

ADVANCING DUAL VET FOR THE GREEN ECONOMY: STRENGTHENING SUSTAINABILITY AND INDUSTRY ALIGNMENT IN THE VET SYSTEM OF KOSOVO

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Abstract

The shift to a green economy necessitates a qualified workforce capable of adopting sustainable practices. The Vocational Education and Training (VET) system in Kosovo, has difficulties in aligning curricula with industry specific sustainability requirements. This article investigates the integration of sustainability and circular economy ideas into the Dual VET system, focusing on three main sectors: renewable energy/energy efficiency (RE/EE), ICT and wood processing.

The research suggests that while some VET institutions have adopted green initiatives, such as the installation of solar panels, recycling programs and eco-clubs, the progress remains unsatisfactory due to limited financial and technical resources, outdated curricula and a lack of alignment with environmental standards (ISO 14001:2015, etc.). Many businesses struggle to engage with the Dual VET system due to unclear legal frameworks and administrative burdens, further hindering the development of sustainability skills.

To overcome these gaps, this study suggests greater coordination among VET institutions, the business sector and policymakers, as well as increased investment in contemporary training facilities, curriculum revisions, and sustainability certifications. Establishing sectoral skills committees, incorporating green skills into all VET content and increasing awareness through media campaigns and business collaborations can help to guarantee that Kosovo's workforce is ready for the demands of the green and circular economy. Strengthening these efforts will help Kosovo's climate obligations, Smart Specialization Strategy and long-term economic sustainability.

Keywords: *Dual VET, sustainability, green economy, vocational education, renewable energy.*

JEL Classification: C0

1. INTRODUCTION

The education system in Kosovo is mainly public and is organised as follows:

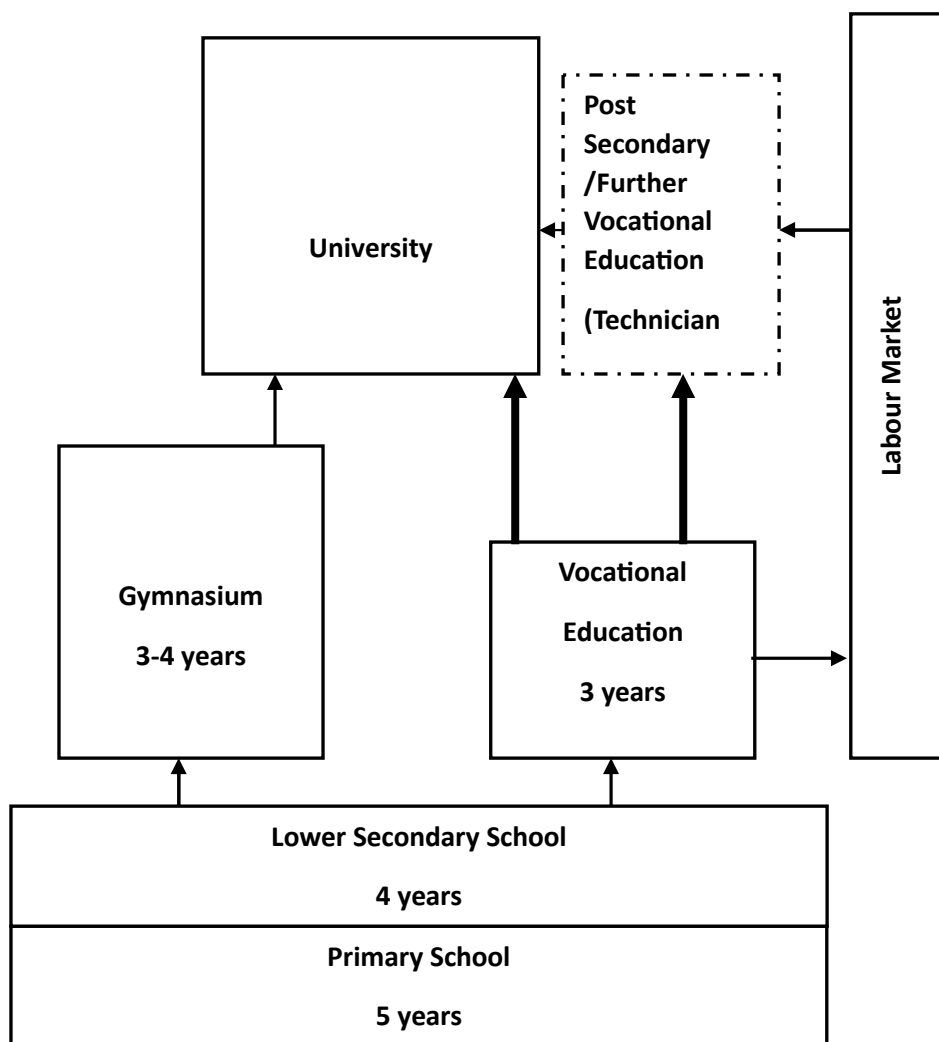


Figure 1. Structure of the education system in Kosovo

The Vocational education and training (VET) system in Kosovo is part of Pre-University Education. The formal qualifications in VET include Levels 3 to 5 as regulated by the National Qualifications Authority (NQA) (NQF, 2020). Level 3 is achieved after completion of grades 10 and 11, while Level 4 is achieved after completion of grade 12. Level 5 is achieved after completion of academic and professional qualifications (formal and informal) between upper-secondary level and higher education.

Kosovo has 68 public VET schools, including six Centers of Competence managed by AVETAE, a MESTI agency (Law no 04/L-138, 2013). Due to capacity constraints, AVETAE has directly managed the Centers of Competence, whereas other VET schools are under the umbrella of MESTI. Municipal Education Directorates (MEDs) oversee VET administration in Kosovo, managing facility construction, maintenance, health, safety. Under the Law on Pre-University Education, they also hire and pay teachers. However, varying interpretations create regional differences in VET administration (Themel, 2024).

In Kosovo, 23 VET schools have fewer than 200 students, while 16 have fewer than 100, indicating a lack of adequate equipment for quality VET instruction. In the 2023/2024 school year, 57.5% of upper secondary students are enrolled in VET programs, 42.5% of them are girls (EMIS, 2024), although only 14.6% of girls enroll in technical profiles. In-company training involves 27.8% Work Based Learning (WBL) and 50% Dual Learning (Bajrami, 2024).

Traditional VET programs include school based (SB) training and WBL, as well as standardized professional practice in school workshops or enterprises. WBL duration is set in the curriculum (MESTI AI 137, 2020).

- Grade 10: 35 weeks with 1 day of WBL and 4 days of SB VET.
- Grade 11: 35 weeks, 1.5 days of WBL and 3.5 days of SB VET.
- Grade 12: 32 weeks with 2 days of WBL and 3 days of SB VET.

Schedules are determined by schools and workplaces, with WBL available as a full-semester block in Grade 12 (Likaj, 2023, p.21).

Dual education programs are based on traditional VET and use standardized curricula approved by the Ministry of Education. Professional practice is entirely company-based, with a systematic approach that aligns traditional curriculum content with job-specific training and credit needs.

Dual education in Kosovo started implementation in the school year 2022/2023, involving five classes of 10th-grade students specializing in hairdressing, culinary arts, hotel hospitality assistance, and masonry. VET students will have the chance to dedicate over half of their educational time to practical experiences in authentic work environments throughout the three-year program.

MESTI has announced that in the school year 2023/2024, dual education will be expanded with an additional 8 new profiles. There will be a total of 12 dual education profiles in 21 vocational schools across 14 different municipalities.

The profiles in which dual VET will be piloted are Cook, Hotel Hospitality Assistant (Waiter/Waitress), Hairdresser and Mason, Tailoring, Automotive Mechanic, Metal Processing, Wood Processing, Heating and Air Conditioning Installer, Electrician, Wholesale and Retail Trade and Aesthetician (Likaj, 2023).

Table 1 presents a comparison of professional practice between traditional and dual curricula in public VET schools in Kosovo.

Table 1. Comparison of professional practice: traditional vs dual curricula

	Work-based learning in companies	
	traditional	dual
Number of days in companies	on average 1,5 days	on average 2,5 days
Teaching units per week	9	16,66
Total amount of TH	909 out of 3264	at least 1632 out of 3264
Share of overall TH	27,8%	50%

Source: WBL in Kosovo; An assessment per EU quality standards
(K. Bajrami, 2004, p. 24)

2. LITERATURE REVIEW

Moving towards green skills and a green future refers to the shift toward an environmentally sustainable, circular, and carbon-neutral economy while ensuring fairness and inclusivity. This transition has broad social impacts, affecting employment, income, healthcare, household costs, and gender roles, varying across sectors and demographics.

Dual Vocational Education and Training (VET) is inherently collaborative and plays a crucial role in facilitating the transition. It helps by:

Educating students with green skills helps in equipping workers with green skills and reskilling them for evolving industries. Adapting curricula to green skills encourages new professionals to adopt new green innovations in terms of green processes and green products in a way that in future economies they will produce with a focus not only on economic performance but also on environmental performance.

Strengthening cooperation among key stakeholders, including government, businesses, and educational institutions, with the help of countries, including Kosovo, to a better future for all the citizens.

Dual VET must integrate economic, social, and ecological factors. A holistic perspective ensures that vocational training aligns with sustainability goals while addressing the needs of all stakeholders in the VET ecosystem.

Within this context, VET is seen as a crucial component of skill-formation systems that support green jobs and skills in these policy environments (Avis, 2020). Based on surveys and interviews with VET instructors and student teachers, research has also helped develop a pedagogical framework for green skills (Nurdianshyah *et al.*, 2019; Ramli *et al.*, 2019; Setiawan *et al.*, 2017).

Also, based on the Oslobrück Declaration (2020) for the years 2021 to 2025, considering the revised European Skills Agenda and the idea for a Council recommendation on VET for sustainable competitiveness, social justice, and resilience, the four key topics are:

1. Resilience and excellence through quality, inclusive and flexible VET
2. Establishing a new lifelong learning culture – relevance of C-VET and digitalization.

3. Sustainability – a green link in VET
4. European Education and Training Area and international VET

The second objective of (Oslobrück Declaration, 2020) is that people want assistance to upskill and upgrade their abilities when employment and qualification profiles shift and new professions arise in the digital and green transitions. National and European qualification systems have grown to be essential components of methods for qualifications that promote openness and excellence in credentials. Promoting VET is essential, specifically on the pathways of the green transitions between education and shaping the new professions. Based on objective 3 (Oslobrück Declaration, 2020), businesses and cultures are impacted by responsible environmental behavior. Concerns like labor demand, education, skills, occupations, and the geographic distribution of employment and people are all impacted by sustainability. Businesses, groups in the private sector, and community projects are important forces behind economic and social sustainability. It should be the goal of Dual Vet to incorporate sustainable skills into their policies and procedures.

3. METHODOLOGY

This study assessed the VET system in Kosovo using a mixed-methods approach that included desk research, primary data gathering and stakeholder consultations. It concentrated on capacities, problems and opportunities in ICT, Green Energy and Wood Processing. The methodology aimed to assess the business sector's and public VET school readiness for Dual VET implementation through extensive data collection, analysis and evaluation.

3.1. Research design

The research used qualitative and quantitative methods to assess VET schools and companies' readiness for Dual VET, green agenda, sustainability and alignment of VET study programs with labour market needs. The study combined primary and secondary research, incorporating stakeholder feedback through consultations to ensure accurate and relevant findings.

3.2. Data collection

The study used several research approaches. Desk research analyzing secondary data, such as government strategies and sectoral reports, to determine skill requirements in green energy, ICT and wood processing. The survey evaluated the readiness of all public VET schools, training centers and around 40 businesses for Dual VET expansion. Semi-structured interviews with most important relevant stakeholders (government, education and labour agencies, business associations, VET providers, etc.), businesses covering three sectors for sector-specific insights (ICT, RE, EE and wood processing). Focus groups with

key 27 stakeholders discussed VET preparedness, work-based learning best practices, gender inclusion, the integration of sustainability and circular ideas into for Dual system.

3.3. Data analysis and limitations

The analysis employed both quantitative and qualitative approaches. Surveys and secondary data were analyzed statistically to investigate VET trends and skill gaps. Data gaps, particularly in enrollment and green energy skills, were addressed through consultations and secondary sources.

4. KEY FINDINGS

The research is focused on key sectors with economic potential, skill demands and vocational training alignment. The ICT sector has expanded significantly, doubling the number of active companies and boosting exports. Software development and outsourcing are key drivers, but skill gaps in software engineering, data analysis and cybersecurity persist. Emerging technologies like AI and blockchain further highlight workforce misalignment with industry needs (Likaj *et al.*, 2025).

Renewable energy and energy efficiency are expanding areas, pushed by Kosovo's environmental objectives. Investments in solar, wind and hydropower provide green jobs, but labor preparedness remains an issue. Training system design, installation and maintenance are insufficient, necessitating curriculum revisions and capacity building (Euler, 2024).

The wood processing business has gradually expanded, with a 50% rise in companies and jobs. The demand for trained personnel in CNC programming and complex machinery is increasing, but VET programs are not aligned with labour market needs and do not follow the technological trends, with low enrollment and negligible female participation. Expanding practical training and work-based learning is critical to maintaining industry growth.

Figure 2 shows the sectors of DUAL VET in which companies operate. The most popular sector is ICT, followed by renewable energy and energy efficiency. Traditional sector, such as wood processing has a smaller share but are nevertheless essential.

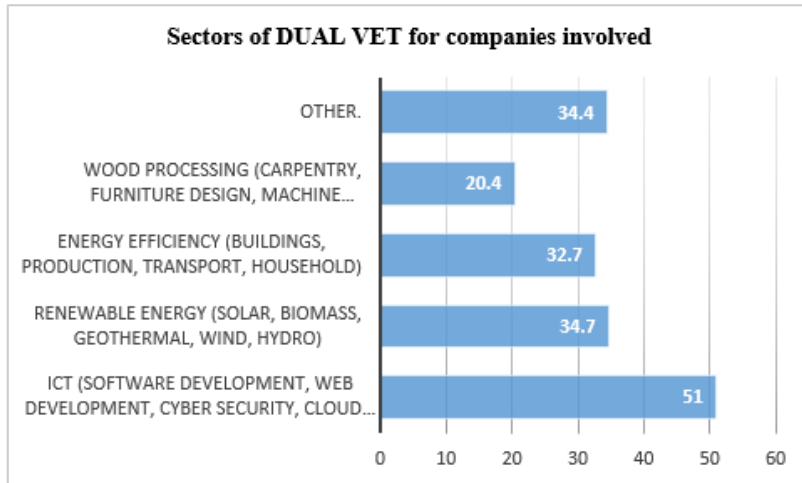


Figure 2. Sectors of Dual VET for companies

4.1. Dual VET sustainability and green agenda, Companies vs VETI

The VET system in Kosovo faces challenges in integrating environmental considerations. On the environmental front, sustainability is mentioned in the Kosovo Development Strategy but is not adequately reflected in VET curricula and the Strategy for Environmental Protection and Sustainable Development 2022 – 2031 (GOK NDS, 2030). The renewable energy sector, essential for Kosovo's green transition, lacks specialized training despite its growth. Learning from countries with advanced green skills integration, Kosovo could embed sustainability modules across VET profiles. Green initiatives are gradually being incorporated through eco-clubs, recycling, and renewable energy workshops. About two-thirds of businesses recognize the importance of environmental issues. Expanding sustainability in VET and aligning with standards like ISO 14001 will enhance practical learning but it needs greater scale to address climate change effectively (Likaj, *et al.*, 2025).

Green activities are a major focus, with VET schools teaching students about sustainability, energy efficiency (EE), and environmental protection. Some VET Schools are recognised for their initiatives, such as installing solar panels and mitigating climate change. VET programs should further include EE and environmental protection to better equip students for green careers. Awareness campaigns, seminars, and student eco groups encourage environmental preservation through hands-on training and recycling. However, insufficient financial and technical resources, particularly in smaller or less-equipped VET schools and companies, may impede the full implementation of sustainability initiatives (Likaj, *et al.*, 2025). Furthermore, there are gaps in integrating educational goals with industry specific sustainability requirements, notably in the

green sector. A lack of awareness and ability to apply environmental standards, such as ISO 14001:2015, impedes progress as shown in Figure 3.

To promote environmental sustainability, systemic initiatives are necessary, such as implementing mandatory green skills training across all VET profiles to make sustainability a core competency and by enhancing partnerships with donors and international organizations to test inclusive and ecologically friendly VET programs. By addressing these issues, Kosovo may develop a VET system that not only meets labor market demands, but also promotes and supports the country's green transformation.

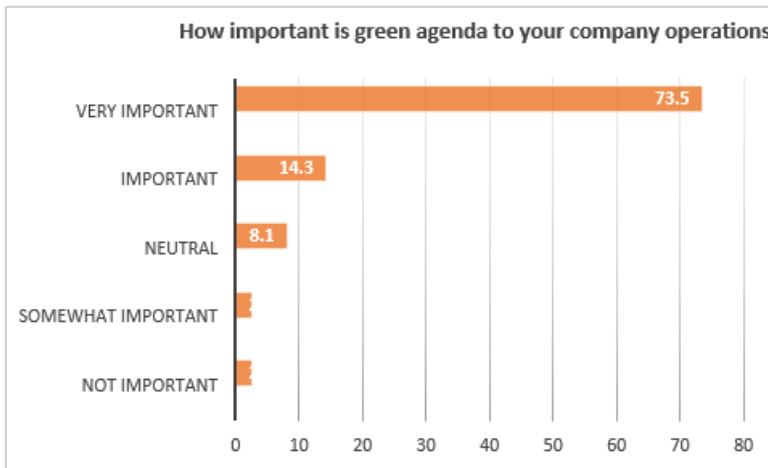


Figure 3. Importance of the green agenda for company operations

The majority of respondents 87.8% combined for very important and important believe that the Green Agenda is extremely essential, indicating that sustainability is becoming more and more acknowledged as a critical component of their operations. A smaller percentage, on the other hand, is neutral or less convinced, suggesting a possible area for additional discussion and education on the subject.

The answers from Figure 4, show the widespread adoption of sustainable practices, which place a high priority on recycling, waste reduction, and energy efficiency. An extensive business commitment to the education of staff about sustainability is indicated by the comparatively high adoption rate of environmental awareness training.

The decreased use of sustainable sourcing and other unique approaches, however, suggests that additional actions or investments might be required.

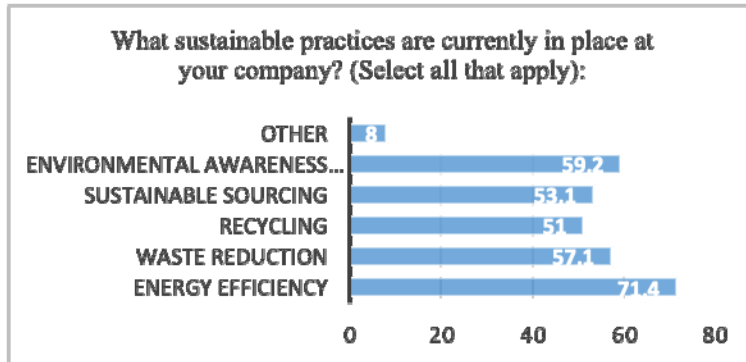


Figure 4. Sustainable practices implemented in companies

A majority of respondents 87.8% in this section emphasize the Green Agenda's significance in their business strategies by stating that they consider it to be crucial to their operations. EE 71.4%, waste reduction 57.1%, and environmental awareness training 59.2% are the sustainable strategies that are most frequently used. But recycling 51% and sustainable sourcing 53.1% are also important, but a little less common. Although more involvement may be required for organizations that place less focus on sustainability, the low percentage of organizations 2.5% that believe the Green Agenda is not vital indicates that sustainability is becoming more and more significant.

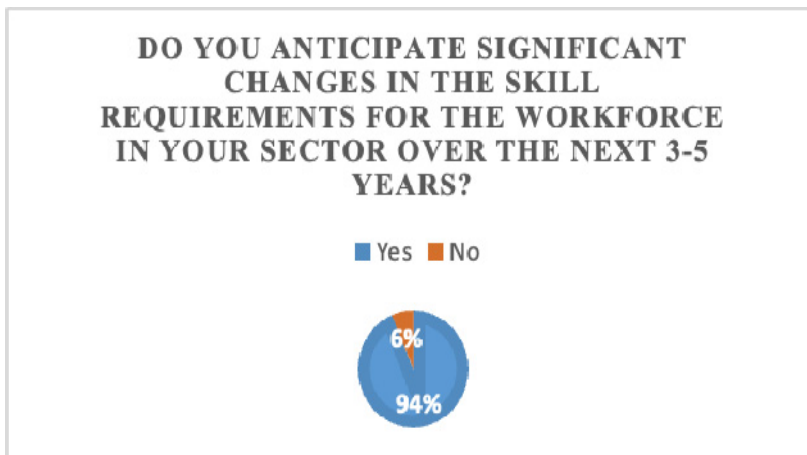


Figure 5. Skill requirements for the next 3 -5 years

Results shown in Figure 5 indicate that over the next 3-5 years, 93.9% of respondents anticipate major changes in the skills needed. Figure 6, illustrates the rising need for expertise in sustainability and innovative technology, especially in

the areas of advanced technical skills 68.1%, digital and IT skills 70.2%, and green skills 59.6%. Additionally, respondents predict that automation, AI and green technology will significantly boost the demand for skilled people, pointing out the significance of future VET programs to satisfy these changing demands as shown in Figure 7.

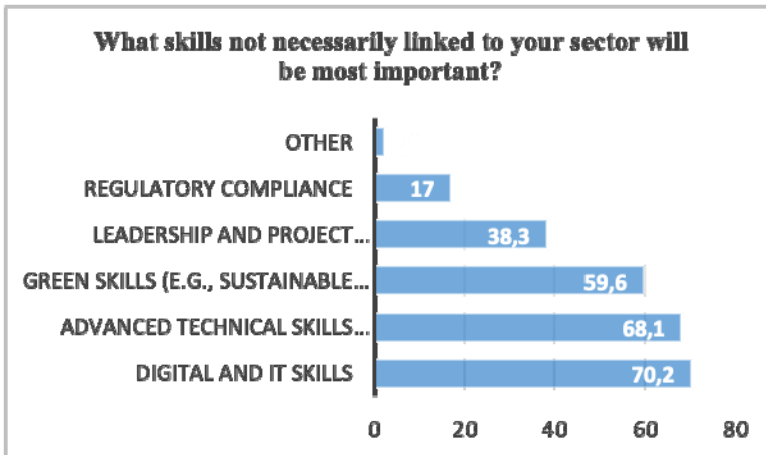


Figure 6. Skills that are not necessarily linked with the respective sector but are most important for company operation

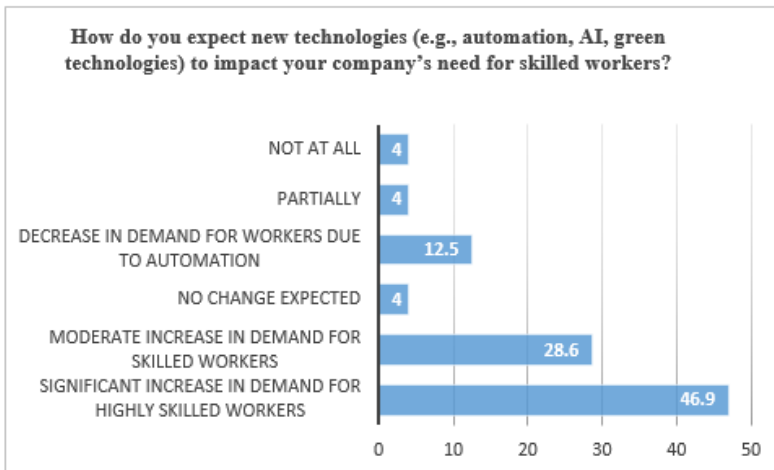


Figure 7. The company needs skilled workers (e.g. automation, AI, green)

To reach a wider environmental impact, it is advised that businesses keep waste reduction and energy efficiency as top priorities while stepping up their efforts in recycling and sustainable procurement. Green practices can be further

improved by putting more emphasis on integrating sustainability into supplier chains and other business areas.

Furthermore, integrating sustainability into company culture may be achieved by promoting greater environmental awareness through more specialized training.

Increased commitment to sustainability may result from interacting with businesses that place less emphasis on or are neutral toward the Green Agenda. Furthermore, integrating sustainability into company culture may be achieved by promoting greater environmental awareness through more specialized training and guidance.

In conclusion, even though VET graduates are widely appreciated, there is a noticeable need for better alignment with industry needs and advancements in technical, digital, and soft skills. To prepare students for the demands of the profession in the future, employers are looking for more hands-on, practical training and want VET programs to keep up with technological developments.

It is advised that VET programs concentrate on improving technical, digital, and project management skills to better meet industry needs and address the problems mentioned. To guarantee that training is customized to particular job profiles, there should be more collaboration between VETI and businesses.

Training periods should be flexible to allow for more hands-on experience, and curricula should be made more adaptable to changing industry demands. Clearer career advancement pathways and greater harmonisation with students' interests are two crucial ways to improve student engagement and retention.

Additional hands-on experience and industry specific expertise should be included in VET teacher qualifications. Lastly, to prepare the workforce for the future, VET programs need to incorporate green skills and emerging technologies (Likaj *et al.*, 2025).

Results of the survey shown in Figure 8, show that a considerable number of VETI 90.9% understand the importance of the Green Agenda in their operations, with 31.8% rating it as extremely essential and 59.1% as important. This demonstrates a good correlation with sustainable practices, indicating that VETI are progressively incorporating environmental considerations into their actions.

The high percentage of environmental awareness training demonstrates that VETI prioritizes knowledge dissemination to promote sustainability among employees and students.

Sustainable practices undertaken include EE and waste reduction 27.3% each, recycling and sustainable resources 22.7% each and environmental awareness training 63.6%. Only 4.5% of VETI have green groups or teams as shown in Figure 9.

This implies a high level of awareness and execution of sustainable practices, but it also points out the need for further community engagement and deeper integration of green initiatives.

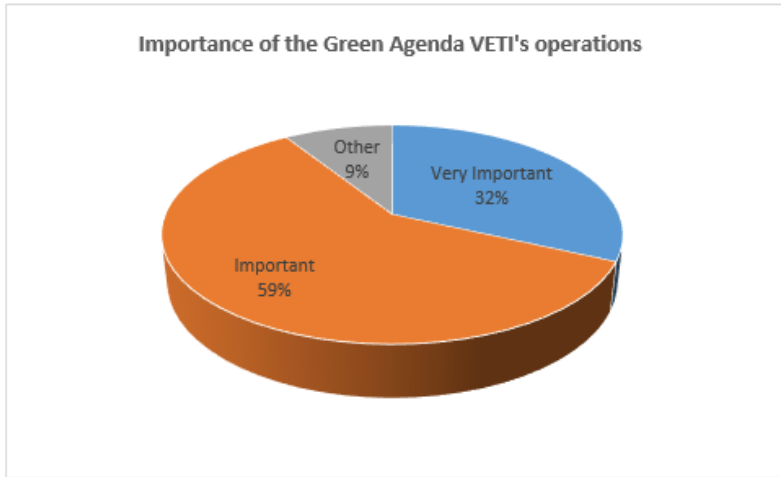


Figure 8. Importance of the green agenda for VETI operations

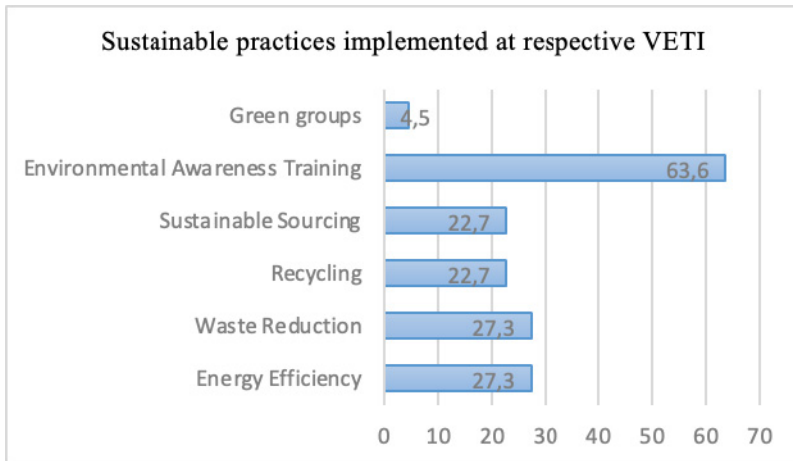


Figure 9. Sustainable practices implemented in VETI

To encourage involvement of students, teaching staff and other stakeholders VETI can increase environmental awareness training and promote green clubs. Integrating sustainable resources and circular economy principles into education processes. Furthermore, sustainability should be included in the curriculum framework and procurement policies to increase environmental actions and train students for green sectors.

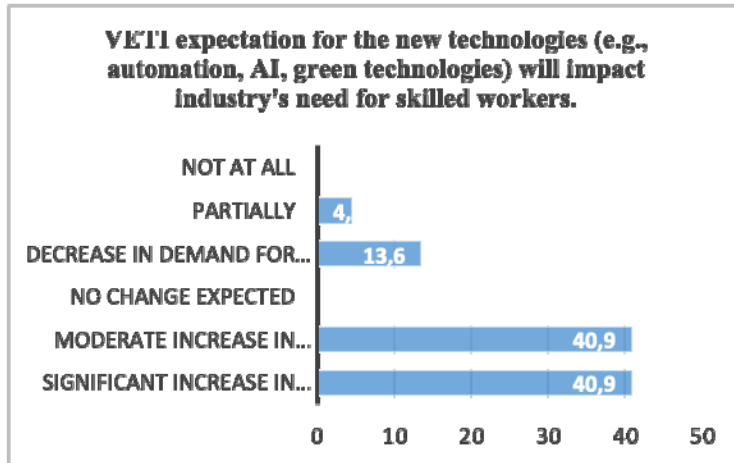


Figure 10. VETI expectations for the new technologies impact on skill needs (e.g. automation, AI, green)

The results of the survey shown in Figure 10, indicate that the impact of new technologies such as automation, AI and green technology is predicted to significantly increase demand for skilled labor with 40.9% of respondents expecting a major increase. VET institutions must react to these developments by providing training in emerging technologies to suit future industry demands.

4.2. Renewable Energy and Energy Efficiency Sector

Solar energy technicians and energy management specialists top the list of job profiles in the RE and EE sectors, according to the study results (Likaj, *et al.*, 2025). Wind turbine technicians and energy efficiency inspectors are also in high demand, as shown in Figure 11. Nevertheless, there was no response to the question about essential abilities or competences and skills, which may indicate a lack of knowledge or understanding regarding the precise competences and skills needed for these positions. Given the growing demand for solar energy technicians, energy management specialists, and EE auditors, it is advised to concentrate on improving training programs for these professions and coordinating educational initiatives with business demands (Likaj *et al.*, 2025).

This role has the highest demand of the listed profiles, indicating a strong interest in solar energy technologies and EE which are critical in the transition to renewable energy.

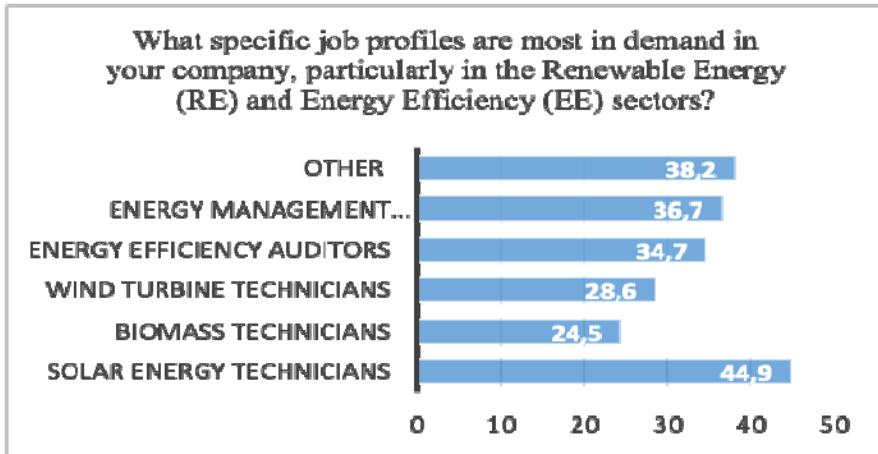


Figure 11. Job profiles in demand for the companies (RE, EE)

The study results in Figure 12, show a significant need for Solar Energy Technicians 18.2%, EE jobs 27.3%, indicating the growing importance of these industries. However, 57.5% of respondents reported no demand for any of the specified job descriptions, indicating a gap in industry awareness or preparation, thus raising awareness of career options in these sectors is critical.

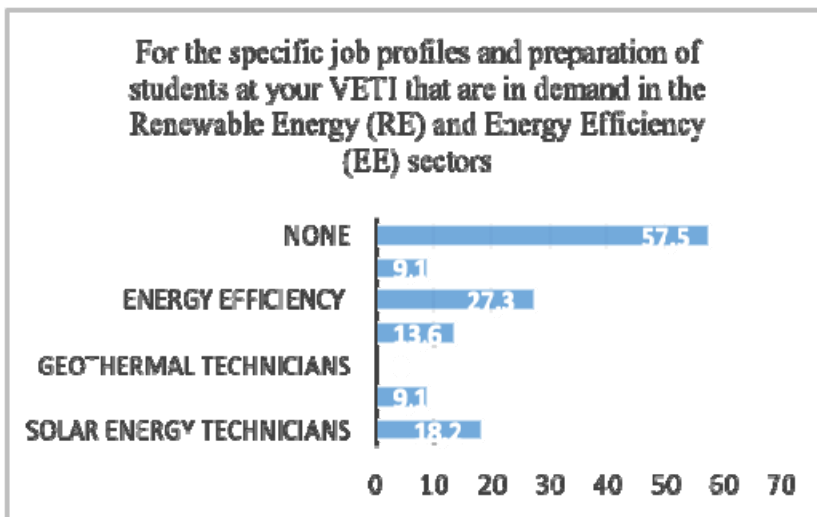


Figure 12. Job profiles in demand for provision at VETI (RE, EE)

5. CONCLUSIONS

Despite mentioning sustainability in the Climate Change Strategy, the Kosovo VET system faces obstacles in incorporating environmental factors. There is a shortage of specialist training in the renewable energy sector, although green initiatives such as eco-clubs and workshops are gradually being implemented. Two-thirds of firms acknowledge environmental concerns, but financial and technical obstacles prevent full adoption of sustainability initiatives. Many firms understand the value of green talents and anticipate a need for technological, digital, and green skills in the coming years. VET programs must better correspond with business needs, including developing technology and green skills (Likaj, *et al.*, 2025).

Solar energy and energy efficiency positions are in high demand, yet there is a lack of understanding about the exact skills required. More study is needed to identify these skills and guarantee that VET programs meet the changing needs of the labor market. Improved relationships with businesses and the extension of sustainability training can assist in closing these gaps.

To increase the integration of sustainability in Kosovo's VET system, sustainability must be made a fundamental skill across all training programs, with environmental issues incorporated into curricula. The renewable energy sector, notably solar energy, energy management, and energy efficiency, should get more targeted training to fulfill the growing demand for competent professionals in these disciplines. Strengthening collaborations with corporations, funders, and international organizations will assist in giving practical, hands-on training in developing technologies while also ensuring that VET programs remain relevant to industry demands.

Despite the rapid growth of the ICT sector in Kosovo, talent deficiencies threaten the long term viability of the digital and circular economy. Employers are having difficulty finding skilled youngsters in software engineering, data analysis and cybersecurity, all of which are critical for green and circular solution development. Emerging technologies like artificial intelligence, cloud computing, and blockchain highlight the need for more industry specific training. While institutions in Kosovo produce ICT graduates, improved academic industry links are critical for building a resilient, sustainable and digitally oriented economy, (Likaj *et al.*, 2025).

Furthermore, VET courses must be revised to reflect industry-specific sustainability standards, emphasizing the importance of green technology, automation, AI and digital skills. Promoting environmental awareness in VET institutions through eco-clubs and sustainability workshops will involve students and faculty in active environmental conservation. Finally, addressing knowledge gaps about the unique competences necessary in green sectors will guarantee that training programs keep up with changing labor market demands.

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