIHD list (and subsequent lists)

The DHET has a high-level understanding of the primary purposes and use of the OIHD list, but these purposes are not well understood among other potential users of the list, who range from the general public to universities and TVET colleges. Given that the list is intended to be used for several purposes, it is difficult to design a single methodology that is well suited to all these purposes. Partly for this reason, the DHET expects the list to be used as a signalling tool for planning, rather than as a strict, prescriptive policy tool. There is also an understandable desire to create a list that can be flexibly used for several purposes, and therefore avoid anchoring the list to a very specific purpose, but this approach has created challenges for the developers of the list across its iterations. The intended creation of additional lists should help, however, by making it easier to specify the primary purpose of each list.

RECOMMENDATION B

The DHET should define the primary purposes for all the lists that emanate from the OIHD process. The lists could still be informed by secondary purposes, but stating each list's main purpose makes it easier for users to understand the context within which the lists were created. The decisions made in this regard should then be clearly stated in the list documentation and communicated to stakeholders.

Defining the potential uses of the OIHD list should be done in a pragmatic manner, as opposed to being overly ambitious. While the stated purposes of the OIHD list are very wide-ranging, different lists should all have distinct uses and purposes that are well-defined and actionable.

It is precisely by accurately defining the purposes of the list that the research team tasked with its creation is able to fulfil its mandate properly. Working in clearly set boundaries improves the output of the list and breeds space for innovation as well. Furthermore, breaking down the complex problems associated with creating a functional LMIS in South Africa into their individual parts allows these problems to be dealt with successfully. Thus, with a more clearly defined set of uses spanning different iterations of the OIHD list, the list's estimations will be both consistent over time and more accurately built for purpose.

8.1.3 Extending the OIHD list to include NQF Level 1 and 2 occupations

There is some confusion around whether to include NQF Level 1 and 2 occupations in the OIHD list, so as to be more inclusive of a large number of workers who might still need to know whether their skills are in demand.

RECOMMENDATION C

It is recommended that the OIHD list continue to focus on occupations that require a qualification equivalent to NQF Level 3 or higher, although data on NQF Level 1 and 2 occupations could perhaps still be used internally by the DHET if this is deemed useful.

As outlined in Section 7.1, this approach is sensible given that, while some NQF Level 1 and 2 qualifications do fall within the DHET's mandate, the DHET's primary focus is on NQF Levels 3 and above. Furthermore, there are few strategic government interventions that pertain to employment linked to lower NQF levels, which means that the extension of the OIHD list to include NQF Levels 1 and 2, were it to be pursued, would have limited impact.

8.1.4 The high–higher–highest ranking system in the 2018 OIHD list

There is an apparent need to segment the level of demand according to various classifications, and the authors of the 2018 list chose to do so by means of high, higher, and highest demand intensities. While there is nothing objectionable about this split, the choice was not guided or prescribed by any specific purpose and was not seen as useful by the users interviewed.

RECOMMENDATION D

The use of the high–higher–highest ranking should be rethought. However, some form of ordering might still be useful. The DHET, in collaboration with the designers of the list, should specify which format(s) would be most useful and easiest to digest. Ranking criteria that could be considered include the size of the index value; the number of vacancies available per occupation; or other means deemed fit for the specific audiences.

8.2 The methodology followed in the OIHD list

Generally, the quantitative methodology used for the 2018 OIHD list proved quite robust. Similarly, the qualitative methodology used in the 2018 OIHD list was theoretically very strong. Here, a general finding should be noted that relates specifically to consistency. While the thinking seems to be that a periodic update of the methodology is necessary as and when new methodological developments arise, it is also particularly useful to keep the methodology consistent for as long as is feasible. Thus, while creating the list every two years is probably fair, updates to the methodology should occur far less frequently, so as to enable more consistent estimations of the OIHD list over time.

Nevertheless, our analysis of the nuances in the 2018 methodology has revealed possible areas for improvement that may assist future iterations of the OIHD list (and, hopefully, subsequent lists as well).

8.2.1 The 2018 quantitative methodology

The 2018 OIHD quantitative methodology appears generally robust, appropriate, and in line with best practices for estimating labour market information. Having said this, a handful of improvements could be considered to strengthen the methodology.

Firstly, the weighting of indicators is currently done in a relatively arbitrary way. Weighting sensitivity checks were conducted, but a more objective approach could be considered.

RECOMMENDATION E

While the current approach to weighting can still be used in future iterations of the OIHD list, the use of PCA, or similar data-driven approaches to weighting indicators, should be incorporated, in order to at least understand the impact of the weighting choices made.

More than anything, this is a more scientific approach to a sensitivity check, which is both widely accepted and seen as relatively objective. A useful activity that could isolate the final four-digit list would be to compare the subjective weighting and objective weighting lists and assess the degree of overlap between the two.

Secondly, other indicators could be considered, although the value of any additions should be considered against the need to stabilise the methodology over time. In particular, the quantitative methodology was not in any way forward-looking, even though most of the available data sources were used.

RECOMMENDATION F

While the qualitative methodology already includes some forward-looking elements, the use of occupational or labour market forecasts and expectation decompositions in the quantitative methodology should be considered, so as to make the analysis more suitable to a medium- to long-term planning perspective.

This measure is to ensure that medium- to long-term discussions regarding the trajectory of occupational demand can be had in a more productive manner. While forward-forecasting methods have their own limitations, their inclusion allows for an informed glimpse into what occupational demand might look like in the future. This is particularly useful when looking at the broader picture surrounding whether an occupation is expected to be in higher demand now or later, which can assist in creating appropriate labour market interventions.

Thirdly, some more creative ways to use the data at the research team's disposal should be considered.

RECOMMENDATION G

Current data (on wage or employment pressure per quarter, for instance) could be used as a means of creating other indicators and incorporating them into the analysis, while also controlling for occupational seasonality and the persistence of occupational demand.

While increasing the number of indicators is difficult due to the availability of data, it is possible to extend the number of indicators based on the data already on hand. For instance, an analysis of employment pressure or wage pressure could help establish whether an occupation experiences cyclical or persistent demand changes. Theoretically, this could improve the accuracy of the index value estimated, as it would now contain relevant information that it previously did not have.

Finally, it should be noted that the current methodology focuses on estimating the demand intensity for each occupation and does not attempt to estimate supply intensities – except, to some extent, through vacancy indicators. This is an understandable methodological choice, given the difficulties of reliably estimating the supply of occupations. However, this choice means that supply and demand factors cannot be disentangled, which might be a significant weakness of the methodology for some occupations.

RECOMMENDATION H

We recommend that the authors of future lists explore the potential of incorporating supply signals into the methodology, as part of either the quantitative or the qualitative methodology. This might not be possible for some occupations (since qualifications often do not map directly onto occupations), but it could be very useful for others. For example:

- **Qualitatively, structured or standardised interview questions and/or other evidence could be used to gauge whether the signals for specific occupations are predominantly driven by occupational supply or occupational demand at the six-digit level.**
- **Quantitatively, the authors could investigate whether it is possible to include a comparison of supply and demand per (four- or six-digit) occupation as an additional indicator. This comparison should ideally be relatively forward-looking, given that prioritisation and planning are about current and future skills needs and are not just present-value-orientated exercises.**

Under either approach, it might be possible for some occupations to disentangle to an extent the level of impact that signals have on occupational demand alone. This will provide a more accurate estimate of the intensity of demand signals, which is important given that failing to account for the different signal sources might bias the size of the index either up or down (as was expanded on in Section 4.4).

8.2.2 The 2018 qualitative methodology

The qualitative methodology for generating the 2018 OIHD list was generally deemed fit for purpose, especially in light of the short time available to complete it. Furthermore, it is the evaluator's opinion that, given the lack of a larger database from which to estimate four-digit OFO lists, the qualitative methodology should continue to be used as a buttress for the quantitative findings and should not be a stand-alone component of the study that provides its own list. This opinion is, however, subject to change depending on the availability of quality data.

Some areas of improvement were identified that could strengthen the qualitative methodology and the likely accuracy of the list as a whole. First and foremost, it is apparent that time was an extreme constraint to achieving wider stakeholder consultation.

RECOMMENDATION I

The qualitative analyst must, in future, be allocated sufficient time, to allow for wider and more detailed interactions with a variety of stakeholders. This should include room for, *inter alia*, validation workshops with various stakeholders and individual semi-structured interviews with SETAs and professional bodies.

This measure has a direct bearing on how accurate the six-digit OIHD list is. With wide validation and consultation, a more accurate representation of what is perceived to be in high demand in the labour market will come to the fore.

While the CFE administered by the DHET was useful in assisting the qualitative analysis, it asked just one very broad question and did not provide guidance on what format the submissions should follow or exactly what information was required (e.g., on which occupations). The creation and implementation of the CFE can thus be improved.

RECOMMENDATION J

CFE questions should be informed by the analyst(s) in charge of the OIHD qualitative analysis (as was arguably the case in the new CFE that went out in 2019), and they should potentially be deepened to obtain answers that can more easily be analysed and compared across occupations.

Given that the qualitative analyst has the clearest understanding of the method for moving from four-digit to six-digit occupations, this analyst should be closely involved in the CFE process to ensure that the questions asked are pertinent in terms of practically informing the list and explaining the quantitative data. Furthermore, the CFE should continue to be administered through the DHET, in order to induce participants to answer in as detailed a manner as possible.

8.3 The dissemination and communication of the OIHD list

8.3.1 The dissemination of the OIHD List

Given that different stakeholders have varying potential uses for the OIHD list, its dissemination has to date been far too generalised, focused only on sending users a link to either the full report or the government gazette. The language and format of the list is also not particularly user-friendly; for example, for a person not familiar with OFO codes or the definitions of specific occupations, the list is not necessarily easy to interpret.

RECOMMENDATION K

The format of the list (as gazetted) should be amended to ensure that it is easier to consult, understand, and use. Additionally, different formats of the list could be created for different users: for instance, an online version could be produced, or the list could be broken down into different dimensions for different audiences.

With regard to end-line users specifically, it was also felt that the OIHD list needed to be more user-friendly. A few suggestions that came directly from the semi-structured interviews included:

1. The insertion of hyperlinks to the definitions of all six-digit occupations, as set out by the OFO (or the inclusion of the definitions themselves, in the event of a paper-based list);
2. An estimate of the amount of time for which an occupation is expected to be in demand (here, the use of forecasting tools becomes particularly important, although the caveat is that forecasting is quite imprecise, as outlined in the previous methodology sections);
3. An estimate of the number of vacancies, per occupation, that the labour market needs filled and/or is expected to need filled over the next five to ten years (granted that a student may need to study for between three and four years in order to qualify for a particular occupation);
4. The inclusion of links between the occupations in the list and possible qualifications that can help an individual achieve employment in those occupations; and
5. For an online list, the insertion of hyperlinks to the webpages of possible institutions where different occupation-related qualifications can be studied.

Regarding the third suggestion, it must be noted that the DHET is resistant to such an approach, as an explicit decision was made not to focus on specific numbers (i.e., not to follow a manpower-planning approach).

Generally, though, improved usability via these or other suggestions will have a direct bearing on how often the OIHD list will be used. Once the list is disseminated in a way that is fit for purpose, it is highly likely that usage of the list will increase.

8.3.2 The communication of the OIHD list

It is apparent that the OIHD list itself has not been communicated appropriately to most of the relevant stakeholders, who, in some instances, had to find out about it through a Google search, as opposed to being informed through formal channels.

RECOMMENDATION L

Workshops and public information forums should be held with various stakeholders to discuss the list, in terms of both its purpose and actual content. This process should include a discussion on how institutions (e.g., TVET colleges) could and should use the list, rather than leaving them to surmise and decide this on their own.

An adequate communication strategy would aid in the institutionalisation of the OIHD list, both in terms of increased awareness of the list and in terms of improved usage patterns that are in line with the purposes of the list.

8.4 The usage of the OIHD list

In broad terms, the *actual* usage of the OIHD list is more limited than its *intended* usage. This observation is backed up by most semi-structured interviews, which revealed that participants did not use the list explicitly but rather at a glance, as a broader input in their day-to-day decisions. That said, it appears as though the list is being used to some extent by the DHET and the NSF as a tool to plan and fund programmes – though, again, this usage is still somewhat haphazard and fairly limited.

8.5 Suggested amendments and additions to the OIHD list and process

There is currently appetite for various additional OIHD-type lists (i.e., national and provincial OIHD lists, a list of priority occupations, and a critical skills list). Creating additional lists, for distinct purposes, appears to be a sensible approach, as a single list would not be well suited to all these different potential uses. It is, however, important that the purposes of these lists, and the differences between them, be clearly defined and communicated, to mitigate the risk of confusion among potential users. Yet these different lists each call for a different methodology, so a single approach is unlikely to be suited to all of them. The feasibility of and considerations for each of these lists are discussed below.

8.5.1 Provincial OIHD lists

There is probably sufficient variation in occupational demand across provinces to warrant the creation of provincial lists, and we further agree with the fact that provincial lists might be useful. However, whether these lists will be feasible to produce is questionable, given the sparsity of the quantitative data (both in terms of the QLFS data used and in terms of the lack of data from some or most of the provinces, which do not have sufficient data collection capabilities on the ground).

Qualitative approaches are thus more feasible from a provincial perspective, as they require less substantial data collection efforts in each province. If the research is done by the qualitative analyst(s) responsible for the OIHD list, there is also the added benefit of each provincial list being created with an internally consistent methodology, which ensures comparability across provinces.

Lastly, and perhaps most importantly, there is a significant risk that provincial lists could result in an indication of short- to medium-term need in specific places, rather than national shortages. The complexity of this problem would be compounded if provincial lists did not overlap sufficiently, especially if the provincial lists were extremely long. Accordingly, other migration-related options might be more appropriate than making long-term skills planning decisions at the provincial level.

RECOMMENDATION M

While it is useful to utilise data as a means of creating a four-digit list, it is recommended that – due to the sparsity of the data – a more qualitative approach be employed in obtaining provincial OIHD lists. A possible solution would be to create the national OIHD list using QLFS data at the four-digit level, as before, and then, for each province, to run through the same qualitative process that was followed when extending the list to the six-digit level.

This approach would be useful for three main reasons:

1. Due to data constraints at the provincial level (especially in terms of data availability and data consistency across all of the provinces), it would be preferable from a data-consistency perspective to use QLFS data that is collected and analysed in a reconcilable and robust manner. This method has the added advantage of using the entire population of QLFS data, as opposed to estimating a list per province, which will make estimates more precise.
2. If the preceding process is followed, the research team that constructed the 2018 OIHD list would have a clear grasp of the methodology used to create the set of provincial lists, as opposed to receiving inputs of varying quality from the different provincial teams. This method is tried and tested and would result in a consistently estimated set of provincial lists, free from any provincial-level biases in terms of output quality. Of course, the successes of (and lessons learnt from) the Western Cape and KwaZulu-Natal provincial lists should be incorporated into this methodology as much as possible, too.
3. If each provincial list were a partial subset of the national list (with room for discussion in the event that a particular occupation does not appear on a provincial list but is thought to belong on it), it would be easier to align national planning to provincial planning. Such a measure also aligns directly with the move towards a more centralised TVET (and, perhaps, general higher education) space, with sufficient provincial involvement in the qualitative research phase needed to ensure that the final lists reflect true provincial-level occupational demand trends.

8.5.2 Priority occupations and critical skills lists

A decision has been made that, in future, the OIHD process will also involve the creation of a priority occupations list, which will allow for focused programmatic interventions co-ordinated by the DHET, and a critical skills list (really an occupational shortages list) for the DHA.

RECOMMENDATION N

It is the evaluator's opinion that the creation of a list of priority occupations and a list of critical skills is sensible, as these lists could be valuable additions to the OIHD process. However, before these lists are generated, extensive consultations should be undertaken to ensure that the purpose, scope, and usage of each list are agreed upon and can be maintained for a reasonable period of time.

It should be noted that some of these consultations had already been undertaken at the time of writing, but this recommendation is retained in the interest of completeness.

In order for these additional lists to achieve their aims, a wide range of stakeholder discussions (inclusive of more nuanced discussions with both the DoL and the DHA) need to be held. This is likely to be an extremely difficult task, because of how these lists and their content should be defined. In particular:

1. The definition of a priority occupation might vary across sources and will likely require a fair degree of judgement on the part of the creators of the list and/or the DHET. Finalising a definition that is stable will assist in the institutionalisation of the priority occupations list.
2. It is also exceedingly difficult to estimate shortages in the labour market. While the current methodology measures occupational demand intensity (and can, of course, be extended to measure occupational supply intensity), translating this into a measurement of the *quantity* of occupations demanded and supplied in the economy is a challenge.
3. Because the creation and communication of the purposes of the current OIHD list has posed a challenge, in the evaluator's view, it stands to reason that this challenge could be amplified with the introduction of more lists. This complexity, while necessary, needs to be dealt with in a consistent manner, and the establishment and communication of each list's purpose need to be carried out on the basis of wide stakeholder discussions and clear advocacy.

Keeping these additional lists and their definitions and purposes consistent over time will ensure that each list can embed itself in the day-to-day activities of expected users. Such a move from the expected to the actual usage of each list has clear benefits: in terms of the ability of the DHET to more easily plan tertiary education outcomes at a centralised level, as well as the ability of potential labour market entrants to fundamentally understand the ways in which they can start filling the knowledge and skills gaps that exist across the South African labour market.

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