1. Introduction

1.1 Background

Demand for workers, and therefore skills, is an indirect demand. When there is demand for a particular good or service, demand for workers employed in that sector goes up along with the need for skills in that particular job role. The nature of skills evolves with technological changes in production. The type of goods and services in demand may itself change over time and therefore need for particular sets of workers may decline in some sectors and rise in another. One needs a dynamic approach to anticipate such rise and fall in the demand for workers, and therefore skills, in particular sectors.

While the Government of India has scaled up the supply-side ecosystem, it has to match the demand-side. India needs a model on '***anticipating and adapting'*** skills regularly at the national and sub-national level.[1] There is a need to understand what skills are in demand now and what will be needed in future to adapt our skilling ecosystem accordingly. What are the core skills; what are transferrable skills and what skills need to be regularly updated?

On 19 January, 2018, the Ministry of Skill Development & Entrepreneurship (MSDE), Government of India (GoI) had launched a World Bank-assisted programme—Skills Acquisition and Knowledge Awareness for Livelihood Promotion (SANKALP). The programme aims to improve short-term skill training qualitatively and quantitatively through strengthening institutions, bringing in better market connectivity and inclusion of marginalised sections of society. The key result areas (RA) under SANKALP are: institutional strengthening (RA1); enhancing market relevance and quality (RA2); and inclusion and access of marginalised communities (RA3).

In the rapidly changing world, it is vital to maintain an agile and responsive skill ecosystem. This requires continuous monitoring of global and local economic and job market trends to identify emerging industries, evolving job roles, and new skill requirements. The consistent evaluation of the emerging trends of the global and local economy and job markets can help in adopting better skill development initiatives to ensure that the workforce possesses the necessary skills to succeed in the dynamic labour market.

"A skill gap study is often the Achilles' heel of skilling efforts. Identifying these gaps is crucial for targeting training and educational programmes effectively. Challenges such as outdated data, regional disparities, the evolving technological landscape, and various economic factors underscore the need for a continuously evolving framework" (Tiwari, 2024).[2]

Assessing skill gaps has evolved over time in India. National Skill Development Corporation (NSDC) had conducted sector-wise skill gap studies for 19 high priority sectors in 2008–09.[3] In 2012, the National Skills Development

[1] National Council of Applied Economic Research (NCAER). 2018. Skilling India: No Time to Lose. https://ncaer.org/publication/skilling-india-no-time-to-lose/. New Delhi, India.

[2] Tiwari, A.K. 2024. "National Skill Gap Study for High Growth Sectors". Inaugural Speech. July 19.

[3] National Skills Development Corporation website. https://nsdcindia.org/nsdcreports.

Corporation, in partnership with Klynveld Peat Marwick Goerdeler (KPMG), had carried out detailed assessment for human resource and skill requirements in 25 sectors and key states. The mandate included sector and sub-sector level analysis; demand-supply projection; estimation of incremental man-power requirement between 2013–2017 and 2017–2022; identification of key-employment clusters; and SWOT analysis of each sector. The pandemic would have affected all forecasts.

This was followed by skill gap assessments by States and other sectors later. MSDE (2021) did a study on assessment and anticipation of current and future skill requirement in the Indian manufacturing sector.[4] NSDC also had carried out assessments in 2022. Automotive Skills Development Council (ASDC) and Ernst and Young (EY) carried out an assessment for the auto sector in 2022 and forecast requirements for 2026.[5] The National Association of Software and Services Companies (NASSCOM) and Retailers Association's Skill Council of India (RASCI) have also carried out human skill requirement studies for the IT and retail sectors respectively.[6]

The difference between 2012 assessments and the current round of assessments starting 2021 was that each study was carried out using a different methodology, making it challenging for the policymaker to have a holistic view on assessing skills demand. Moreover, it is ambiguous what were measured by each of these studies and whether they were in line with what the policymakers want. Further, while individual sectors are able to make forecasts for their sectors, there are occupations that are in demand across sectors. It is necessary to capture those changes. Plus, given the rapid technological changes, one is not sure how long will these forecasts hold, if at all.

This document contributes towards developing a single methodology which will help assess skills shortage and gap across sectors.

1.2 Objectives of the Study

The specific objective of this project is to develop a prototype for 'anticipating and adapting' skills at the national level, essentially a Labour Market Information System (LMIS) at the national level which will assess current skill shortages and anticipate future skills. The prototype will provide a dynamic framework for skill demand assessment that can be regularly updated in alignment with the emerging needs of the

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[4] Ministry of Skill Development and Entrepreneurship. 2021. "Skill Assessment and Anticipation Study: Manufacturing Sector". https://www.msde.gov.in/sites/default/files/2021-06/FINAL%20-%20MSDE%27s%20Skill%20Assessment%20and%20Anticipation%20Study%20Report.pdf. New Delhi.

[5] Automotive Skills Development Council and EY. 2022. Human Resource and Skill Requirements in the Auto and Auto Components Sector in (2026). https://skillsip.nsdcindia.org/sites/default/files/kps-document/skillreqinautomotivesector.pdf. New Delhi.

[6] NASSCOM, Indeed.com and Draup. 2023. India Tech Industry Demand and Supply Analysis 2023. https://nasscom.in/knowledge-center/publications/india-tech-industry-digital-talent-demand-and-supply-2023. March 2.

Wazir Advisors and Retailers Association's Skill Council of India. 2024. Mapping of Employment Scope & Skill Gaps in Retail till FY26. https://www.rasci.in/pdf/RASCI%20Skill%20Gap%20Report%20upto%202026.pdf. Mumbai, India.

economy. Further, the prototype can be replicated at sub-national and sectoral levels.

The specific objectives of the study include:

1. To identify seven high growth potential sectors.
2. To analyse industry feedback on identifying industry-specific key skill (cognitive, socio-emotional, technical & vocational, and knowledge) requirements in the seven identified industries.
3. To map the key job roles/ professions and geographic clusters aligned with the seven selected sectors along with the qualification and skill requirements associated with these job roles and provide estimates of current employment.
4. To identify the existing and potential job roles for enhancing female workforce participation in the seven identified sectors.
5. To provide projections and forecasts of future skill needs for the seven selected sectors for a period of three years based on anticipated changes in the labour market, technological advancements, and industry trends at the national and international levels.
6. To provide a framework for regular updation of demand assessment results at predefined intervals to provide continuous insights for skill planning for the selected seven sectors.
7. To provide detailed methodology for undertaking skill demand assessment at the sectoral level as also guidelines / methodology for undertaking similar assessments at the state level.
8. To seek recommendations for improving the design and effectiveness of the skill programmes;
9. To provide policy recommendations to address systemic issues contributing to skill gaps.
10. To provide recommendations to MSDE on enhancing skill training programmes, curriculum development, and skill initiatives to align them with the identified skill gaps; sector- wise upskilling or reskilling initiatives; apprenticeships, vocational training, or on-the-job training; areas of collaboration with industry including opportunities for establishing partnerships; industry-led training programmes, internships, or mentorship programmes to bridge the gap between industry needs and the skills possessed by the workforce.

1.3 Literature Review

The 2015 Policy of the MSDE notes, "our country presently faces a dual challenge of paucity of highly trained workforce, as well as non-employability of large sections of the conventionally educated youth, who possess little or no job skills."[7]

[7] Ministry of Skill Development and Entrepreneurship (MSDE). 2015. National Policy for Skill Development and Entrepreneurship 2015. http://www.msde.gov.in/National-Policy-2015.html.

1.3.1 Skill Mismatches

India has skilling, upskilling and reskilling challenges. Green (2013) points out that mismatches between supply and demand occur due to imperfect adjustments, whether through prices or quantities.[8] The potential consequences of a mismatch are lost productivity, lower pay and reduced well-being. Mismatches can be of various types and can occur due to a variety of reasons (Box 1.1). In this research work, the focus is on skills shortage. The objective is to develop a Labour Market Information System (LMIS) model for India, which can assess and anticipate skills shortage and eliminate or minimise any present/future skills shortage.

How are skill gaps/mismatch measured? It is still a new and evolving topic. Skill mismatch can exist both at the macro and micro level (Pellizzari and Fichen 2017).[9] Pellizzari and Fichen describe macro mismatch as "aggregate mismatch as the existence of an allocation of workers to jobs that could improve the realized equilibrium in terms of either employment levels or output. The same definition could be applied to other (or multiple) dimensions of heterogeneity, such as workers' skills and jobs' requirements. It is the concept of an aggregate notion of mismatch which is a feature of the joint distribution of workers' and jobs' characteristics." In macro, one is modeling skills shortage. Skills shortage is a macro term (Box 1.1).

Box 1.1: Types of mismatches

Skills Shortage describes the situation where a job vacancy is hard to fill because of a lack of applications with the needed skills.

A skill gap occurs where an employee's competence to do the job is called into question (typically by his/her manager).

Skills underutilisation occurs when a worker has work-related skills not used (or used at too low a level) in the job.

Unemployment occurs where workers are not employed yet available and looking for a job, indicating that all their skills are unused.

Workers' training barriers occur when individuals are unable to form and achieve a demand for learning that would be best for them, given their circumstances, e.g., lack of information, lack of access to credit, etc.

Employer training barriers occur when employers lack sufficient information or capacity to assess the benefits of training for their organisation or if external providers are unavailable.

Source: Green, F. 2013. Skills and Skilled Work: An Economic and Social Analysis. Pages 31-32. Oxford University Press, United Kingdom.

The micro definition of skill mismatch "is constructed by comparing the skills (or qualifications) of an employed worker with the skill (or qualification) requirements of

[8] Green, F. 2013. Skills and Skilled Work: An Economic and Social Analysis. Oxford University Press, United Kingdom.

[9] Pellizzari, M., Fichen, A. 2017. "A new measure of skill mismatch: theory and evidence from PIAAC". *IZA J Labor Econ* 6, 1. https://doi.org/10.1186/s40172-016-0051-y.

her job (hence, the non-employed and vacancies are completely disregarded). In the micro concept, one is assessing skill gaps. Then, any given job-worker pair can be classified as a good match if the skills (or qualifications) of the employee are compatible with the requirements of the job. If the worker is more skilled (or qualified) than required, she is classified as over-skilled (over-qualified) and under-skilled (or under-qualified) in the opposite case" (Pillizzari and Fichen, 2017). For measuring the micro mismatch, there is need to conduct employer-employee studies. Skills can be measured by education or actual skills of workers. There is a substantial literature which shows skills as a better measure of human capital than education (Hanushek and Woessmann, 2008 and Hanushek, 2013).[10]

There are various indicators of skill mismatch/gap (Green 2013; p 53).[11]

1. "*Perceived under-utilisation: Skills under-utilisation.*
2. *Difference between highest education required and completed: This measures over-education/under-education and education-subject mismatch.*
3. *Managers' assessment of employees' competence to measure skill gaps.*
4. *Hard-to-fill vacancies for skills reasons: skill shortages.*
5. *Unemployment and indicators of discrimination, lack of capacity, and self-esteem: These measure learning barriers.*
6. *Absence of formal training needs analysis; perceived lack of information training/capacity measures employer training barriers.*
7. *Benchmarking against other similar countries/regions: This measures skill deficit*".

1.3.2 International Evidence on Labour Market Information System

Anticipating and building skills for the future are essential in rapidly changing markets. The International Labour Organisation (ILO), Organisation for Economic Co-operation and Development (OECD), European Centre for the Development of Vocational Training (CEDEFOP), and European Training Foundation (ETF) conducted a joint survey on governance mechanisms and institutional frameworks that steered relevance of training provisions to the labour market needs in over 60 countries in 2017.[12] The survey was conducted among key stakeholders in skill governance: ministries of labour and of education, worker unions and employer associations. This report collates empirical evidence generated through the survey. Skill anticipation relies on various methods that collate and summarise labour market information (LMI) to analyse skill shortages and labour market

[10] Hanushek, E.A. 2013. "Economic Growth in Developing Countries: The Role of Human Capital". *Economics of Education Review*. 37: 204–212.

Hanushek, E.A. and L. Woessmann. 2008. "The Role of Cognitive Skills in Economic Development". *Journal of Economic Literature*. 46 (3): 607–668.

[11] Green, F. 2013. Skills and Skilled Work: An Economic and Social Analysis. Oxford University Press, United Kingdom.

[12] International Labour Organisation (ILO), the Organisation for Economic Co-operation and Development (OECD), the European Centre for the Development of Vocational Training (CEDEFOP), and the European Training Foundation (ETF). 2017. Skill Needs Anticipation: Systems and Approaches: Analysis of stakeholder survey on skill needs assessment and anticipation. https://www.cedefop.europa.eu/files/2223_en.pdf. ILO, Geneva.

imbalances. They are often forward- looking and can be combined to provide a more detailed and multifaceted picture of the labour market.

ILO, OECD, CEDEFOP and ETF (2017) document the various instruments, data sources and surveys that are used for LMIS. The report also documents the best practices of countries like the Netherlands (Box 1.2).[13] There are many methods to do this including qualitative methods, sector studies, employer-employee surveys, enterprise surveys, quantitative forecasting models, graduate surveys/tracer studies and vacancy surveys. Data can be also collected in a myriad of ways. Analysis can be done using formal, national level, quantitative model-based projections using econometric techniques or computable general equilibrium or similar models or partial quantitative-based projections. Sectoral-based models can also be done. Foresight methods includes focus groups/roundtable, Delphi style methods, scenario development analysis, sectoral/occupational/regional (sub-national) studies and/or Observatories (using both quantitative and qualitative evidence).

Box 1.2: LMIS in Netherlands

Skills assessment in the Netherlands includes various instruments and data sources, some based on surveys from statistical offices.

- Regular surveys are conducted with graduates entering the labour market.
- Administrative data from Public Employment Services (PES), education ministry and social security insurance contributions.
- Various bodies and skills councils contribute qualitative (and additional quantitative) material to help understand detailed problems.
- Long and medium-term forecasting models assess skills imbalances by detailed occupation and qualification (combination of field and level) using survey data.
- There are also tracer studies of all major training programmes that elicit school-to-work transitions from recent graduates (one to two years after graduation).
- Several sector studies are also conducted within the same organisation.
- The PES generates several short-term specific labour market forecasts and analyses, including of vacancies.
- Within sector councils, ministries and tripartite policy groups, labour market or education and training system responses are discussed and incorporated into recommendations.

Source: International Labour Organisation (ILO), the Organisation for Economic Co-operation and Development (OECD), the European Centre for the Development of Vocational Training (CEDEFOP), and the European Training Foundation (ETF). 2017. Skill Needs Anticipation: Systems and Approaches: Analysis of stakeholder survey on skill needs assessment and anticipation. https://www.cedefop.europa.eu/files/2223_en.pdf. ILO, Geneva.

The Bureau of Labour Statistics has one of the most sophisticated LMI systems. It is dynamic and online. https://www.onetonline.org/. The Occupational Information

[13] International Labour Organisation (ILO), the Organisation for Economic Co-operation and Development (OECD), the European Centre for the Development of Vocational Training (CEDEFOP), and the European Training Foundation (ETF). 2017. Skill Needs Anticipation: Systems and Approaches: Analysis of stakeholder survey on skill needs assessment and anticipation. https://www.cedefop.europa.eu/files/2223_en.pdf. ILO, Geneva.

Network (O*NET) Programme is the nation's primary source of occupational information. Valid data are essential to understanding the rapidly changing nature of work and how it impacts the workforce and US economy. From this information, applications are developed to facilitate the development and maintenance of a skilled workforce. Table 1.1 shows examples of various national and regional taxonomies (at the end of the chapter).

The Content Model is the conceptual foundation of O*NET. The Content Model provides a framework that identifies the most important types of information about work and integrates them into a theoretically and empirically sound system. The Content Model was developed using research on job and organisational analysis. It embodies a view that reflects the character of occupations (via job-oriented descriptors) and people (via worker-oriented descriptors). The Content Model also allows occupational information to be applied across jobs, sectors, or industries (cross-occupational descriptors) and within occupations (occupational-specific descriptors). These descriptors are organised into six major domains, which enable the user to focus on areas of information that specify the key attributes and characteristics of workers and occupations.

1.4 Definitions

"Skills are personal qualities with three key features – (i) productive: using skills at work are productive of value; (ii) expandable: skills are enhanced by training and development and; (iii) social: skills are socially determined" (Green, 2013; p. 10).[14] NCAER (2018) delineated three types of skills and they are:[15]

- **Cognitive skills** are *basic skills* of literacy and numeracy, applied knowledge and problem-solving aptitudes and *higher-order skills* such as experimentation, reasoning, and creativity.
- **Technical and Vocational Education and Training skills (TVET)** are the physical and mental ability to perform specific tasks using tools and methods in any occupation.
- **Social and behavioral skills** include working well with others, communicating and listening well, and being agreeable and outgoing.

The detailed list of skills is shown in Table 1.2 (at the end of the chapter). The study develops methodology to assess skills shortage at sectoral level and skill gap at the worker level in a particular sector.

Skills shortage describes the situation where a job vacancy is hard to fill because of a lack of applications with the needed skills.[16] For example, one is looking for accountants but is unable to find any with the appropriate degree, qualifications, experience, and skills.

A skill gap occurs where an employee's competence to do the job is called into

[14] Green, F. 2013. *Skills and Skilled Work: An Economic and Social Analysis*. Oxford University Press, United Kingdom.

[15] NCAER. 2018. *Skilling India: No time to lose*. http://www.ncaer.org/publication_details.php?pID=300, New Delhi, India.

[16] Green, F. 2013. *Skills and Skilled Work: An Economic and Social Analysis*. Oxford University Press, United Kingdom.

question (typically by his/her manager).[17] For example, one is looking for accountants and finds several with the appropriate degree and qualifications but not the appropriate skill set.

1.5 Objectives

The objective is to assess skill shortages and gaps. Given that 46 per cent of the workers in India were still employed in the agriculture and allied sector in 2023–24, one cannot use the standard international methods to analyse this work.[18] Further unlike the United States model, the O*NET, India cannot afford to ignore the self-employed workers or the unincorporated enterprises.[19] In 2023–24, 39 per cent of workers were self-employed in India with only three per cent as employers.[20]

India collects and publishes vast data—national accounts, household survey, and enterprise data for both organised and unorganised sectors. However, organised data are only collected for the manufacturing sector. Further, there are administrative data across various ministries.

Ideally, to assess skill shortages and gaps, India should have started with Occupational Wage Employment Survey (OWES) of pre-identified occupations across sectors. The Labour Bureau under the Ministry of Labour and Employment does conduct occupational wage surveys on a periodic basis but the associated employment and skills data are not available.[21] Even the wage data are not available spatially. Unit level data are also not available for further analysis.

Given the data constraints and a lack of theoretical construct, the Centre has to design the exercise, which will be implemented in coordination with States and Sector Skill Councils (SSCs).

In order to assess skill shortages and gaps in the short-run (less than one year), medium-run (3 to 5 years) and long-run (more than 15 years), what does India need to do? Looking at international literature, India needs to adopt multiple methodologies to understand both the on-going and anticipated changes and challenges. The methodology consists of seven components to assess skill shortages and skill gaps. The Centre and states have to work in a collaborative manner for a holistic assessment. The seven components are:

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[17] Ibid.

[18] MoSPI, Government of India. 2024b. INDIA - Periodic Labour Force Survey (PLFS), July, 2022–June, 2023. https://microdata.gov.in/nada43/index.php/catalog/210/related_materials. November 8.

[19] "The Occupational Employment and Wage Statistics (OEWS) programme of the Bureau of Labour Statistics Department, United States produces employment and wage estimates for approximately 830 occupations based on a survey of business establishments (employers). The OEWS survey covers wage and salary workers in nonfarm establishments and does not include the self-employed, owners and partners in unincorporated firms, household workers, or unpaid family workers."

BLS website. https://www.bls.gov/oes/oes_emp.htm.

[20] MoSPI, Government of India. 2024b. INDIA - Periodic Labour Force Survey (PLFS), July, 2022–June,2023. https://microdata.gov.in/nada43/index.php/catalog/210/related_materials. November 8.

[21] Labour Bureau website. https://www.labourbureau.gov.in/occupational-wage-survey.

1. Macro Analysis of Sectoral Shares of Gross Value Added (GVA) and Workers; Identification of Geographical Clusters and; Sectoral Workforce Characteristics using secondary data.
2. Simulations to forecast jobs and opportunities. This may be implemented both at the Central and state levels. NCAER has used I-O analysis to understand occupational trends.
3. Demand projections of jobs of non-agricultural sectors using OWES of non-agricultural enterprises. The OWES will be a detailed database of selected occupations which will give wages rates, number of workers, gender, other social background characteristics, qualifications and skills across geographies. The data will be representative at the district level.
4. Assess skill shortages and gaps of non-agricultural sectors using survey of non-agricultural firms for data on vacancies and skills: Vacancy rates across sectors needs to be estimated along with identification of occupations and associated qualifications that are vacant for more than a defined period of time.
5. Analysis of jobs in sub-sectors of non-agricultural sectors using big data methodologies. Analysis of job roles being advertised across web will inform about the real-time trends on the demand-side especially sub-sectoral trends and differences across geographies.
6. District-level analysis of jobs in the agriculture and allied sectors. A bottom-up strategy is adopted for analysis of agriculture and allied sectors. Secondary data analysis methods are used to understand district-wise trends. FGDs and stakeholders' analysis coupled with surveys will help identify job trends.
7. Stakeholder interactions to understand economic and technological changes that are anticipated but may not show up quantitatively. Focus Group Discussions (FGDs) and structured interviews are tools which will be used for consultations with all stakeholders across the value chain of the sector and the skilling/training process in that sector. This strategy informs us about new and evolving sectoral technologies; emerging job roles; upcoming job trends; identify changing skills needed for job roles; academia-industry partnerships; best practices; recruitment practices; internships/apprenticeships; upskilling/reskilling needs; and what firms are doing to encourage female workers or attract female workers, etc.

1.6 Structure of the Report

Chapter 2 shows the selection process of the seven sectors. Chapter 3 presents the simulation exercises for each of the sectors using I-O analysis. Chapters 4 to 10 present the results from each of the sectors. The last but not the least, Chapter 11 presents the conclusions and policy recommendations.

Table 1.1: Examples of national and regional taxonomies

Items	*Occupational Information Network (O*NET)*	*European Skills, Competencies, Qualifications and Occupations (ESCO)*	*UK Skills Taxonomy*	*Singapore Skills Taxonomy (SST)*	*Australian Skills Classification (ASC)*	*Canada Skills and Competency Taxonomy*
Approach	Quantitative and Qualitative	Quantitative and Qualitative	Quantitative (Data driven)	Quantitative and Qualitative	Quantitative and Qualitative	Quantitative and Qualitative
Data source	Analysts' input; Surveys to job incumbents and employers	Collaboration between sectoral and occupational experts, review of existing classifications and qualifications, desk research by main trend by sector, job adverts, and CVs	Online job adverts in the UK	Collaboration between stakeholders from various sectors on vision, transformation, occupation and skill needs, education institutions, unions and Government In progress Development of Job Skills Repository using data from foresight exercises, online job adverts, and CVs, census, skills frameworks, training consumption and supply data	O*NET; Australian Employability Skills Framework; Employer surveys; Job adverts; Education and training course documentation	Career handbook, Skills and Knowledge Checklist, Essential Skills profiles, O*NET, Stakeholder consultations; Surveys to job incumbents and employers; Online job adverts
Developer / Owner	US Bureau of Labor Statistics	European Commission, DG EMPL	Nesta (Private company)	SkillsFuture Singapore	National Skills Commission	Employment and Social Development Canada
Granularity	1016 occupations, 177 elements covering skills, knowledge, abilities, work activities and work styles, and around 18,000 tasks	3008 occupations, 13,890 skills/competence, knowledge	41 million adverts, 10,500 skills	1,692 occupations, 10,000 skills (Critical core skills, technical skills, and competencies)	857 occupations, 10 core competencies, 2,136 specialist tasks, and 70 technology tools	900 occupations, around 250 elements covering skills, abilities, attributes, knowledge, interests, work context, work activities, and tools and technologies.
Structure	6 domains (occupation-specific information, occupational requirements, workforce	3 pillars (occupations, skills/competence, qualifications)	4 layers (Broad clusters, skills groups, skills clusters,	5 layers (Level 1-4 clusters, branching out to "unique skills")	3 layers (Cluster family, Cluster, task)	8 domains (Skills, Abilities, Personal attributes, Knowledge, Interests,

Items	*Occupational Information Network (O*NET)*	*European Skills, Competencies, Qualifications and Occupations (ESCO)*	*UK Skills Taxonomy*	*Singapore Skills Taxonomy (SST)*	*Australian Skills Classificati on (ASC)*	*Canada Skills and Competency Taxonomy*
	characteristics, experience requirements, worker requirements, and worker characteristics)		and unique skills)			Work context, Work activities, Tools and technologies)
Skills "importance" rating (i.e., How important a skill is for an occupation)	Scale of 1–5	Binary (Essential / Optional)	% in job adverts	Ranking of top 5 critical core skills	N/A	Currently being explored
Skills "level" rating (i.e. What level of skill is required for an occupation)	Level (1–7)	N/A	N/A	Technical skills and competencies (Proficiency Level 1–6) Critical core skills (Basic, Intermediate, Advanced)	Scale of 1–10 and respective 3 levels (Basic 1— 3, Intermedia te 4-6 and High 8–9)	Currently being
Link with qualifications	No direct link	Yes (to rely on Europass for information at the EU level, pilot project in 2019 of linking learning outcomes of qualifications with skills)	No direct link	Yes in terms of levels (Technical skill levels correspond to Singaporean qualification levels)	No direct link	No direct link
Data disseminatio n	Website (Interactive interface, Excel format, API)	Website (Hierarchical structure, API)	Website (Interacti ve interface)	Website (Interactive interface) By industry, sector information, career pathways, occupation and job roles, existing and emerging skills, training programmes for skills upgrading and mastery	Website (Interactiv e interface, Excel format)	Forthcoming Website (Interactive interface)
Updates	Regularly	Regularly	Ad-hoc	Regularly	Regularly	N/A
Cost implications	High	High	Low	High	High	High

Source: Directly sourced from ILO and OECD. 2023. "Global skills gaps measurement and monitoring: Towards a collaborative framework". *Technical paper prepared for the 1st meeting of the Employment Working Group under Indian presidency*. https://labour.gov.in/sites/default/files/iloissaoecd_global_skills_gaps_measurement_and_monitoring.pdf. January.

Table 1.2: List of skills

Foundational cognitive skills	***Advanced cognitive skills***	***Foundational socio-emotional skills***	***Advanced socio-emotional skills***	***Knowledge***	***Sector/ Job-specific skills***
Reading Literacy	Learning strategies	Civic and digital citizenship	Instructing	General	Occupational
Writing	Critical thinking	Seek and value diversity	Negotiation	Sectoral	Technical
Speaking	Creativity	Conscientiousness (including attitude towards work)	Persuasion		Innovation
Communication	Independent research	Openness to experiences			Physical
Language Skills 1	Judgement and decision-making	Extraversion			
Language Skills 2	Systems analysis	Agreeableness			
Numeracy/Mathematics	Systems evaluation	Neuroticism/Emotional stability			
Information and Communication Technology (ICT) Literacy to Skills	Financial resources	Social skills at work			
Self-learning to Active (Independent) Learning	Material resources				
Active Listening	Personnel resources				
Science	Time management				
Problem Solving					

Source: Bhandari, B. 2021. "Policy for the Full Range of Employability Skills". NCAER Working Paper No. 123. https://www.ncaer.org/wp-content/uploads/2022/09/1623156388WP-123_NCAER_Skill_Working_Paper.pdf. NCAER, New Delhi, India.