OUTPUT 06: REPORT ON SKILL GAPS AND MISMATCHES IN CLIMATE CHANGE ADAPTATION IN THE BUILT ENVIRONMENT IN COASTAL REGIONS.

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Contents

Introduction:

Professionals within the built environment have a lead role in the concerted effort to adopt climate change adaptation strategies and systems particularly in dynamic coastal regions. In order to equip these professionals with the relevant knowledge, skills, and competencies the point of departure is to identify the skill gaps and mismatches they face in their operations. The objective of Output 6 is to identify existing skill gaps and mismatches in climate change adaptation in the built environment in coastal regions

The identification of stakeholders and ultimately the identification of possible skill gaps with regards to professionals within built environment and construction industry is considered one of the key aspects to address in order to implement more effectively mitigation measures against climate change through innovative technologies. It is generally thought that the construction industry is one of the major contributors of greenhouse gas emissions (GHGs) and resource depletion, however, the construction industry also holds great potential in assisting and contributing to a country's effort in mitigating climate change (USGBC, 2016). Innovation within the industry and the adoption of sustainable practices are key to achieve this. The construction industry is a key sector in all five project partners. For example, in Malta the construction industry accounts for a significant portion of its GDP, and provides numerous employment opportunities (European Commission, 2021).

Due to the ubiquitous nature of the construction industry across all countries, the construction industry provides numerous valuable opportunities to contribute to the reduction of greenhouse gas emissions and mitigate against climate change, as even a slight improvement within the industry would have a recurring, multiplied, positive impact across the board locally and across borders.

However, in order for countries to innovate and implement such technologies and other sustainability practices in building designs and retrofitting, highly knowledgeable professionals and skilled workers in various fields are required. It's also necessary for the different stakeholders to work in tandem and adopt a comprehensive approach through knowledge sharing at professional levels and by including energy-efficient designs, green building materials renewable energy systems and other similar sustainability practices.

Skill shortages and skill gaps is not a recent phenomenon, however, due to the relatively recent boom in construction, various countries, including the project's partners are facing ever growing challenges in the form of skill gap and resource shortages (Mullin et al., 2010). Furthermore, with a growing population and urbanization, the need for construction of housing, infrastructure and commercial buildings is heightened. Therefore, to meet this demand, and maintain development at a high level yet embracing sustainable practices skilled workers and professionals are required. The preliminary research of all the partners within the project identified knowledge communication, political agenda, and a clear climate action plan as major hurdles in dealing with climate change adaptation in the built environment. This is particularly significant in coastal regions, where pressures are exacerbated by the relative higher population densities when compared to inland regions and where climate change impacts are projected to be felt the most, especially when it comes to sea level rise.

Objectives

Project Objectives:

"to identify the impact of climate change on the built environment in coastal regions, integrate the Paris Agreement, SDGs, and SFDRR requirements, recognize opportunities for adaptation, understand skill gaps, and develop a research-based learning approach to improve competencies in climate change adaptation in coastal regions." (BEACON TOR)

Output 6: Identify skill gaps and mismatches in climate change adaptation in the built environment in coastal regions.

The University of Malta (UM) led the development of Output 6, including the preparation of the data collection instruments, the related templates and the analysis and the final report.

Methodology

The data generation methodology employed in this study involved a pragmatic approach through mixed research methods; namely questionnaires or interviews. This approach was necessary in order to address the different contexts in which the participants of the project's partners had to operate to collect the data from the different stakeholders within the sector. The contexts differ on different scales: The geographical location and the resulting environmental context, the related challenges due to climate change and the adaptation measures according to the building typologies and urban infrastructure together with the regulatory legal framework that determines the responsibilities of the different stakeholders, including the professional bodies. The variations in the contexts in which the project's partners operate including the institutional set-up, the operational procedures and the roles and responsibilities of the stakeholders that would directly contribute in the data generation exercise so as to determine the skill gaps and mismatches in the sector were discussed among the project's partners in the planning stage of the research methodology of Output 6 during the Steering Committee meeting organised in Sweden in June 2022. The discussion among the project's partners served as baseline data to set the guidelines related to the data collection procedure for the project's partners. It was decided that the stakeholders considered for this study would include the different built environment professions such as architects, engineers and planners. Furthermore, the data generation tools would address the various phases of property cycle; namely design, construction, retrofitting.

Moreover, the data collection methodology of Output 6 has to be considered within the broader objective of the BEACON Project and framed together with the particular objectives of Output 4 and Output 5. Since the three outputs: Output 4, Output 5 and Output 6 involved the direct communication and interaction with stakeholders from the respective project countries, it was considered practical by the project partners to organise the data collection exercises of the three outputs into one set of guidelines. The partners felt that this approach could facilitate the communication with the stakeholders. Contacting the stakeholders once for the three output rather than for each of the three outputs separately, would ensure a higher probability of response rate among the stakeholders.

Since the data generation exercise included primary data collection with stakeholders, the project partners were elicited to acquire the ethical clearance, rather than from the respective institutions, through the Lead partner. The lead partner, University of Huddersfield managed the ethical clearance for the project at large.

The section related to Output 6 in the data collection guidelines provided to the project partners include 22 questions. The study's approach ensured that the data collected was relevant, accurate, and reliable, providing meaningful insights into the challenges faced by built environment professionals in addressing climate change adaptation. These questions could be administered either as a survey or used as guiding question in interviews to the different professional stakeholders. The questionnaire was designed to gather information on the professionals' perceptions of their skills and knowledge related to climate change adaptation, the challenges they face, and the training and professional development needs they have. The questionnaire was aimed to capture the views pertaining to the built environment professionals from various sectors. These included architects, engineers, surveyors, planners, and contractors amongst others. Moreover, the data generation exercise also aimed to understand the professionals' perceptions towards the effectiveness of the training and continuous professional development opportunities available to them.

Every project partner compiled a country report. Each country report was analysed through thematic coding and categorisation to identify the main skill gaps and mismatches in the named country. A summary of the main funding for every partner country is available hereunder. The concluding section of this report identifies the common skill gaps and mismatches within the build environment to address climate change adaptation notwithstanding the different geographical, institutional, operational and legal context.

Results:

UK – University of Huddersfield

The study in the UK was led by the University of Huddersfield. One of the mismatches identified is the insufficient merge of the concept of adaptation to climate change in work plans and visions. This indicates a need for a holistic approach to climate change adaptation measures that acknowledges the inevitability of climate change impacts and that seeks to incorporate this approach into planning and decision-making. Correspondingly another significant mismatch identified in the study is the lack of clear ground-level plans for climate change adaptation across all disciplines. Stakeholders need to be educated on the skills necessary to handle climate change, including how to develop and implement effective adaptation strategies. Many of these stakeholders lack awareness of how their professional roles are affected by climate change and often perceive it as linking only to sustainability. There is a need for increased awareness of the broad range of impacts that climate change can have on different aspects of the built environment and eventually, the skills required to address these impacts.

The study also identified other skill shortages in the built environment sector which include basic climate science knowledge, the ability to link climate change impacts with professional roles, measuring long-term benefits of adaptation, resource allocation, communication skills, knowledge of green energy and decarbonization, and aligning with a net-zero strategy. Addressing these skill gaps is critical to ensure that effective climate change adaptation measures are implemented in the built environment sector.

Measures to address these gaps might include the development of education and training programs to provide stakeholders with the necessary skills and knowledge. These programmes would focus on providing stakeholders with basic climate science knowledge. It is also evident that finding ways to assist professionals in relating their professional roles to climate change impacts and adaptation measures is of paramount importance and consequently, it is important to develop and implement

effective adaptation strategies that consider long-term benefits. Moreover, effective resource allocation and communication skills were also found to be necessary for successful climate change adaptation measures in the built environment sector. Stakeholders need to understand how to allocate resources effectively to ensure that adaptation measures are implemented efficiently and effectively. Communication skills are also essential as these would help relay information, knowledge, expertise and innovative ideas throughout the industry and different strata of society which, would in turn, assist in developing appropriate effective measures and communicating the benefits of these measures to stakeholders.

Sweden – Lund University:

From the study carried out in Sweden by Lund University it was found that there are significant challenges facing Sweden regarding climate change adaptation. Experts seem to have the necessary skills and knowledge for climate change adaptation. However, despite their qualifications, there seem to be a lack of coordination, collaboration, and sense of urgency in dealing with climate change. One of the most significant challenges noted by experts is the lack of coordination and collaboration between organizations. Inefficient use of expertise can lead to redundancy and an unnecessary waste of time and resources. There is a general lack of understanding of how climate change can affect each individual, especially at the political leadership level and within municipalities. The professional stakeholders note that climate adaptations and proposals need to be dealt with on every level of government, by any segment of society, be it private or public. There seem to also be several legal issues, especially regarding the financing of climate adaptation measures and under who's responsibility it falls. Therefore, these mismatch issues hinder an effective approach to the climate change adaptation strategy implementation.

Stakeholders have noted that climate adaptation specialists should ideally be present in every municipality, but this is evidently not the case currently. As a result, certain regions lack access to the necessary expertise to manage climate change impacts effectively. The lack of expertise within municipalities suggests the need to strengthen the educational department to produces more professionals. This indicates also the need for better coordination in the utilisation of such expertise as required at a local and national governmental level.

It has been noted that municipalities, especially small municipalities find it difficult to attract qualified personnel this hence lead to a significant skill gap that undoubtedly makes it more difficult to manage climate change impacts and implement climate change mitigation measures effectively. On the other hand, it seems that consultants, research institutes, and 'VA-collaboration', especially those dealing with water management issues, have no evident issue in finding qualified personnel. Therefore, there is clearly also a need for individuals with a broader spectrum of expertise in order to tackle climate change impacts on a broader spectrum not solely on water resource.

Another issue identified through this study was that many organizations may not even be aware of what particular skills they might be lacking as a direct result of lacking climate science knowledge amongst the public and professionals. This highlights the need for increased awareness and heightened coordination efforts. General knowledge about climate change adaptation needs to increase drastically, especially among politicians and the general public. As an incentive, cost-saving measures and government grants can be used to encourage municipalities and private companies to prioritise climate adaptation efforts. Despite experience-sharing seminars are becoming more common, and are organized by various stakeholders, knowledge about climate change adaptation needs to increase, Coordination and collaboration structures need to be in place for the efficient use of expertise. Climate

adaptation specialists should also be in place in every municipality and not restricted to larger municipalities only.

Legal issues are also a significant mismatch challenge that municipalities and private companies in Sweden are facing Financing climate adaptation measures and determining responsibility can be a complex and time-consuming process and requires concrete effort from government. There is a need for greater clarity and more straightforward, easily grasped legal structures to facilitate the implementation of climate adaptation measures.

Sri Lanka - The University of Colombo

The University of Colombo has identified several skill gaps in Sri Lanka's climate change adaptation efforts. One key issue identified here was the lack of regular training sessions for academics in Sri Lanka, with most continuing professional development (CPD) courses not focusing on climate adaptation. Respondents emphasized the need for a CPD programme and a Master of Science degree programme in climate change adaptation to provide proper training. As a results of the lack of focused academic courses, experts in climate change adaptation are lacking in Sri Lanka, with an evident need for more training opportunities, such as PhD programs and foreign exposure. Additionally, expertise in climate change adaptation is not satisfactory among academics in arts faculties, who lack sufficient experience and knowledge in the subject. On the other hand, engineering and architecture academics who seem to have the appropriate knowledge and experience lack resources like tools and other instruments.

Despite having building codes and climate change adaptation measures in place, they are generally poorly implemented. Other deficiencies were identified in fields such as climate change modelling, technological skills, knowledge of climate law and justice, analytical skills, and computer modelling knowledge and skills. The construction industry in Sri Lanka is also facing a shortage of skilled labour, which is in turn, impeding progress and reduces the country's global competitiveness. Factors contributing to this include a poor workforce structure, lack of standardized policies, high industry wastage, and the perception that the industry is not glamorous in nature. To improve climate resilience, there is a need to develop new skills related to sustainability, green infrastructure, and climate adaptation.

There are many training programmes, policies and incentives in place. However, they seem to focus mostly on the rural/agricultural aspect, to assist farmers in adapting to climate change. More needs to be done to continue increasing awareness and understanding among local government officials, farmers, and communities. There have also been several community-based adaptation projects implemented in order to minimize land degradation, develop community-led strategies, and ensure adaptation to drought and floods, but they were, again, primarily focused on the agriculture and rural aspects and not the built environment per se. Therefore, it is important to develop new skills related to sustainability, green infrastructure, climate adaptation, etc., to improve the competitiveness and productivity of the construction industry and increase climate resilience.

The scarcity of skilled labour and lack of proper workforce structure and policies in the construction industry, could be addressed by giving more incentives for training, CPDs and similar technical knowledge related to climate change adaptation. These training incentives could be provided either by the Government, NGOs, or by other stakeholders. Overall, the stakeholders recommend the development of a comprehensive CPD program, a Master of Science degree programme in climate change adaptation, and PhD programmes in Sri Lankan universities to provide appropriate training and expertise needed to address skill gaps related to climate change adaptation. Moreover, it was also

suggested that opportunities for foreign exposure should also be provided to enable sharing of knowledge and expertise between other countries.

Spain - Universidad De Cantabria

The Universidad de Cantabria led the research in Spain. The stakeholders identified several mismatches that hinders effective adaptation to address climate change including effective communication and dissemination of information. The need to raise awareness and to integrate climate change adaptation into university studies was also highlighted by these stakeholders There is the feeling amongst professionals in the field that there is a shortage of awareness and general knowledge with regards to climate change adaptation measures. Currently there are several regulations, policies and legislations in place which promote climate change adaptations, however, stakeholders emphasise there more needs to be done. Rigorous regulations and legislations need to be implemented in order to enable continuous promotion of the notion of climate change adaptation/adaptations measures. Moreover, it was also highlighted that the promotion of innovative technologies need to be improved across the entire spectrum in the sector especially amongst the built environment professionals. The inclusion of the concept of constant new innovative technologies and research concepts within the field, implementation of more sustainable, effective climate change adaptation and mitigation measures could be achieved. Engaging the general public and increasing their awareness in climate change adaptation was also found to be essential.

Ensuring that climate change adaptation is integrated into regional and local planning processes is another important aspect identified. In doing so, decision-makers can better understand the potential impacts of climate change and develop appropriate measures to mitigate or adapt to these impacts. Coordination and collaboration between different stakeholders involved in climate change adaptation is paramount especially in avoiding “siloing” effect for more effective use of expertise and resources. Public authorities, private sector actors, and civil society organizations must work together to ensure that climate change adaptation measures are effective and sustainable.

However, stakeholders in Spain do not consider the shortage of labour to be a problem. The skill gaps identified were specifically related to identifying the hazard assessment of climate change on the built environment, sustainable water management, and the ability to obtain funding.

The ability to identify the impacts of climate change on the built environment is an essential skill, as a means to understand the potential risks and hazards related to climate change. This is necessary to take effective adaptation measures. By assessing the potential impact of climate change on the built environment, decision-makers/policy makers can better plan and implement measures to mitigate or adapt to these risks.

Sustainable water management is also identified as one of the skill shortages. This skill is particularly important in the context of coastal areas where water resources are relatively scarce and are more susceptible to changes in weather patterns. Water scarcity is a growing problem both throughout the Mediterranean and worldwide, and the effects of climate change are exacerbating this issue. The need for university study plans which include courses and programmes that focus on sustainable water management and conservation is again highlighted here.

Malta - University of Malta

The study conducted by the University of Malta was used to assess the readiness of professionals in addressing climate change adaptation. This study revealed that in the vast majority, professionals within the building industry feel they do possess the necessary skills and knowledge to address climate change adaptation, but they also acknowledge the importance of regular on-going training. They also recognize that they need to stay updated on innovative materials, energy-efficient products, innovative technologies, and practical implementation and sharing of experiences and current case studies.

However, professionals also acknowledge that they face many skill gaps, particularly in the implementation stage of a project. They suggest that there should be training sessions which include the sharing of experiences, especially from the local context. Professionals expressed the need to learn more about retrofitting, and having a comprehensive approach to sustainability, including specialized CPDs for professionals, workers, and the general public. Simply addressing the skill gaps however is seen as not enough. Professionals feel helpless as they ultimately depend on other stakeholders to achieve sustainability goals.

In Malta stakeholders experience difficulties in finding qualified applicants to address climate change adaptation, particularly site-skilled workers, technical persons, and specialized professionals. Professionals were also concerned about the lack of site-skilled workers on construction sites. The majority of the CPDs currently being offered to professionals are not related to climate change adaptation. Therefore, professionals suggest that more training sessions and programs related to climate change adaptation are necessary to close this skill gap.

Generally, the professionals do not feel that their formal professional training helped them in dealing with climate change adaptations. This was particularly felt among professionals of a certain age group. Hence, professionals reiterate the importance of Continuous Professional Development (CPD) to keep themselves updated with the latest developments in the field such as innovative materials, energy-efficient products, innovative technologies (and use of software), practical implementation, sharing of experiences/case studies, decarbonization, and retrofitting and design.

Professionals feel that a comprehensive approach to sustainability is necessary, including specialized CPDs for professionals, workers of middle and lower tier levels, and the general public. They believe that addressing the skill gaps is not enough, and there is a need for all stakeholders to collaborate and engage in sustainability efforts.

Comparative Analysis

UK, Sri Lanka, Sweden, Spain, and Malta have different skill shortages and gaps related to climate change adaptation. The University of Huddersfield in the UK identifies skill shortages in basic climate science knowledge, the ability to link climate change impacts with professional roles, measuring long-term benefits of adaptation, resource allocation, communication skills, knowledge of green energy and decarbonization, and aligning with net zero strategy. Lund University in Sweden finds skill shortages in coordination and collaboration structures, climate adaptation specialists in every municipality, and in the north of Sweden where climate impacts are less understood. The University of Colombo in Sri Lanka notes skill gaps in climate change modelling, technological skills, knowledge of climate law and justice, analytical skills, computer modelling, and sustainability, green infrastructure, and climate adaptation. The Universidad De Cantabria in Spain identifies necessary skills for climate change adaptation in coastal areas, including communication, sustainable water management, hazard assessments, and obtaining funding, but there is no current labour shortage. The University of Malta reports that despite Malta being a small island state, there is a need for expertise in diverse areas, including public policy, social sciences, and urban planning, to tackle the multidisciplinary nature of climate change adaptation.

The following list highlights the common issues identified in the 5 partner countries, which notwithstanding having different contexts as explained above, they are facing similar challenges.

Some common themes include:

- Lack of coordination and collaboration among stakeholders
- Need for increased awareness and understanding of climate change adaptation
- Shortages of skilled personnel in certain areas or sectors
- Lack of training and education opportunities related to climate change adaptation
- Need for more resources and political priority to address climate change adaptation
- Emphasis on sustainability, green infrastructure, and community-based adaptation strategies.

Conclusion – Different Contexts Similar Challenges

Through the data collection from relevant professional stakeholders, the countries have collected information with regards to skill gaps and mismatches within the built environment in coastal areas. The analysis of data resulted in the identification of major skill gaps within the industry. These are summarised in Figure 1. The most evident skill gaps highlighted by many respondents from all countries included the lack of communication across professionals, trade levels and academia, and the lack of collaboration between municipalities, sharing of knowledge and better use of human resources. Other respondents also identified the lack of technological skills with regards to information technology, AI and other similar smart technologies as another major skill gap which needs to be tackled in order to effectively and efficiently implement climate change adaptation measures. Overall, skilled workers and professionals can aid in the retrofitting and renovating of old building stock, lengthening the overall building life-span and making buildings more energy-efficient, reduce greenhouse gas emissions and contribute to the reduction of resource depletion.

Knowledge dissemination both at a governmental and public level is crucial for easier uptake of climate mitigation measures where better, more sustainable, urban strategies for buildings, transport and other infrastructure could be implemented, resulting in the reduction of greenhouse gas emissions, enhanced living conditions and increase resilience of coastal areas to climate change impacts. To address this shortage, university study plans should focus on including courses and other CPD programs that focus on the identification of climate change impacts on the built environment holistically. The use of education and several outreach campaigns could be used in order to help promote understanding and awareness of the importance of adapting to climate change and its impacts. Increasing the public's awareness and overall engagement, stakeholders confident that they could create a culture of climate resilience which could, furthermore, encourage individuals to takeaction to reduce their carbon footprint and adapt to climate change.

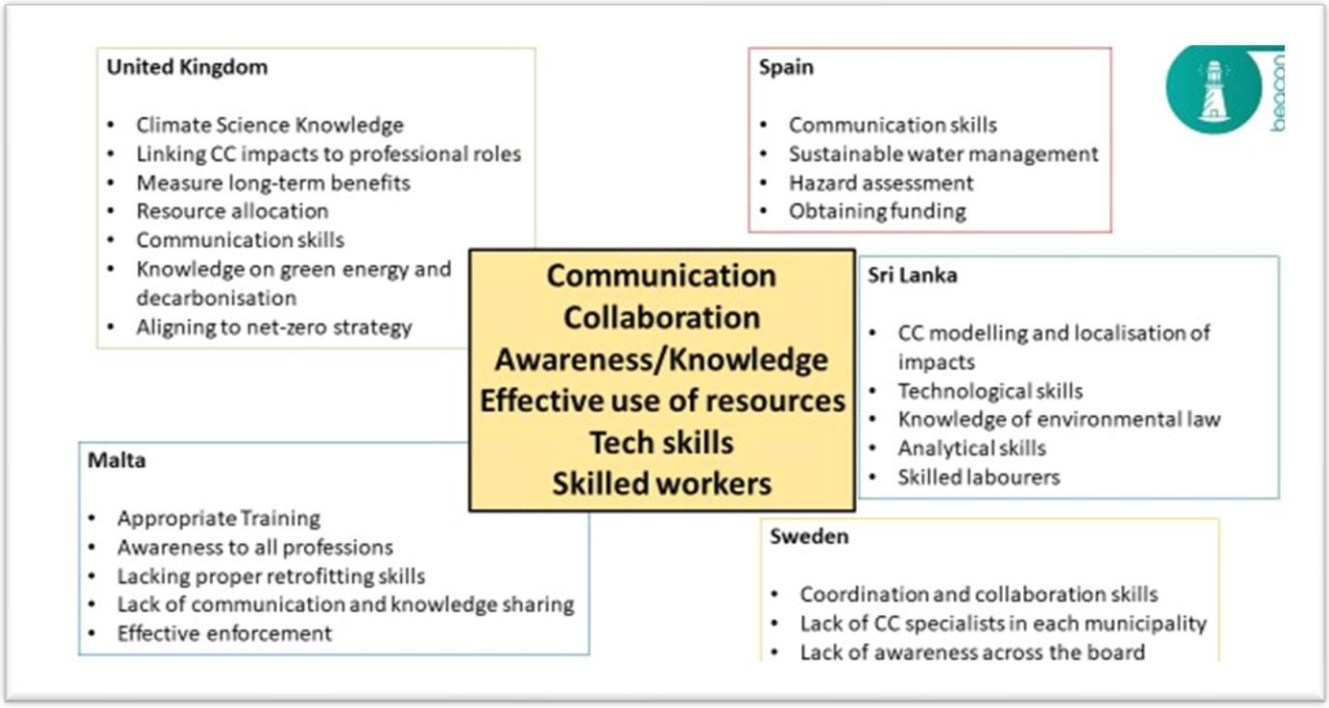

Figure 1 – Common mismatches and skill gaps among the partner countries.

Finally, it is also crucial that the importance of green energy and decarbonisation in mitigating the impacts of climate change is understood by stakeholders in the built environment sector and even the general public as end-users so that they can align their efforts with a net-zero strategy to ensure that their actions contribute to reducing carbon emissions and consequently, minimize the impact of climate change on the built environment.

In summary, the outcome of this study highlights several key skill gaps in climate change adaptation measures in the built environment sector. Addressing these gaps is very important to ensuring that effective adaptation measures are implemented to minimize the impact of climate change on the built environment. Education and training programs that focus on basic climate science knowledge, effective resource allocation and communication skills, and alignment with a net-zero strategy can help bridge these gaps and ensure a more sustainable future.

Effective communication of climate change adaptation measures is essential for the success of any project related to climate change adaptation since it involves the general community. Effective communication strategies that can reach a broad range of stakeholders, from policymakers to local communities. Communication should be done in a way which is easier to understand and accessible to any individuals in society. Furthermore, Higher Education Institutions could assist in improving this skill by formulating targeted study plans to provide appropriate training for all climate change professionals who ultimately can be the game- changers.

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