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Competency Gaps of Employees in the Construction Sector in Terms of the Requirements of a Low-Carbon Economy. Polish and Czech Case

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Abstract: Environmental policy obliges modern society to transition to a low-carbon economy. After entering to life, the Paris Agreement obligated the signatories to prepare the first nationally determined contributions (NDCs). The NDCs aim first to reduce greenhouse gas emission targets under the UNFCCC and they apply equally to both developed and developing countries. Countries voluntarily indicate what actions will be taken to achieve the declared goals. The construction sector is an industry that is under scrutiny due to its negative impact on the environment, but it also has the potential to reduce it. Activities that can reduce greenhouse gas emissions can be carried out at various levels in the construction industry. One of them is the appropriate preparation of the staff, including equipping them with the so-called green skills. This research aimed to determine the competency gaps of people employed in the construction industry, including competencies in the field of low-emission economy. For the purposes of the study, a questionnaire survey was carried out in Poland and the Czech Republic and based on the results obtained the appropriate competencies were determined that should be possessed by people employed in the construction sector, including competencies related to a low-emission economy. Competency profiles for people employed in the construction sector were built and competency gaps of these people were determined. In both countries, no competencies have been identified in any of checked areas that meet or exceed the requirements of managers according to specific competency profiles.

Keywords: competency gaps; low-carbon economy; low-emission economy; sustainable economic development; energy efficiency; energy security; construction sector

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1. Introduction

Assumptions for the low-carbon development concept can be found in several documents related to sustainable development. The first widely known documents were the Rio Declaration (Rio Declaration on Environment and Development) and a program called Agenda 21, which resulted from the United Nations Conference on Environment and Development (UNCED), widely known as the Earth Summit, which convened between the 3–14 June 1992 in Rio de Janeiro, Brazil [1,2]. In the context of this convention, low-carbon development strategies are now referred to as low-emission development strategies (LEDS), low-carbon development strategies (LCDS), low-carbon development plans, and climate-friendly development [3]. All these terms are used interchangeably [4].

It is recognized that there is no internationally agreed definition of the concept of low-carbon development in general, nor of the associated strategies and actions in particular. The reason given is the inability to present their configuration that would represent all the specific contexts and conditions in different countries that may be part of LCDS [5].

Indeed, different levels of economic and social development of individual countries (in this case we cannot only talk about economic indicators; it is necessary to take into account a broader perspective, i.e., cultural conditions, a society's conviction of the necessity to move to a low-emission economy) make it impossible to adopt unified goals and solutions that would suit each country or region.

The first global environmental investment and credit scheme, which provided a standardized emissions offset instrument, was the Clean Development Mechanism (CDM), defined in Article 12 of the Kyoto Protocol (the Protocol was adopted on 11 December 1997, but due to the complex ratification process it entered into force on 16 February 2005). However, the Kyoto Protocol operationalized the United Nations Framework Convention on Climate Change (UNFCCC) by committing industrialized countries and economies in transition to limit and reduce greenhouse gas (GHG) emissions in accordance with agreed individual targets. The mechanism stimulates sustainable development and emission reductions, while giving industrialized countries some flexibility in how they meet their emission reduction or limitation targets [6]. The next significant step was defining the Bali Action Plan in 2007—a commitment of the developing countries to take nationally appropriate mitigation actions (NAMAs) in the context of sustainable development [7]. At the 15th Conference of the Parties (COP) in Copenhagen, the draft decision for the working group on long-term cooperative action (AWGLCA) listed low-carbon plans as a requirement for developed countries and conditionally (in brackets) the preparation of low-carbon plans for developing countries [8] The conference resulted in the Copenhagen Accord, which expressed a clear political intention to reduce carbon emissions and respond to climate change, both in the short and long term. The Copenhagen Accord recognizes that a "low-emission development strategy is indispensable to sustainable development" [9]. The next activities related to NAMA were, inter alia, the creation of a Green Climate Fund in Cancún at COP 16 in 2010, which provide funding to developing countries. Launched at COP 17 in Durban in 2011, the fund directs funds to developing countries to reduce greenhouse gas emissions and adapt to the negative effects of climate change [10]. According to the assumptions, NAMA refers to all emission reduction measures in developing countries and is prepared under the initiative of the national government. These can be policies targeting transformational changes in the economic sector or cross-sectoral activities in a broader national sense [7]. These actions are in line with the "commitments" found in Article 4.1 of the UNFCCC, in particular 4.1.b, which requires all parties to formulate, implement, publish, and regularly update national programs containing measures to mitigate climate change [11]. All country signatories to the UNFCCC were asked to publish their intended nationally determined contributions (INDCs) at United Nations Climate Change Conference held in Warsaw in 2013 [12]. After the Paris Agreement entered into force in 2016, the INDCs became the first nationally determined contributions (NDCs) to countries which ratified the agreement, unless they chose to submit a new NDC at the same time. The NDCs are the first GHG emission targets under the UNFCCC that apply equally to both developed and developing countries [13]. All parties were required to submit new or updated NDCs every five years (e.g., by 2020, 2025, 2030), regardless of their respective implementation time frames.

Taking action to reduce greenhouse gas emissions is therefore one of the main goals of all countries that have agreed to reduce their carbon dioxide emissions and respond to climate change, including Poland and the Czech Republic [14–16]. The transition to a low-carbon economy on a global scale can bring significant benefits to both developed and developing countries. Therefore, many countries are developing and implementing LEDS [17]. Actions to reduce greenhouse gas emissions should be undertaken in various sectors and areas. One of the sectors that receives particular attention is the construction sector. It is recognized as a sector with huge production of greenhouse gases and at the same time as a sector with great potential to reduce the current negative environmental impact [18–21].

One of the areas of influence is the appropriate preparation of staff who are or will be employed in the construction sector, i.e., equipping them with appropriate knowledge. The necessity to pay attention to the availability and development of professional knowledge of the construction sector personnel is indicated, among others, by Gann and Senker (1998), Egbu (1999), MacKenzie, Kilpatrick and Akintoye (2000), Clarke, Gleeson, and Winch (2017, 2020) [20–25]. This research work aimed to determine the competency gaps of people employed in the construction industry, including competencies in the field of low-emission economy. The research was carried out in three stages. We determined the appropriate competencies that should be possessed by people employed in the construction sector, including competencies related to a low-emission economy; we built competence profiles for people employed in the construction sector, taking into account the requirements related to a low-carbon economy and we determined the competency gaps of people employed in the construction sector in the Polish–Czech border area, taking into account the requirements related to a low-carbon economy.

This work offers two major contributions to literature. Firstly, we have developed competence profiles for people employed in the construction sector, taking into account the requirements of a low-carbon economy. These profiles can also be used in other countries to identify competency gaps of people employed in construction or as a basis for creating such profiles (after completing country-specific competencies). Secondly, we showed the methodology for determining the competency gaps of people employed in construction, taking into account the requirements of a low-emission economy, i.e., we have provided a tool that can be used directly to identify competency gaps in construction in any country. The proposed methodology can also be used to identify competency gaps in any sector of the economy after proper preparation of competency profiles for this sector.

The research was conducted in two countries, Poland and the Czech Republic. In both countries, gaps in the existing competencies of employees in the construction sector were revealed.

2. Reducing Greenhouse Gas Emissions in the Construction Sector

The construction sector is a huge burden on the environment as it uses natural resources, releases solid waste, creats various forms of pollution, reduces afforestation, etc. Energy is used in many forms throughout the life cycle of buildings, from the production of building materials, during construction, operation, demolition, and recycling and disposal of materials [26–28]. Carbon dioxide emissions in the preparation of building materials, the consumption of various fuels in buildings and the production of electricity, which is the main source of energy and operation in modern buildings, also have a huge impact on the environment [26–31]. Buildings are estimated to contribute 1/3 of greenhouse gas emissions [32]. Road construction is also a heavy burden on the environment [33–35].

Direct and indirect emissions from electricity and commercial heat used in buildings rose to 10 GtCO2 in 2019, the highest level ever recorded [36]. Several factors have contributed to this rise, including growing energy demand for heating and cooling with rising air-conditioner ownership and extreme weather events [37–39]. Enormous emission reduction potential remains untapped due to the continued use of fossil fuel-based assets, a lack of effective energy-efficiency policies, and insufficient investment in sustainable buildings [40,41]. Meanwhile, construction is a sector that can make a significant contribution to reducing greenhouse gas emissions [42–48]. This is due to potential of this sector to implement solutions characterized by rapid impact and high-cost efficiency, which mainly include measures to increase the energy efficiency of buildings [49–58]. Two groups can be distinguished among them: one related to the design and construction of new buildings and one related to the renovation of existing buildings. In the first case, new buildings, in accordance with the provisions of, inter alia, the Energy Performance of Buildings Directive (EPBD), should have nearly zero energy consumption [59–61]. Relevant requirements are also placed on the renovated buildings [62]. An important aspect influencing the reduction of CO2 emissions by the broadly understood construction industry is also

the preparation of the current and future staff designing and implementing construction investments. Raising the professional and engineering skills necessary for the transition to a low-carbon economy is one of the climate action goals set by the NDCs of several countries [63]. So-called green skills, also known as skills for sustainability, are the technical skills, knowledge, values, and attitudes needed in the workforce to develop and support sustainable social, economic, and environmental outcomes in business, industry, and the community [64]. The catchword "green skills" is very popular these days, both in political circles and in literature. Unfortunately, there is little systematic empirical research to direct public intervention to meet the needs for the skills that will be needed to operate and develop green technology [65–68].The need of research in this area is also confirmed by the fact that despite the widespread awareness of the importance of sustainable development, even among employers and academicians there are still people who are not familiar with the concept of green skills, who show, for example, a tendency to refer to general green skills as green practices [69–71].

3. Objectives and Methodology

The aim of the research was to determine the competency gaps of people employed in the construction industry, including competencies in the field of low-emission economy. The study was conducted using the PAPI (paper and pen personal interview) and CAWI (computer assisted web interview) technique. The survey was conducted in the period from November 2020 to May 2021 among enterprises located on the Polish–Czech border. In order to reach the respondents, e-mail correspondence was also used, in which, in addition to the link to the survey, a traditional survey was attached with the possibility of sending it back to the sender. Online questionnaires were available at: https://interaktywnie.com/ (accessed on 15 November 2021) in Polish and Czech. A total of 112 enterprises participated in the study, including 32 enterprises in the first stage and 80 in the second stage (55 on the Polish side, 25 on the Czech side). Although the survey was not only aimed at men, 100% of the respondents were male. The characteristics of the sample are presented in Table 1. The research was conducted among representatives of the industry, including: (1) owners of construction companies, (2) people holding managerial positions in construction companies, but not their owners, (3) people dealing with energy certification of buildings.

Table 1. Sample characteristic.

Sample Characteristic		Poland	Czech Republic	Together
Age	up to 30	27.3	28	27.5
	30–45	40	44	41.3
	over 45	32.7	28	31.3
Sex	male	100	100	100
Education	vocational	14.5	20	16.3
	secondary	30.9	48	36.3
	higher	54.5	32	47.5
The size of the enterprise	small	54.5	36	48.8
	medium	29.1	28	28.8
	large	16.4	36	22.5

An extensive analysis of the available literature did not allow finding a list of competencies necessary for employees working in the construction industry. There is also no list of supplementary competencies in the area of low-emission economy, which could constitute the basis for supplementing the existing competences of human resources employed in the construction industry. The lack of competency profiles for people employed in the construction industry in general and the lack of a list of complementary competencies in the area of low-emission economy, which could extend the existing, traditional competencies

and together with them constitute a selection set for the competency profile for employees of the analyzed industry, resulted in conducting research in three stages:

I. Determining the relevant competencies, i.e., the expected (assumed) competencies that should be possessed by people employed in the construction industry, including competencies related to a low-emission economy.
II. Defining competency profiles for people employed in the construction industry, taking into account the requirements related to a low-carbon economy.
III. Determining the competency gaps of people employed in the construction industry in the Polish–Czech border area, taking into account the requirements related to a low-carbon economy.

On the basis of the available literature, we compiled a list of competencies, including those related to the low-emission economy, that people employed in the construction industry should possess. The prepared set includes both general and specialist competencies in three areas: knowledge, skills, and attitude. The initial list included all competencies appearing in publications on the competencies of employees in the construction sector, as well as competencies that have been identified as necessary in this sector in generally available education programs. The verification consisted of assessing whether the competencies identified on the basis of the literature are mandatory, optional, or not necessary. The respondents could additionally supplement the list. The competency added by the respondents is the ability to assess the technical and economic effects of the decisions made. This competency has been added to the list of competencies in the area of skills. Due to the distribution of responses—most of the respondents indicated that the predefined competencies are obligatory or optional for employees of the construction sector—none of the originally established competencies was removed. The list of competencies considered by the respondents as expected (mandatory and/or optional) in the construction sector is presented in Table 2.

Table 2. List of competencies of employees in the construction sector, including competencies related to the low-carbon economy.

Knowledge:	Skills:	Attitude:
Low-carbon economy	Planning and organizing	Teamwork
Legal and economic issues in the field of environmental protection	Ability to coordinate work	Ease of making contacts
Nearly zero energy building requirements for new buildings	Ability to evaluate the effects of activities	Ability to handle stress
Sustainable construction project	Analysis/problem solving skills	Ability to build authority
Sustainable building technologies and building materials	Decision-making skills	Ability to show trust
Water supply and sanitation	Project management skills	Learning to learn
Decentralized electricity generation and integration of renewable energy generation methods into buildings	Communication	Self-confidence/ resilience
Solid waste disposal	Reacting to a variety of situations	Creativity
Reuse of materials and controlled demolition	Providing help in solving problems	Assertiveness
Energy efficiency of buildings	Waste treatment procedures at the construction site	Knowledge transfer
Tightness and insulation	Analyzing the condition of the construction site, diagnosing problems and solutions	Sharing of experiences
Thermal bridges	Repair of structures damaged by moisture	Respect for the knowledge and skills of others
Humidity and ventilation	Supervision of wet room installations	Time management skills
Quality and location of windows	Circulation control to and from the site	Critical thinking skills
Renewable energy technology systems including heat pumps, solar and photovoltaic systems, water collection and reuse systems, and biomass systems	Installation of heat pumps	Self-development skills

Table 2. *Cont.*

Construction process of a nearly zero energy building	Installation of photovoltaic systems	Sensitivity to the environment
Principles of renewable energy systems and technologies	Ability to evaluate the technical and economic effects of the decisions made	
Integrated heating technologies		
Influence of control systems on heating		
Layout of the construction site, areas of potential danger, drainage channels		

Competency profiles were built on the basis of responses from respondents who determined the importance of each competency for the construction sector, assigning them percentages from 10% to 100% (every 10%). Competency gaps were determined on the basis of the difference between the expected level of competencies of people employed in the construction sector and the level of competences currently held in the sector (the level of current competences of construction sector workers) established in the research.

Competency gap is defined as the difference between the current competency level of employees in the construction sector, including competencies related to the low-emission economy, and the required competency level.

4. Results

On the basis of the conducted research, competency profiles were built for employees of the construction industry for the Polish and the Czech side. These profiles were built in accordance with the adopted methodology in three areas, i.e., knowledge, skills, and attitudes—Table 3.

Table 3. Competency profiles of construction industry employees for Poland and Czech Republic.

Knowledge	Poland	Czech Republic	Arithmetic Average
Low-carbon economy	81%	82%	82%
Legal and economic issues in the field of environmental protection	72%	86%	79%
Nearly zero energy building requirements for new buildings	78%	81%	80%
Sustainable construction project	73%	91%	82%
Sustainable building technologies and building materials	79%	90%	85%
Water supply and sanitation	75%	89%	82%
Decentralized electricity generation and integration of renewable energy generation methods into buildings	74%	82%	78%
Solid waste disposal	73%	86%	80%
Reuse of materials and controlled demolition	72%	87%	80%
Energy efficiency of buildings	88%	85%	87%
Tightness and insulation	86%	89%	88%
Thermal bridges	87%	88%	88%
Humidity and ventilation	89%	91%	90%
Quality and location of windows	85%	87%	86%
Renewable energy technology systems including heat pumps, solar and photovoltaic systems, water collection and reuse systems, and biomass systems	77%	88%	83%
Construction process of a nearly zero energy building	78%	88%	83%
Principles of renewable energy systems and technologies	76%	87%	82%
Integrated heating technologies	75%	88%	82%
Influence of control systems on heating	72%	87%	80%
Layout of the construction site, areas of potential danger, drainage channels	77%	89%	83%

Table 3. *Cont.*

Skills	Poland	Czech Republic	Arithmetic Average
Planning and organizing	83%	91%	87%
Ability to coordinate work	86%	90%	88%
Ability to evaluate the effects of activities	86%	89%	88%
Analysis/problem solving skills	88%	94%	91%
Decision-making skills	87%	92%	90%
Project management skills	86%	88%	87%
Communication	86%	93%	90%
Reacting to a variety of situations	82%	87%	85%
Providing help in solving problems	83%	88%	86%
Waste treatment procedures at the construction site	81%	88%	85%
Analyzing the condition of the construction site, diagnosing problems and solutions	81%	88%	85%
Repair of structures damaged by moisture	77%	84%	81%
Supervision of wet room installations	76%	85%	81%
Circulation control to and from the site	73%	84%	79%
Installation of heat pumps	73%	84%	79%
Installation of photovoltaic systems	74%	85%	80%
Ability to evaluate the technical and economic effects of the decisions made	83%	86%	85%
Attitude	**Poland**	**Czech Republic**	**Arithmetic Average**
Teamwork	88%	94%	91%
Ease of making contacts	85%	90%	88%
Ability to handle stress	87%	92%	90%
Ability to build authority	81%	88%	85%
Ability to show trust	82%	91%	87%
Learning to learn	85%	90%	88%
Self-confidence/ resilience	82%	90%	86%
Creativity	84%	92%	88%
Assertiveness	83%	95%	89%
Knowledge transfer	81%	94%	88%
Sharing of experiences	84%	94%	89%
Respect for the knowledge and skills of others	87%	94%	91%
Time management skills	87%	91%	89%
Critical thinking skills	83%	90%	87%
Self-development skills	88%	92%	90%
Sensitivity to the environment	82%	90%	86%

After defining the competency profiles separately for each of the two countries, the arithmetic mean of the obtained results was calculated. The analysis of the answers shows, however, that there are differences between the required level of some competencies between the surveyed countries. Therefore, the competency gaps for employees in the construction sector have been defined separately for the Polish and the Czech side. The competency gaps for the construction sector are presented in Table 4 for the Polish side and Table 5 for the Czech side.

Table 4. Competency gap of employees in the construction industry in Poland.

Knowledge:	The Current Level of Employees' Competencies	Competency Gap
Low-carbon economy	49%	32%
Legal and economic issues in the field of environmental protection	52%	20%
Nearly zero energy building requirements for new buildings	51%	27%
Sustainable construction project	52%	21%
Sustainable building technologies and building materials	54%	25%
Water supply and sanitation	58%	17%
Decentralized electricity generation and integration of renewable energy generation methods into buildings	53%	21%
Solid waste disposal	55%	18%
Reuse of materials and controlled demolition	49%	23%
Energy efficiency of buildings	60%	28%
Tightness and insulation	62%	24%
Thermal bridges	61%	26%
Humidity and ventilation	61%	28%
Quality and location of windows	58%	27%
Renewable energy technology systems including heat pumps, solar and photovoltaic systems, water collection and reuse systems, and biomass systems	53%	24%
Construction process of a nearly zero energy building	49%	29%
Principles of renewable energy systems and technologies	50%	26%
Integrated heating technologies	49%	26%
Influence of control systems on heating	49%	23%
Layout of the construction site, areas of potential danger, drainage channels	56%	21%
Skills:		
Planning and organizing	59%	24%
Ability to coordinate work	60%	26%
Ability to evaluate the effects of activities	55%	31%
Analysis/problem solving skills	59%	29%
Decision-making skills	60%	27%
Project management skills	60%	26%
Communication	58%	28%
Reacting to a variety of situations	59%	23%
Providing help in solving problems	55%	28%
Waste treatment procedures at the construction site	50%	31%
Analyzing the condition of the construction site, diagnosing problems and solutions	52%	29%
Repair of structures damaged by moisture	51%	26%
Supervision of wet room installations	51%	25%
Circulation control to and from the site	51%	22%
Installation of heat pumps	52%	21%
Installation of photovoltaic systems	50%	24%
Ability to evaluate the technical and economic effects of the decisions made	51%	32%

Table 4. *Cont.*

Attitude:		
Teamwork	56%	32%
Ease of making contacts	54%	31%
Ability to handle stress	52%	35%
Ability to build authority	54%	27%
Ability to show trust	52%	30%
Learning to learn	51%	34%
Self-confidence/ resilience	64%	18%
Creativity	55%	29%
Assertiveness	55%	28%
Knowledge transfer	49%	32%
Sharing of experiences	54%	30%
Respect for the knowledge and skills of others	52%	35%
Time management skills	53%	34%
Critical thinking skills	55%	28%
Self-development skills	55%	33%
Sensitivity to the environment	47%	35%

Table 5. Competency gap of employees in the construction industry in the Czech Republic.

Knowledge:	**The Current Level of Employees' Competencies**	**Competency Gap**
Low-carbon economy	51%	31%
Legal and economic issues in the field of environmental protection	61%	25%
Nearly zero energy building requirements for new buildings	55%	26%
Sustainable construction project	61%	30%
Sustainable building technologies and building materials	63%	27%
Water supply and sanitation	74%	15%
Decentralized electricity generation and integration of renewable energy generation methods into buildings	64%	18%
Solid waste disposal	66%	20%
Reuse of materials and controlled demolition	60%	27%
Energy efficiency of buildings	60%	25%
Tightness and insulation	70%	19%
Thermal bridges	69%	19%
Humidity and ventilation	68%	23%
Quality and location of windows	69%	18%
Renewable energy technology systems including heat pumps, solar and photovoltaic systems, water collection and reuse systems, and biomass systems	58%	30%
Construction process of a nearly zero energy building	60%	28%
Principles of renewable energy systems and technologies	59%	28%
Integrated heating technologies	61%	27%
Influence of control systems on heating	61%	26%
Layout of the construction site, areas of potential danger, drainage channels	62%	27%

Table 5. *Cont.*

Skills:		
Planning and organizing	75%	16%
Ability to coordinate work	76%	14%
Ability to evaluate the effects of activities	74%	15%
Analysis/problem solving skills	74%	20%
Decision-making skills	72%	20%
Project management skills	73%	15%
Communication	75%	18%
Reacting to a variety of situations	73%	14%
Providing help in solving problems	74%	14%
Waste treatment procedures at the construction site	69%	19%
Analyzing the condition of the construction site, diagnosing problems and solutions	64%	24%
Repair of structures damaged by moisture	65%	19%
Supervision of wet room installations	64%	21%
Circulation control to and from the site	66%	18%
Installation of heat pumps	63%	21%
Installation of photovoltaic systems	67%	18%
Ability to evaluate the technical and economic effects of the decisions made	63%	23%
Attitude:		
Teamwork	77%	17%
Ease of making contacts	73%	17%
Ability to handle stress	71%	21%
Ability to build authority	69%	19%
Ability to show trust	68%	23%
Learning to learn	72%	18%
Self-confidence/ resilience	73%	17%
Creativity	70%	22%
Assertiveness	71%	24%
Knowledge transfer	69%	25%
Sharing of experiences	64%	30%
Respect for the knowledge and skills of others	68%	26%
Time management skills	69%	22%
Critical thinking skills	66%	24%
Self-development skills	66%	26%
Sensitivity to the environment	66%	24%

5. Discussion

The analysis of the research results for the Polish and Czech side shows that in each of the three areas, i.e., knowledge, skills, and attitudes, competency gaps have been identified among people already employed in the sector. This means that the level of competencies of employees working in the construction sector in both countries does not correspond to the level expected in the created competence profiles.

For Poland, for the area of knowledge, the smallest gap value is 17% and the highest 32%. According to the research results, employees' knowledge should first of all be improved in:

(1) Low-carbon economy—competency gap—32%,

(2) Energy efficiency of buildings—28%,
(3) Humidity and ventilation—28%,
(4) Construction process of a nearly zero energy building—29%.

In the area of skills, the smallest gap is 21% and the highest is 32%. The most important skills to improve are:

(1) Ability to evaluate the effects of activities—competency gap—31%,
(2) Analysis/problem solving skills—29%,
(3) Communication—28%,
(4) Providing help in solving problems—28%,
(5) Waste treatment procedures at the construction site—31%,
(6) Analyzing the condition of the construction site, diagnosing problems and solutions—29%,
(7) Ability to evaluate the technical and economic effects of the decisions made—32%.

In the area of attitude, the smallest gap value is 18% and the highest is 35%. The most important areas to improve are:

(1) Teamwork—competency gap—32%,
(2) Ease of making contacts—31%,
(3) Ability to handle stress—35%,
(4) Learning to learn—34%,
(5) Knowledge transfer—32%,
(6) Respect for the knowledge and skills of others—35%,
(7) Time management skills—34%,
(8) Self-development skills—33%,
(9) Sensitivity to the environment—35%.

For the Czech Republic, for the area of knowledge, the smallest gap value is 15% and the highest is 31%. According to the research results, employees' knowledge should first of all be improved in the field of:

(1) Low-carbon economy—competency gap—31%,
(2) Sustainable construction project—30%,
(3) Renewable energy technology systems including heat pumps, solar and photovoltaic systems, water collection and reuse systems, and biomass systems—30%,
(4) Construction process of a Nearly Zero Energy Building—28%,
(5) Principles of renewable energy systems and technologies—28%.

In the area of skills, the smallest gap is 14% and the highest is 24%. The situation is therefore much better than in other areas. Skills that can be improved are:

(1) Analyzing the condition of the construction site, diagnosing problems and solutions—competency gap—24%,
(2) Supervision of wet room installations—21%,
(3) Installation of heat pumps—21%,
(4) Ability to evaluate the technical and economic effects of the decisions made—23%,

In the area of attitude, the smallest gap value is 17% and the highest is 30%. The most important areas to improve are:

(1) Knowledge transfer—competency gap—25%,
(2) Sharing of experiences—30%,
(3) Respect for the knowledge and skills of others—26%,
(4) Self-development skills—26%.

6. Conclusions

Very large changes in the construction industry that have taken place in the last 20 years, and which are related to, inter alia, a low-carbon economy, make it necessary to look again at the competencies that are currently required in individual sectors. Construction is assigned a special role in building a low-emission economy. Eco (green) investment has been identified as a key element in the transformation from a brown to green economy [71].

The impact of green human resources practices on employee engagement and environmental sustainability was also confirmed. Green human relations practices significantly influence employee involvement, and employee involvement positively affects the sustainable development of the environment. In practice, this means that companies must adopt green practices and conduct employee training programs in adopting green practices that contribute to a sustainable goal [72].

The lack of competency profiles for people employed in the construction industry, which take into account the changes taking place in the economy, means that current graduates of faculties related to the construction sector do not have competencies that are then required of them at work positions. There is also no training system that would allow to supplement the knowledge or acquire additional competencies for people who have already been employed in the sector and have worked for several years. The definition of both competence profiles for the construction sector and competence gaps should be used to analyze the existing training programs and their adaptation to the current requirements of the industry.

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