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► Trade and Value Chains in Employment-Rich Activities (TRAVERA) Analysis of the Engineering Products and Services Sectors in Jordan

A study of the “Mainstreaming Employment into Trade and Investment in the Southern Mediterranean” programme



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► Table of abbreviations

EFTA	European Free Trade Association
GAFTA	Greater Arab Free Trade Area
HVAC	Heating, ventilation and air conditioning
JSMO	Jordan Standards and Metrology Organization
MSMEs	Micro, small and medium-sized enterprises
R&D	Research and development
SMEs	Small and medium-sized enterprises
STED	Skills for Trade and Economic Diversification
TVET	Technical and vocational education and training
WTO	World Trade Organization

► Executive summary

The International Labour Organization (ILO) is implementing the programme entitled “[Mainstreaming Employment into Trade and Investment](#)” (METI) in the Southern Mediterranean, funded by the European Union. The overall objective of the **METI programme** is to enable policy makers in the Middle East and North Africa to incorporate employment issues into trade and investment policies, and to design and implement interventions that ultimately optimize the quantity and quality of employment created in the region. The value chain assessment carried out under the METI programme aims to identify bottlenecks and opportunities for expanding markets and exports in order to create more and better jobs. These will inform the support needed from governments and workers’ and employers’ organizations to enhance the sector’s competitiveness and exports, and to equip workers with the required skill sets.

The value chain assessment combines desk research, firm data collection and interviews with key informants. It also included a technical and policy foresight workshop (STED workshop) to support the development of sector-level skills governance arrangements, share the cooperation activities in the sector and engage participants in the key stages of diagnostics and planning on the skills needs for the target sector. The overall objective of the value chain assessment is to develop an implementation roadmap to support the sector in improving the capacity and competencies needed to enhance the sector’s competitiveness and realize its export potential. The assessment follows the ILO’s [Trade and Value Chains in Employment-Rich Activities](#) (TRAVERA) and [Skills for Trade and Economic Diversification](#) (STED) methodologies and draws on core elements of the ILO’s [Market Systems Approach to decent work](#). It combines all three approaches and the findings are reported in two separate reports, a STED and a TRAVERA report. This STED report provides an in-depth analysis of the engineering products and services sector in Jordan, focusing on its contributions to the economy, employment trends and workforce composition.

In 2021, the **engineering products sector**, which includes heating, ventilation, air conditioning, electric products, and construction materials, contributed to 5 per cent of the manufacturing sector’s gross domestic product (GDP). The sector’s export value was 0.2 billion Jordanian dinar, accounting for 14.1 per cent of manufacturing exports. Employing approximately 10,000 individuals, it represents 4.6 per cent of the manufacturing workforce. This sector benefits from a skilled engineering workforce and access to regional and international markets through free trade agreements, with a growing number of emerging companies supplying components to assembly firms (USAID, A/E Business Council and Jordan Exports, n.d.).

The **engineering services sector** comprises architectural and engineering services, including environmental engineering services, services supporting construction such as project management, planning and supervision, and air-conditioning services such as installation and maintenance. The engineering services sector contributes between 8 and 10 per cent to Jordan’s GDP. In 2022, the export value of construction services dropped to US\$68 million from US\$81 million in 2021. Jordan exports engineering services to over 31 countries, with the Gulf Cooperation Council countries and Iraq as key markets. In 2018, the sector employed 11,535 individuals, representing 1.4 per cent of total employment, and saw an 8 per cent increase in the number of registered companies from 2018 to 2022 (USAID, A/E Business Council and Jordan Exports, n.d.).

Employment in the manufacturing sector rose from 130,000 in 2019 to around 148,000 in 2021, while the construction sector has seen more stable growth. A significant gender disparity exists, according to the survey carried out for the purpose of this study, with men constituting 84 per cent of the workforce. Women are notably underrepresented in engineering products (9 per cent) compared to engineering services (36 per cent). Participation of youth and women is also lower compared to that of men aged 25 and above, indicating systemic barriers.

The sector relies heavily on technical and trade skills, with technicians and associate professionals forming the largest groups. Both engineering products and services face challenges including high energy costs, inadequate government support, and market requirements. Key obstacles include skills mismatches, high employee turnover, outdated technology and low research and development (R&D) investment, with 57 per cent of firms reporting a shortage in automation and robotics skills according to the survey carried out for the purpose of this study.

Interviews and consultations carried out for the purpose of this study reveal that Jordan's engineering sector has growth opportunities, particularly in air conditioning, due to advancements in energy-saving technologies. However, challenges such as financial constraints, regulatory compliance and logistical inefficiencies persist. The sector faces intense global competition, technological lag, and market volatility. Enhancing access to finance, streamlining regulations and investing in technology are crucial for competitiveness.

Table 1 shows the key challenges and corresponding growth opportunities in Jordan's engineering sector.

► **Table 1** **Key challenges and corresponding growth opportunities in Jordan's engineering sector**

Aspect	Challenges	Policy areas for intervention
Training and development	- Small and medium-sized enterprises (SMEs) face limited training budgets (2.5 per cent) and fewer training hours (20 hours/year) compared to large enterprises. - Barriers include high training costs, outdated programmes and logistical issues.	- Collaboration with educational institutions and private sector partnerships to enhance training programmes - Leveraging online platforms for cost-effective training delivery
Recruitment	- There is a significant skill gap, with 48 per cent of firms struggling to find skilled candidates. - There are retention challenges due to competitive salaries and limited career advancement.	- Strengthening ties with vocational schools and offering internship programmes - Implementing retention strategies, such as career development pathways
Technological and managerial gaps	- SMEs struggle with inadequate technology (52 per cent) and lack of management training (46 per cent). - There is low investment in innovation and R&D, with only 28 per cent of firms having dedicated R&D departments.	- Adopting advanced technologies such as 3D printing and automation - Enhancing management training programmes and fostering innovation culture
Export expansion barriers	Regulatory compliance (68 per cent), financial constraints (54 per cent) and logistical challenges (47 per cent) hinder exports.	- Streamlining regulatory processes and improving access to export financing - Leveraging regional agreements such as the Arab League Agreement to enhance market access
Global competition and market volatility	- There is intense competition from countries with advanced technology and lower costs. - Market volatility exists in key export regions such as Iraq and Lebanon.	- Ensuring strategic positioning in niche markets and developing competitive pricing strategies - Diversifying export markets to mitigate regional volatility

Aspect	Challenges	Policy areas for intervention
Raw material suppliers	High energy costs, limited government support and stringent buyer requirements constitute barriers to growth for businesses.	Investing in energy-efficient technologies and seeking government incentives for sustainable practices
Manufacturing and assembly	High energy and logistics costs, compliance issues and limited access to financing and technology present significant challenges for businesses in this sector	Enhancing manufacturing processes through automation and improving access to financing options
Distribution	High logistics costs and energy expenses for local firms.	Optimizing supply chain management and leveraging international freight partnerships for cost-effective logistics
Sales/retail sales	Micro, small and medium-sized enterprises (MSMEs) face access difficulties and competitive pressure.	Expanding e-commerce platforms and enhancing marketing strategies to reach wider markets
Installation and maintenance	Training, regulatory compliance and operational costs impact local MSMEs and informal workers.	Upskilling workers through specialized training programmes and improving regulatory frameworks to support MSMEs

Source: Authors compilation.

► Sector dynamics

Jordan's engineering products sector is impacted by global trade dynamics, with key players including China, Mexico and the United States. The global demand for air-conditioning units is driven by urbanization and a shift towards green technologies. The engineering sector benefits from a strong legal framework and various stakeholders including government bodies, financial institutions and industry associations.

Across both the engineering products and services sectors, high energy costs, inadequate government support and stringent market requirements are persistent barriers that need urgent attention. While specific challenges vary among different stakeholders, common issues such as labour regulations, access to financing, and market information are prevalent. Addressing these challenges through coordinated policy reforms, financial support, and capacity-building initiatives is crucial. By targeting these common and sector-specific barriers, both engineering products and services can enhance their value chain and achieve sustainable growth.

► Recommendations

This report recommends enhancing trade and employment by improving skills development, aligning industry needs with educational programmes, and strengthening business capabilities. To boost market access, it suggests leveraging free trade agreements with key partners, such as the Gulf Cooperation Council countries, China, Germany and the United States, while promoting international compliance standards such as International Organization for Standardization (ISO) standards and CE¹ marking to facilitate exports. Trade missions and business-to-business matchmaking are encouraged to penetrate regional markets. Regarding employment, it places an emphasis on modernizing recruitment strategies through artificial intelligence-driven tools, improving working conditions, and fostering diversity and inclusion by aligning industry needs with government programmes. It also recommends promoting family-friendly policies and offering tax incentives for hiring women and youth as key measures to enhance workforce participation.

¹ CE marking stands for Conformité Européenne (European Conformity).

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► About METI and TRAVERA

The ILO is implementing the programme “[Mainstreaming Employment into Trade and Investment](#)” (METI), funded by the European Union. The overall objective of the **METI programme** is to enable policy makers in the Middle East and North Africa to incorporate employment issues into trade and investment policies, and to design and implement interventions that ultimately optimize the quantity and quality of employment created in the region.

METI’s value chain assessment aims to identify bottlenecks and opportunities for expanding markets and exports to create more and better jobs. These will inform the support needed from governments and workers’ and employers’ organizations to enhance the sector’s competitiveness and exports, and to equip workers with the required skill sets.

The value chain assessment combines desk research, firm data collection and interviews with key informants. The aim of this analysis is to develop an implementation roadmap to support the sector in improving the capacity and competencies needed to enhance the sector’s competitiveness and realize its export potential.

The assessment follows the ILO’s TRAVERA and STED methodologies and draws on core elements of the ILO’s [market systems approach to decent work](#). The assessment combines all three approaches, and the findings are reported in two separate reports, STED and TRAVERA reports.

- The TRAVERA study focuses on the employment content of different segments of the export value chain and provides an understanding of the different economic agents, their functional relations and their business environment. Moreover, the TRAVERA study identifies new opportunities for but also constraints to the expansion of production and exports of the respective subsector. The final report provides guidance to stakeholders for the development of effective policy responses.
- The STED study builds on existing work by the ILO and other institutions on the national skills development and TVET system and focuses on the existing and emerging skills needs, skills gaps and occupations specific to the selected subsector/value chain, as well as on the key systemic constraints of the skills supply side. The study addresses policy recommendations for stakeholders to help workers acquire the skills needed by exporting firms so that these firms can increase and diversify their export revenues.

The assessment involves a desk review, analysis of data from the TRAVERA-STED survey and structured interviews with key informants from relevant key stakeholders, including education and training providers, as well as national TVET authorities.





► Introduction

Jordan, located in the heart of the Middle East, is known for its rich human capital and strategic geopolitical significance. The demographic landscape of Jordan features a sizable and youthful population with distinct gender proportions. In the first quarter of 2024, Jordan's population stood at 11.5 million, with a growth rate of 2.2 per cent. Men constitute 53 per cent of the population, while women make up 47 per cent. Notably, Jordan has one of the youngest populations globally, with 63 per cent under the age of 30 and approximately one third within the 15–30 age range (Jordan, Department of Statistics 2024).

Jordan's labour market is characterized by a diverse range of industries, including services, manufacturing, agriculture and tourism. According to the latest data, the national unemployment rate reached 21.9 per cent of the labour force during the first quarter of 2023 (Jordan, Department of Statistics 2024), with a breakdown of 19.6 per cent for men and 30.7 per cent for women. The unemployment rate for youth aged 15–24² reached 46.1 per cent, highlighting ongoing challenges in the job market. Although the overall trend shows a decrease of 1 per cent from the preceding year and 3 per cent from 2021, unemployment rates for 2023 remain higher than the pre-COVID-19 period and have adverse effects on various sectors. The Government is actively working to address these challenges through various initiatives aimed at improving job creation, particularly for youth in the emerging sectors.

Jordan is an active participant in the global market, with a well-established trade network. The country's major exports include clothing, chemicals and potash, which significantly contribute to its GDP. Imports primarily consist of machinery and apparatus, crude petroleum and food products, supporting various sectors

of the economy (Jordan Exports 2024). Trade agreements with neighbouring countries and international partners, including the United States and the European Union, have bolstered Jordan's trade relations, enhancing economic growth and stability (ILO 2022). Despite the European Union being a significant trading partner for Jordan, it is not their preferred supplier, which results in a trade imbalance with higher exports than imports. The deficit in the trade balance, particularly the decline in manufactured goods exports, has negatively affected overall employment rates, even before the pandemic.

From 2010 to 2019, Jordan experienced slowed economic growth, with GDP maintaining a persistently low growth rate. Export rates stagnated following the global financial crises and Arab uprisings, and foreign direct investment also declined during this period. Recovery between 2012 and 2019 was slow and inconsistent, due to regional instability and a large influx of refugees. From 2017 to 2019, foreign direct investment inflows decreased significantly, falling from approximately 1.4 billion Jordanian dinar to below 1 billion Jordanian dinar. Net foreign direct investment inflows as a percentage of GDP dropped to pre-1999 levels of around 1.6 per cent (ILO 2023), likely due to the Government's budget consolidation measures, such as tax increases and subsidy cuts, in addition to regional geopolitical concerns. In 2020, the GDP growth rate turned negative, exports declined by 4.5 per cent and the unemployment rate rose by 4.1 per cent. Signs of recovery appeared in the second quarter of 2021, with trade increasing by 15 per cent and the unemployment rate decreasing by 1 per cent, though it remained above pre-COVID-19 levels. This positive trend persisted into the first quarter of 2023, with the GDP growth rate reaching 2.8 per cent (Jordan, Ministry of Planning and International Cooperation 2023). However, the Government's commitment to improving infrastructure, regulatory frameworks and the business environment continues to make Jordan an attractive destination for investors, driven by

² This report uses the official definition of "youth" provided by the United Nations. See <https://www.un.org/esa/socdev/documents/youth/fact-sheets/youth-definition.pdf>. However, it should be noted that the study did not find any indication of workers below the age of 18 years.

favourable government policies, a stable political climate and strategic economic reforms.

The engineering sector in Jordan is the fourth largest in terms of total industrial exports, making it an attractive investment due to its high value-added potential. It plays a crucial role in the economy by supporting various other sectors through the provision of maintenance services, manufacture of spare parts, development of production lines and upgrading of production technology. In 2022, the number of establishments operating in the engineering industries sector registered with industrial chambers in Jordan was approximately 5,552. The registered workforce in the sector for 2022 was around 40,766 workers. The number of operating engineering offices was 1,291, with 50 new offices registered that year. By 2024, the number of active offices grew to 1,332, distributed across various categories and ranks, and the number of registered engineers reached 192,272 (Jordan, Companies and Engineering Offices Authority 2023).

TRAVERA (Trade and Value Chains in Employment-Rich Activities) focuses on the employment content of different segments of the export value chain and provides an understanding of the different economic agents, their functional relations and their business environment. This study was conducted using a comprehensive methodology that included primary research such as enterprise surveys, skills supply assessments, and extensive consultations with experts. Additionally, the research incorporated background desk studies that analysed available statistics and reviewed relevant publications and documents. This multifaceted approach ensured a thorough understanding of the value chains and their impact on employment and skill development.

The engineering sector in Jordan faces significant recruitment and employment challenges, including a skills gap among new graduates, particularly in advanced technologies such as artificial intelligence and machine learning. There is intense competition for qualified talent, with smaller firms struggling to meet

the salary and benefits expectations of top candidates. Regulatory compliance and financial constraints hinder export growth, especially for SMEs, which also face logistical challenges and international market competition. Employment statistics reveal a workforce primarily comprised of individuals with a technical education, yet 42 per cent require further training, particularly in advanced manufacturing and digital skills. High turnover rates, especially in SMEs, coupled with limited benefits, contribute to job dissatisfaction. Additionally, informal workers encounter precarious working conditions, underscoring the need for targeted interventions to enhance skill development, improve working conditions and bolster the sector's competitiveness in global markets.

Jordanian firms play a vital role in the engineering services sector, with local companies making up 70 per cent of environmental service providers. These firms support construction projects through project planning, design and supervision, and offer essential environmental services. While primarily focused on the domestic market, some companies also serve regional and international clients, highlighting their contributions within the engineering services value chain. In the engineering products sector, large domestic companies, such as Petra Engineering Industries Co. and National Refrigeration Co., are key players in air-conditioning production. Other firms act as assemblers, importing components and distributing products locally and abroad, underscoring the diverse landscape of Jordanian firms within this sector.

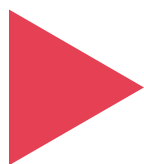
Surveys reveal several constraints faced by the engineering products and services sectors, which impede their ability to upgrade the value chain. In the engineering products sector, raw material suppliers identified high energy costs and inadequate government support as major challenges. Aggregators face issues related to logistics, technology access, and stringent market requirements. Manufacturers encounter various challenges, including financing, operational costs and compliance with regulations. Similarly, the

engineering services sector grapples with high energy costs and labour regulations, impacting both raw material suppliers and processors. Addressing these constraints through targeted interventions is essential for enhancing competitiveness and facilitating value chain upgrades.

The engineering products and services sectors in Jordan have significant growth potential driven by market opportunities, trade agreements, technological advancements and regulatory requirements. High-potential export markets, especially in the Gulf Cooperation Council countries, present substantial opportunities, particularly in air-conditioning and environmental services. Local sourcing can enhance competitiveness by reducing costs and developing a robust supply chain. National policies promoting value-added industries also support this growth. Furthermore, improving service quality and advancing engineering education can strengthen the workforce and align it with industry needs. By capitalizing on these drivers, Jordan can bolster its competitive edge and foster economic growth.

Jordanian engineering firms face intense competition and high local production costs, with 55 per cent of firms noting challenges related to price competition. Government support, including subsidies and tax incentives, is crucial for innovation and quality improvement. Enhancing supply chain integration and employing digital tools can address the logistical inefficiencies reported by 50 per cent of ecosystem players. Sustainability practices are gaining traction, but high costs and limited financing remain barriers. Regional integration presents growth opportunities, although political instability and trade barriers pose challenges. To navigate these issues, strong political collaboration and adherence to ethical supply chain practices are essential for enhancing competitiveness in the global market.

The report is structured into five key sections. Following the introduction, the second section provides an **overview of the sector** providing definitions and a detailed examination of employment and enterprises within the sector. The third section presents the **findings from research and stakeholder consultations**, exploring trade patterns and trends in the region, the European Union and globally, while highlighting the evolution of exports, and product and market diversification, and identifying top exporters and importers. The fourth section summarizes the **opportunities and constraints for the sector** by delving into the value chains and business environments, including the institutional framework and legal aspects, and discussing market access considerations, relevant trade agreements, non-tariff measures, and compliance with European Union rules of origin. The fifth section contains a **policy orientation**, providing recommendations based on the analysis and consultations, and the sixth section concludes.



► Overview of the engineering products and services sectors

2.1 Sector selection process

In 2022, the METI programme established a policy working group in Jordan to guide the project at the national level and to provide a space for social dialogue and cooperation. The working group is chaired by the Economic and Social Council of Jordan and comprises representatives from the following institutions:

- Business and Professional Women Association-Amman
- General Federation of Jordanian Trade Unions
- Jordan Chamber of Industry
- Jordan Enterprise Development Corporation
- Jordan Exports
- Jordanian National Commission for Women
- Ministry of Industry, Trade and Supply
- Ministry of Investment
- Ministry of Labour
- Ministry of Planning and International Cooperation
- Ministry of Public Works and Housing
- Ministry of Youth
- Phenix Center for Economics & Informatics Studies

One of the first tasks of the working group was to identify a priority export sector with the potential to create more and better jobs, in particular for women and youth, and in SMEs. Along with national priorities, the following selection criteria were defined:

- potential for upgrading in the value chain
- product complexity
- potential for diversification of export markets
- environmental sustainability
- working conditions
- probability of automation
- COVID-19 recovery
- crisis resilience

The METI team provided targeted analytical input alongside the identified selection criteria. Following several rounds of consultations, the working group decided by consensus to focus on the engineering products and services sector.

The engineering products and services sectors encompass engineering, electrical and information technology industries as well as engineering services. A comprehensive classification has been provided by the JCI based on the International Standard Industrial Classification (ISIC) system, with some adaptations to suit the national context. This classification has been carefully chosen by engineering experts in the JCI, based on thorough research and experience, and relies on international standards (mainly ISIC 4 and, in some cases, Harmonized System (HS) codes) for guidance.

2.2 Classification and subsectors

The classification by the JCI aligns closely with ISIC 4, ensuring international compatibility and comprehensiveness. The subsectors identified in the engineering products and services sectors are detailed below.

2.2.1 Engineering, electrical and information technology industries sector

The table below outlines the subsectors of the engineering products sector as classified by the JCI, aligned with ISIC codes. This classification provides a structured overview of the sector's various components, with a specific focus on air conditioning, refrigeration, fire equipment and their supplies.



Jordan. 2018 © Abdel Hameed Al Nasier/ILO

► **Table 2** Alignment between subsectors and ISIC codes

Alignment with ISIC code	Subsector
2410	Basic iron and steel articles
2420	Basic metal industries except iron and steel
2511/2829	Construction metal products, machinery, equipment, and tools for construction materials production
2593	Metal household tools and supplies, sharp and cutting tools
2592/2599	Sheet metal, casting, turning, wire, nails and screws
2750/2652	Electrical home appliances and accessories, including watches and alarm clocks
2520/2813	Central heating and solar heater works
2830	Metal devices and equipment for agricultural use
2710/2732/2740/2651	Electricals, lighting supplies, wires, electronic devices and weight measuring devices
2720	Compounds and primary cells
2610/2640	Information and communications technology device production, receivers, radio, television and recording devices
2910/2920	Vehicles, transportation equipment and supplies
7110	Drafting work
2822	Metal machines and tools
2813/2816	Pumps, winches, escalators and elevators
2825	Air conditioning, refrigeration, fire equipment and their supplies
2825	Equipment for preparing food and water

Source: United Nations, Department of Economic and Social Affairs (2008).

2.2.2 Engineering services

The engineering services classification was developed by the JEA, specifically the Companies and Engineering Offices Authority as follows:

1. environmental engineering
2. engineering services supporting the construction sector
3. mining
4. water and sewage
5. city and urban planning
6. traffic engineering and transport systems
7. project management
8. bridge engineering
9. structural engineering for high-rise buildings
10. road design and construction
11. power and electrical
12. mechanical engineering
13. surveying engineering
14. electronics engineering
15. architectural engineering
16. site surveying
17. material testing
18. structural engineering
19. interior design
20. management engineering

This report covers the following subsectors:

- engineering products: air conditioning, refrigeration, fire equipment and their supplies;
- engineering services: maintenance and installation services related to air conditioning, refrigeration, fire equipment and their supplies;
- engineering services: environmental engineering;
- engineering services: engineering services supporting the construction sector.

2.3 Sector profile

According to Department of Statistics in Jordan, employment trends in the sector show a consistent increase in the number of workers, with the manufacturing sector growing from 130,000 employees in 2019 to around 148,000 by 2021. In contrast, employment in the construction sector has been more stable, rising from 60,000 in 2019 to around 65,000 from 2021 to 2023 (Jordan, Department of Statistics 2024).

According to the results of surveys conducted in May 2024 in Jordan in support of this report, a significant gender disparity exists in employment within the sector. In 2023, men constituted 84 per cent of the workforce, while women accounted for only 16 per cent. The disparity is particularly pronounced in engineering products, where only 9 per cent of the workforce is female compared to 36 per cent in consulting services. Additionally, the participation of youth and women in the workforce is lower compared to that of men aged 25 and above, highlighting systemic challenges that hinder equitable workforce engagement.

The occupational distribution in the engineering products sector shows a strong reliance on technical and trade skills, with technicians and associate professionals forming the largest group at 27 per cent, followed by craft and related trades workers at 24 per cent. In engineering services, technical and associate professionals constitute the largest segment at 36 per cent, with craft and related trades workers at 16 per cent. This underscores the sector's dependency on specialized technical expertise and practical skills.

2.3.1 Engineering products

In 2021, the engineering products sector in Jordan contributed 199 million dinar to the country's GDP, representing 5 per cent of the total manufacturing GDP. Its exports account for 14.1 per cent of manufacturing exports. The sector provides employment for approximately 10,000 individuals, representing 4.6 per cent of total employment within the manufacturing sector. The industry benefits from an abundance of skilled engineers and access to regional and international markets through free trade agreements. According to Jordan's Economic Modernisation Vision, the sector is characterized by a growing number of emerging companies that supply components to assembly firms, reflecting its development and potential for expansion (Jordan, Ministry of Planning and International Cooperation. n.d.).

In the engineering products subsector, there are large domestic firms that produce air conditioners such as Petra Engineering Industries Co. and National Refrigeration Co. These are the most well-known air-conditioning firms in Jordan and are owned by Jordanian investors. Other firms are assemblers or aggregators that import inputs and other parts from different countries, and then sell air conditioners locally in Jordan or export them.

2.3.2 Engineering services

The engineering services sector, which includes architectural and engineering services, contributes between 8 and 10 per cent to Jordan's GDP. In 2022, Jordan's construction service exports amounted to US\$68 million, a decrease from US\$81 million in 2021. The country exports engineering services to over 31 nations, with the Gulf Cooperation Council countries and Iraq being key markets. In 2018, there were 11,535 employees in the engineering services sector, representing 1.4 per cent of total employment according to the Department of Statistics. The sector benefits from a skilled engineering workforce and has experienced growth, with the number of registered engineering companies increasing by 8 per cent between 2018 and 2022 (USAID, A/E Business Council and Jordan Exports, n.d.).

Ownership of the engineering services category is entirely Jordanian, with national companies constituting 70 per cent of environmental services firms. Regarding the export activities of these companies, almost all are local firms that implement projects in Jordan or even export their services to regional and, sometimes, international markets. Their role is mainly to provide the support needed for construction projects, such as project planning, design and supervision. They also provide environmental services such as provision of environmental assessments and consulting, conduct of environmental impact studies and analyses, and development of environmental management systems.

2.4 Exports in the value chain

Exports in Jordan's engineering sector are vital for the country's economic development, contributing substantially to the national gross domestic product (GDP). Engineering products alone make up approximately 14.1 per cent of Jordan's manufacturing exports, according to the Economic Modernization Vision (Jordan, Ministry of Planning and International Cooperation, n.d.). However, the sector faces numerous obstacles hindering its export expansion. Regulatory compliance is one of the most significant challenges, with 68 per cent of firms identifying it as a major barrier, particularly for markets such as the European Union and Gulf Cooperation Council countries, which impose stringent standards such as CE marking³ and Saudi Standards, Metrology and Quality Organization (SASO) certification. In addition, 54 per cent of SMEs reported financial constraints as a hindrance to export growth, limiting their ability to invest in technology upgrades essential for competitiveness. Furthermore, logistical challenges, including high shipping costs and inefficient customs procedures, were noted by 47 per cent of businesses, contributing to delays and increased costs according to the survey.

In the environmental engineering and services sectors, skill gaps and international market competition are key challenges. Around 62 per cent of firms reported a shortage of skilled professionals, limiting their ability to compete in international projects, particularly in advanced fields such as environmental engineering. The findings from both the STED workshop conducted in July 2024 and industry surveys emphasize a critical need for enhanced technical skills, especially in automation, robotics and digital technologies. International competition, primarily from established firms in developed markets, poses another significant hurdle, with 58 per cent of Jordanian companies citing it as a major barrier to growth. Regulatory and certification requirements for engineering services further compound these challenges, with 55 per cent of firms identifying these as critical obstacles to market entry according to the surveys of firms conducted in May 2024.

³ CE marking is a certification mark that indicates conformity with health, safety and environmental protection standards for products sold within the European Economic Area (EEA). The CE mark is also found on products sold outside the EEA that have been manufactured to EEA standards. It is mandatory for certain product groups within the EEA, and serves as a declaration by the manufacturer that the product meets all the requirements of the relevant European directives and regulations.

The sector also faces various threats and challenges, particularly global competition and technological lag. Jordanian firms, especially SMEs, struggle to compete with countries such as China, which dominate global engineering markets due to their technological capabilities and lower production costs. Survey data shows that 63 per cent of respondents view competition from these regions as a significant threat. Moreover, 58 per cent of SMEs indicated a need for substantial technological upgrades to remain competitive, yet many struggle with high costs and access to advanced technologies. Market volatility, especially in politically unstable regions such as Iraq and Lebanon, presents another risk, with 38 per cent of firms expressing concerns over disruptions to export strategies and revenue streams according to the surveys.

In conclusion, while Jordan's engineering sector plays a crucial role in the country's export economy, it faces significant challenges that hinder its growth. Addressing these issues requires targeted interventions in regulatory compliance, financial support, skill development, technological upgrades and market stability to enhance the sector's competitiveness in global markets.

2.5 Employment in the value chain

Employment in Jordan's engineering products sector spans various roles across the value chain, with a workforce mainly comprised of individuals with technical and vocational education. Around 67 per cent hold diplomas or certifications, while 23 per cent have bachelor's degrees or higher. However, a notable skills mismatch exists, as 42 per cent of employees require further training, particularly in advanced manufacturing and digital skills. Employers report shortages of maintenance and product development engineers, while gaps in automation, robotics, and project management skills are significant. Educational institutions face challenges in funding and aligning curricula with industry needs.

In the engineering services sector, there are shortages in key roles such as environmental engineers and project managers, alongside high demand for upskilling in digital tools, energy efficiency and sustainability. Skills in communication, leadership and client management are also lacking, further hindering sector growth.

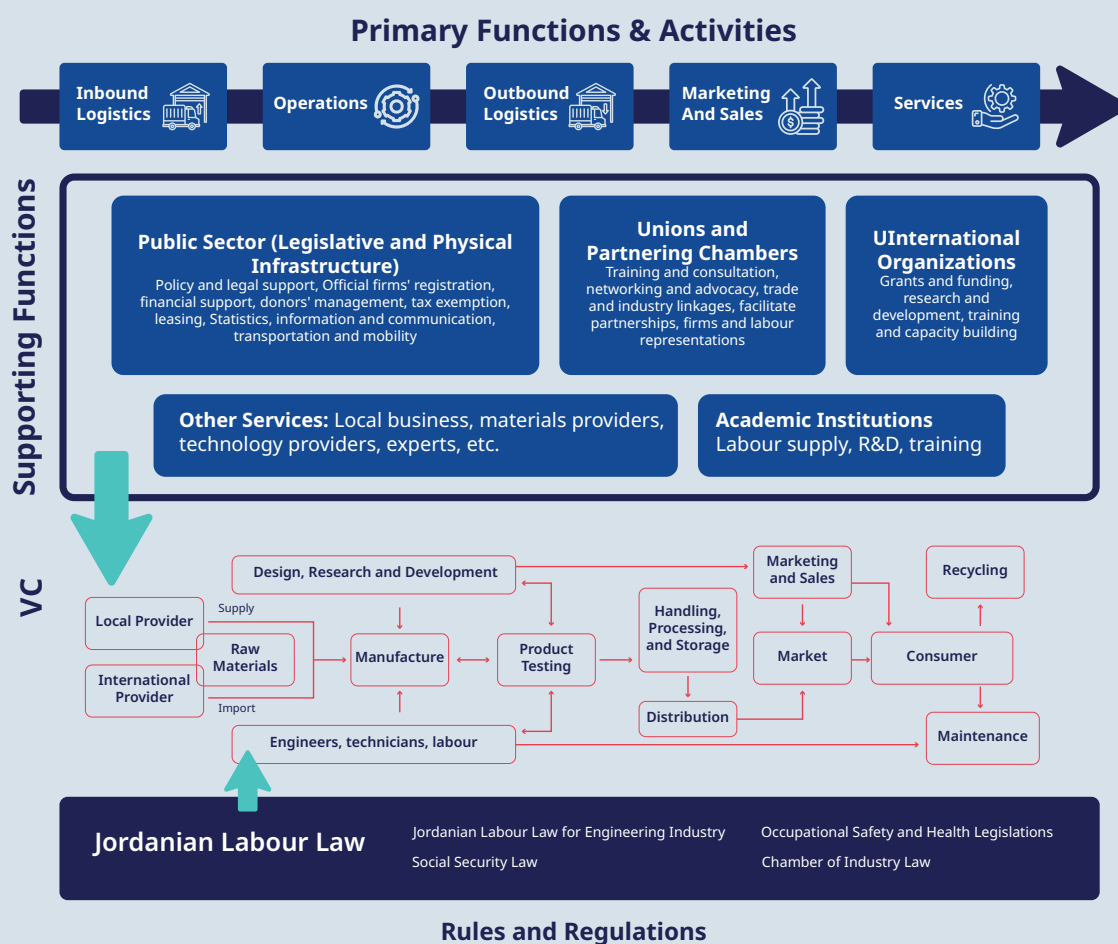
Turnover rates in the sector are high, especially in SMEs, with 31 per cent of firms reporting rates above 15 per cent annually. While 66.7 per cent of companies offer performance bonuses, critical benefits such as health insurance (15.2 per cent) and retirement plans (6.1 per cent) are scarce. Other welfare measures, such as professional development and maternity/paternity leave, are also limited.

Informal workers face challenging conditions, working long hours with project-based pay ranging from 501 to over 1,000 dinar per month. Lacking union affiliation, these workers struggle with low income, unstable job security and limited career growth opportunities, making them vulnerable to exploitation and long-term financial instability.

2.6 Value chain characteristics, market actors and processes

2.6.1 Engineering products – Air conditioning

► Figure 1 Value chain - Engineering products



Source: Authors' compilation.

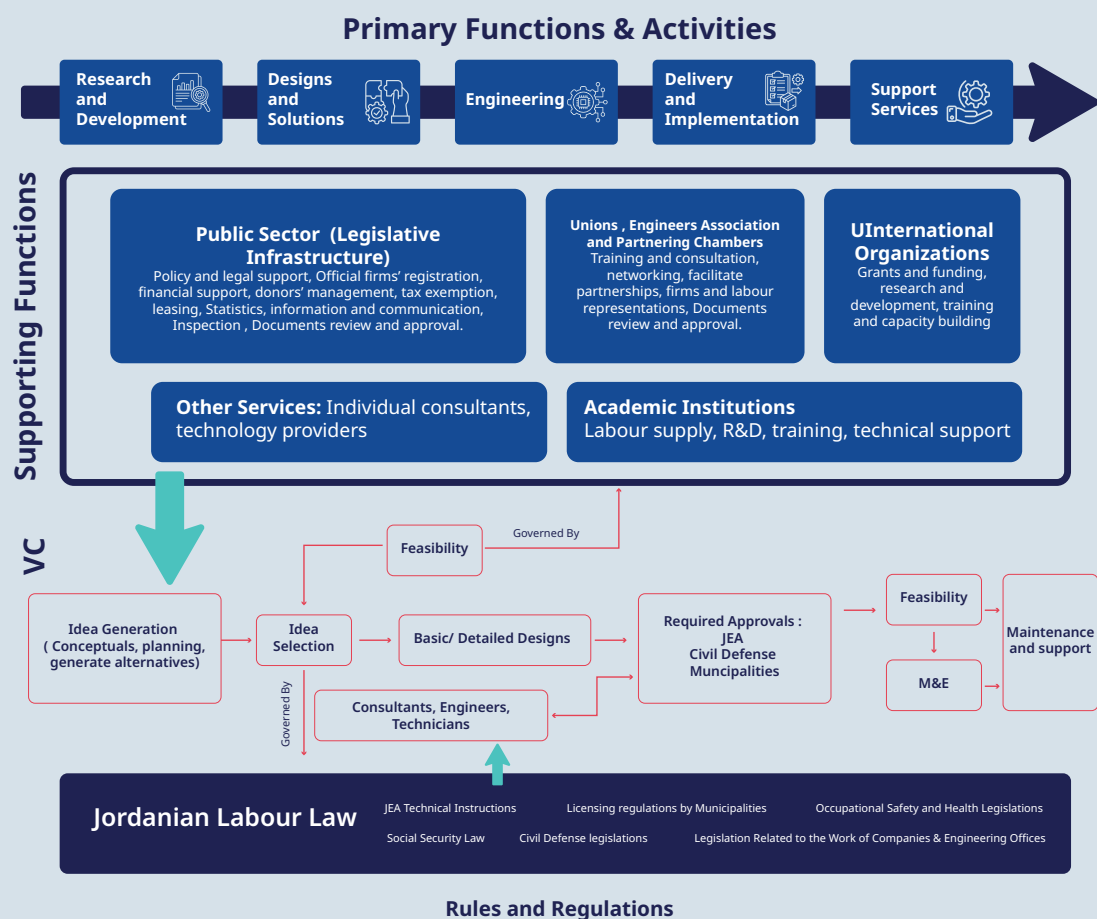
► **Table 3** Description of the value chain – Air-conditioning products

Stage	Overview	Main stakeholders
Raw material suppliers	Most firms import materials and components required for air- conditioning production	Main exporters to Jordan – China
Manufacturing and assembly	Production and assembly of components such as compressors, coils and fans into complete systems	Manufacturers: Local large firms Assemblers: Local MSMEs
Distribution	Distribution to wholesalers	Large local firms
Shipping and logistics	Freight forwarders that provide third-party logistics	Local MSMEs contract with international firms (such as, Maersk, APL, Evergreen and COSCO)
Sales/retail sales	Sales/retail sales of air-conditioning products	MSMEs
Installation and maintenance	Installation and ongoing maintenance through contracts	Local MSMEs and informal workers
Regulatory and certification	Compliance with regulations and quality and safety standards (CE marking, and SASO and Underwriters Laboratories (UL) certification)	Jordan Standards and Metrology Organization (JSMO)

Source: Author's compilation.

2.6.2 Engineering services

► Figure 2 Value chain - Engineering services sector



Note: VC= value chain, M&E= monitoring and evaluation.

Source: Authors' compilation.

► **Table 4** Value chain - Environmental engineering and engineering services supporting the construction sector

Stage	Overview	Key stakeholders
R&D	Conceptual planning and generating alternatives	Large local and foreign-investor firms and international non-governmental organizations
Designs and solutions	Creation of detailed designs and solutions based on selected ideas	Large local and foreign-investor firms
Project implementation	Implementation of engineering projects by consultants, engineers and technicians	Large local firms
Support services	Post-implementation maintenance and support services	Local MSMEs
Quality assurance and compliance	Inspection and regulatory compliance and quality	Government bodies (municipalities and ministries)
Environmental impact assessment and consulting	Environmental evaluation and sustainability consulting	Large local firms and some MSMEs

Source: Authors' compilation

2.7 Common characteristics and overlaps in the selected value chain

The engineering products and services sectors in Jordan exhibit several common characteristics and overlaps that are crucial for understanding their dynamics and potential for growth. Both sectors are marked by significant technological innovation and adoption, stringent regulatory compliance, a highly skilled workforce, and substantial market access and trade opportunities. Additionally, investment in R&D and a strong emphasis on environmental sustainability are shared priorities. These commonalities highlight the interconnected nature of the value chains, where advancements in one sector often drive progress in the other, creating a synergistic effect that enhances overall competitiveness and growth potential in the Jordanian market.

2.7.1 Technological innovation and adoption

Technological innovation and adoption play a pivotal role in both the engineering products and services sectors in Jordan. Companies in these sectors are increasingly integrating advanced technologies to enhance their efficiency, quality and competitiveness. In the engineering products sector, firms are adopting automation and smart technologies in their manufacturing processes to streamline operations and reduce costs. Similarly, in the engineering services sector, there is a growing emphasis on implementing advanced software tools for design, project management and environmental impact assessments. These technological advancements are essential for maintaining a competitive edge in both domestic and international markets.

Despite the progress, there are shared challenges in technological adoption across both sectors. Financial constraints, lack of technical expertise and insufficient infrastructure are common barriers that hinder the full-scale implementation of advanced technologies. For instance, smaller enterprises, particularly SMEs, often struggle with the financial investment required for technological upgrades. This limitation affects their ability to compete with larger firms that have more resources to invest in innovation. According to our survey data, around 65 per cent of firms in the engineering products sector and 70 per cent of firms in the engineering services sector have started integrating advanced technologies, yet many still face significant hurdles.

The emphasis on technological innovation is not just a trend but a necessity driven by market demands and regulatory requirements. Companies that fail to adopt these technologies risk falling behind their competitors, both locally and globally.

2.7.2 Regulatory compliance and standards

Compliance with stringent regulatory standards is a cornerstone for both the engineering products and services sectors in Jordan. Adhering to national and international standards ensures the quality, safety and reliability of products and services, which is essential for market access and consumer trust. In the engineering products sector, firms must comply with regulations such as the CE marking for products sold within the European Economic Area and SASO standards for the Kingdom of Saudi Arabia. These certifications are crucial for exporting to high-potential markets and enhancing the competitiveness of Jordanian products.

Similarly, the engineering services sector faces regulatory challenges, particularly in environmental engineering and construction. Compliance with environmental regulations and quality standards is critical for project approvals and successful implementation. Firms must ensure that their practices align with both local and international environmental standards to secure contracts and maintain their reputation. The results of the surveys carried out for this study indicate that 68 per cent of firms in the engineering products sector and 60 per cent of firms in the engineering services sector consider regulatory compliance a major challenge. This highlights the need for better support systems to help firms navigate complex regulatory landscapes.

2.7.3 Skilled workforce and training

A highly skilled workforce is fundamental to the success and competitiveness of both the engineering products and services sectors in Jordan. Continuous training and skills development are essential to keep pace with technological advancements and evolving industry standards. Both sectors require a diverse set of skills, ranging from technical expertise in engineering design and project management to soft skills such as problem-solving and communication. Ensuring that the workforce is equipped with these skills is crucial for maintaining productivity and quality in both sectors.

There is significant overlap in the types of skills needed in the engineering products and services sectors. Technical skills related to automation, robotics and quality control are highly valued in both, while soft skills such as teamwork and adaptability are equally important. Approximately 75 per cent of firms in these sectors invest in continuous training programmes for their employees, reflecting a shared commitment to workforce development. However, the scope and quality of these programmes vary, with larger firms typically offering more comprehensive training compared to SMEs.

During the STED workshop conducted in July 2024, participants discussed the current capacity of vocational training centres and vocational schools in Jordan in the engineering sector in general (and in both the products and services sectors). The consensus was that these institutions, while fundamental to developing a skilled workforce, face challenges in meeting the market demand for skilled professionals. The need to explore ways to enhance both the capacity and effectiveness of these institutions was highlighted, emphasizing the importance of aligning their offerings with the evolving needs of the market. Additionally, participants evaluated the potential for forging partnerships between industry and vocational training centres. Such collaboration is seen as crucial to ensuring that training programmes remain current and relevant to industry requirements, ultimately bridging the gap between the skills supplied by educational institutions and those demanded by employers.

2.7.4 Market access and trade opportunities

In 2000, Jordan confidently became a member of the WTO, thereby enjoying remarkable benefits. Joining the organization provided Jordan with access to the markets of 163 countries for its exports of goods and services. This access was governed within a clear and transparent environment, ensuring adherence to procedures, laws and regulations as per the rules and agreements of the organization. Moreover, Jordan's membership in the WTO has provided an unequivocally attractive environment for investment and business.

It is important to shed light on the meaning of market access and to distinguish it from free trade agreements.

Market access is the ability and opportunity for companies or countries to effectively and competitively sell their goods and services in overseas markets. This includes navigating and complying with a range of conditions, including tariff rates, quotas and regulations that importing countries impose on foreign goods and services. The intricacies of market access determine the relative ease or difficulty for international products to enter and compete in a domestic market. Various barriers, such as regulatory restrictions, trade tariffs and non-tariff barriers, can significantly affect market access and create challenges for foreign businesses seeking to enter new markets. Market access can be influenced by various barriers, such as:

- **Tariffs:** Taxes imposed on imported goods.
- **Quotas:** Limits on the amount of a specific product that can be imported.
- **Licensing requirements:** Special permission required to import certain goods.
- **Standards and regulations:** Health, safety, environmental and technical standards that imports must meet.

Access to regional and international markets is a critical driver of growth for both the engineering products and services sectors in Jordan. Exporting products and services not only increases revenue but also enhances market presence and competitiveness. The Gulf Cooperation Council countries and Iraq are key target markets for firms in both sectors, offering significant opportunities due to their growing construction and infrastructure development needs. These markets present high potential for Jordanian firms, especially in the context of regional economic integration and trade agreements.

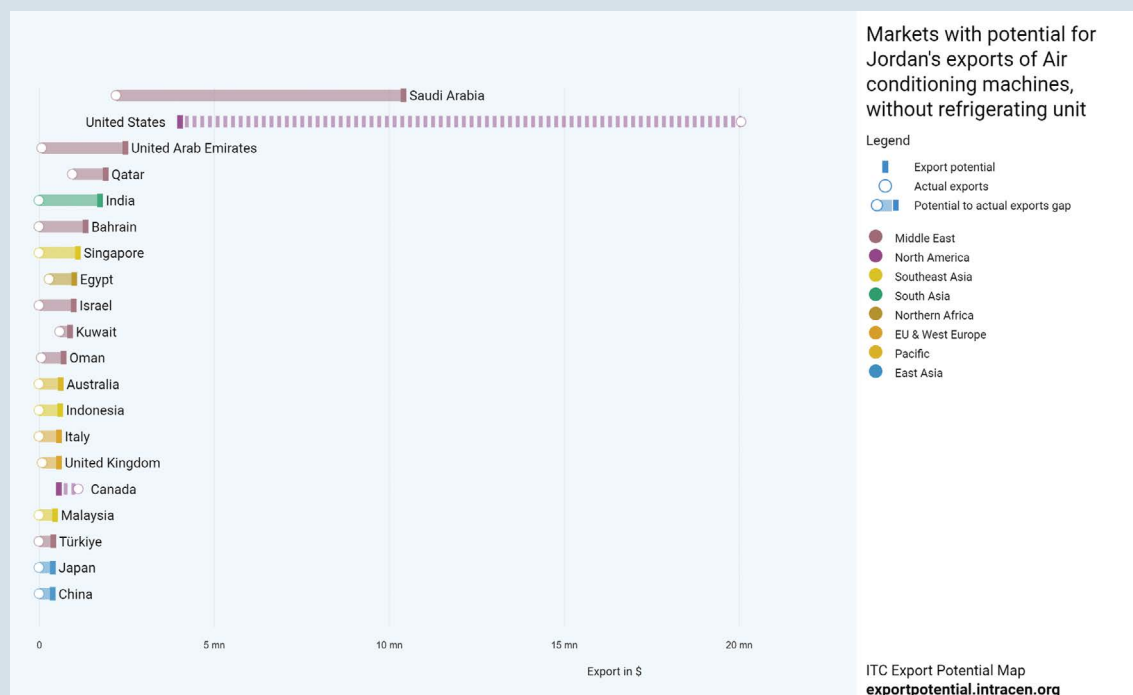
Firms in both sectors face similar challenges in accessing these markets. Compliance with international standards, navigating trade regulations and managing logistical complexities are common obstacles. For instance, around 55 per cent of firms in the engineering products sector and 50 per cent in the engineering services sector are actively seeking to expand their market presence in Gulf Cooperation Council countries and Iraq. However, meeting the stringent regulatory requirements and ensuring timely delivery remain significant hurdles. These challenges highlight the need for strategic support to help firms overcome barriers to market access.

Jordan is strategically located in the heart of the Middle East, offering ample opportunities to expand its global exports, particularly in industrial and mechanical equipment. Notably, under HS code 8415, which covers industrial fans, ventilators, air-conditioning machines and other climate control equipment, Jordan has significant export potential. This is due to the increasing global demand for energy-efficient and advanced climate control solutions, presenting a major opportunity for Jordan to export these products worldwide. By leveraging competitive production costs and enhancing its technological capabilities, Jordan can diversify its export portfolio and target markets with rising infrastructure demands and a growing need for sustainable energy solutions.

The figures provided below clearly outline the exporting opportunities for (HS codes 841582 and 841590)⁴ from Jordan to other countries. It is important to note that information for other products categorized under HS code 841510, 841520 and 841581 is not available.

Figure 3 illustrates the export opportunities available for exporting under HS code 841583.⁵ It shows the countries with the highest export potential that Jordanian exporters can harness, namely the Kingdom of Saudi Arabia, the United Arab Emirates and the United States.

► **Figure 3** Jordan's export opportunities for HS code 841583



Source: ITC (n.d.).

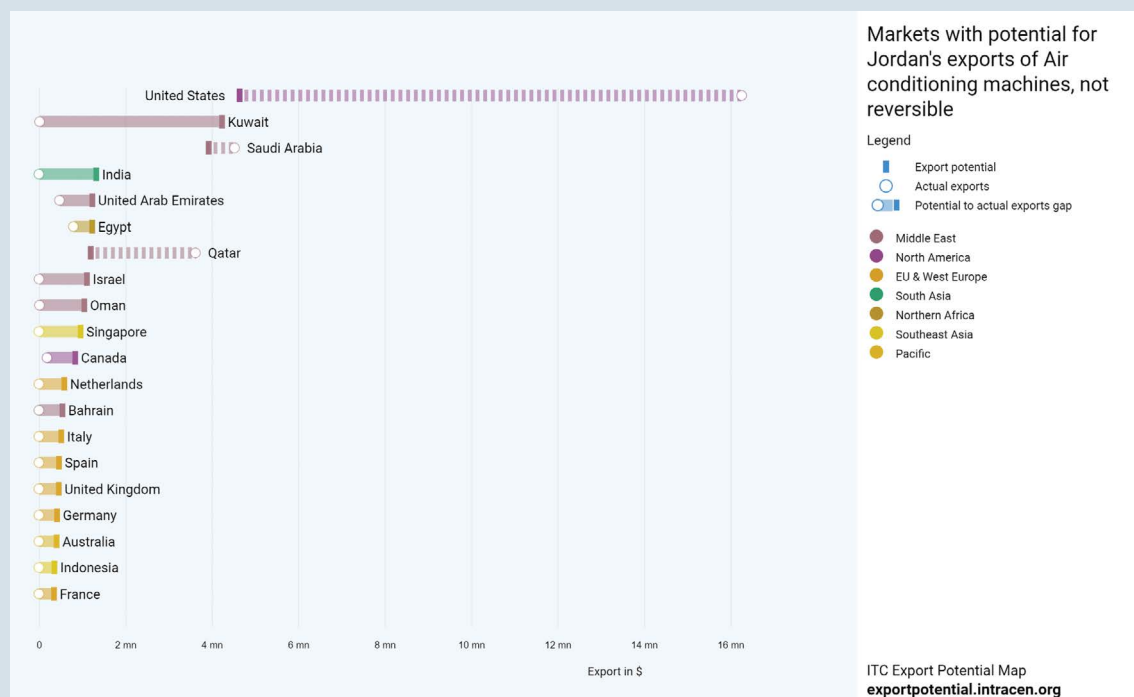
⁴ HS code 841582: Air conditioning machines incorporating a refrigerating unit but without a valve for reversal of the cooling-heat cycle (excl. of a kind used for persons in motor vehicles, and self-contained or "split-system" window or wall air conditioning machines).

HS code 841590: Parts of air conditioning machines, comprising a motor-driven fan and elements for changing the temperature and humidity, n.e.s..

⁵ HS code 841583: Air conditioning machines comprising a motor-driven fan, not incorporating a refrigerating unit but incorporating elements for changing the temperature and humidity (excl. of a kind used for persons in motor vehicles, and self-contained or "split-system" window or wall air conditioning machines).

Figure 4 illustrates the export opportunities available for exporting under HS code 841582. It shows the countries with the highest export potential that Jordanian exporters can harness, namely the Kingdom of Saudi Arabia, Kuwait and the United States.

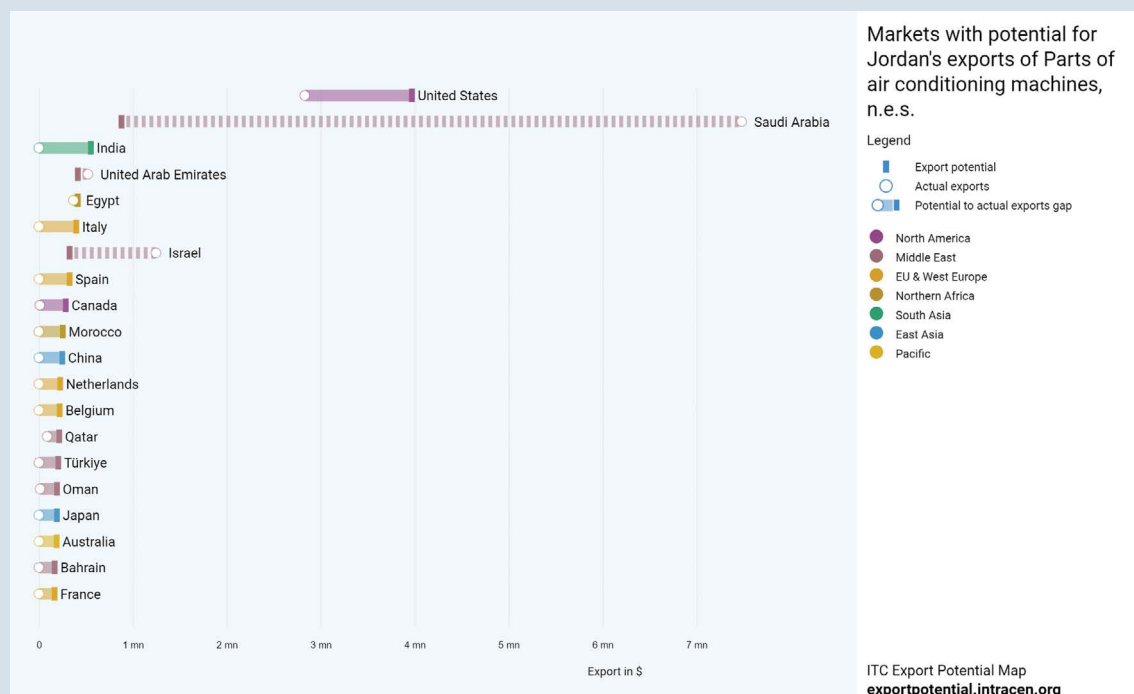
► **Figure 4** Jordan's export opportunities for HS code 841582



Source: ITC (n.d.).

Figure 5 illustrates the export opportunities available for exporting under HS code 841590. It shows the countries with the highest export potential that Jordanian exporters can harness namely India, the Kingdom of Saudi Arabia and the United States.

► **Figure 5** Jordan's export opportunities for HS code 841590



Source: ITC (n.d.).

2.7.5 R&D

Investment in R&D is crucial for fostering innovation and maintaining a competitive edge in both the engineering products and services sectors. R&D activities help develop new products, improve existing ones and enhance service delivery methods. Despite its importance, investment in R&D remains low across both sectors. Only 28 per cent of firms have dedicated R&D departments, and 35 per cent of respondents noted the absence of innovation as a critical gap.

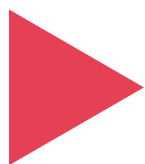
There is a significant overlap in the need for R&D across both sectors. Collaborative R&D efforts with academic institutions and industry partners can leverage expertise, share resources and accelerate innovation. For example, according to the surveys carried out for the purpose of this study, nearly 40 per cent of firms in the engineering products sector and 35 per cent in the engineering services sector have established R&D partnerships with universities and research institutions. These collaborations are essential for driving innovation and developing competitive products and services.

2.7.6 Environmental sustainability

Environmental sustainability is a growing concern and priority for both the engineering products and services sectors in Jordan. Implementing sustainable practices and technologies helps reduce environmental impact and ensure that regulatory requirements are met. Firms in both sectors are adopting green technologies and practices to minimize their environmental footprint. In the products sector, this includes the development of energy-efficient air-conditioning and refrigeration systems. In the services sector, it involves conducting thorough environmental impact assessments and promoting sustainable construction practices.

The emphasis on environmental sustainability is driven by both regulatory requirements and market demands. Approximately 45 per cent of firms in the engineering products sector and 50 per cent in the engineering services sector have adopted sustainable practices and technologies according to the surveys. These efforts not only help ensure compliance with environmental regulations but also enhance the marketability of products and services. Customers and clients are increasingly prioritizing sustainability, and firms that can demonstrate their commitment to environmental stewardship have a competitive advantage.





► Findings from research and stakeholder consultations

3.1 Overview of research approach

A comprehensive research approach was adopted to analyse the engineering products and services sector in Jordan. The methodology integrated a desk review with field research, utilizing a coordinated TRAVERA-STED approach. The research involved firm-level data collection through structured interviews with key personnel, as well as discussions with ecosystem players, international experts and global value chain participants. A technical and policy foresight workshop engaged diverse stakeholders to develop sector-level skills governance arrangements and action plans. This approach aimed to enhance competitiveness, promote exports and equip workers with essential skills, ensuring a robust analysis of the sector's current landscape and future opportunities.

3.2 Challenges related to recruiting qualified workforce

The engineering sector faces significant recruitment challenges across various levels, from raw material suppliers to manufacturers and service providers. One of the key issues is the pervasive skills gap, with recent graduates and new employees lacking both basic and advanced competencies necessary for modern engineering roles. The shortage of specialized skills, particularly in emerging technologies such as artificial intelligence and machine learning, exacerbates this problem. Additionally, many companies reported difficulties in finding motivated and committed employees, with low job engagement being a critical factor across the sector.

Compounding these challenges is intense competition for skilled talent, with employers vying for a limited pool of qualified professionals, especially in specialized areas. Smaller firms, in particular, struggle to meet the high salary, benefits and development expectations demanded by top candidates. Moreover, rapid technological advancements have shifted recruitment requirements, making it difficult for companies to adapt quickly. Unfavourable working conditions, including inadequate pay, poor safety standards and limited career development opportunities, further contribute to job dissatisfaction and high turnover rates. The nature of the work itself presents additional barriers, as many roles are temporary or located in remote areas, which deters potential candidates.

Addressing these recruitment challenges requires a comprehensive approach, including improving educational outcomes, modernizing recruitment strategies and enhancing working conditions to attract and retain the necessary talent to drive innovation and growth in the sector.

3.3 MSME dynamics in the value chain

In the engineering services sector, Jordanian companies play a significant role, with local firms constituting 70 per cent of environmental services providers. These firms are primarily engaged in supporting construction projects through services such as project planning, design and project supervision. Additionally, they offer vital environmental services, including environmental assessments, impact studies and the development of environmental management systems. Most of these companies operate locally, but some also extend their services to regional and international markets. This active involvement underscores the vital contribution of Jordanian MSMEs in both domestic and global contexts within the engineering services value chain.

In the engineering products subsector, large domestic firms such as Petra Engineering Industries Co. and National Refrigeration Co. are prominent players in the air-conditioning market. These well-known companies are owned by Jordanian investors and are engaged in the production of air conditioners. Furthermore, other firms in this subsector function as assemblers or aggregators, importing components from various countries and subsequently selling air conditioners either locally in Jordan or exporting them to other markets. This diverse landscape highlights the integral role of Jordanian firms in both manufacturing and distribution within the engineering products value chain.

3.4 Constraints and root causes that hinder an upgrade of the value chain

The survey responses from the engineering products and engineering services sectors highlight several constraints and root causes hindering the efforts to upgrade the value chain. These challenges can be grouped together based on the role they play in the value chain, providing a comprehensive view of the barriers faced by different stakeholders.

3.4.1 Engineering products

Raw material suppliers: Raw material suppliers struggle primarily with the high cost of energy and electricity, which was universally regarded as a very important challenge by 95 per cent of the respondents. Additionally, 80 per cent of suppliers cited inadequate government support as a significant hurdle, while 75 per cent highlighted the lack of market and market access information as a barrier. Furthermore, stringent requirements from buyers and intermediaries posed a challenge for 70 per cent of suppliers.

Aggregators: Aggregators face multifaceted challenges. High logistics costs and the cost of energy and electricity are particularly pressing, with 43 per cent and 64 per cent of respondents, respectively, rating these as very important challenges. Access to financing, technology, and government support are also critical issues, with 53 per cent identifying access to machinery or technology as a very important threat. Moreover, aggregators reported difficulties due to stringent market requirements, insufficient product innovation and a lack of market information. This indicates a broad spectrum of barriers, emphasizing the need for holistic solutions to support these stakeholders.

Manufacturers: Manufacturers appear to be severely impacted by various challenges. The data shows a unanimous recognition of issues related to financing, access to technology, high logistics costs, energy costs, labour regulations and government support. This uniformity across various constraints highlights the extensive difficulties manufacturers face in enhancing their value chains. Economic and regulatory policies, market access information, and stringent requirements from buyers further compound these challenges, suggesting that manufacturers require substantial and varied forms of assistance to overcome them.

In conclusion, the engineering products sector is plagued by a wide range of challenges, particularly high operational costs, stringent regulations and inadequate support structures. Manufacturers, aggregators and raw material suppliers all face significant barriers that hinder their ability to upgrade the value chain. Addressing these issues requires targeted interventions that can reduce costs, improve access to necessary resources and provide robust support from government and industry bodies.

3.4.2 Engineering services

Raw material suppliers: The primary concerns for raw material suppliers in the engineering services sector are cost of energy and electricity, and labour regulations, with 74 per cent of respondents unanimously acknowledging these as challenges. Additionally, 82 per cent of respondents identified government support as a significant issue, while 76 per cent mentioned that they faced challenges related to market access information, and that business service costs were also problematic. However, access to financing and technology seemed less of an issue, suggesting that these suppliers might have relatively better access to these resources compared to their counterparts in the engineering products sector.

Processors: Processors within engineering services reported a mix of moderate to very important challenges. The most significant issues included access to financing (reported as a very important challenge by 50 per cent of respondents), high logistics costs (40 per cent), and energy costs (61 per cent). Additionally, skilled labour gaps and labour regulations were cited as important challenges, impacting around 35 per cent of respondents. Other considerable challenges include market access information (reported by 72 per cent), the use of technology, product innovation, and stringent requirements from buying countries, highlighting the need for targeted interventions. These areas of concern, particularly those related to operational costs and regulatory compliance, require focused support to improve the overall competitiveness of processors.

In conclusion, the engineering services sector faces critical challenges related to operational costs and regulatory compliance, which are similar to those faced by the engineering products sector. However, the severity and nature of these challenges can vary. Raw material suppliers and processors both experience significant barriers, particularly in energy costs and skilled labour. Strategic support in these areas, coupled with better market access information and technology use, can greatly enhance their ability to upgrade the value chain.

Tables 5 and 6 below summarize the challenges per function in the value chain within both the engineering products and services sector:

► **Table 5** Challenges per function in the value chain – Engineering products

Engineering products			
Challenge	Raw material suppliers	Aggregators	Manufacturers
Access to or cost of financing	Low	High	High
Access to machinery or technology	Low	High	High
High logistics costs (transportation for export)	Medium	High	High
Cost of energy and electricity (cost of utilities)	High	High	High

Engineering products			
Lack of skilled labour (gap in skills of workers)	Medium	Medium	High
Labour regulations	Medium	Medium	High
Inadequate government support	High	High	High
Lack of market and market access information	High	High	High
Inadequate use of technology or lack of access to technology	Low	Medium	High
Insufficient product innovation	Medium	Medium	High
Insufficient potential for profit	Medium	Medium	High
Economic and regulatory policies (domestic regulations such as business permits, export regulations and taxes)	Medium	High	High
Quality and availability of raw materials and other inputs	Medium	Medium	High
Risky business in foreign markets	Medium	High	High
Strict requirements and technical regulations of buying countries are strict	Low	High	High
Products certification and standards	Low	Medium	High
More profitable sales in the local market	Medium	Medium	High
Stringent requirements from buyers and intermediaries	High	Medium	High
Cost of business services	Medium	Medium	High

Source: Authors' interpretation of the quantitative survey findings.

► **Table 6** Challenges per function in the value chain – Engineering services

Engineering services		
Challenge	Raw material suppliers	Processors
Access to or cost of financing	Low	High
Access to machinery or technology	Low	Medium
High logistics costs (transportation for export)	Medium	High
Cost of energy and electricity (cost of utilities)	High	High
Lack of skilled labour (gap in skills of workers)	Medium	High
Labour regulations	High	High
Inadequate government support	High	High
Lack of market and market access information	High	High
Inadequate use of technology or lack of access to technology	Low	High
Insufficient product innovation	Medium	Medium
Insufficient potential for profit	Medium	Medium
Economic and regulatory policies (domestic regulations such as business permits, export regulations and taxes)	Medium	High
Quality and availability of raw materials and other inputs	Medium	High
Risky business in foreign markets	Medium	Medium
Strict requirements and technical regulations of buying countries	Medium	High
Products certification and standards	Medium	High
More profitable sales in the local market	Medium	Medium
Stringent requirements from buyers and intermediaries	High	High
Cost of business services	High	Medium

Source: Author's interpretation of the quantitative survey findings.



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3.5 Industry competitive analysis

During a technical and policy foresight workshop, participants identified the following characteristics of the competitive analysis for the engineering products in Jordan.

► **Table 7** **Characteristics of the competitive analysis for the engineering products sector**

Factor	Details
Market overview	Domestic market: Expected growth of 60 per cent in air conditioning due to energy-saving systems and climate change. Regional and international markets: Similar trends driven by energy efficiency and trade agreements.
Competition landscape	Opportunities in the commercial market with high demand relative to supply High competition noted in international markets (Kingdom of Saudi Arabia, United Arab Emirates and United States)
Competitive advantage	National market: High engineering expertise, flexibility in production and competitive pricing. Regional market: Strong reputation and geographic advantages. International markets: Compliance with international standards and agreements.
Marketing and sales	National market: Use of trade shows and digital marketing. Regional market: Focus on trade agreements and delegations. International markets: Free trade agreements and international exhibitions.
Customer analysis	Growing customer preference for energy-efficient and environmentally friendly products/services
Operational capabilities	Identified gaps in skilled labour, particularly in maintenance and product development
Financial performance	Need for initiatives such as tax incentives to support R&D and innovation to enhance competitiveness
Regulatory and environmental factors	Importance of compliance with environmental regulations and sustainability practices highlighted
Future outlook	Emphasis on the need for training programmes and development initiatives to align skills with market demands, especially in response to technological advancements and climate challenges

Source: Technical and policy foresight workshop conducted in July 2024.

3.6 Drivers of change

The engineering products and services sectors in Jordan, particularly in air-conditioning, refrigeration, fire equipment, environmental engineering, and construction support services, hold significant growth potential. Identifying and leveraging the key drivers behind this potential is crucial for the sector's development and competitive edge. Growth drivers include market opportunities, trade agreements, technological advancements and regulatory requirements identification. By focusing on these areas, Jordan can enhance its competitiveness, increase exports and contribute to economic growth. The following subsections delve into the specific growth drivers of the targeted two subsectors, providing insights into how these factors can be effectively utilized.

3.6.1 Engineering products

High potential markets for export: According to the Economic Modernisation Vision, engineering products contribute to 14.1 per cent of manufacturing exports (Jordan, Ministry of Planning and International Cooperation, n.d.). The survey findings indicated that the Gulf Cooperation Council countries demonstrate higher market potential due to a booming construction sector and high demand for advanced air conditioning and refrigeration systems, especially the Kingdom of Saudi Arabia, which presents a significant market opportunity. Other potential markets are China, Egypt, Germany, Iraq, Lebanon and the United States.

Local sourcing/procurement: Increasing local sourcing of components, such as parts of air-conditioning machines, comprising a motor-driven fan and elements for changing the temperature and humidity, compressors, heat exchangers, and electronic controls, can indirectly enhance competitiveness by sourcing inputs from the local market with lower prices. Developing a robust local supply chain for these key components can reduce costs and improve production efficiency.

National policy to promote highly value-added industry: The engineering products sector was identified as a “high value industry” in Jordan’s Investment Promotion Strategy (Jordan, Ministry of Investment, n.d.). The Strategy aims to develop Jordan into a regional industrial hub through high-growth exports featuring high-quality and high-value products.

3.6.2 Engineering services

High potential markets for export: The survey findings indicated that the Gulf Cooperation Council countries present higher market potential due to the focus on sustainability, environmental regulations, and large-scale construction projects in the Kingdom of Saudi Arabia, Qatar and the United Arab Emirates, making the Gulf Cooperation Council countries a prime market. Furthermore, reconstruction and development projects in Iraq create substantial demand for environmental engineering and construction services.

High potential for quality improvement: There is significant potential to increase the quality of engineering services in Jordan by adopting and integrating international best practices. Improving service quality can drive growth by making Jordanian firms more competitive and increasing recognition of their excellence in engineering solutions, which in turn can attract more business both regionally and globally.

Abundance of skilled engineers and technicians to be utilized: A strong emphasis on advancing the quality of engineering education and training programmes will drive sector growth. By aligning educational curricula with industry needs and global standards, Jordan can ensure a steady pipeline of highly qualified engineers. This commitment to education and training enhances the workforce's ability to meet the evolving demands of the engineering services sector, thereby supporting long-term growth and sustainability.

3.7 Strengths, weaknesses, opportunities and threats analysis

Jordanian engineering firms face intense competition from international players and struggle with higher local production costs. Competition challenges were reported by 55 per cent of firms, highlighting the need for innovation and quality improvement. Government support through subsidies, tax incentives and improved market access is crucial. Furthermore, adherence to international quality standards and certifications is vital for global market trust.

Experts emphasize improving supply chain integration to enhance efficiency and competitiveness. The current fragmented supply chain leads to logistical inefficiencies, noted by 50 per cent of ecosystem players. Recommendations include forming supply chain consortia, using digital management tools and improving infrastructure. Despite 40 per cent of ecosystem players engaging in sustainability practices, challenges such as high costs and limited financing persist. The adoption of green technologies and corporate social responsibility initiatives, along with stricter regulations, are recommended.

International experts see regional integration as a key growth opportunity, with 45 per cent supporting it. However, political instability, trade barriers and regulatory differences are major challenges. Strong political collaboration and regional trade agreements are needed. The focus on supply chain due diligence presents both challenges and opportunities, with 50 per cent of international experts stressing the need for robust practices. Firms must ensure ethical supply chains and stay updated with regulations, supported by international guidance and training programmes.

Tables 8 and 9 show the strengths, weaknesses, opportunities and threats analysis of the engineering products (air conditioning) and engineering services sectors, respectively.

► **Table 8** Strengths, weaknesses, opportunities and threats analysis of the engineering products (air conditioning) sector

STRENGTHS • Leading local firms leverage 3D printing, robotics and automation for higher efficiency and better quality. • Access to markets via free trade agreements such as GAFTA agreement and the Jordan-European Union Association Agreement boosts export opportunities. • Products listed under air conditioning (HS Code 841583) show high export demand, indicating strong international interest. • Proximity to market: Local manufacturers benefit from being close to their customers, allowing for quick service and support. • Customization: This involves offering solutions tailored to local climate conditions and customer preferences.	WEAKNESSES • Micro and small enterprises have notable deficiencies in advanced manufacturing, digital technologies, and sustainability practices. • Many firms are assemblers or aggregators that rely on imported inputs and parts. • Production costs are high compared to countries with lower labour costs. • Technological lag: Local companies often lag behind in incorporating the latest technological advancements such as smart home integration and high energy efficiency. • Brand perception: International brands generally have stronger brand recognition and perceived reliability • There is a dependence on imported components for production.
OPPORTUNITIES • Establishment of supply chain consortia and collaborative platforms. This might include different opportunities such as shared logistics and warehousing, joint R&D, knowledge sharing, supply/value chain integration, training and sustainable initiatives. • Adoption of green technologies such as energy efficient machinery, renewable energy sources and sustainable materials • Regional integration through value chains to enhance competitiveness and access to new markets, particularly for air-conditioning assemblers • Export potential: Growing demand in neighbouring countries (for example, Iraq and the Kingdom of Saudi Arabia) provides significant export opportunities.	THREATS • Political instability in the region, trade barriers, and differences in regulatory standards across countries • Logistical inefficiencies and regulatory hurdles in the supply chain • Intense competition: Strong competition from established international brands can put pressure on local companies regarding pricing and innovation. • Regulatory changes: Stricter environmental regulations may increase production costs and require significant investment in new technologies. • Fluctuating raw material prices and supply chain disruptions

Source: Author's compilation from multiple sources, including the STED workshop, key informant interviews and quantitative surveys.

► **Table 9** **Strengths, weaknesses, opportunities and threats analysis of the engineering services sector**

STRENGTHS • A notable amount (33.3 per cent) of surveyed firms export engineering services, indicating a strong international presence. • Firms have a wide range of skills supporting construction services and environmental engineering, enhancing their service offerings and market reach. Positions with these skills include architectural designers/engineers, structural engineers, draftspeople and computer-aided design technicians.	WEAKNESSES • Competition among domestic and international engineering firms intensifies in project bidding and profit margins. • Lack of awareness about environmental engineering solutions limits demand for related projects and services.
OPPORTUNITIES • There are further opportunities to expand services regionally and internationally and increasing demand for environmental services and sustainable construction practices. • Leveraging new technologies such as building information modelling can enhance service quality and efficiency. • The growing emphasis on sustainable construction practices can create new service opportunities.	THREATS • Potential changes in regulations could impact environmental services and construction projects. • International firms in Jordan and the region offering similar services can pose competitive threats to local firms. • Increasing costs of sustainable technologies and limited access to financing for green projects may create challenges.

Source: Author's compilation from multiple sources, including the STED workshop, key informant interviews and quantitative surveys.

In summary, the strengths, weaknesses, opportunities and threats analysis for the engineering products (air conditioning) and services sectors is as follows:

► **Table 10** Common strengths, weaknesses, opportunities and threats analysis for both sectors

STRENGTHS • Utilization of advanced technologies (such as 3D printing and robotics) • Market access via free trade agreements (such as the GAFTA agreement and the Jordan-European Union Association Agreement) • Strong export demand for key products • Proximity to market for quick service • Customization capabilities • Strong international presence in engineering services • Diverse technical skills in construction and environmental engineering	WEAKNESSES • Lag in adopting advanced manufacturing and digital technologies • Reliance on imported inputs and high production costs • Technological lag in smart home integration and energy efficiency • Lower brand recognition compared to international brands • Intense competition in project bidding and profit margins • Limited awareness of environmental engineering solutions
OPPORTUNITIES • Formation of supply chain consortia. This might include different opportunities such as shared logistics and warehousing, joint R&D, knowledge sharing, supply/ value chain integration, training and sustainable initiatives. • Adoption of green technologies and sustainable materials • Regional value chain integration • Expansion of export opportunities in neighbouring countries • Increased demand for environmental services and sustainable construction • Leveraging of building information modelling technology for improved service quality	THREATS • Political instability and trade barriers • Logistical inefficiencies and supply chain hurdles • Intense competition from established international brands • Stricter environmental regulations raising production costs • Fluctuating raw material prices • Potential regulatory changes impacting services • Competition from international firms in the region • Rising costs of sustainable technologies and limited financing

Source: Author's compilation based on tables 8 and 9.

3.8 Summary of opportunities and constraints

3.8.1 Opportunities

Both the engineering products and engineering services sectors present several opportunities for growth and development.

1. **Technological advancements:** Adoption of new technologies can enhance productivity and innovation across both sectors, leading to more efficient operations and better-quality products and services.
2. **Market expansion:** There is potential for expanding market access, both regionally and internationally, which can open up new revenue streams and customer bases for local firms.
3. **Skill development:** Investing in workforce training and development can address skills gaps and boost overall sector capabilities, enhancing competitiveness.
4. **Sustainability initiatives:** Emphasizing environmental sustainability and compliance can meet growing market demands for eco-friendly practices and improve sector reputation.

3.8.2 Constraints

Despite these opportunities, several constraints hinder the growth and efficiency of the engineering products and services sectors:

1. **High operational costs:** Both sectors face significant challenges related to high energy and logistics costs, which impact overall profitability and competitiveness.
2. **Regulatory challenges:** Stringent regulations and compliance requirements can create additional costs and barriers to market entry and expansion.
3. **Limited government support:** Inadequate government support and funding can constrain the ability of firms to invest in necessary resources and technologies.
4. **Access to financing:** Difficulty in obtaining financing remains a major constraint, limiting the ability of firms to invest in growth and innovation.
5. **Skills gaps:** A shortage of skilled labour affects productivity and quality, particularly in specialized areas of engineering and technology.

Addressing these constraints while leveraging available opportunities can drive significant progress in both sectors, fostering sustainable growth and increased competitiveness.



► Policy orientation

The strategic development of skills and capabilities across the engineering sector is essential to ensuring sustained economic growth and competitiveness. Fostering synergies between education, industry and workforce development creates the foundation for innovation and productivity. Targeted efforts to equip individuals with the necessary expertise and support business growth will be critical in meeting future challenges and advancing sectoral performance.

Developing the right skills

Realign educational programmes with industry needs

- **Promote science, technology, engineering and mathematics education** early to cultivate a talent pool ready for engineering innovation
- **Build industry-academia partnerships** for internships and hands-on experience, bridging gaps between theoretical knowledge and real-world application
- **Update curricula** in universities and technical institutes to include modern technologies, such as artificial intelligence, digital tools and advanced manufacturing

Provide continuous upskilling opportunities

- Create specialized training centres for key sectors (such as HVAC and renewable energy)
- Develop certification programmes to ensure workforce proficiency in emerging technologies
- Encourage SMEs to integrate training and professional development into their practices

Raise awareness about engineering careers

- Organize engineering career fairs to promote engineering as a key sector for national development
- Engage underrepresented groups in community outreach programmes to build interest in engineering
- Enhance market competitiveness through skills development
- Curriculum modernization to include artificial intelligence, machine learning, advanced computer skills and business management
- Industry-academia collaboration for practical training opportunities, internships and apprenticeships
- Professional development programmes for current employees, emphasizing new technologies and industry trends

Strengthening the business capabilities of SMEs

Enhance technological competence

- **Subsidize technological upgrades** through grants or loans
- **Promote technology adoption** in automation, 3D printing and robotics

Improve management practices

- **Management training programmes** in project management, strategic planning and leadership
- **Facilitate mentorship and coaching** between SMEs and industry experts

Foster innovation and R&D

- **R&D tax incentives and innovation grants** to boost product development
- **Promote industry-academia collaboration** for joint research initiatives

Increasing market access and sales

- **Leverage free trade agreements and expand trade agreements** with the Gulf Cooperation Council countries, China, Germany and the United States
- **Promote international compliance standards** such as ISO standards and CE marking to facilitate exports
- **Organize trade missions and business-to-business matchmaking** for greater market penetration in regional markets

Improving recruitment and working conditions

- **Modernize recruitment strategies** by adopting modern artificial intelligence-driven talent acquisition
- **Enhance employer branding** to attract top talents
- **Improve working conditions** with competitive compensation, flexible working hours and workplace modernization

Boosting employment for women and youth

- **Align industry needs with government programmes** to create job opportunities for women and youth
- **Promote family-friendly policies** and flexible working hours
- **Encourage diversity and inclusion** through tax incentives for companies hiring women and youth

Cross-cutting recommendations

- **Promote sustainability** through environmental standards, green technology grants and sustainability training
- **Streamline regulatory processes** to reduce bureaucratic hurdles and improve business operations
- **Foster a culture of innovation** through hubs, incubators and R&D support for start-ups

In summary, a comprehensive approach to skills development, business enhancement and market integration will drive long-term prosperity. Leveraging cross-sector collaboration and fostering an environment conducive to innovation can provide the foundation for a resilient and competitive economy, positioning engineering industries for future success.

Conclusion

The engineering products and services sectors are a crucial part of Jordan's economy, significantly contributing to GDP and exports. In 2021, the engineering products sector contributed 199 million dinar to GDP, accounting for 5 per cent of manufacturing output and 14.1 per cent of manufacturing exports. Additionally, this sector supports around 10,000 jobs. Similarly, the engineering services sector, which includes architectural and engineering services, contributes 8–10 per cent to GDP and employs 11,535 people.

► Workforce composition

Despite its economic importance, the sectors face several challenges. One major issue is workforce composition, with a noticeable gender imbalance, in which women represent only 16 per cent of the workforce. Moreover, youth participation is lower compared to that of older men, indicating the need for a more inclusive work environment.

► Training and development disparities

Training and development disparities further compound these challenges. Larger firms tend to invest more in employee training compared to SMEs, which struggle with budget constraints. High training costs, outdated programmes, and logistical difficulties significantly hinder effective skill development across the sector.

► Recruitment challenges

Recruitment remains a persistent challenge due to a significant skills gap. Around 48 per cent of firms find it difficult to hire qualified candidates, and retention issues are exacerbated by concerns over competitive salaries and career progression opportunities.

► Market opportunities

Despite some challenges, there are promising market opportunities for Jordanian companies, particularly in Gulf Cooperation Council countries such as the Kingdom of Saudi Arabia. Success in these markets depends on adherence to international quality standards and technological advancements. However, financial constraints and the need for better local sourcing and improved enabling services remain key challenges.

► Financial and regulatory constraints

Moreover, the sector faces distinct financial and regulatory constraints. Processors struggle with securing investment capital and managing payments due to regulatory hurdles. Therefore, improved investment access and regulatory reforms are essential for the sector's growth.

► Workforce skills and training

Moreover, workforce skills and training present notable challenges. A significant skills gap exists, with employees lacking the technical skills to operate advanced machinery and software. Comprehensive training programmes and continuous professional development are essential to ensure the workforce is equipped with the latest skills and knowledge.

► Market information and data analytics

Lastly, there is a significant gap in market information and data analytics capabilities. Many firms lack the tools and expertise to analyse market trends effectively. Investing in market research capabilities and data analytics is crucial for informed strategic decision-making and competitive advantage.

► Strengths and growth drivers

Jordan's engineering products sector holds substantial growth potential driven by strategic market opportunities and technological advancements. Leading local firms leverage 3D printing, robotics, and automation to enhance efficiency and quality. Collaborations with academic institutions and research centres further bolster innovation. Access to markets via free trade agreements such as the GAFTA agreement and the Jordan-European Union Association Agreement boosts export opportunities. High-potential export markets, including the Gulf Cooperation Council countries and high-demand products under HS code 841583, highlight strong international interest.

In the engineering services sector, sustainability initiatives and large-scale projects in the Gulf Cooperation Council countries and Iraq offer significant market potential. Adherence to international standards such as ISO 9001 (quality management systems) and ISO 14001 (environmental management systems) ensures quality and regulatory compliance. Incorporating advanced technologies such as building information modelling and the Internet of things strengthens service offerings and competitiveness.

The engineering products and services sectors in Jordan hold considerable growth potential. Opportunities for advancement include: adopting new technologies, which can drive productivity and innovation; expanding into regional and international markets; opening new revenue streams; increasing government support and incentives to ease regulatory burdens; investing in workforce training to address skill gaps and enhance sector capabilities; and focusing on sustainability to meet eco-friendly market demands.

However, several constraints impede progress. High operational costs, particularly related to energy and logistics, affect profitability and competitiveness. Stringent regulatory requirements can impose additional costs and barriers to market entry. Limited government support and funding restrict the ability of firms to invest in resources and technologies. Access to financing remains a challenge, hindering growth and innovation. Additionally, a shortage of skilled labour impacts productivity and quality, especially in specialized fields.

By addressing these constraints and capitalizing on the available opportunities, both sectors can achieve sustainable growth and enhanced competitiveness.

Policy orientation

The policy recommendations outlined in section 4 emphasize the importance of aligning educational programmes with current industry needs to foster a skilled workforce that can drive innovation in Jordan's engineering sector. Key strategies include promoting science, technology, engineering and mathematics education, enhancing industry-academia collaboration and providing continuous learning opportunities for the current workforce. To strengthen the business capabilities of SMEs, the recommendations advocate for technological upgrades, improved management practices and increased support for R&D.

The recommendations also focus on enhancing market access and financial stability through better utilization of free trade agreements, tailored financial support, and customer engagement initiatives. Moreover, there is a strong emphasis on creating more employment opportunities for women and youth by promoting equal opportunities and flexible work arrangements, and aligning industry needs with government policies.

To ensure the successful implementation of these recommendations, fostering synergies among key stakeholders, ensuring effective coordination, and promoting sustainability and innovation across the sector, are crucial. Addressing these areas will contribute to enhancing productivity, market competitiveness and overall growth in Jordan's engineering sectors.

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I. Methodological approach

Part 1: Desk review

The initial phase of the study involved a comprehensive desk review of existing literature and data sources to establish a foundational understanding of the targeted sector. This phase provided the essential context and baseline data necessary for the subsequent field research.

The desk review findings were utilized in the following sections of the study:

- Sector profile (for example, GDP, employment, exports and imports)
- Patterns and trends in trade
- Institutional framework (for example, legal framework and supporting functions)
- Market access overview

Part 2: Field research

The second part of the assignment included field research aimed at enriching and strengthening the insights collected from secondary research by delving into the specifics of the targeted sector. While secondary research provided a foundational understanding, the field research offered additional data to draw more reliable conclusions and create the value chain analysis for each subsector. This was achieved through a combination of surveys, interviews, workshops and focus group discussions. This comprehensive methodology not only validated and enhanced the information obtained through desk research but also uncovered new dimensions, challenges and opportunities. By bridging the gap between secondary research and field research, the data collection process contributed significantly to a deeper and more detailed analysis of the sector, ensuring that the secondary research findings reflected the richness and complexity of the industry.

Field research findings were utilized in the following sections of the study:

- Value chains
- Sector employment and skills needs
- Drivers for future growth
- Market opportunities and challenges

Surveys conducted and sampling

Surveys were conducted to gather quantitative data from a broad cross-section of firms of different sizes (micro, small, medium-sized and large) within the targeted subsector. A representative sample was identified using stratified sampling to ensure diverse representation across different sizes, locations and types of firms. The surveys included structured questions covering key performance indicators,

financial metrics, technology adoption and innovation activities. This method provided a large dataset that helped quantify trends and patterns within the sector.

The research involved firm-level data collection through structured interviews with key personnel, as well as discussions with ecosystem players, international experts and global value chain participants. A technical and policy foresight workshop engaged diverse stakeholders to develop sector-level skills governance arrangements and action plans. This approach aimed to enhance competitiveness, promote exports and equip workers with essential skills, ensuring a robust analysis of the sector's current landscape and future opportunities.

Sample size

- Quantitative survey: A total of 33 enterprises from both sectors participated in the quantitative survey.
- Qualitative survey: A total of 45 interviews were conducted, distributed as follows:
 - 12 enterprises
 - 23 ecosystem players
 - 10 informal workers

Representative quantitative sample

The quantitative sample comprised companies with the following distribution:

- 48 per cent were aggregators;
- 14 per cent were raw material suppliers;
- 17 per cent were both raw material suppliers and aggregators;
- 14 per cent were aggregators-processors;
- 4 per cent were manufacturers;
- 3 per cent were processors.

This distribution ensured a broad representation of the various roles within the engineering products and services sectors.

List of interviewees

Interviews were conducted with a wide range of stakeholders to gain qualitative insights:

- **Firm-level interviews:** Chief executive officers, managers and department heads from a representative sample of firms.
- **Ecosystem players and experts:** Representatives from employers' organizations, chambers of commerce, trade unions, industry support institutions and researchers.
- **International players and global experts:** Key figures from international value chains and experts with a global perspective on technology and investment.

The selection of interviewees was strategic to ensure that multiple perspectives were captured, enhancing the richness of the data collected.

Part 3: STED technical and policy foresight workshop

This workshop aimed to support the development of sector-level skills governance arrangements, share the cooperation activities in the sector and engage participants in the key stages of diagnostics and planning on the skills needs for the target sector. Workshop participants included business representatives, workers' and employers' organizations, key government ministries and agencies, and education and training providers.

To ensure a comprehensive and inclusive approach, the workshop employed a multifaceted method that:

- identified key stakeholders, ensuring representation from various sectors including business, workers' and employers' organizations, government ministries, agencies and education/training providers;
- facilitated interactive discussions, brainstorming sessions and group activities to encourage diverse perspectives and collaboration;
- captured insights and recommendations through documentation and feedback mechanisms during the workshop; and
- ensured gender and age inclusivity by actively involving women, men and youth representatives in the workshop sessions.

► **Table 11** Summary table of entities participating in the STED workshop

Entity type	Number	Percentage
Government	18	45%
Industry/employers' organization/business membership organization	11	28%
Workers' organization	2	5%
TVET institution	7	18%
Other	2	5%
Total	40	100%

Source: Results of STED workshop held in July 2024.

Each method used in the data collection phase contributed uniquely to the comprehensive understanding of the sector:

- **Surveys:** Provided quantifiable data on key metrics, allowing for statistical analysis and identification of patterns and trends.
- **Interviews:** Offered in-depth insights and qualitative data that helped understand the challenges, opportunities, and nuanced experiences of stakeholders.
- **Workshops and focus group discussions:** Facilitated interactive discussions and collaborative problem solving, generating practical recommendations and fostering stakeholder engagement.

By combining these methods, the field research provided a holistic understanding of the targeted sector, encompassing both local and global perspectives. The methodology ensured a balance between quantitative data and qualitative insights, fostering inclusivity and collaboration among various stakeholders.

STED workshop findings were utilized in the following sections of the study:

- Envisioning the future
- Visions for inclusive and sustainable growth in the future
- Business capability gaps
- Skills implication of business capability gaps
- Skills supply and mismatch
- Systematic constraints in the skills supply
- Skills shortages
- Skills gaps

II. List of market actors (by value chain) consulted during the study

Role in value chain	Entity name
Distributors/wholesalers	Decoration One
Distributors/wholesalers	Exeed Electronics
Economic and social organizations	Economic and Social Council - Jordan
Economic and social organizations	Jordan Economic Forum
Economic and social organizations	Jordan Strategy Forum
Government and regulatory bodies	Greater Irbid Municipality
Government and regulatory bodies	Ministry of Industry, Trade and Supply
Government and regulatory bodies	Ministry of Investment
Government and regulatory bodies	Ministry of Labour
Government and regulatory bodies	Ministry of Planning and International Cooperation
Government and regulatory bodies	Ministry of Public Works and Housing
International organizations and development agencies	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)
Manufacturers/producers	Petra Engineering Industries Co.
R&D	College of Advanced Vocational Training
R&D	Freelancer specialized in R&D
R&D	Hashemite University
R&D	Higher Council for Science and Technology
R&D	ILO - Better Work
R&D	Philadelphia University
R&D	Philadelphia University - Jordan Engineers Association
R&D	Royal Scientific Society - National Energy Research Center
R&D	University of Jordan
R&D	University of Applied Sciences
Service providers	Freelancer specialized in air-conditioning installation and maintenance

Role in value chain	Entity name
Support institutions	Amman Chamber of Industry
Support institutions	Business and Professional Women Association
Support institutions	Chamber of Commerce
Support institutions	General Federation of Jordanian Trade Unions
Support institutions	Irbid Chamber of Industry
Support institutions	Jordan Engineers Association
Support institutions	Jordan Enterprise Development Corporation
Support institutions	Jordanian National Committee for Women
Training provider	Sector Skills Council - Construction
Training provider	Technical and Vocational Skills Development Commission
Training provider	Vocational Training Corporation
Training provider	Wadi Seer Training Centre (UNRWA)





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