Working paper No. 7

The skills of the middle class in Arab countries

Working paper series on the middle class

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Economic and Social Commission for Western Asia

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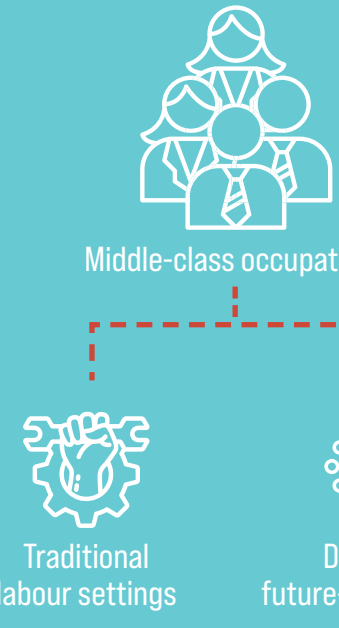
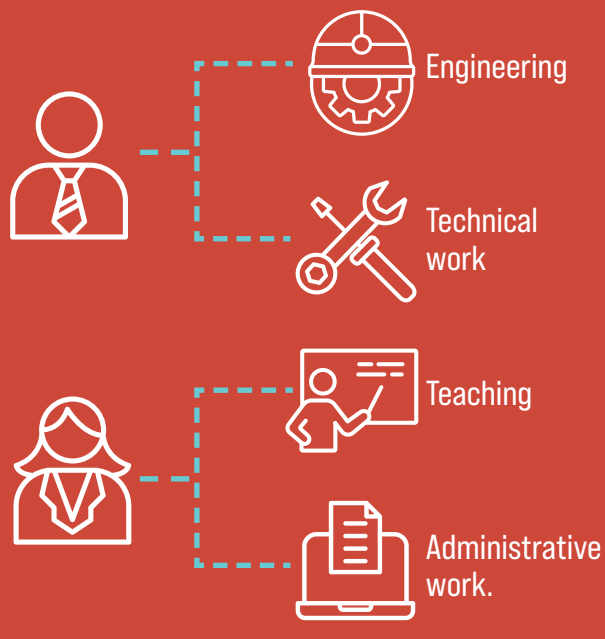


The skills required in middle-class occupations in the Arab region are mostly those **found in traditional labour settings.** However, a subset of countries in the region show an **inclination for digital and future-focused skills** in middle-class occupations.



Gender differences are apparent in terms of required skills. **Skills related to male-dominant occupations** are often concentrated in **engineering and technical work**, while **skills related to female-dominant occupations** are focused in the areas of **teaching and administrative work.**

Introduction

This paper aims to determine whether the skills required in middle-class professions in the Arab region align with global trends, or whether they lag behind, as noted in other research on the future of work.[1] In terms of global trends, the hard skills that are increasingly in demand in developed countries predominantly include skills in the areas of automation, artificial intelligence (AI), data science, and machine learning. Recent research raises concerns about current technological change trajectories in the Arab region, which many see as skill- and labour-replacing, particularly in manufacturing and service jobs. In that regard, Yusuf, 2021 notes that certain countries in the Arab region may encounter a further erosion of the middle class with an increase in digital technologies and automation, and that workers with lower levels of education and wages, specifically the lower middle class, will be those most adversely affected.[2] This paper draws on the findings of the paper "The Arab region may be missing the Fourth Industrial Revolution: Arab skills are still stuck in the past"[3] and addresses arguments made in "Digital technology and inequality: the impact on Arab countries".[4]

It is envisaged that this paper will help decision makers formulate employment policies that can enhance the stability and growth of the middle class in a fast-paced labour market environment. Using labour force surveys from five Arab countries, we have identified the hard and soft skillsdemanded for the middle-class workers. Hard skills, on the one hand, are defined as specialized, technical skills used for specific job tasks. Examples of hard skills include coding in Java, Python, financial analysis, and any skill that is considered technical and not interpersonal. On the other hand, soft skills are defined as skills prevalent across many occupations and industries, including personal attributes and learned skills. The required hard skills for middle-class jobs are a mix of mid-level skills including in the areas of finance and accounting, as well as restaurant operations, which has a strong traditional focus. Aside from communication skills, the demand for soft skills is also not in line with international trends, which show that there is an increasing focus on problem-solving, creativity and innovation skills, among others.

While this paper aims to provide an empirical assessment from the demand side on what skills are needed in the current labour market, the driving forces behind skills generation, such as education, cannot be overlooked. The Arab region, as pointed out by the International

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Labour Organization (ILO) and ESCWA (2021),[5] is suffering from a structural skill mismatch between the supply and the demand sides of the market. This structural mismatch implies that the skills demanded in the market are not aligned with the supplied skills generated by the education system and other outlets, which further implies that the market will not be able to match job candidates with vacancies, leaving a share of the middle class unemployed. At the same time, there are job vacancies that remain unfilled.

We also observe that the skills demanded for the middle class are different between genders. For example, while skills demanded in middle-class male occupations are clustered in manufacturing and engineering, skills in jobs that tend to be held by women are clustered in education and clerical work. We also detect that while the hard in-demand skills in each sector for the middle class differ significantly from each other, the soft skills of the middle class are common across industries.

While skills demanded in middle-class male occupations are clustered in manufacturing and engineering, skills in jobs that tend to be held by women are clustered in education and clerical work.

The automation of middle-class jobs is partially feasible. Our analysis shows that, on average, 38 per cent of tasks found in descriptions of currently demanded middle-class occupations can be augmented or automated by existing AI modalities. However, tasks found in descriptions of sales and clerical occupations are the least likely to be automated. The above-mentioned trends for in-demand skills in middle-class jobs may further delay the augmentation of the Arab region's middle class as the so-called fourth industrial revolution takes place.

Middle-class skills are mainly traditional in nature

01

In this section, we discuss what skills are demanded in middle-class jobs in the Arab region, as set out in the Economic and Social Commission for Western Asia (ESCWA) Skills Monitor. Specifically, we assess linkages between the middle-class jobs observed in the labour market, using the occupations identified in country labour force surveys, and the demand for skills as identified in the ESCWA Skills Monitor. The Skills Monitor provides up-to-date information about the demand for skills in the Arab region's virtual market. The objective of the Skills Monitor is to highlight the composition of the in-demand skills in each job, rather than to quantify the demand for jobs. From the in-demand skills,[6] we highlight the following two key issues:

a. The most in-demand (hard and soft) skills in specific middle-class jobs;

b. The prospects for the survival of middle-class jobs, evaluated by the proportion of tasks undertaken in those jobs that are at risk for automation.

The first issue focuses on the composition of in-demand skills in the countries studied. To facilitate accurate and interpretable analysis, we have split job skills into hard and soft skills, using the definition provided by Lightcast, a labour market analytics company.[7] The second issue focuses on the tasks and skills required in individual middle-class jobs, and we have attempted to understand if those jobs are subject to automation. To that end, we have scored jobs on the basis of their artificial-intelligence-augmentation potential (hereafter their AI score), namely the potential that AI can either replace or facilitate the performance of the tasks required in each occupation.[8],[9] The AI score is calculated on the basis of the number of registered patents or technologies that help automate, augment or replace tasks that involve human participation. The AI score for a given job type is calculated by measuring the percentage of tasks an existing AI patent could augment in that job type. Specifically, the percentage is determined by machine analysis of descriptions of each job posting, and checking the tasks mentioned to see if they can be automated by any registered AI patent.

The analysis begins by defining a list of "middle-class occupations" using labour force surveys from Egypt, Jordan, the State of Palestine, and Tunisia. Although we use similar labour force survey data from Kuwait, Kuwait is reported separately from the other four countries throughout the paper. This is because of the rather unique economic and social context of Kuwait, as a Gulf Cooperation Council (GCC) member State, compared to the four other non-GCC States.[10]

This part begins by discussing the hard skills required in middle-class occupations. Table 1 shows the top-10 in-demand hard skills in middle-class occupations by country.[11] The table shows that many of the skills required in middle-class occupations are appropriate for mid-skill occupations but not for high-skill occupations.

Table 1. Top-10 in-demand hard skills in middle-class jobs

Top-10 in-demand hard skills (in decreasing importance)	Egypt	Jordan	State of Palestine	Tunisia	Kuwait
1	Knowledge of computer science	Knowledge of finance	Knowledge of finance	Knowledge of marketing	Restaurant operations
2	Accounting	Accounting	Accounting	Bilingualism (French/English)	Accounting
3	Finance	Social work	Computer science	Finance	Finance
4	Knowledge of key performance indicators	Computer science	Financial statements	Computer science	Computer science
5	JavaScript	Financial statements	Computer engineering	Knowledge of key performance indicators	Marketing
6	Sales	Data analysis	Data collection	Agile methodology	Mechanical engineering
7	Business development	Economics	Social science	Corrective and preventive action	Invoice processing
8	Structured Query Language	Data collection	Economics	Restaurant operations	Business development
9	Invoice processing	Project management	Structured Query Language	Scrum (software development)	AutoCAD (computer-aided design)
10	Agile methodology	Social science	Debugging	Accounting	Auditing

Source: ESCWA analysis and production based on data from the ESCWA Skills Monitor and country Labour Force Surveys.
Note: Country-unique skills are highlighted in red.

The review of middle-class skills in high demand in the five countries revealed both a number of differences[12] and many similarities. The in-demand skills in Egypt are particularly interesting. For example, computer science and programming-relevant skills, such as knowledge of Java are in high demand in Egypt, together with traditional hard skills, such as sales techniques, invoicing and business development. According to data provided in the ESCWA Skills Monitor, Egypt has a more diversified set of skills among their middle-class workers than other countries in the Arab region, signalling that economic activity is relatively more diverse. Those results shows that the middle class in Egypt has the potential to catch up with the increasing global demand for digital economy skills.[13]

For other countries, knowledge of accounting, finance and general computer science are consistently the most demanded skills in the virtual market. The skills most in demand in the middle-class vacancies found online in Jordan are all, to a certain extent, related to the social sciences. Even though a decent number of coding and programming skills are in demand in all five countries, the top-10 in-demand skills in middle-class jobs in Kuwait, the State of Palestine and Tunisia are less closely related to the digital economy compared to the top in-demand skills in Egypt or Jordan.

Communication, sales and management are the soft skills most in demand in middle-class jobs

02

As was the case with hard skills, in-demand soft skills in middle-class occupations were also analysed. Table 2 is analogous to table 1 and shows the top-10 in-demand soft skills for middle-class occupations in the five countries.

The most in-demand soft skills for middle-class occupations are similar across the region, although there are a few context-based distinctions between the virtual markets. For example, the Tunisian labour market has a unique demand for French, while the State of Palestine has three unique skills among the top-10 requested soft skills. The most frequently demanded soft skills across all five countries are communications, sales and management. When comparing the most in-demand skills for middle-class workers with those required of members of the owning class, it becomes clear that those skills are broadly applicable and are not class-dependent.

Table 2. Top-10 in-demand soft skills in middle-class jobs

Top-10 in-demand soft skills (in decreasing importance)	Egypt	Jordan	Kuwait	State of Palestine	Tunisia
1	Communications	Communications	Communications	Communications	Communications
2	Management	Management	English language	English language	Management
3	English language	English language	Arabic language	Arabic language	English language
4	Problem solving	Arabic language	Management	Management	Innovation
5	Planning	Planning	Planning	Planning	French language
6	Customer service	Coordinating	Customer service	Coordinating	Operations
7	Operations	Operations	Operations	Detail-oriented skills	Planning
8	Leadership	Leadership	Leadership	Computer literacy	Leadership
9	Presentations	Accountability	Problem solving	Interpersonal communication	Problem solving
10	Microsoft Word	Problem solving	Microsoft® Office	Problem solving	Customer service

Source: ESCWA analysis and production based on data from the ESCWA Skills Monitor and country Labour Force Surveys.
Note: Country-unique skills are shown in red.

Gender Disparities apparent among in-demand skills in middle-class occupations

03

The gender composition of each occupation can be ascertained by looking at labour force survey data. For each middle-class occupation according to the International Standard Classification of Occupations (ISCO), the number of males and females employed in each job type was extracted.[14] It was assumed that each labour force survey was representative of the gender composition of job types, and the male and female labour data were linked to the in-demand skills identified in the ESCWA Skills Monitor to see if there were any significant differences in terms of in-demand skills for middle-class male versus middle-class female workers. The analysis of Kuwait is presented separately from the aggregate analysis of the other four countries. Specifically, the aggregate results for the gender analysis are presented in table 3, while the findings from Kuwait are shown in table 4.

In the aggregate analysis excluding Kuwait, the skills demanded for both genders were similar for the top in-demand skills. When looking at the top-30 in-demand hard skills by gender, the skill sets for males and females overlap. In fact, the top-15 skills are almost identical for males and females, with the exception of AutoCAD (computer-aided design), which appears only for males.

However, when looking at skills below the top 15, some diverging patterns are seen. While a certain amount of overlap is observed, including for digital marketing, which ranks 22nd and 17th in the male and female skill lists, respectively, other skills vary greatly by gender. For the in-demand skills list for males, economics, software development, SAP applications and Java were ranked near digital marketing, while for the in-demand list for females, strategic planning, curriculum development, economics, and project management were ranked near digital marketing. Furthermore, strategic planning, curriculum development and project management were not present in the top-30 skills expected for males. The results of the findings are summarized in table 3.

Table 3. Top in-demand skills with high gender disparities (Analysed countries excluding Kuwait)

Skill name	Skill type	Ranking for males	Ranking for females
AutoCAD	Hard	15	66
Software development	Hard	21	37
Electrical engineering	Hard	25	77
Software engineering	Hard	27	59
Curriculum development	Hard	107	20
Lesson planning	Hard	126	22
Office management	Hard	88	25
Student engagement	Hard	144	28
Behaviour management	Hard	150	30

Source: ESCWA analysis and production based on data from the ESCWA Skills Monitor and country Labour Force Surveys.

Table 4. Top in-demand skills with high gender disparities (Kuwait)

Skill name	Skill type	Ranking for males	Ranking for females
Troubleshooting	Soft	7	35
Lifting ability	Soft	17	50
Low voltage	Hard	14	63
Electrical systems	Hard	15	65
Machinery	Hard	17	80
Teaching	Soft	34	6
Lesson planning	Hard	64	5
Travel arrangements	Hard	66	7
Office supply management	Hard	68	9

Source: ESCWA analysis and production based on data from the ESCWA Skills Monitor and country Labour Force Surveys.

The second column of table 4 shows that high gender differentials are prevalent in both hard and soft skills in Kuwait. Furthermore, the skill ranking differentials are more pronounced in Kuwait as compared with the aggregate data for the other four countries analysed.

The data shown in tables 3 and 4 indicate that in-demand skills for males and females tend to be different: while unique male-demanded skills are likely to be related to the technical and engineering fields, unique female-demanded skills are more likely to be related to education and management. Technical details on the data creation process used in the formulation of tables 3 and 4 can be found in annex 2.

When looking at skills below the top 15, some diverging patterns are seen. While a certain amount of overlap is observed, including for digital marketing, which ranks 22nd and 17th in the male and female skill lists, respectively, other skills vary greatly by gender.

Middle-class hard skills are more industry-specific than soft skills

04

Using labour force survey data, occupation data were generated for 20 different industries. The top-10 hard and soft skills observed for each industry were then extracted from the Skills Monitor database. Three representative industries from the labour force survey data were selected to simplify the analysis. The selected industries were information and communications, financial and insurance activities, and construction. We limited the analysis to Egypt, Jordan, the State of Palestine, and Tunisia due to aggregation limitations.

Using labour force survey data, occupation data were generated for 20 different industries. The top-10 hard and soft skills observed for each industry were then extracted from the Skills Monitor database. Three representative industries from the labour force survey data were selected to simplify the analysis.

Tables 5 and 6 show the dominant hard and soft skills demanded in the three industries mentioned above for middle-class occupations. From table 5, we see the top in-demand hard skills are largely dependent on the industry in question. Programming, computer systems and coding-relevant skills dominate the information and communication industry, while business-relevant skills dominate the financial and insurance industries. Several engineering-relevant hard skills are in high demand in the construction industry.

Table 5. Top-10 in-demand hard skills in the three selected industries (Analysed countries excluding Kuwait)

Top-10 in-demand hard skills (in decreasing importance)	Information and communications	Financial and insurance activities	Construction
1	Computer science	Accounting	Computer science
2	JavaScript	Finance	Finance
3	Cascading Style Sheets	Financial statements	Accounting
4	Application programming interface	Computer science	Mechanical engineering
5	Structured Query Language	Auditing	AutoCAD
6	HyperText Markup Language (HTML)	Key performance indicators	Electrical engineering
7	Git version control system	Invoicing	Software development
8	Agile methodology	Business development	Agile methodology
9	JavaScript	Sales	Software engineering
10	Software development	Financial analysis	Key performance indicators

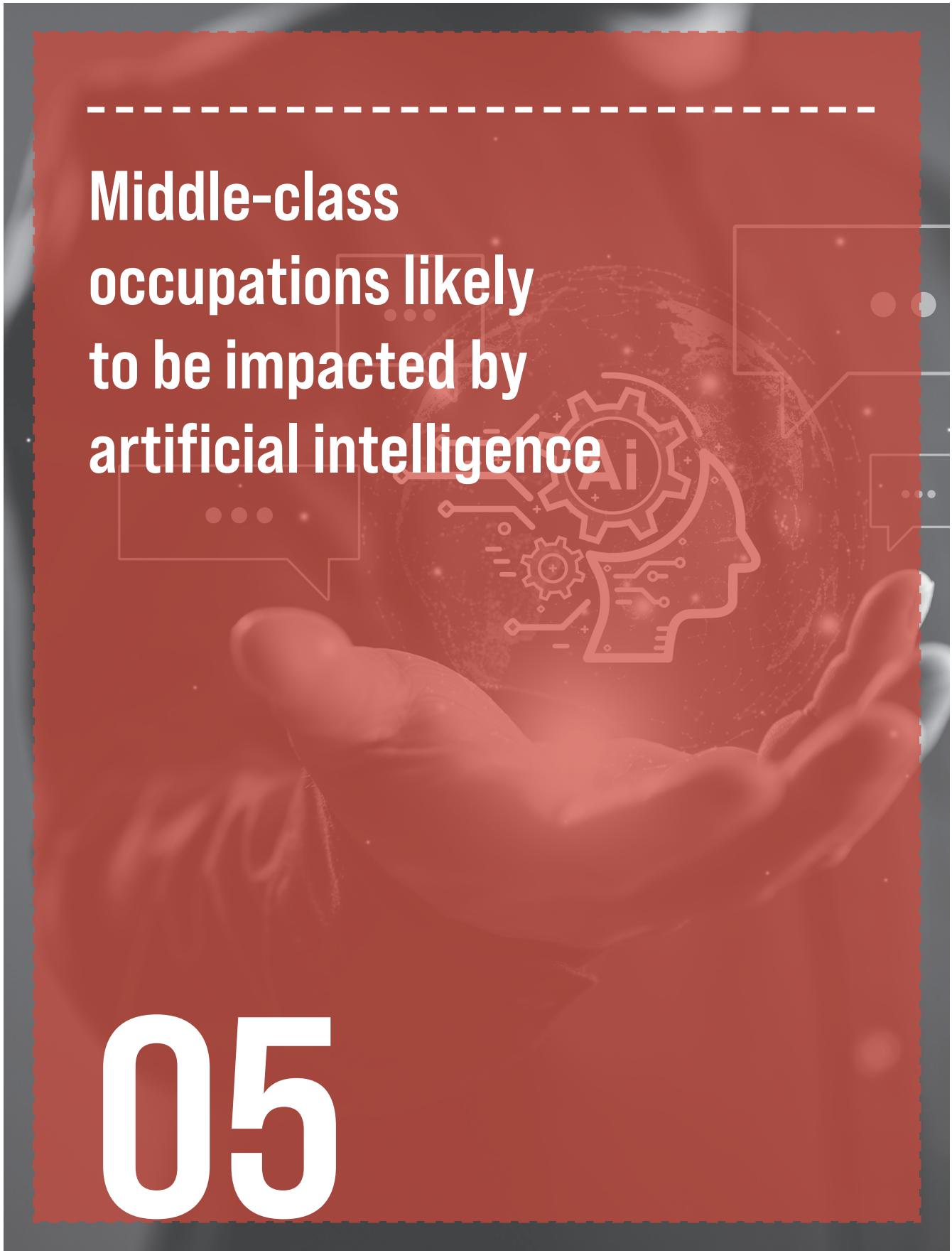
Source: ESCWA analysis and production based on data from the ESCWA Skills Monitor and country Labour Force Surveys.

Table 6 illustrates that the top in-demand soft skills in the three industries are very similar. Information technology skills are particularly in demand in the information and communications industry, while knowledge of Microsoft Office is in demand in the financial and insurance industry.

Table 6. Top-10 in-demand soft skills in the three selected industries (Analysed countries excluding Kuwait)

Top-10 in-demand soft skills (in decreasing importance)	Information and communications	Financial and insurance activities	Construction
1	Communications	Communications	Communications
2	Management	Management	Management
3	Problem solving	English language	English language
4	English language	Planning	Planning
5	Planning	Arabic language	Problem solving
6	Information technology	Customer service	Operations
7	Operations	Problem solving	Leadership
8	Leadership	Operations	Arabic language
9	Customer service	Leadership	Customer service
10	Arabic language	Microsoft Office	Innovation

Source: ESCWA analysis and production based on data from the ESCWA Skills Monitor and country Labour Force Surveys.



Middle-class occupations likely to be impacted by artificial intelligence

05

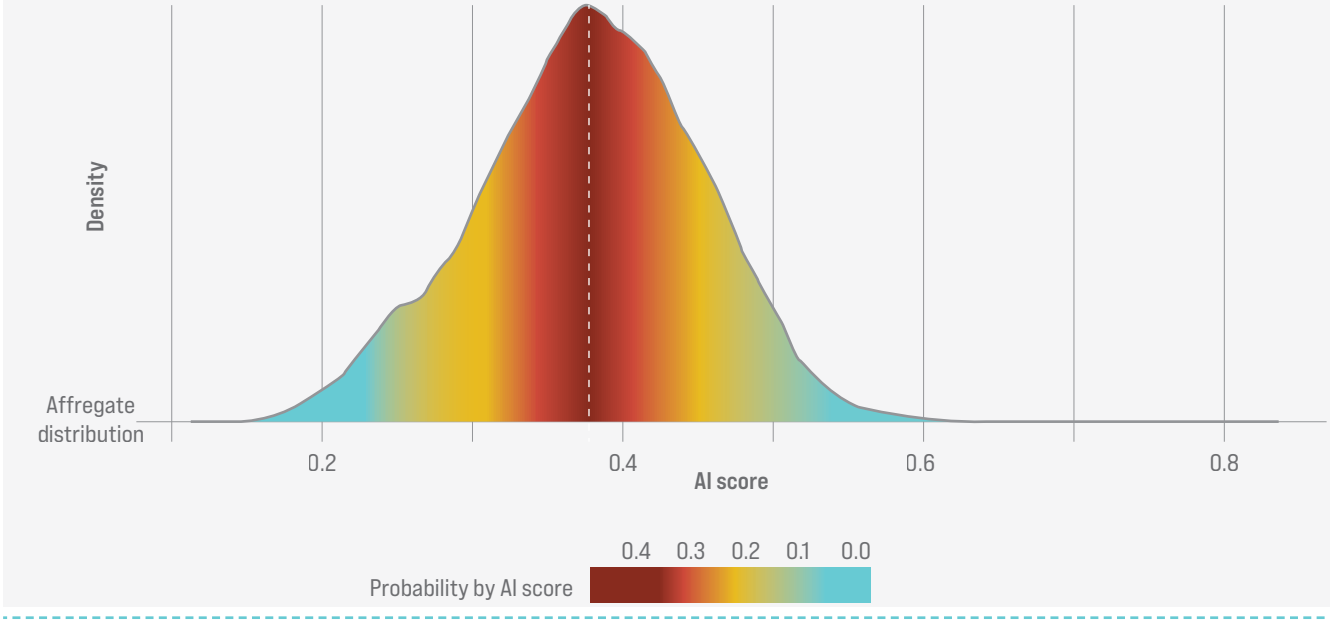
To analyse whether AI is likely to affect or render unnecessary the skill sets used in middle-class occupations, the AI augmentation-scoring methodology mentioned in the introduction section was used. AI augmentation scores were extracted from the ESCWA Skills Monitor database. As mentioned previously, those scores provide an indication of the percentage of tasks an existing AI patent could augment. In simple terms, AI augmentation refers to tasks facilitated by AI. The figure below shows the overall distribution of AI scores across middle-class occupations: scores vary from less than 0.2 (less than 20 per cent of tasks in a particular job can be augmented) to more than 0.6 (more than 60 per cent of tasks can be augmented).

The figure uses different colours to represent the density of distribution.[15] Darker colours indicate a condensed distribution of scores, while lighter colours indicate a sparse distribution. The dashed line in the middle shows the mean of the distribution, which stands at 0.378. This means that, on average, in middle-class jobs posted on the virtual market, 37.8 per cent of the tasks performed in the context of those jobs are augmentable using current AI technologies.

The job types clustered around the tails of the distribution curve are of particular interest. Those job types have the lowest (left tail) or the highest (right tail) percentage of AI-augmentable tasks. From the distribution, the 1st and 99th score percentile were identified. The 1st percentile lies at 0.21, and the 99th percentile lies at 0.54. The 1st percentile represents the least augmentable one per cent of jobs in our data, and the 99th percentile represents its most augmentable counterpart.

From the least augmentable percentile (the left tail), we observe a mix of service, teaching and technical jobs. Those job types include cafe baristas, middle-school teachers and a set of engineering occupations relevant to manufacturing. From the most augmentable percentile (the right tail), we observe analyst, consultant and computer-based occupations. Specifically, we found 204 job postings with the ISCO-normalized title of business consultant clustered on the right-hand tail. This means that more than 54 per cent of the skills demanded in business consultant positions can be augmented by current AI technologies.

Aggregated artificial intelligence-score density plot (Analysed countries excluding Kuwait)



Source: ESCWA analysis and production based on data from the ESCWA Skills Monitor and country Labour Force Surveys.
Note: The coloring of the distribution tells us the asymmetry (skewness) level of the AI score distribution of the region.

Concluding remarks

06

This paper analyses data on the demanded skills of workers in middle-class occupations in Egypt, Jordan, the State of Palestine, Tunisia, and Kuwait, with the help of country labour force surveys and ESCWA Skills Monitor. It highlights the key in-demand skills for middle-class occupations and disaggregates those skills by country, skill type, gender, and industry. The paper also draws attention to the potential impact of AI-augmentation on middle-class occupations by analysing the nature of the tasks associated with those occupations.

Top in-demand middle-class skills in four of the five countries show a strong inclination toward so-called traditional skills and skills of particular relevance in the digital economy. However, this is not the norm in all Arab States, where most skills are traditional skills. While the countries studied show divergences in terms of the top in-demand hard skills, the top in-demand soft skills in middle-class occupations are more homogenous across the five countries. Soft skills such as communications and management are in strong demand across all countries studied.

Analysing in-demand skills by looking at the proportions of men and women employed, a similar pattern is seen: there is significant divergence in terms of the hard skills acquired by men and women, while soft skills are more homogenous across both genders. With regard to hard skills, the skills that tend to be acquired by men are particularly useful in technical and engineering contexts, and the skills acquired by women are particularly useful in education and management. Disaggregating in-demand skills by industry, it is clear that there is a degree of divergence in terms of the hard skills that are required in the three selected industries. In-demand soft skills, however, are similar across those industries. Finally, many middle-class jobs are characterized by significant automation potential.

On the basis of the findings of this paper, the following actions are recommended for policymakers:

- First and foremost, we recommend that Arab States should invest in building or upgrading information systems that can effectively monitor the supply and demand of skills needed in middle-class jobs so as to facilitate the rapid integration of workers into the labour market. A lack of time sensitivity, a main disadvantage of census and survey data, can be addressed by establishing a live system for monitoring the skills of job seekers and the skills required in the job market.

- Second, we recommend that Arab States should adopt an evidence-based approach in its decision-making processes with regard to the middle class. As illustrated in this paper, the five countries analysed vary in terms of the skills in demand in middle-class occupations. Any policy targeting the welfare of the middle class needs to consider the nature of the skills required in the labour market in each country and ensure that the skills acquired by job seekers match those of employers.

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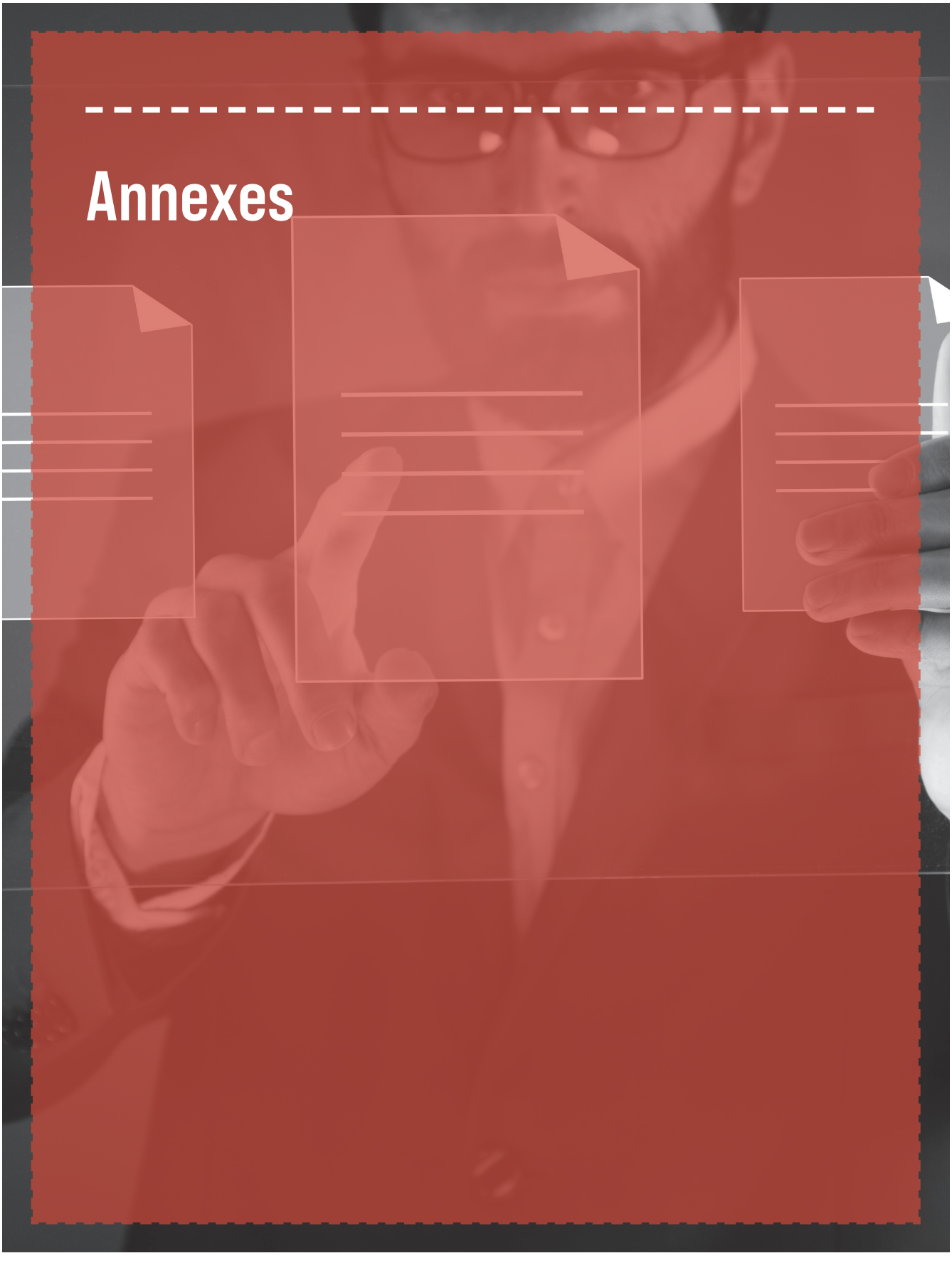
- Third, although a discussion of the skill supply is omitted in this report, bridging potential skill mismatches between the labour supply and demand in the region is pivotal. Solving the skill mismatch problem will require reforms of countries' education systems to enhance their responsiveness to labour market needs and ensure that they provide the skills required by employers. Some small-scale interventions could also be implemented with a view to achieving short-term impacts. For example, Governments could address job mismatches by launching job matching programmes to help match job seekers with employers. An upskilling programme could also facilitate the identification of additional skills that job seekers could seek to acquire in order to find employment.

- Fourth, we encourage Arab States to investigate gender disparities in the skills required in middle-class jobs. Our analysis suggests that there is significant divergence in terms of the skills associated with male and female workers. That divergence may reflect existing biases in certain professional environments, with a tendency in certain professions to hire men and a tendency in others to hire women.

- Finally, we encourage Arab States to consider the potential medium- and long-term repercussions of the fourth industrial revolution for job markets in the region. Arab States failed to fully exploit opportunities stemming from the last industrial revolution;[16] and the fourth industrial revolution, which is primarily being driven by automation, is another chance for the Arab region to catch up with the global north.

Annexes



Annex 1. Linking ISCO nodes from labour force surveys to the ESCWA Skills Monitor

This section discusses the details of linking International Standard Classification of Occupations (ISCO) nodes from labour force surveys to data provided in the ESCWA Skills Monitor database. The ISCO node is a nested structure containing between one and six digits. The first digit is the broadest job type classification and the following digit indexes the subgroups of the prior code. A challenge of the analysis conducted is that the length of ISCO nodes obtained from the labour force surveys was between three and six digits, while the jobs data in the Skills Monitor database were only available at the four-digit level.

Of the four countries analysed, only Kuwait and Tunisia utilized four-digit ISCO codes. The ISCO codes from the other three countries needed to be normalized before being matched in the database. For ISCO nodes with lengths greater than four digits, such as those for Egypt and the State of Palestine, only the first four digits were used. For nodes with three digits, as in the case of Jordan, they were matched to all jobs using four-digit nodes but utilizing only the first three numbers. The table summarizes the data linkage results.

Table 7. Data linkage summary

Outcome of interest	Egypt	Jordan	Kuwait	State of Palestine	Tunisia
Unique ISCO nodes provided (normalized to four digits)	206	63*	170	208	72
ISCO nodes linked to the Skills Monitor	178	192*	159	122	46
ISCO nodes linked to AI data	140	128	120	80	25
Unique hard skills linked to ISCO nodes	1,987	2,039	2,041	1,271	714
Unique soft skills linked to ISCO nodes	240	237	239	189	169
Average AI score**	0.376	0.373	0.298	0.356	0.366

Source: ESCWA analysis and production based on data from the ESCWA Skills Monitor and country Labour Force Surveys.

Note: *Jordan uses a three-digit code and hence #linked > #provided.

**The score is the percentage of tasks in a given job description that current AI patents can augment.

Annex 2. Data compilation for tables 1 to 4

Tables 1 and 2: To illustrate the process of data compilation, details for table 1 are given here. First, all job postings in the four countries were extracted from the ESCWA Skills Monitor, resulting in 292,915 total postings. Second, for each job posting found, we expanded it to include associated skills. Third, the skills were filtered by occurrences for simplicity and relevance, and only the top-50 in-demand hard skills for each pair were retained. For example if seven skills were observed for one job posting, the data entry (which accounts for one row in the 292,915 entry dataset) would be expanded to seven rows, representing each skill observed in that job.

Next, all skill rows were aggregated by summing up occurrences extracted from each country and four-digit ISCO nodes. That step aggregated the aforementioned observations into 1,072 unique pairs, with each pair containing a set of skills associated with a specific job. To obtain the corresponding in-demand hard skills for middle-class occupations, the list of middle-class occupations obtained from labour force surveys was used. After essential data cleaning, each country's ISCO classification for middle-class occupations was used to obtain a filtered list of 1,072 middle-class occupations in which hard skills were required. Finally, the data were further aggregated by country and the top-10 skills were identified by the number of occurrences in the data.

Tables 3 and 4: Due to the differences in ISCO levels available across countries, ISCO job types were aggregated at the three-digit level to facilitate comparison. For each ISCO three-digit family observed in the data, the top-50 hard and soft skills were identified. We then normalized the numbers of males and females employed in each three-digit family as a percentage measure by gender. Finally, we used the percentage as a weight to sum the occurrences of skills by gender.[17] For example, if the skill of accounting was observed 50 times in a three-digit ISCO family for workers, and 5 per cent of males and 1 per cent of females were required to have that skill, then the calculation was 50*0.05 and 50*0.01 for male and female workers, respectively.

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Endnotes

1 Economic and Social Commission for Western Asia (ESCWA), 2022.
2 Yusuf, Shahid, 2021.
3 ESCWA, 2022.
4 Yusuf, 2021.
5 International Labour Organization (ILO) and ESCWA, 2021.
6 It is implicitly assumed that skill profiles (job postings aggregated/normalized to a pre-set level) for each job type observed in the virtual market represent the actual in-demand skills for the job type in the labour market.
7 For further information, see https://skills.lightcast.io/faqs.
8 The methodology used to calculate the artificial-intelligence-augmentation potential was developed by the Qatar Computing Research Institute.
9 The AI score indicates the percentage of tasks that can be automated using current AI patents. Specific jobs are awarded an AI score between 0 and 1.
10 Occupation nodes are selected from the International Standard Classification of Occupations (ISCO), developed by ILO, to represent the middle-class jobs in each country based on the definition of the middle class formulated by ESCWA. From the labour force survey side, the occupations under the selected ISCO nodes are identified, and we note the frequency of those occupations by country, by gender (percentage of males or females employed) and by sector. It should be noted that middle-class jobs are held by both employees and self-employed adults. By utilizing the ISCO classification for jobs, we exclude all self-employed individuals in the market, a potential source of bias in our analysis. We then map the selected ISCO occupations from the labour force surveys into the ESCWA Skills Monitor. The linkage is facilitated by matching jobs classified according to the ISCO classification in the labour force survey with jobs under the same ISCO nodes stored in the ESCWA Skills Monitor. A detailed description of the linkage process can be found in annex 1 to the present report. From the Skills Monitor side, we use machine-learning techniques (especially natural language processing) to analyse job descriptions for each posting reviewed online and classify them into the most appropriate ISCO hierarchy. For each job posting in the Skills Monitor, we observe a list of skills associated with the job and its AI score. The linked data reveal the in-demand skills and the automation potential of middle-class job types in each country.
11 Data extracted in September 2022.
12 The differences in results can also be potentially attributed to differences in survey years. In this analysis, we make use of data from the following surveys: Egypt Labor Market Panel Survey 2018, Jordan Labor Market Panel Survey 2016, Palestine Labour Force Survey 2019, Tunisia Labor Market Panel Survey 2014, and Kuwait Labor Force Survey 2016.
13 For further information, see https://skillsmonitor.unescwa.org/analytics/countryprofiling.
14 Total male and female employment by country in each observed occupation was calculated and then aggregated across the studied countries.
15 Technically speaking, we use an empirical cumulative density function to approximate probabilities from the AI score distribution.
16 ESCWA, 2022.
17 It is assumed that the aggregated frequencies from four-digit families are representative of the actual frequencies of three-digit families.

This paper analyses data on the skills of workers in middle-class occupations in the Arab region using labour force surveys from Egypt, Jordan, Kuwait, the State of Palestine, and Tunisia. This paper is one of the first attempts in the Arab region at combining conventional national survey data with data for labour market analysis. Several trends among Arabic middle-class workers are noted in terms of their skill sets. The paper identifies the top skills demanded in the Arab market for middle-class occupations through a combination of labour supply data and online job demand data. When looked at in terms of the proportion of men and women in each job category, a skills gap was found between male- and female-dominant occupations. In addition, the linkage between middle-class skills and different industry sectors was also analysed, and the likelihood that middle-class occupations could be automated was assessed by comparing the skills required with patents in the field of artificial intelligence (AI).

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