WP3. “Setting the professional skills”

Survey report in National context of Italy

IIPLE - **Istituto di Istruzione Professionale Lavoratori Edili di Bologna**

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BuildOffsiteEU

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Synthesis

“ BuildOffsiteEU : Off-site Industry-towards Innovation in Construction Sector” is a project co-financed by the European Commission under the Erasmus+ program and is implemented in the following EU countries: Spain, Greece, Slovenia, Italy, North Macedonia.

One of the main tasks of the BuildOffsiteEU project is to define new professional skills, bridging the skills gap between "traditional occupations" and "enhanced occupations" of industrialized construction through a detailed analysis of sustainability principles from an EE&CE point of view and their relationship with industrialized construction procedures/processes and activities allow us to define the "green skills and competences" necessary to qualify-retrain the "new workers".

The BuildOffsiteEU project is identifying and establishing clear and validated links between the skills of traditional profiles and those required by industrialized construction and provides construction workers with accurate information on their reskilling needs in this innovative field.

Skills mapping of new workers highlights skills gaps in the workforce and helps key target audiences and beneficiaries of BuildOffsiteEU (in particular VET centres, employers and trainers) to identify their needs and the opportunities offered by this model sustainable construction.

The survey provides information on the skills that workers need to update to create industrialized constructions, improving energy efficiency and the circular economy, and also indicates some recommendations. This will contribute to the development of new training programs and curricula for workers in the construction sector.

The national online survey was carried out between December 2023 and January 2024. The Google online survey was sent to a wide range of IIPLE targets which included: employers/managers/employees of industrialized construction companies; competency-based performance experts and evaluators; VET trainers in the construction sector, qualified students in the sector. The survey was filled out by 20 people.

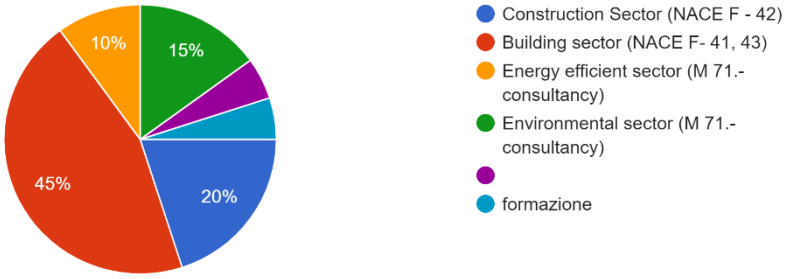
Profile of the participants in the interviews/focus groups

20 people participated in the survey. In the graphs below it is possible to observe the percentages of the interviewees with respect to the sector they belong to (Sector – graph n.1), the job position held (Working position – graph 2), the gender (Gender – graph n.3) and the age (Age – graph n.4).

It is therefore possible to note that the male gender prevails, as do employees and managers in the construction sector. The age is mainly between 18 and 46 years.

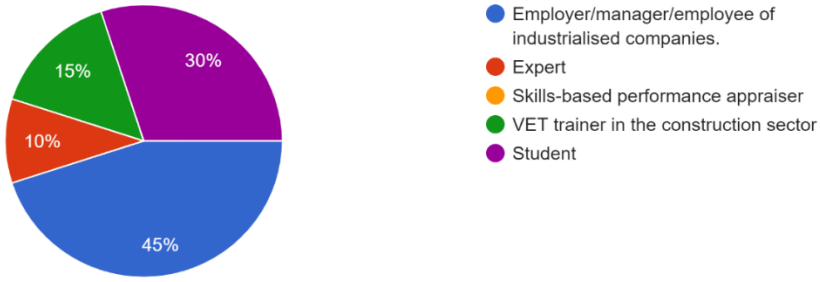
Sector

20 risposte

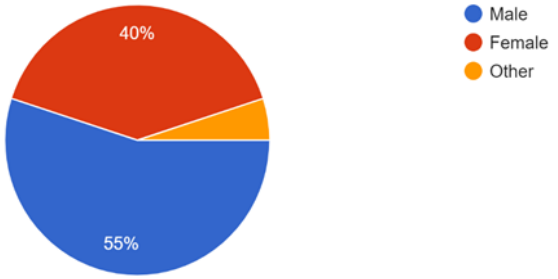


Working position

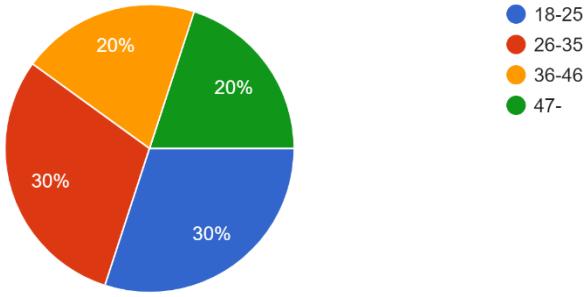
20 risposte



Gender
20 risposte



Age
20 risposte



Presentation of the results of the online survey in Italy

four occupations were selected , deemed relevant in the context of the survey:

1. Installer electrical – ESCO Code 7411.1;
2. Installation engineer for HVAC systems (heating, ventilation and air conditioning) – ESCO Code 3115.1.5;
3. Roof workers; Code ISCO-08 7121
4. Construction workers – ESCO Code 7114 and 7112.1.

The pool of skills for each of these professions was extracted from the ESCO database considering the existing skills identifiable as "traditional" and l skills to be updated /integrated associated with skills for industrialized construction.

The selected skills were divided into 3 categories: managerial, transversal and technical skills.

For each occupation, respondents were asked to select from the skill pool and identify which group a certain skill belongs to, i.e. “existing skills” – what workers currently know and are able to do for selected occupations, called “traditional skills" or "skills to be upgraded", necessary to enable the successful transition of the sector towards industrialized construction.

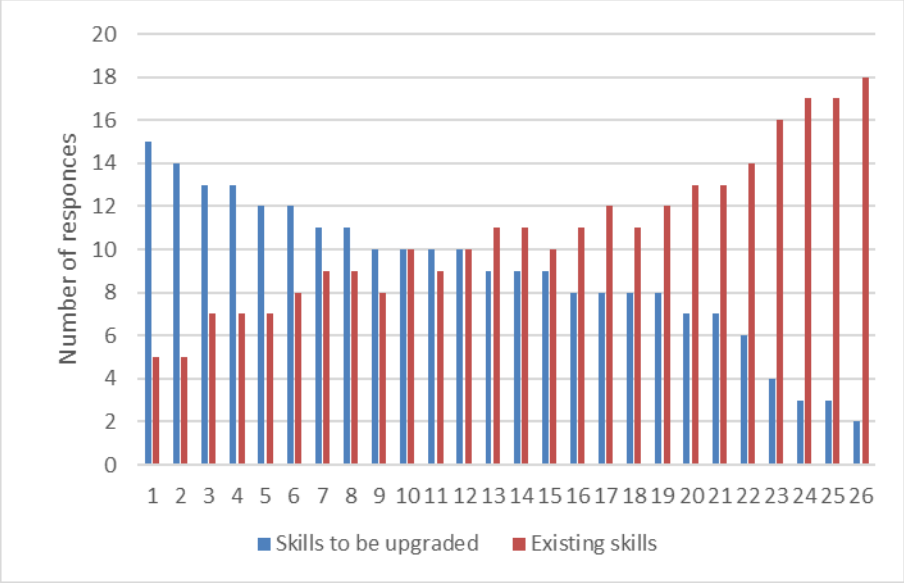
The main skills for the four occupations that need to be retrained in the country related to industrialized construction, improving energy efficiency and the circular economy are defined by the number of responses received for each of the skills in the questionnaire.

1. Electrical installer

Existing “traditional” skills for electrical installers define that they currently perform work inside and outside in almost every type of facility:

- Install and maintain electrical cables and other electrical infrastructure in buildings.
- Installation and maintenance of electrical equipment and machinery.
- Make sure that the electrical equipment installed is insulated and does not present a fire risk.

Graph 1 presents the results of the online survey on the profession of electrical installers. The blue bars represent the skills to be updated for electrical installers, while the red bars represent the "traditional" skills.



1. calculate the orientation of the solar panel
2. follow health and safety procedures in construction and working at heights
3.install smart devices
4. uses BIM models
5. install automation components
6. interpret 2D and 3D digital floor plans
7. mount photovoltaic panels
8. assemble the sensors
9. work on a construction team
10. Test and resolve equipment malfunctions
11. Provide the power connection from the busbars
12.write inspection reports
13.install inverter
14.calculate building supply needs
15.Use diagnostic tools for electronic repairs
16.assemble electrical and mechatronic components and units
17. Repair wiring systems
18. replace defective components
19. check the compatibility of the materials
20. install cabling systems, lightning protection and protection systems
21. measure the electrical characteristics
22. install electrical panels
23. install household appliances
24.Work with high voltage electrical current
25. use precision tools
26. use measuring tools

Graph 1 . "Traditional" skills and abilities to be updated for the Electrical Installer profile

Below is the classification of the "traditional" skills of the electrical installer:

1. use measuring tools
2. Work under tension
3. use of precision instruments
4. install household appliances
5. install electrical panels
6. install cables, lights and protection systems
7. Install the wiring, lightning protection and protection system
8. measure the electrical characteristics
9. Install inverter
10. assemble electrical and mechatronic components and units
11. calculate building supply needs
12. replace defective components
13. Test and resolve equipment malfunctions
14. Use diagnostic tools for electrical repairs
16. write inspection reports
17. check the compatibility of the materials
18. Provide power connection from busbars
19. assembly of photovoltaic panels
20. work in a team
21. interpret 2D and 3D digital projects
22. install smart devices
23. installation of automatic components
24.Use of the BIM model
2 5. Follow safety procedures when working at heights
26. Calculate the rotation of the solar panels

Below is the ranking of the most important skills to update for the electrical installer:

1. calculate the orientation of the solar panel
2. follow health and safety procedures in construction and working at heights
3. install smart devices
4. uses BIM models
5. install automation components
6. interpret 2D and 3D digital floor plans
7. mount photovoltaic panels
8. assemble the sensors
9. work on a construction team
10. Test and resolve equipment malfunctions
11. Provide the power connection from the busbars
12.write inspection reports
13.install inverter
14.calculate building supply needs
15.Use diagnostic tools for electronic repairs
16.assemble electrical and mechatronic components and units

17. Repair wiring systems
18. replace defective components
19. check the compatibility of the materials
20. install cabling systems, lightning protection and protection systems
21. measure the electrical characteristics
22. install electrical panels
23. install household appliances
24. work with high voltage electrical current
25. use precision tools
26. use measuring tools

There is a clear gap between "traditional" skills and the skills to be updated for electrical installers. Below are the main skills for electrical installers who need to be retrained in Italy in relation to industrialized construction, improving energy efficiency and the circular economy:

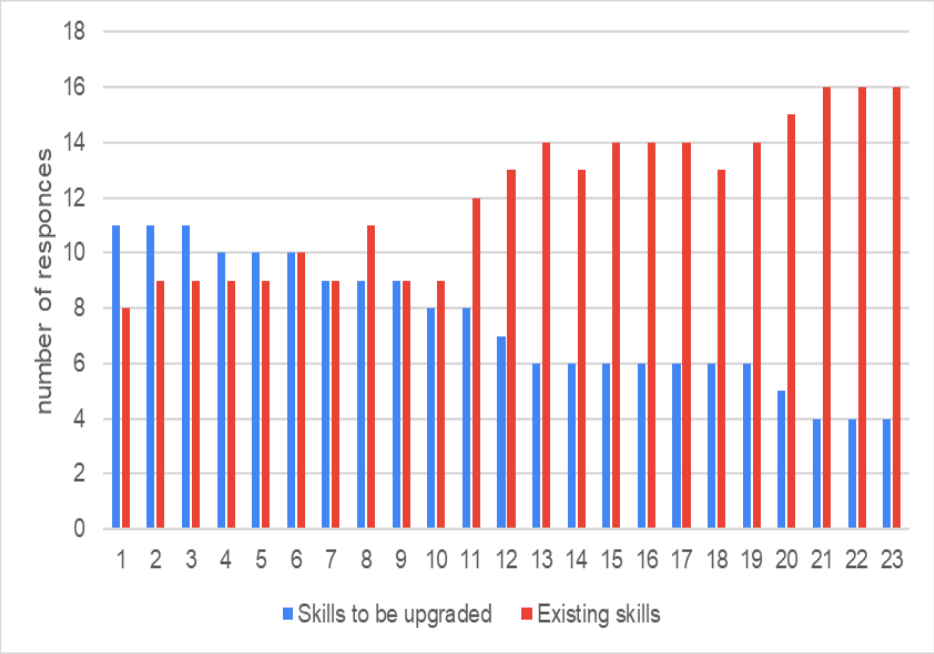
1. calculate the orientation of the solar panel
2. follow health and safety procedures in construction and working at heights
3. install smart devices
4. uses BIM models
5. install automation components
6. interpret 2D and 3D digital floor plans
7. mount photovoltaic panels
8. assemble the sensors
9. work on a construction team
10. Test and resolve equipment malfunctions

2. HVAC Engineering Technician

The “traditional” skills that exist for HVAC engineering technicians are:

- Help in the design and installation of devices that provide heating, ventilation, air conditioning and possibly refrigeration in buildings.
- Make sure the equipment complies with environmental standards.
- Handle hazardous materials used in systems.
- Make sure safety precautions are taken.

The results of the online survey for HVAC engineering technician employment are presented in Graph 2. The blue bars represent skills for HVAC engineering technicians to upgrade, while the red bars represent “traditional” skills.



1 . ensure compliance with environmental regulations
2.manage the refrigerant transfer pumps
3. interpret 2D and 3D digital floor plans
4.organize equipment repairs
5.lead a team
6. carry out maintenance on the installed equipment
7.install a geothermal heat pump
8. apply health and safety regulations
9.Perform refrigerant leak checks
10. installation and maintenance of home automation systems
11.drain dangerous liquids
12.install heating, ventilation, air conditioning and refrigeration ducts
13. resolve equipment malfunctions
14.carry out routine checks on machinery
15.advise on adapted ventilation systems
16.install the air conditioning device
17.install ventilation equipment
18.lay the pipe installation
19.Install the heating pump
20.install refrigeration equipment
21.monitor service equipment and use test equipment
22.install electrical and electronic equipment
23.install the heating boiler

Graph 2 . “Traditional” skills and abilities must be updated for the job of plant engineer of HVAC systems .

Below is the ranking of "traditional" skills for the HVAC engineering technician:

1. monitor service equipment and use test equipment
2. installation of electrical and electronic equipment
3. boiler installation
4. installation of refrigeration equipment
5. conduct routine checks on machinery
6. installation of devices Install heating, ventilation, air conditioning and refrigeration ducts
7. heat pump installation
8. installation of ventilation devices
9. installation of heating boiler
10. advise on adapted ventilation systems
11. lay the pipe installation
12. resolve equipment malfunctions
13. installation of devices Install heating, ventilation, air conditioning and refrigeration ducts
14. perform refrigerant leak checks
15. Installation of geothermal heat pumps
16. arrange equipment repairs
17. Apply health and safety STDs

18. Operate refrigerant transfer pumps
19. Interpret digital diagrams in 2D and 3D
20. Discharge of dangerous liquids
21. Lead a team to perform maintenance on installed equipment
22. install and maintain home automation systems
23. ensure compliance with environmental legislation.

Below is the ranking of the most important skills to update for the HVAC engineering technician:

1. manage refrigerant transfer pumps
2. ensure compliance with environmental regulations
3. interpret 2D and 3D digital floor plans
4. organize equipment repairs
5. lead a team
6. carry out maintenance on the installed equipment
7. install a geothermal heat pump
8. apply health and safety regulations
9. Perform refrigerant leak checks
10. installation and maintenance of home automation systems

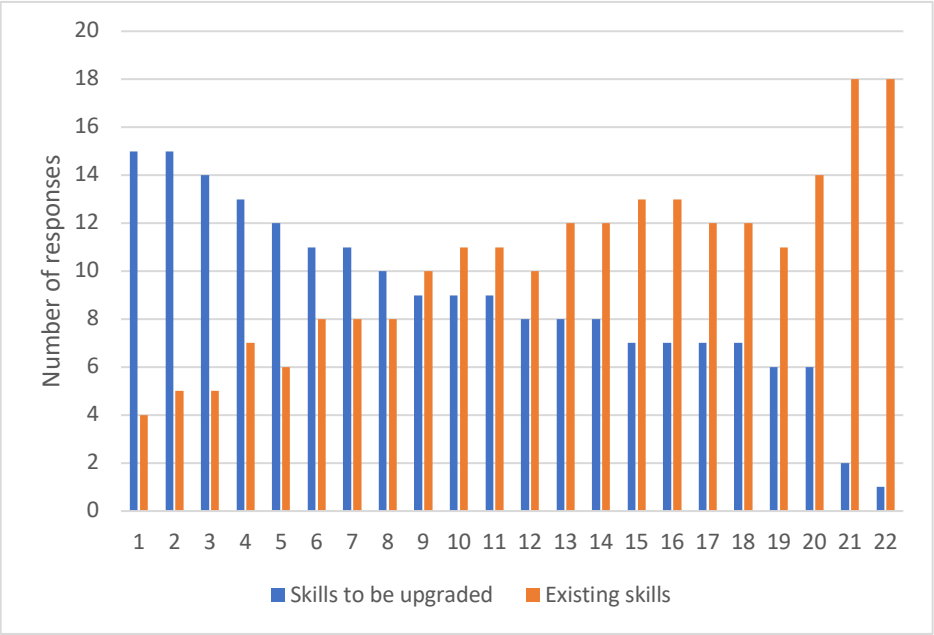
There is a clear gap between "traditional" skills and the skills to be updated HVAC Engineering Technicians. The main skills for the HVAC engineering technician that need to be improved in the country in relation to industrialized construction, improving energy efficiency and the circular economy are followed:

3. Worker assigned to work on the roof

The "traditional" skills that exist for the laborer assigned to roof work are the following:

- Cover structures with roofs.
- Model and assemble elements for the construction of buildings and other structures.
- They use materials such as wood, plastic and metal in their creations.
- Install the load-bearing elements of a roof, whether flat or sloped.
- Cover the roof with a weatherproof layer.

Figure 3 presents the results of the online survey on the employment of roof workers. The blue bars represent the skills that Roof Workers need to upgrade, while the red bars represent the “traditional” skills.



1. create a green roof
2.program a CNC controller
3. Follow safety procedures when working at heights
4.interpret 2D and 3D digital floor plans
5.inspect building materials and calculate building material requirement
6. evaluate conservation needs
7.sort waste and demolition materials
8. Follow health and safety procedures in construction
9.build the roof structure with construction profiles
10.install roof windows
11. apply restoration techniques
12.install insulating material and roller cover
13.apply tolls for cutting materials
14. install the connections of the modular roof elements
15. inspect roofs, install gutters
16.lay the roof tiles
17. lay the roof with roofing materials such as clay tiles, asphalt composite tiles, roofing
18. prepare the roof for the solar system (photovoltaic and solar thermal system)
19.build scaffolding
20.install a lightning protection system
21. recognize construction and insulation materials
22.use measuring tools

Graph 3 . “Traditional” skills and abilities need to be improved for the Roof Worker occupation .

Below is the ranking of the "traditional" skills of the Roof Worker:

1. Use measuring tools.
2. Recognize construction and insulation materials
3. Install a lightning protection system
4. Inspect roofs
5. Install gutters
6. Lay the tiles
7. Lay the roof with roofing materials such as clay shingles, asphalt composite shingles, engineered roofing, and laminate roofing
8. Install connections of the modular roof elements
9. Prepare the roof for the solar system (photovoltaic and solar thermal system)
10. Build scaffolding
11. Install roof windows
12. Apply restoration techniques
13. Build the roof structure with building profiles
14. Install insulation material and rolled covers
15. Assess conservation needs
16. Follow construction health and safety procedures
17. Separate waste and demolition materials
18. Interpret 2D and 3D digital floor plans
19. Inspect the material and calculate material needs
20. Follow safety procedures when working at heights.
21. Program a CNC controller

22. Make a green roof

The ranking of the most important skills to update for the Roofing Worker:

1. create a green roof
2.program a CNC controller
3. Follow safety procedures when working at heights
4.interpret 2D and 3D digital floor plans
5.inspect building materials and calculate building material requirement
6. evaluate conservation needs
7.sort waste and demolition materials
8. Follow health and safety procedures in construction
9.build the roof structure with construction profiles
10.install roof windows
11. apply restoration techniques
12.install insulating material and roller cover
13. install the connections of the modular roof elements
14. inspect roofs, install gutters
15.lay the roof tiles
16. lay the roof with roofing materials such as clay tiles, asphalt composite tiles, roofing
17. build and roll roofing.
18. prepare the roof for the solar system (photovoltaic and solar thermal system)
19.build scaffolding
20.install a lightning protection system
21. recognize construction and insulation materials
22.use measuring tools

There is a clear gap between “traditional” skills and the skills that need to be updated for roof workers . Below are the main skills of rooftop workers that need to be improved in the country in relation to industrialized construction, improving energy efficiency and the circular economy:

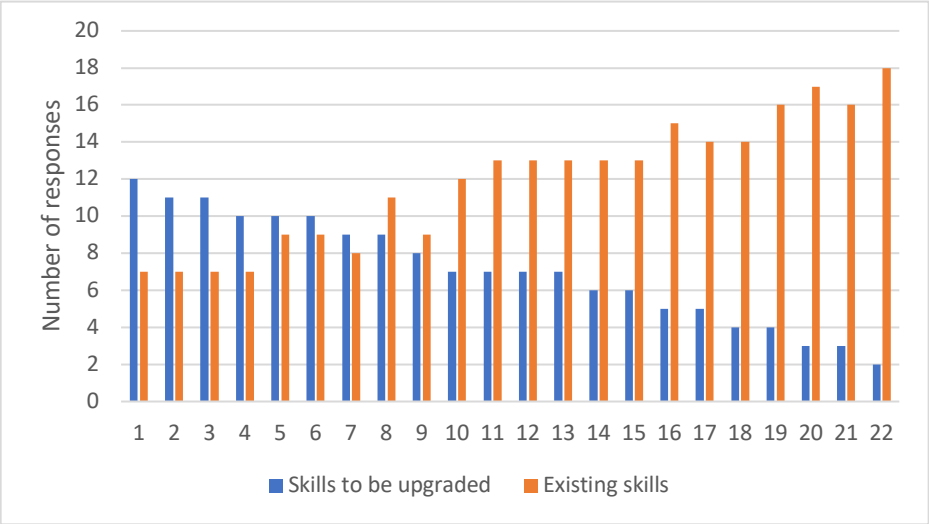
1. create a green roof
2.program a CNC controller
3. Follow safety procedures when working at heights
4.interpret 2D and 3D digital floor plans
5.inspect building materials and calculate building material requirement
6. evaluate conservation needs
7.sort waste and demolition materials
8. Follow health and safety procedures in construction
9.build the roof structure with construction profiles
10.install roof windows

4. Construction worker

The “traditional” skills that exist for Construction worker are as follows:

- Carry out routine tasks in relation to building construction and demolition work.
- Assemble walls and structures by skilfully arranging different types of bricks in a predetermined pattern, using a binding agent such as cement to join the bricks together.
- Fill the joints with mortar or other suitable materials.

Figure 4 presents the results of the online survey on the employment of construction workers. The blue bars represent skills to be upgraded for Construction worker and the red bars represent “traditional” skills.



1. work ergonomically
2. Follow safety procedures when working at heights
3. interpret 2D and 3D digital floor plans
4. calculate building supply needs
5.Recognize the impact of material life on maintenance and demolition
6. prepare the casing for the photovoltaic walls
7.sort waste and demolition materials
8. use construction materials and reuse of components
9. Follow health and safety procedures in construction
10. Interpret plans for modular construction
11.Install insulating material on the floor and walls
12. prepare the facade cladding
13. install windows
14.inspect building materials and calculate building material requirement
15. install connections of modular construction elements
16. install building profiles and different types of bricks
17. recognize construction and insulating materials
18. apply restoration techniques
19. work on demolition processes
20. use measuring tools
21 recognize dry construction methods
22. work with mortar and cement

Graph 4 . “Traditional” skills and competences to be strengthened for the occupation of construction worker .

Below is the ranking of "traditional" skills for construction workers:

1. Work with mortar and cement.
2. Use measuring tools
3. Working with demolition processes
4. Recognize dry construction methods
5. Install building profiles and different types of bricks
6. Apply restoration techniques
7. Recognize insulation and construction materials
8. Inspect building materials and calculate building material requirements
9. Install insulation material on the floor and walls.
10. Install the connections of the modular construction elements.
11. Prepare the facade cladding

12. Install windows
13. Interpret plans for modular construction
14. Use construction materials and reuse of components
15. Follow health and safety procedures in construction
16. Recognize the impact of the durability of construction and demolition materials
17. Prepare the enclosure for the photovoltaic walls
18. Separate collection of materials and demolition waste
19. Work ergonomically
20. Calculate supplies
21. Follow safety procedures when working at heights
22. Interpret 2D and 3D drawings

the ranking of the most important skills to update for Construction Worker :

1. work ergonomically
2. Follow safety procedures when working at heights
3. interpret 2D and 3D digital floor plans
4. calculate building supply needs
5. recognize the impact of material life on maintenance and demolition
6. prepare the casing for the photovoltaic walls
7. sort waste and demolition materials
8. use construction materials and reuse of components
9. follow health and safety procedures in construction
10. interpret plans for modular construction
11. install insulation material on the floor and walls
12. prepare the facade cladding
13. install windows
14. inspect building materials and calculate building material requirement
15. install connections of modular construction elements
16. install building profiles and different types of bricks
17. recognize building and insulating materials
18. apply restoration techniques
19. work on demolition processes
20. use measuring tools
21. recognize dry construction methods
22. work with mortar and cement

There is a clear gap between "traditional" skills and the skills to be updated Construction worker. Below are the main skills of construction workers that need to be improved in the country in relation to industrialized construction, improved energy efficiency and the circular economy:

1. work ergonomically
2. Follow safety procedures when working at heights
3. interpret 2D and 3D digital floor plans

4. calculate building supply needs
5. recognize the impact of material life on maintenance and demolition
6. prepare the casing for the photovoltaic walls
7. sort waste and demolition materials
8. use construction materials and reuse of components
9. follow health and safety procedures in construction
10. interpret plans for modular construction

Main conclusions reached, as well as recommendations for the "skills to be improved" of industrialized construction and key sustainability criteria for industrialized construction

The main skills for the four occupations that need to be improved in the country related to industrialized construction, improving energy efficiency and the circular economy are:

- Installer electric – 9.
- HVAC Engineering Technician - 7
- Roof Worker –8.
- Construction worker – 7.

The profession of electrical installer requires significant updating of skills. This could be due to the evolution of technologies in the electricity sector, which require a deeper understanding of new technologies, energy efficiency and the circular economy.

HVAC Engineering Technician: HVAC engineering technicians also need appropriate skills, capable of accommodating developments in energy efficiency and innovations in heating, ventilation and air conditioning systems.

Roof Worker: Roof workers need to focus on acquiring skills related to energy efficiency and the use of new techniques, including the installation of photovoltaic and solar thermal systems. Furthermore, there may be a need to develop skills in managing waste and demolition materials, indicating a growing focus on the circular economy.

Construction worker: Construction workers also need upskilling, especially in new technologies, energy efficiency and the circular economy. Specific skills required may include understanding of BIM models, advanced sustainable construction techniques such as green roofs and sustainable waste management.

In summary, for all 4 professions, the skills related to new technologies, energy efficiency and the circular economy are qualified as upgradeable. Skills: management of waste and demolition materials; installation and maintenance of photovoltaic and solar thermal systems; the use of new techniques such as green roofs, 2D and 3D digital floor plans, the use of BIM models are recognized as new skills to up

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