

TrainERGY project

IO Number: 1

Energy Efficient Operations Training Needs Specialization

Training needs specialization and skill matrix development methodology ENG



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## 1. Introduction

This report provides an overview of the methodology designed for the *Skill Matrix development* process. The skill matrix will be the core intellectual output of the Work Package 2 and will form the basis for the proper organization of the teaching and learning activities (C1, C2, C3), during which the EEO curriculum modules will be tested. The skill matrix will show the current distribution of the EEO skills, identified along the process, in terms of theoretical and practical knowledge, among the countries of the countries involved in the project (Poland, Greece, Italy, UK).

The remainder of the document is organized as follows. In Section 2, the first phase of the process is described, which is the Training Need Specialization. This phase has been realized through an analysis of the actual offer of master programs provided in Europe devoted to EEO topics and it reflected on the Survey that has been disseminated along the project. Some results of the analysis realized are also presented. Then, in Section 3 the Skill Matrix methodology is described, on the basis of the results emerged from the previous analysis.

## 2. Training Needs Specialization (TNS)

The TNS is the project phase devoted to the realization of a survey, questionnaire based, aimed at confirming/validating the results of the Training Needs Analysis (TNA) conducted within the PrESS Project and investigating the presence of EEO skills and practices in SMEs.

To this aim, we developed a Survey Design Methodology based on a bottom-up approach in order to define appropriate Skill Areas, grouping the need emerged from the PrESS TNA, and, then, to identify specific EEO Skills to be tested in the Survey, breaking down each Skill Area into specific skills.

The methodology that can be summarized in the following five phases:

1. **Skill areas definition:** i.e. definition of priorities areas in which SMEs need to improve their EEO skills;
2. **Analysis of the existing EEO curricula** provided in seven EU countries (Italy, UK, Poland, Greece, Spain, France, Germany);
3. **Main topics identification:** i.e. analysis of the topics included in the courses of the curricula identified in step 2;
4. **Main Topics Classification:** allocation of the main topics identified to the skill areas defined in step 1;
5. **Skills definitions:** grouping the main topics allocated to each area in skills.

## 2.1 Methodology Implementation

The *Skill Areas Definition* phase has been realized in two steps. First of all, the project partners confirmed the TNA from PrESS. Then, we grouped the training needs priorities emerged from PrESS in the five Skill Areas shown in Fig. 2.1.

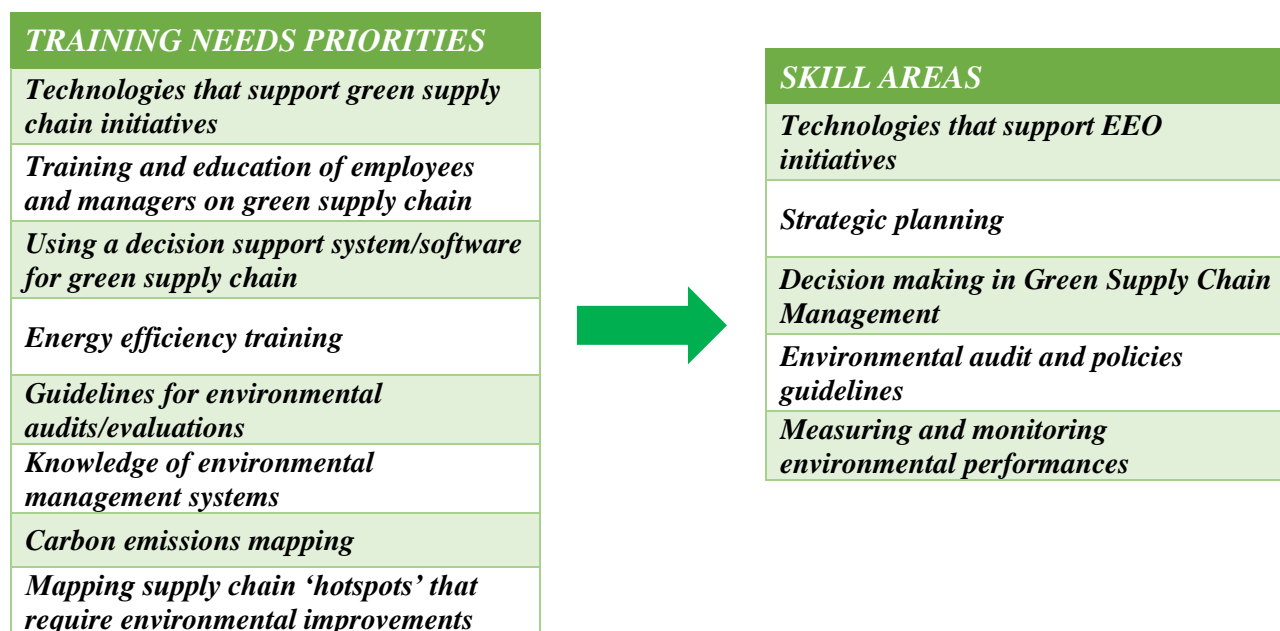


Fig. 2.1 – From Needs to Skill Areas

In the next phase, an *analysis of the existing EEO curricula* offered in seven EU countries has been performed through a desk research performed in collaboration with the UoL, mainly based on a database provided by a Norwegian company (Keystone Academic Solutions) specialized in the higher education web marketing ([www.masterstudies.com](http://www.masterstudies.com)). The Tab. 2.1 shows the total number of programs analysed per Country. The sample has been chosen in order to extend the analysis to other Countries comparable with the ones of the partners involved in the project.

France	Germany	Italy	UK	Spain	Poland	Greece	TOTAL
8	7	12	14	8	10	5	64

Tab 2.1 – Number of analysed programs per Country

Thanks to the database, we had the chance to go deeply through the programs' contents (via the official program websites), highlighting the main topics covered by each course. In Fig. 2.2 a simple record of the databases emerging from this analysis has been reported.

At the end of the *main topics identification* phase, we identified 282 main topics.

	PROGRAM	ACADEMIA	WEBSITE	MAIN TOPICS
4	Master in Green Management, Energy and Corporate Social Responsibility	University Bocconi	<a href="http://www.unibocconi.eu/wps/wcm/connect/Bocconi/SitoPubblico_EN/Navigation+Tree/Home/Programs/Graduate+School/Master+Programs/MaGER/Program+Structure/">http://www.unibocconi.eu/wps/wcm/connect/Bocconi/SitoPubblico_EN/Navigation+Tree/Home/Programs/Graduate+School/Master+Programs/MaGER/Program+Structure/</a>	<ul style="list-style-type: none"> <li>• green innovation</li> <li>• green supply chain management</li> <li>• green marketing</li> <li>• sustainable consumption</li> <li>• environmental management systems and certification (ISO 14001, EMAS, etc.).</li> </ul>

Fig. 2.2 – Main Topics Identification

The main topics identified have been then classified (*main topics classification*) according to the skill areas defined in the first step, as shown in Fig. 2.3.

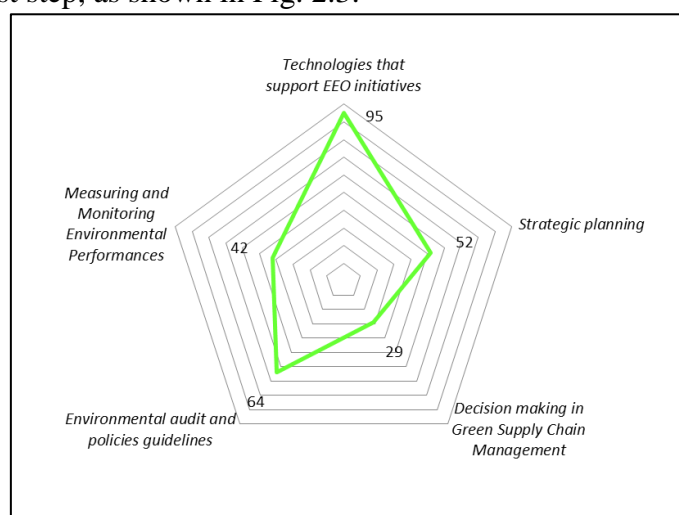


Fig. 2.3 – Number of Main Topics per Skill Area

According to our classification, 34% of the main topics identified have been allocated to the area of technologies, while only 10% are related to the decision-making area. In other words, this graphic shows the distribution of the main topics among the skill areas. On the basis of this result, we also analyzed the number of programs covering the skill areas.

We assume that a skill area is covered by a program if there exists at least one of its main topics belonging to such class.

Considering that every program covers different main topics and that every main topic is related to a single skill area, every course has been counted “n” times if “n” is the number of skill areas to which its contents are referred to.

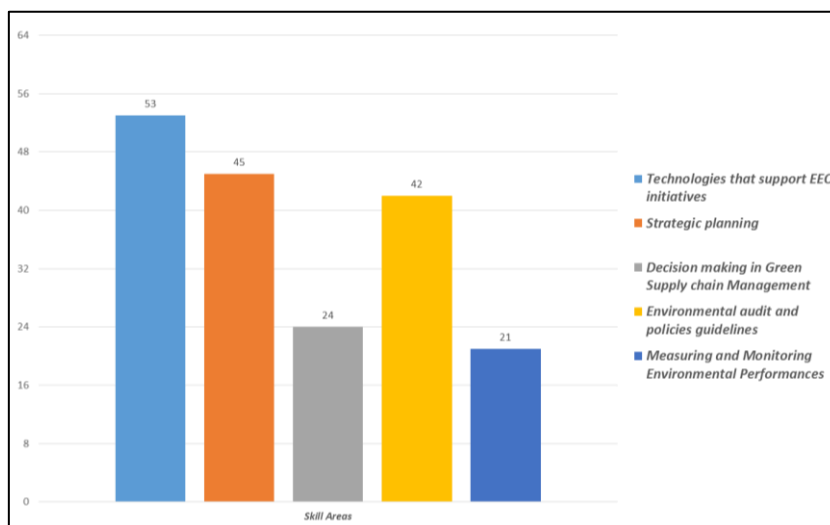


Fig. 2.4 – Number of programs per Skill Area

As expected, this distribution reflects the former one since 83% of the analyzed programs cover the technologies skill area, while about 35% of them cover the decision-making and measuring area. This result can be justified by the variety of the educational offer, since there are no courses strongly oriented to only one of the identified skill areas.

Furthermore, we detailed this analysis by investigating the number of courses provided by every country per skill area (Fig. 2.5) in order to detect educational offers and interests at a national level.

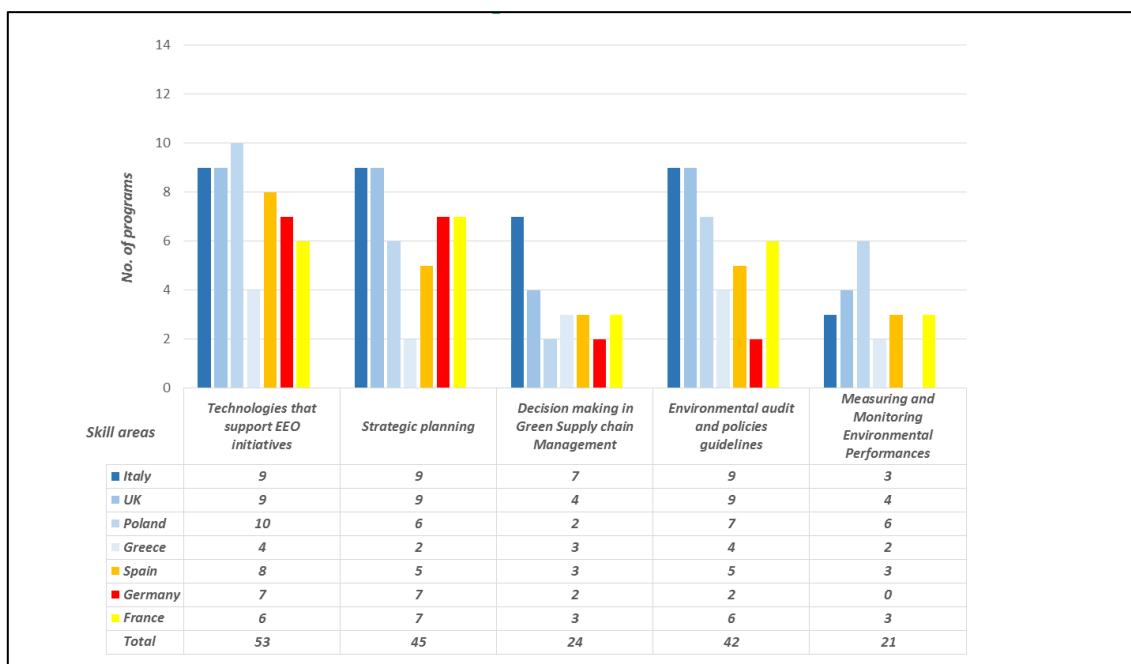


Fig. 2.5 – Programs provided by every country per skill area

In the next step, the whole list of 282 main topics have been allocated to the skill areas (*main topics classification*), and then the main topics belonging to the same category have been grouped in order to define the skills. At the end of this phase (*skill definition*), 18 skills have been defined, as shown in Fig. 2.6.



Fig 2.6 – EEO skills

It is easy to see that higher is the number of main topics associated to a single skill area, higher is the number of skills identified within it (see Fig. 2.3)

Once defined the skills, it was possible to detect the number of programs provided by every country covering the single skills (Fig. 2.7).

We assume that an EEO program cover a skill if at least one of its main topics is associated to that skill.

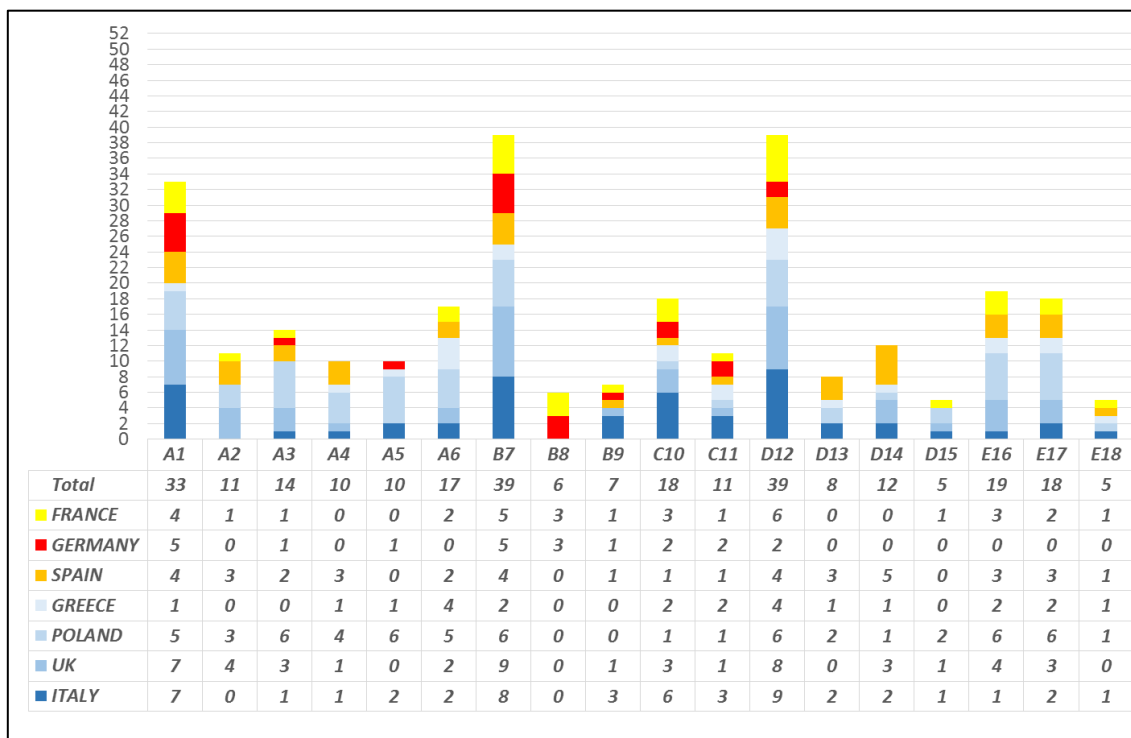


Fig. 2.7 – Number of programs provided by every country per skill

All the TNS process was preparatory for the development of a survey, aimed at testing the theoretical and practical knowledge of the EEO skills identified in SMEs. The survey presents two questions per each skill, investigating the following dimensions (defined according to the Dublin Descriptors):

- Knowledge and understanding;
- Applying knowledge and understanding.

Respondents can mark a value in the scale range from 1 (minimum) to 5 (maximum) as shown in Fig. 2.8 in which an extract of the survey is presented.

#### E.1.6 Database management systems for supporting environmental decisions

- What is your knowledge about specific databases oriented to environmental issues (Environmental Data Explorer, Environmental Data Resources, etc.)

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

1	2	3	4	5
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- Have you ever had practical experiences with the use and/or the implementation of this kind of technologies?

1=Never; 2=Seldom; 3=Sometimes; 4=Often; 5=Very Often

1	2	3	4	5
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Fig. 2.8– Extract of the survey



### 3. Skill Matrix Methodology

The skill matrix will give a synthetic indication concerning the presence of the single EEO skills at each specific location.

Basing on the results from the survey and the TNS process, a methodology for the realization of the skill matrix has been developed.

The main idea behind the methodology is to define two dimensions for measuring both the demand and offer sides (SMEs and Academia's perspectives respectively) in order to classify the EEO skills and realize the skill matrix.

Therefore, the methodology can be summarized in the following phases:

1. Calculation of a **Covering Index** per each skill indicating the fraction of courses covering that skill in every country and identification of a **Covering Degree**;
2. Calculation of a **Skill Presence Index** showing the presence of the skills based on the response rates from the survey;
3. **Skills classification** comparing the dimensions just defined;
4. **Skill matrix realization** using the results emerging from the Step 3.

#### 3.1 Methodology Implementation

The **Covering Index** calculation phase has been realized using the results obtained in the analysis of the existing EEO curricula. On the basis of the research conducted on the number of courses provided by every country per skill (Fig. 2.7), indicating by:

$n_{ik}$  number of courses provided by country  $i$  covering the skill  $k$ ;

$N_i$  total number of courses provided by country  $i$ ;

we can define the Covering Index of the skill  $k$  in country  $i$  as:

$$CI_{ik} = \frac{n_{ik}}{N_i}$$

The Covering Index of the skill  $k$  in country  $i$  indicates the fraction of courses provided by the considered country covering the analysed skill.

Then, is possible to classify the skills in four ranges, according to the value assumed by  $CI_{ik}$ , identifying a **Covering Degree** as shown in Tab. 3.1:

Range	Covering Degree
$CI_{ik} \leq 0,20$	<b>Not Covered</b>
$0,20 < CI_{ik} \leq 0,40$	<b>Slightly Covered</b>
$0,40 < CI_{ik} \leq 0,60$	<b>Moderately Covered</b>
$CI_{ik} > 0,60$	<b>Highly Covered</b>

Tab. 3.1 – Covering Degree classes

This qualitative indicator can be seen as a measure of the “offer side”, identifying the actual distribution of the master programs offer and the interest of the considered countries in EEO topics.

On the other hand, that is the “demand side”, we also build a quantitative indicator, named ***Skill Presence Index*** to measure the presence of the skill in SMEs basing on the answers collected through the dissemination of the survey.

The skill presence index of the skill  $k$  could be defined as the weighted sum of the response rates recorded for that skill. Indicating by:

$w_j$  weight associated to the response  $j$ ,  $\forall j = 1,2,3,4,5$

$RR_{jk}$  rate of response  $j$  recorded per skill  $k$

The skill presence index  $PI_k$  of the skill  $k$  can be defined as:

$$PI_k = \sum_{j=1}^5 (RR_{jk} * w_j)$$

If we set the following weights per every possible answer:

<b>Response</b>	<b>Weights</b>
1	-2
2	-1
3	0
4	1
5	2

Tab. 3.2 – Weights assignment

We can get that:

$$-2 \leq PI_k \leq 2$$

Then, according to the value assumed by  $PI_k$ , four ranges can be identified (Tab. 3.3):

<b>Range</b>	<b>Description</b>	<b>Meaning</b>
$-2 \leq PI_k \leq -1$	<b>Definitely not</b>	<b><i>the skill is definitely not possessed [used]</i></b>
$-1 \leq PI_k \leq 0$	<b>more no than yes</b>	<b><i>the skill is quite not possessed [used]</i></b>
$0 \leq PI_k \leq 1$	<b>more yes than no</b>	<b><i>the skill is quite possessed [used]</i></b>
$1 \leq PI_k \leq 2$	<b>definitely yes</b>	<b><i>the skill is definitely possessed [used]</i></b>

Tab. 3.3 – Skill Presence Index Ranges

Considering the dimensions defined, we can represent the EEO skills in a graph with the Skill Presence Index on the x-axis and the Covering Degree on the y-axis. Four main quadrants can be identified in the graph, as shown in Fig. (3.1).

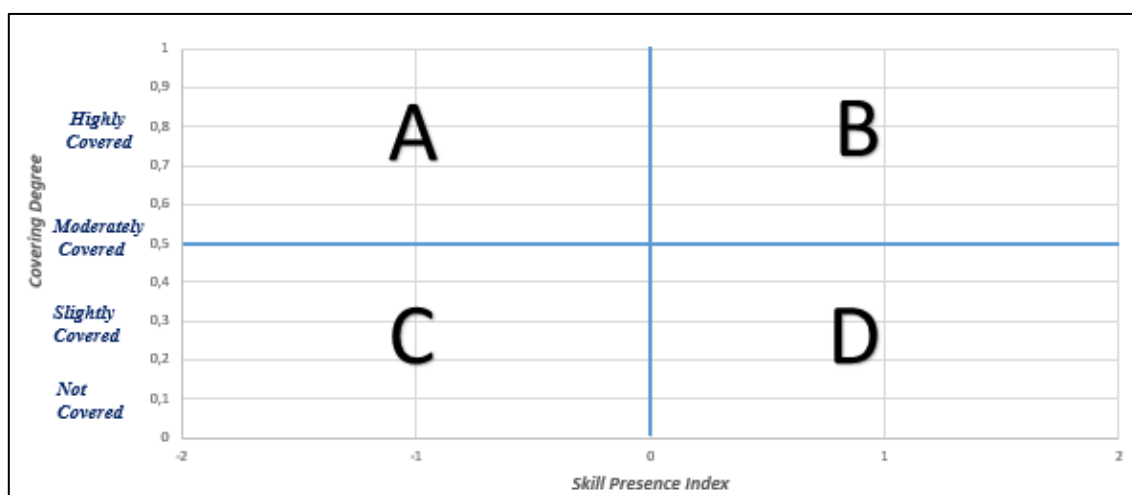


Fig. 3.1 – Skill classification per country

Skill will be points in this graph and, according to the position occupied in it, they will be classified as belonging to one of the following categories (*skill classification*):

- A. Covered skills, but not possessed/used at all;
- B. Covered skills, possessed/used at all;
- C. Slightly covered or not covered skills, but not possessed/used at all;
- D. Slightly covered or not covered skills, but possessed/used at all.

At the end of this step, it will be possible to proceed with the *Skill matrix realization* phase. The skill matrix will have countries on the rows (indexed by  $i$ ) and the skills on the columns (indexed by  $k$ ). The generic element  $a_{ik}$  of the skill matrix will correspond to the label assumed by the skill  $k$  in country  $i$  resulting from the classification phase (Fig. 3.2).

	Skills					
Country	A1	A2	...	...	...	E18
Poland	A	C	...	...	...	C
Italy	B	D	...	...	...	A
UK	C	D	...	...	...	B
Greece	A	B	...	...	...	D

Fig. 3.2 – Skill Matrix

This analysis could show which skills are really possessed and/or used in each country (the ones belonging to areas B and D) and which skills require appropriate improvements (areas A and C) driving the training sessions organization and the EEO modules development.