ACQF-II project

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Common Occupation Profiles

D1.2 Methodology – D1.3 Report

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DRAFTED:

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Acronyms and Abbreviations

OJV	Online job vacancy
OJA	Online job advertising
OJP	Online job posting
PES	Public Employment Services
AHP	Analytic Hierarchy Process
API	Application Programming Interface
ESCO	European Skills/Competences, qualifications, and Occupations
GDP	Gross domestic product
KDD	Knowledge discovery in databases
KPI	Key performance indicators
LMI	Labour market information
NEET	Not in employment, education or training
NGO	Non-governmental organisation
OJV	Online Job Vacancy
DPS	Data Production System
MENA	MENA, an acronym in the English language, refers to a grouping of countries situated in and around the Middle East and North Africa.
Q&A	Questions and answers

1. Introduction

In today's rapidly evolving labour market, the alignment of educational outcomes with market demands is more crucial than ever. As the gap between the skills taught by educational institutions and those required by employers widens, there is a pressing need for a strategic approach to bridge this divide. The labour market is marking a pivotal moment: robust, trustworthy data is essential. As we face significant skill shortages, understanding the nuances of the labour market becomes crucial. The need for data extends beyond traditional sources, with an increasing reliance on detailed and real-time data from new players such as dating platforms and work platforms. These sources provide a fresh perspective on the dynamics of job matching and employee expectations, highlighting areas of growth and sectors that are lagging. New platforms are redefining participation in the labour market, offering unprecedented flexibility and reshaping career trajectories.

A striking revelation was the velocity of change in productivity compared to historical benchmarks, such as those from 1970. The importance of detailed skills data is emphasized by employers and organizations, alongside the need to invest in the intangible values of human resources and professional development.

The primary need addressed by common occupation profiles is the critical requirement for educational systems and policy makers to adapt to the changing dynamics of the job market. This adaptation is necessary to enhance employability, meet employer expectations, and support economic growth. The use of real-time labour market data, particularly from online job postings, provides a rich and dynamic source of information to analyse current and future skills demands comprehensively.

The goals of this document are twofold:

- Methodology: To outline a robust methodology for collecting and analysing labour market data that can inform the development of occupational profiles. This report details the data-driven techniques and tools utilized to capture and interpret job market trends.
- Findings on common Occupation profiles: To present the analytical findings regarding common occupational profiles, highlighting key skills, demands, and career pathways that align educational qualifications with labour market needs.

The expected outcomes from this study:

- Enhanced educational alignment: Providing educational institutions with data-driven insights that can guide curriculum development and ensure that learners are equipped with relevant skills.
- Informed policy making: Assisting policy makers in crafting policies that foster a skilled workforce capable of meeting current and future job market demands.
- Strategic study and career pathways: Offering students and career professionals clear and actionable pathways for career advancement based on empirical data.

By addressing these needs and achieving these goals, this study aims to significantly contribute to the development of a labour market where education and employment are closely aligned, thereby enhancing individual career success and economic prosperity.

2. Methodology

This section outlines the methodology employed to analyse labour market trends and build common occupational profiles that bridge the gap between educational achievements and labour market needs. The approach combines cutting-edge technology and comprehensive labour market data analysis, utilizing both conventional data sources and innovative data extraction techniques.

Definition of common occupation profiles: A data-driven definition of a job, with the focus on skills insights. They mix conventional data and new metrics to inform about the demand and the possible study pathways to an occupation (qualification).

The primary data source for this analysis is a vast repository of online job postings. These postings are continuously gathered in real-time and provide a rich, up-to-date source of information on employer needs and job market dynamics. The data includes detailed descriptions of job roles, required qualifications, and specific skills.

To accurately assess and visualize the demand for specific occupational profiles globally and regions, our approach integrates advanced data analytics with strategic data sourcing from the ETF job postings mixed with the Lightcast global job postings. The analysis focuses on identifying trends in job postings across different geographical areas, specifically targeting four African countries, all African nations collectively, Europe, and on a global scale.

Alongside real-time data, this methodology incorporates established databases such as O*NET and ESCO. These sources offer structured and detailed descriptions of various occupations and their requirements, which serve as a benchmark for analysing and categorizing job market data. The vast amount of data and its varying quality pose significant challenges. To manage this, robust data cleaning and pre-processing steps are implemented to standardize and filter the data before analysis. To keep the occupational profiles relevant, the system is designed to incorporate real-time data updates, allowing for continuous refinement and accuracy.

Occupational profiles are meticulously matched and classified using a combination of the Lightcast Occupation Taxonomy, ESCO Occupation and corresponding ISCO and O*NET classifications. This ensures a standardized approach to comparing job roles across different international classification systems, enhancing the reliability and comparability of the analysis.

AI technologies play a crucial role in extracting relevant information from online job postings. Machine learning algorithms are used to parse complex job descriptions and identify key skills and qualifications. This automated extraction not only ensures efficiency but also maintains consistency in how data is interpreted and categorized.

The real challenge and innovation lie in the integration of dynamic job posting data with static, conventional data from O*NET and ESCO. By aligning real-time insights with comprehensive occupational standards, the methodology ensures that the occupational profiles developed are both current and robust.

The analysis involves a series of extraction designed to extract job posting data for selected job profiles over the year 2023. These queries are structured to capture the demand dynamics across various dimensions:

- Jobs demand by country: Focuses on the specific demand in Kenya, Egypt, Morocco, and Tunisia. This query aggregates monthly job postings for targeted occupations, providing insights into regional job market trends.
- Jobs demand in Africa: Expands the analysis to include all African. This broader view helps in understanding continent-wide demand and identifying regional variations within Africa.
- Global Demand: Provides a worldwide perspective by counting job postings for the selected occupations without geographical limitations, offering a global snapshot of occupational demand.
- Europe Demand: Concentrates on European countries, identifying trends and demands in a developed market context, which can be critical for comparative analysis and understanding developed versus emerging market dynamics.

The addition of Key Performance Indicators (KPIs) such as the AI Index, Green Index, and Digital Index to each occupational profile provides a more nuanced understanding of the skill composition within each job role. Each occupational profile is enhanced with three specific indices: the AI Index, the Green Index, and the Digital Index. These indices are designed to express the prevalence and importance of certain categories of skills relative to the total skills required for each occupation. They serve as a metric to gauge the extent to which specific types of skills are represented in the job profiles, offering insights into the evolving demands of the labour market:

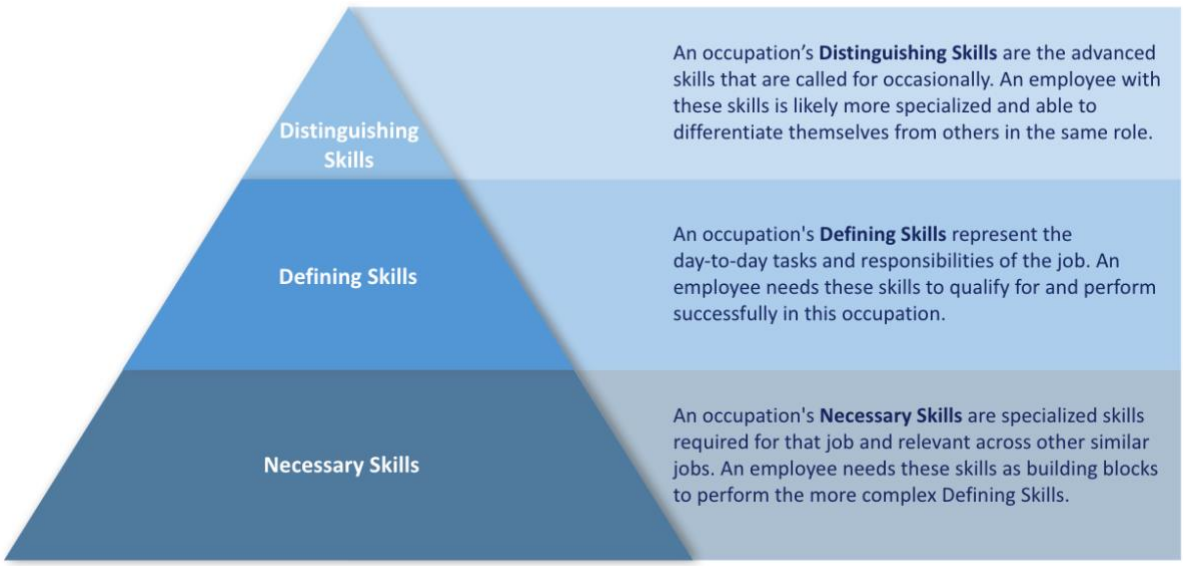
- AI Index: This index measures the proportion of artificial intelligence-related skills within the total skill set required for the occupation. A higher AI Index indicates a greater emphasis on AI skills,

suggesting that the occupation is more aligned with technological advancements and requires a workforce capable of managing and implementing AI solutions.

- Green Index: The Green Index quantifies the prevalence of environmental and sustainability-related skills. This index is particularly relevant in assessing how occupations contribute to environmental goals and sustainability practices. A high Green Index signifies a strong focus on eco-friendly practices and knowledge, reflecting the growing importance of sustainability in various sectors.
- Digital Index: This index reflects the proportion of digital skills required for the occupation. It highlights the role of digital literacy and competencies in the job, which can include everything from basic computer skills to advanced programming and digital communication abilities. A higher Digital Index suggests that the occupation is digitally intensive and likely to evolve with technological progress.

Each index is calculated as the ratio of the number of specific category skills (from job postings data) to the total number of skills listed for the occupation. These indices are essential for stakeholders, including educators, policymakers, and industry leaders, as they provide critical insights into the skill demands of occupations. They help in identifying trends in the labour market, such as increasing requirements for digital capabilities or a growing focus on sustainability, which can influence strategic decisions in training and development programs, recruitment strategies, and policy formulation.

For each occupation profiles, a list of skills is presented. The skills are job-specific skill and each skill is linked to ESCO taxonomy. The skills are selected by the DDN framework:



1- Defining Skills represent the day-to-day tasks and responsibilities of the job. An employee needs these skills to qualify for and perform successfully in this occupation.

2- Distinguishing Skills are advanced skills that are called for occasionally. An employee with these skills is likely more specialised and able to differentiate themselves from others in the same role.

3- Necessary Skills are specialised skills required for that job and relevant across other similar jobs. An employee needs these skills as building blocks to perform the more complex Defining Skills.

After DDN is selected, they're joined to the Top 10 Specialized skills by the demand by different locations.

The Skills are connected to ESCO taxonomy and projected growth. The two-year projection is based on the computation of skills demand (job postings) in the market, reflecting the anticipated evolution of skills.

2.1 Selection of the profiles

The list of profiles can be selected in various ways. Following is the draft of the ideas that can be used as a framework to select the profiles for analysis.

The list of 20 Occupations is based on mixed methods:

- Advertising and marketing professionals (Method 1)
- Mobile Developers (Method 1)
- Project managers (Method 1 & 5)
- Sales Representative (Method 2 & 6)
- Executive Assistant (Method 2)
- Supply-Chain Specialist (Method 1)
- Artificial Intelligence Consultant (Method 5)
- Web-Developer (Method 3-4)
- Front-end Developer (Method 3-4)
- Full-Stack Developer (Method 3-4)
- IT Specialist/Engineer (Method 3-4)
- Java Developer/Engineer (Method 3-4)
- Data Scientist (Method 5)
- Data Engineer (Method 5)
- Data Analyst (Method 5)
- Environmental Planner (Scientist) (Method 1 & Method 5)
- Electrician (Method 5)
- Building and General Maintenance Technician (Method 5)
- Customer Service Representative (Method 6)
- Business/Management Consultant (Method 6)

Method 1: Demand within Region

This approach reflects the actual demand of the local market and prepares different stakeholders to meet these demands. The data is reflective of the last 12 months and the region could be defined as a specific country separately, or average demand within 4 countries of Africa.

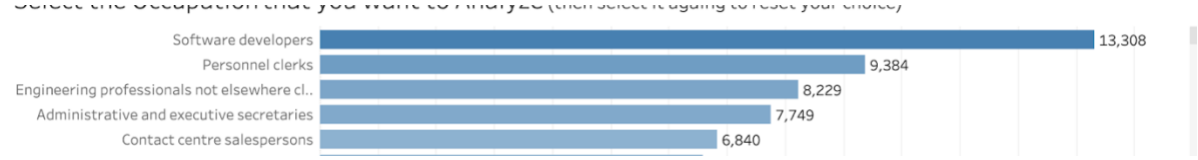
Top 5 Occupations by demand within Africa:

The Top 5 Occupations by Specific countries are following:

Kenya:

Morocco:

Tunisia:



Egypt:

As we can see, a big share of the top 5 occupations per each country are overlapping, but there are still some distinctions. If we want to include the top occupations by each country despite their corresponding weight in the average of the regions, we could create an inclusive list of top occupations by countries, instead of taking average considering the number of job postings.

Method 2: Global Demand

Reasoning: This approach reflects the actual demand of the global market and even if demands the local region are not reflecting this demand yet, prepares the stakeholders for the job profiles of the global market

2	Retail Sales Associate (General)	2579116
3	Office / Administrative Assistant (General)	2257366
4	Laborer / Warehouse Worker	2220508
5	Registered Nurse (General)	2014555
6	Tractor-Trailer Truck Driver (General)	1664813

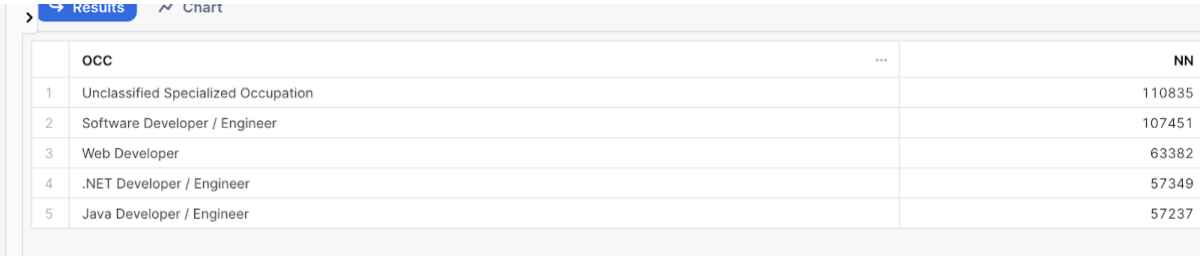
Method 3: Demand within Emerging Field – Region

The list of profiles can be determined by the demand within specific industry, like Computer programming, consultancy and related activities and further filtered for the countries within Africa and/or specific countries in Africa

	OCC	...	NN
1	Web Developer		1620
2	Front End Developer		833
3	Full Stack Developer		777
4	IT Specialist / Engineer		704
5	Java Developer / Engineer		675

Method 4: Demand within Emerging Field – Global

The profiles can be determined by specific industry, but on the global scale



	OCC	NN
1	Unclassified Specialized Occupation	110835
2	Software Developer / Engineer	107451
3	Web Developer	63382
4	.NET Developer / Engineer	57349
5	Java Developer / Engineer	57237

Method 5: Demand of occupations with Emerging skills – Global

The list of profiles can be determined as a lit of occupations that require having specific skills, like – Generative AI, Machine Learning, etc. for Global data.

Profiles with the AI skills:

	LOT_V6_SPECIALIZED_OCCUPATION_NAME	NN
1	Data Scientist	132371
2	Software Developer / Engineer	77685
3	Data Engineer	68326
4	Data Analyst	36852
5	Sales Representative (General)	26357

Profiles with Green Skills

	LOT_V6_SPECIALIZED_OCCUPATION_NAME	NN
1	Project Manager (General)	80034
2	Environmental Planner / Scientist	64080
3	Electrician	53890
4	Building and General Maintenance Technician	51772
5	Tractor-Trailer Truck Driver (General)	45506

Method 6: Demand of Occupations with Remote possibilities

The list of profiles with the most remote possibilities.

	LOT_V6_SPECIALIZED_OCCUPATION_NAME	NN
1	Software Developer / Engineer	581170
2	Project Manager (General)	360193
3	Customer Service Representative (General)	336378
4	Sales Representative (General)	315457
5	Business / Management Consultant	306527

3. Common Occupation profiles

The findings from the analysis of common occupation profiles have profound implications for both educational institutions and policy makers. These implications are crucial in aligning educational outcomes with labour market demands, thus enhancing the relevance of educational programs and the employability of graduates.

Data-Driven Curriculum Design: The insights obtained from the common occupational profiles should guide curriculum developers to incorporate specific skills that are in high demand within the job market. This includes both hard technical skills and soft skills, which are increasingly valued in the digital economy.

Responsive educational offerings: Institutions should remain agile, updating their programs frequently based on the latest labour market data to ensure that students are learning skills that are current and in demand.

Skill-Based learning emphasis: Educational programs can be tailored to help students develop specialized skills that distinguish them in the job market, as well as broad-based competencies that allow for career flexibility and resilience.

Integration of real-world projects: Implementing project-based learning that mimics real-world challenges can be beneficial, as it allows students to apply theoretical knowledge in practical settings, making them more job-ready upon graduation.

Career Guidance and Student Support: With a clearer understanding of career pathways and necessary skills, career services can offer more targeted advice to students and design workshops that build the required skills for specific occupational profiles.

Skills and Education Policy Formulation: Policies should encourage and support educational institutions in continuously adapting their offerings to meet labour market needs. This includes funding for new technologies and teaching methodologies that facilitate up-to-date, skill-oriented education.

Lifelong Learning and Continuing Education: Developing policies that promote lifelong learning will help the workforce stay relevant in a rapidly changing job market. This includes incentives for both individuals and companies to engage in continuous professional development.

Labour Market Analysis and Forecasting: Encouraging ongoing research into labour market trends and future skill requirements can help in pre-emptively adjusting educational policies and practices.

Utilization of Data for Policy Development: Harnessing the power of big data analytics to inform policy decisions, ensuring that they are based on comprehensive and timely labour market data.

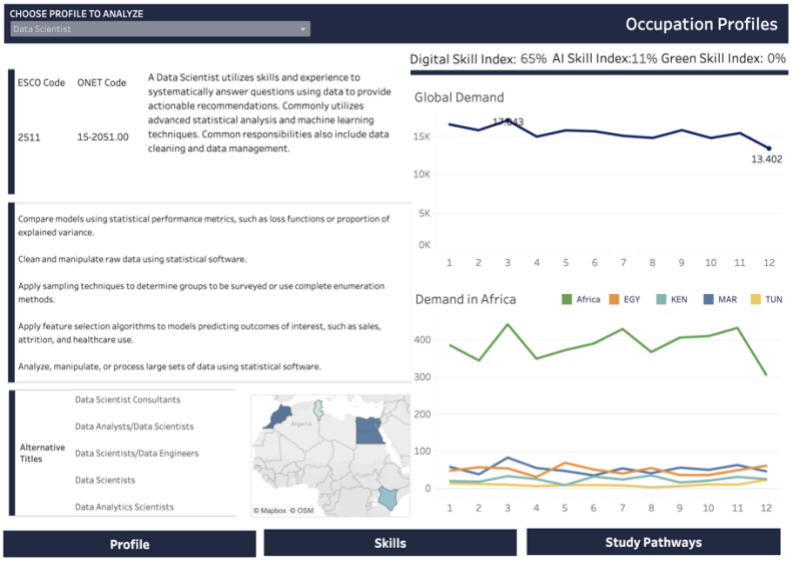
Engagement with Educational Institutions and Employers: Foster a collaborative approach among educational providers, businesses, and government bodies to ensure that education and training programs are closely aligned with economic needs and opportunities.

The findings on common occupation profiles provide critical insights that should drive the development of educational programs and policy making. By leveraging these insights, educational institutions can better prepare students for successful careers, while policymakers can formulate strategies that ensure the workforce remains competitive and aligned with industry needs. This holistic approach will not only benefit individual career trajectories but also bolster the broader economic landscape.

Common occupation profiles are organized in a dashboard composed by three sheet:

- The dashboard introduces the user with the possibility to choose a specific profile and get the following information regarding it.
    - Description of the chosen profile
    - Correspondence of chosen profile with profiles from ESCO and ONET taxonomies
    - Task Description provided by ONET
    - Alternative job titles the profile is presented on the market

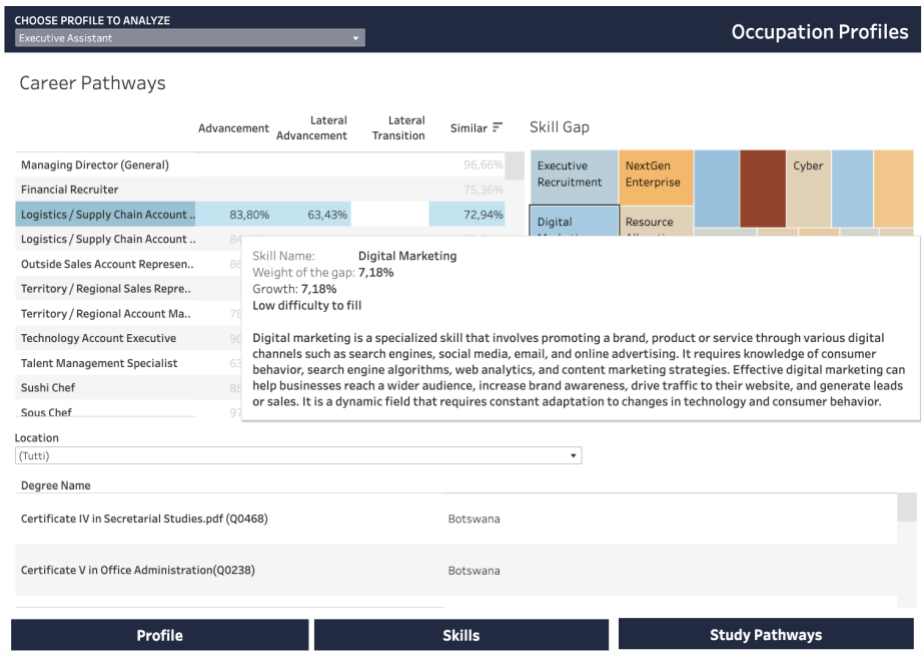
- Global Demand (number of job postings) for the job profile within 2023
- Demand within all the African countries and 4 countries Egypt, Kenya, Morocco and Tunisia specifically



- The Skills section in the dashboard analyses skills for the selected job profile:
  - Top Specialized skills by recall of skills within the available job postings Globally, within EU and among job postings of specific 4 countries in Africa. Recall is shown as a % share of available skills.
  - The data is colour coded by the projected skill growth on the market. The exact value of the projected growth can be seen upon hovering on the skill in the skill Tooltip.
  - Tooltip also demonstrates the detailed description of the skill.

- The section analyses the pathways for the selected profile: career pathways related to the specific profile and educational pathways leading to them.

- For the selected profile, list of occupations are presented, distributed by 4 different hierarchical categories: Advancement, Lateral Advancement, Lateral Transition or Similar level. For each of them, the index of similarity is given.
- Upon selecting specific career, user can also see the skill gap existing from the chosen profile and the original profile of the analysis. The skills are colour coded by the skill weight to analyse the gap.
- User is also presented with the list of the degrees connected to the profile of analysis at various locations in African countries.



4. Conclusions

The methodology outlined in this report represents a comprehensive approach to understanding and responding to the dynamics of the modern labour market. By leveraging cutting-edge tools and technologies, this approach enables the systematic collection, analysis, and interpretation of large volumes of labour market data. The integration of real-time job postings with established occupational databases like O*NET and ESCO has created a robust framework for developing common occupational profiles that are both accurate and relevant.

Key achievements:

- Enhanced Labour Market Insights: The use of advanced data analytics tools has provided deeper insights into labour market trends, skill demands, and job requirements. These insights are crucial for aligning educational programs with real-world needs.
- Data-Driven Decision Making: The methodology supports data-driven decision-making within educational institutions and among policymakers, ensuring that strategies and policies are grounded in empirical evidence.
- Scalable and Adaptable Framework: The flexible and scalable nature of the methodology allows it to be adapted to different regional and sectoral contexts, making it a valuable tool for global application.
- Impact on Stakeholders:

- Educational Institutions: Can now more effectively tailor their curriculum and training programs to meet the demands of the job market, enhancing the employability of graduates.
- Students and Job Seekers: Gain access to valuable information about the skills and qualifications that are most sought after by employers, aiding them in making informed career choices.
- Policy Makers: Are equipped with actionable insights to develop policies that foster a responsive education system and a skilled workforce.

Going forward, there is a need to continue refining the tools and methodologies to keep pace with the rapidly changing labour market. The incorporation of more granular data, such as regional employment trends and industry-specific needs, will enhance the precision of occupational profiles. Additionally, fostering stronger collaborations between educators, industry leaders, and policymakers will be crucial in creating a cohesive strategy that supports both economic growth and individual career success.

By bridging the gap between educational output and labour market requirements, the methodology presented in this report not only enhances individual career prospects but also contributes to the broader economic objective of creating a highly skilled and adaptable workforce. The continued development and application of this methodology will be pivotal in navigating the complexities of the future job market, ensuring that education remains relevant and responsive to industrial needs.

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