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Current and Future Sustainability Competences at MBS

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Abstract

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The objective of this thesis is to identify the current and future sustainability competences that need to be acquired by Metropolia Business School (MBS) Master´s students, from the stakeholders´ perspectives, in order to better incorporate sustainability expertise into the existing Master´s curricula. The stakeholders in this Thesis are internal staff and the students, who both influence the study contents and thus their perspectives were important to explore.

The thesis used qualitative research methods, namely surveys and interviews, to explore the stakeholder perspectives. Also, two extensive literature reviews were conducted to explore sustainability competences across various EU documents for the HEI education settings and for segmenting the sustainability competences for HEIs.

The survey among MBS Master´s students and semi-structured interviews among MBS Master´s teaching staff? revealed that MBS students expressed high interest for organized, practical, and structured sustainability knowledge that they can easily apply and share. In the interviews with the MBS teaching staff, the need for clearer, more structured, and more practical guide in integrating sustainability in the teaching subjects was underscored. The thesis also identified a practical need for visualization tools that would facilitate integration of sustainability competences into different courses.

The outcome of the thesis is the lists of current and future sustainability competencies identified and the Sustainability Competences Compass. This Sustainability Competences Compass segments the sustainability competences and thus provides a clearer picture on how “sustainability competence” can be defined to support MBS instructors in designing and planning their courses. The compass would help the MBS teaching staff identify the areas that are addressed and also those that are untouched. This will help prevent over-focusing on developing just one competency and would instead help identify and integrate a broader range of skills into courses that are taught in MBS. The compass can be utilized, for example, in “Competence area” teams in MBS to facilitate sharing of teaching contents, strategies and practices among MBS teaching staff.

Keywords Sustainability competence, sustainable development

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1 Introduction

The world is facing complex problems directly linked to the issues of sustainability. These problems have high damage potential and urgent, and without clear immediate solution. Given this alarming scenario, countries have committed to initiatives addressing sustainability challenges in three major dimensions, namely, ecological, social, and economic. After the 2021 UN Climate Change Conference (COP26) in Glasgow, the countries that are now covered by net-zero commitments represent over 90% of the world's GDP and around 90% of global emissions (COP26, 2021). This collective action at a global level gives rise to the growing concern that these challenges require sets of competences and skills that are different from what human resources currently have. It means, existing knowledge and know-how needs to be recalibrated to come up with the appropriate solutions. "New competences are needed for citizens, consumers, professionals, communities, and society at large to be able to tackle these sustainability challenges, and create new paradigms that can lead to global sustainability" (Steinfeld & Mino, 2009; UNESCO, 2014 as cited by Bianchi, 2020 p. 5).

Education enables the creation of solutions to these complex sustainability problems. This crucial role of education obliges Higher Education Institutions, like the Metropolia University of Applied Sciences, to build sustainability competences in students for handling real-world sustainability problems, challenges, and opportunities.

1.1 Business Context

The case organization of this Thesis is the group of four Master´s Programmes at Metropolia Business School (MBS, "Liiketalous YAMK"). These MBS Master's programmes already incorporate topics and courses related to sustainability, however, there is a need for a more systematic approach to incorporating sustainability competences into the existing Master´s curricula. To do this, it is important to start with what current and future sustainability competences need to be acquired by MBS Master´s students, from the stakeholders´ perspectives. Perspectives and insights from stakeholders help to identify and more clearly point out the areas and competences that will require either special attention or further development, and it will thus contribute to better alignment of the needed sustainability knowledge with the stakeholders´ needs.

The stakeholders in this Thesis are: (1) internal (the staff), (2) internal (the students). These groups of stakeholders influence the study contents and thus their perspectives are important to explore, so that to provide a firm ground for implementing the next curriculum renewal. The (3) external stakeholders (industry & society) are not included into this perspective as studying their views will require a separate research project.

1.2 Business Challenge, Objective and Outcome

The business challenge of this thesis is to identify the current and future sustainability competences that need to be acquired by MBS Master´s students, from the stakeholders´ perspectives. This topic is significant as it helps improve sustainability contents of existing MBS Master's Programmes and thus, ensuring better alignment with stakeholders needs. This goal arises from the need to better incorporate sustainability expertise into the existing MBS Master´s curricula in the next round of curriculum renewal, and do it in an evidence-based, well-grounded manner. Thus, this thesis will contribute to a bigger goal of renewing the MBS Master´s curricula in Sustainability.

The current MBS Master´s curricula already include the topics and courses related to sustainability (e.g. "Sustainably", "Circular Economy", and "Corporate Social Responsibility" courses) which are meant to address the immediate needs of the industry professionals, i.e. the MBS Master´s students. Sustainability topics are also included in other courses in the form of cases, content elements, guest presentations, etc. At the same time, a needs analysis in sustainability competences has never been conducted at MBS. So, there is hope that it will identify and more clearly point to those areas and competences that will require either special attention or further development, from the stakeholders´ perspectives, and it will thus contribute to better alignment of the existing sustainability contents with the stakeholders´ needs.

Therefore, this thesis aims *to identify the sustainability competences that are needed in industry professionals currently and in the near future; and to propose a segmentation of the sustainability competences* as a basis for curricula development in the MBS Master´s Programmes curricula (YAMK). The Research question is:

What sustainability competences are needed in the industry professionals currently and will be needed in the near future (2-3 years), and *how* these competences can be segmented so that to provide a foundation for competence development in the MBS Master´s Programmes?

The outcome of the thesis is (a) the identified sustainability competences that are needed in industry professionals currently and in the near future, and (b) a segmentation of the identified competences that will serve as a basis for developing them in the MBS Master´s Programmes curricula.

1.3 Thesis Outline

This thesis focuses on helping the case organization, Metropolia Business School and its (MBS) Master's Programmes (“Liiketalous YAMK”). The study is limited to the four Master's Programmes and aims to determine and categorize the sustainability competences for internal development based on the views of internal stakeholders (students and staff).

There are seven (7) sections in this thesis. Section 1 introduces the topic, along with the study’s background and rationale. It also outlines the objectives and scope. Section 2 explains the research approach, design, and the methods used for data collection and analysis. Section 3 presents the first part of the literature review and the Current State Analysis (CSA), focusing on present and future needs in sustainability competences. Section 4 continues the literature review. Section 5 outlines the initial proposals for sustainability competences and their classification for curriculum development in MBS Master’s Programmes, based on identified needs and existing knowledge. Section 6 describes the validation of these proposals. Finally, Section 7 provides the study’s conclusions.

2 Method and Material

The research approach and design, including the data collection and analysis methods used in this study are described in this section.

2.1 Research Approach

There are several research approaches that are commonly used in research. Some of the most common *research families* are fundamental vs. applied research; quantitative vs. qualitative research, and desk studies vs. field studies. Saunders (2019) defines *fundamental research* as a type of research that is primarily concerned with expanding knowledge of the underlying processes and principles involved in business and management. Fundamental research is typically associated with academic institutions and is exploratory in nature and seeks to generate new insights, theories, or frameworks that can inform future research or practical applications. In contrast, applied research is focused on solving specific business or management problems and improving understanding of a particular issue. It is goal-oriented and seeks to produce tangible solutions that can be applied in practice. Applied research is often conducted in collaboration with industry or government agencies and is typically privately funded. (Saunders 2019, pp. 9-10.)

Field research involves the collection of new data through direct observation, interaction, or communication with people, objects, or events in the natural setting or context of interest to the researcher. Field research can take many forms, including surveys, interviews, focus groups, case studies, ethnography, experiments, and action research, and provides detailed insights into the research topic. (Saunders 2019, pp.132-133.) *Desk research* means the use of existing (secondary) data to define research questions, identify gaps in knowledge, and provide context for a research project.

In terms of *research methods*, *quantitative* research involves collecting and analyzing numerical data through surveys, or other methods to define, identify, or examine the dimensions of sustainability competences. *Qualitative* research, on the other hand, involves collecting and analyzing non-numerical data, such as interview transcripts, field notes, or focus group discussions, to gain deeper understanding of the experiences, attitudes, and perceptions of individuals and organizations with respect to sustainability

competences. A mixed-method research, which is a combination of quantitative and qualitative research, is commonly used in most studies involving sustainability competences (Hague, 2018).

In terms of *research strategies* in the field of business, case study and action research are the most commonly used. Saunders (2019) describes case study as an in-depth investigation of an individual, group, or organization, or of a bounded system, such as a market or industry sector. Case studies typically involve the collection of multiple sources of data, including interviews, observations, documents, and artifacts, and the use of various methods of analysis, such as content analysis, narrative analysis, and pattern matching. The purpose of a case study can be to understand a complex phenomenon, develop new theoretical insights, test or validate existing theories, or inform practice. On the other hand, action research is a research strategy described by Saunders (2019) as evolving and iterative. Action research typically involves cycles of planning, action, observation, and reflection, and can take many forms, such as participatory action research, action learning, and action science. The aim of action research is to generate new knowledge, inform practice, and improve the lives of individuals and communities.

According to Kananen (2013, pp. 21-23), applied action research is closely aligned with development work carried out within organizations to enhance operations. The objectives of applied action research often involve improving processes, activities, products, services, or facilitating organizational changes. In this approach, development transforms into research by adhering to standard research practices: data is systematically gathered, documented, and analyzed using research methods that yield reliable and contextually novel results. Unlike traditional action research, applied action research typically involves fewer cycles and places less emphasis on studying the change process itself during implementation. Instead, the main focus lies in achieving practical improvements and tangible results.

This study falls under the category of applied research and makes use of qualitative research methods, including interviews, discussions, observations, and a survey. The chosen research strategy for this thesis is applied action research. Since the focus is on identifying the current and anticipated sustainability competences of MBS students, the study draws on the practical outcomes of both the survey and the interviews.

2.2 Research Design

Figure 1 shows the research design of this study. The research design serves as the structure for collecting and analyzing data to address the research question and meet the objectives. It explains the choice of data sources, collection methods, and analysis techniques (Saunders et al., 2019, p. 185). Figure 1 presents the research design used in this thesis, showing how the study is structured and carried out.

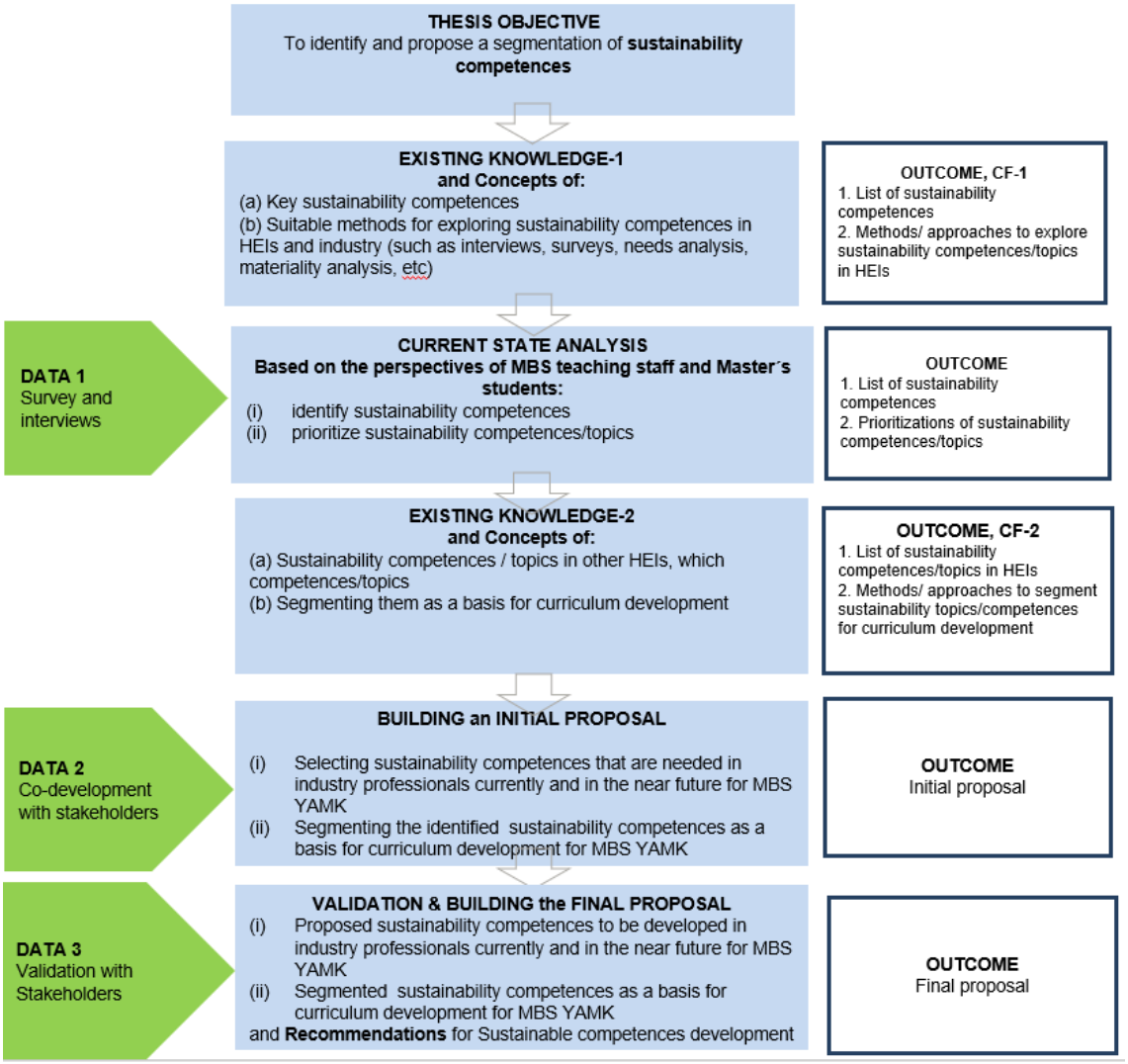


Figure 1. Research design of this study.

As shown in Figure 1, this thesis starts with identification of the business challenge and setting the thesis objective. The research objective for this thesis is to identify and propose a segmentation of sustainability competences for developing curricula at MBS YAMK.

The second stage involves a review of existing knowledge and key concepts, in order to prepare for analyzing the current stakeholder views on sustainability competences. As described in Saunders et al. (2019), review of literature contextualizes the research project in relation to previous research, hence, provides a clearer background and rationale. The global conversation on sustainability has been ongoing for over three decades, and as a result, there is a wealth of research exploring various dimensions of sustainability. This extensive body of literature on sustainability offers rich insights into relevant theories and concepts. Therefore, reading and becoming familiar with this existing literature is beneficial in gaining a stance on sustainability competences. This stage is referred to as Existing Knowledege-1 in Figure 1 and it ends with the conceptual framework-1 that includes (a) the list of sustainability competences as summarized from available literature, and (b) examples of methods that can help to explore sustainability competences in the context of HEIs.

The third stage is the analysis of needed sustainability competences (currently and in the near future) at MBS YAMK, based on internal stakeholders´ views. The analysis is based on Data-1 collection that utilizes a survey (with the students), and a series of interviews (with instructors). The survey and interview questions were developed based on the existing literature-1 and conceptual framework-1. The thesis researcher keeps two distinct perspectives: the current and the future needed sustainability competences (in 2-3 years). The data gathered from the surveys and interviews is analysed via (a) the needs analysis and (b) prioritize various sustainability topics based on the stakeholders´ perspectives. The use of two analysis tools should improve the reliability of findings and help the utilization of results. The outcomes of the analysis include (1) the list of identified sustainability competences (needed currently and in the near future at MBS YAMK), and (2) prioritization of identified sustainability competences/topics into bigger logical groups.

The fourth stage is the new round of literature review focused on the search for best practice in other HEIs how they identified the needed sustainability competences in higher education, and how these sustainability competences are segmented/prioritized or otherwise visible in curricula development. These inputs and suggestions from available knowledge are used to guide the Recommendations development in the next stage.

The fifth stage is the development of Recommendations co-created with the key stakeholders based on comparing and segmentation of the identified competences as a

basis for further curricula development (based on the internal analysis results vs. available literature inputs). Additionally, a report and discussion at the meeting with the key stakeholders is to be held to have the input from wider internal stakeholders.

The sixth stage focuses on validating/evaluating the recommendations and identifying necessary adjustments before making any further plans. The validation is conducted in the form of another interaction round (Data 3), this time with the top management (Heads of MBS) and, potentially, other selected leading experts with relevant expertise (business and education) that Head of MBS will point to. The outcome of this stage is the final, refined set of Recommendations for Sustainable competences development at MBS YAMK.

2.3 Data Collection and Analysis

This study is based on multiple data sources, gathered over three separate rounds. Table 1 shows details of data collection in this study.

Table 1. Data collections 1-3 used in this Thesis.

	Participants/ data source	**Data type**	**Topic, Description**	**Date Duration**	**Documented as**
	DATA 1, Current State Analysis				
1	Desk research	Document Analysis	List of Sustainability Competences	October 2022	Notes
2	MBS Master Students	Survey	Sustainability Competences	November 2022	Survey
3	Internal Stakeholders (Teaching Staff)	Co-development	Segmentation of Sustainability Competences	November 2022	Interview
4	Interviewee01 Teaching Staff	Interview (online)	Sustainability Competences	November 2022	Questionnaire, Recording and Interview Notes
5	Interviewee02 Teaching Staff	Interview (face-to-face and online)	Sustainability Competences	November 2022	Questionnaire, Recording and Interview Notes
6	Interviewee03 Teaching Staff	Interview (face-to-face and online)	Sustainability Competences	November 2022	Questionnaire, Recording and Interview Notes

7	Interviewee04 Teaching Staff	Interview (face-to-face and online)	Sustainability Competences	November 2022	Questionnaire, Recording and Interview Notes
8	Interviewee05 Teaching Staff	Interview (face-to-face and online)	Sustainability Competences	November 2022	Questionnaire, Recording and Interview Notes
9	Interviewee06 Teaching Staff	Interview (face-to-face and online)	Sustainability Competences	November 2022	Questionnaire, Recording and Interview Notes
	DATA 2, For Proposal Building				
10	Internal Stakeholders (Teaching Staff)	Discussion	Segmentation	January-May 2025	Interview Notes
	DATA 3, Validation and Building Final Proposal				
11	Internal Stakeholders (Teaching Staff)	Interview and discussions	Validation and evaluation of the Recommendations for Sustainable competences development at MBS	May 2025	Interview Notes and recording

As shown in Table 1, the first round, Data 1 was conducted for the current state analysis. Data 1 was gathered via a survey and a series of interviews. The survey was conducted among MBS Master´s students and the interviews were done with the teaching staff of MBS (Data 1).

The survey entitled “Sustainability Competences Survey” was rolled-out in November 2022. The MBS Master students accessed the survey form through the Metropolia OMA portal. The results of the survey were used as a starting point to the interviews with six teaching staff of MBS were conducted in November 2022 as semi-structured, face-to-face interviews, held in MBS premises, with questions created in advance. The interviews were recorded and the field notes taken. The questions for the interviews can be found in Appendix 2 and the summary of interviews in Appendix 3.

Data gathering for the thesis was conducted in such a way as to use only: (a) anonymized data (e.g. data from groups of respondents, without any possibility to identify any of the responding individuals) such surveys from: (a) staff and students, and (b) data from interviews (i.e. psydo-anonymized data: Respondent A, Respondent B, etc), which is not sensitive in nature and obtained with permission for use, and without indicating the names/companies/personal details of respondents.

3 Existing Knowledge and Best Practice on Sustainability Competences and Suitable Methods to Identify Them in HEIs (Conceptual framework-1)

This section presents the discussion based on available literature on what are key sustainability competences. This section searches for sustainability competences mentioned in existing literature and discusses suitable methods of identifying them applicable for higher education institutions (HEIs). To establish the understanding of the concept of Sustainability Competences, this literature review starts with the concepts of sustainability, and sustainability competence of educators and learners. It ends with a list of sustainability competences as summarized from available publications in this field.

3.1 Defining Key Sustainability Competences

Bianchi (2020) in “Sustainability Competences: A Systematic Literature Review” points to several reputable sources of definitions for sustainability competences. One of these sources is a study by Brundiers et al (2020, p.17), which cited the definition of the term key competences in sustainability sourced from Wals (2005) and Wiek et al. (2011) as

> *“a distinctive and multifunctional competence, which is composed of several sustainability competences that functionally relate to each other. It facilitates achieving successful performance and a positive outcome that progresses sustainability (given what is known, valued, and aspired at a given moment in time), while working on specific sustainability challenges and opportunities in a range of contexts.”*

Building on the definitions for sustainability competences from her systematic literature review, Bianchi (2020) coined her own definition of competences in sustainability as:

> “the interlinked set of knowledge, skills, attitudes, and values that enable effective, embodied action in the world with respect to real-world sustainability problems, challenges, and opportunities, according to the context” (based on: cf. Wiek et al., 2011; Redman & Wiek, under review; UNESCO, 2007, as cited in: Bianchi 2020, p. 2).

Here, it is important to add that *competence*, as a concept of British origin, “refers to *practical skills, knowledge and understanding* of the work environment and is tied to job performance” (Winterton, 2002, as cited from: Bianchi 2020, p.8). “*Competence-based education* is outcome-focused, as it is centered on enabling individuals to engage

effectively in different situations and contexts to contribute to transform their structures" (Rieckmann, 2012, as cited from: Bianchi 2020, p.8).

Yet, sustainability and competences are broad concepts. In many studies, competence is often articulated along with other terms such as skills, abilities, and capabilities. While sustainability is commonly related to environment issues, this concept has been expanded to cover economic and social dimensions.

In this thesis, the term *competence* is understood in the context of integrating sustainability themes into education and follows the definition of sustainability competences provided by Bianchi (2020), as referenced earlier.

3.1.1 Sustainability

The concept of sustainability has its origins in various historical periods and events. Walter Stahel (2019), the world-famous expert on Circular economy, traced back the emergence of a concept of sustainability to 18th century. Stahel (2019) identified Hanz Carl Von Carlowitz, a German forest scientist in 1713, as the one who introduced the idea of sustainable forestry, emphasizing the importance of harvesting timber in a way that ensured long-term health and productivity of forests. Carlowitz called this resource management idea *Naghaltigkeit*, which translates to "sustainability." (Stahel, 2019, p.11)

The concept of sustainability continued to develop over the years, with contributions and influences from various disciplines and individuals. Martin Haigh (2005), a professor of Geography in Oxford University, noted the ideas on sustainability started to gain traction and to turn into concrete actions in the early 70's. Over time, this slowly transformed into a global movement and created specific detailed actions. In the education field, this led to the integration of sustainability principles in different aspects of education at the lower levels and in universities. Simultaneously, the collective action of countries to solve the world's most pressing challenges or "wicked problems" of the world gave birth to the UN Sustainability Goals (Haigh, 2005, p. 32).

The term *sustainability* gained widespread recognition following the 1987 publication of the Brundtland Report, also known as "Our Common Future." In this report, Gro Harlem Brundtland, the Chairwoman of the World Commission on Environment and Development (WCED), defined sustainability, or more specifically, sustainable

development as *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"* (Brundtland Commission, 1987, p.41). This definition highlights two central ideas: (i) the notion of 'needs', especially the fundamental needs of the world's poor, which should be prioritized above all; and (ii) the recognition of limitations set by technological and social conditions that affect the environment's capacity to fulfill both current and future needs (Brundtland Commission, 1987, p. 41).

In 2012, UNESCO publication entitled "Education for Sustainable Development Sourcebook" defined sustainability as "a paradigm for thinking about a future in which environmental, social and economic considerations are balanced in the pursuit of development and an improved quality of life." More recently, sustainability is defined as "prioritising the needs of all life forms and of the planet by ensuring that human activity does not exceed planetary boundaries" in the Joint Research Centre of the European Commission (2022, p.12). The definition of sustainability has shaped recent business practices, particularly, in the EU.

3.1.2 Sustainability Competences Frameworks

Contemporary pedagogical perspectives define competences as a combination of interconnected knowledge, skills, attitudes, and values. These cannot be effectively developed through traditional teaching methods alone but must instead be cultivated by learners through reflection, practical engagement, and lived experience (Mindt & Rieckmann, 2017; Molderez & Fonseca, 2018, as cited in Bianchi, 2020, p.10). Along similar lines, Wong (2020, p.98) explains competence as the collection of specific skills and knowledge required to carry out a job, emphasizing that such competence is not easily transferable, as each skill set is tailored to a particular role. Similarly, Jónsson et al. (2024, p.26) define competence as a state—marked by the successful attainment of one or more competencies. Bringing together the concepts of sustainability and competence helps to frame the kinds of skills, knowledge, and behaviors needed to meaningfully contribute to sustainable practices across different fields.

According to Bianchi (2020), sustainability competences are needed for society to be able to tackle sustainability challenges and re-learn to live in tune with the planet on which our economy and our society depend. Bianchi (2020) relies on three most cited and influential frameworks for identifying key Sustainability Competences in academic

program development, and she comes to the conclusion that - presently, based on these three existing framework - key sustainability competences can be groups into 8 groups. These three most influential sustainability competence frameworks are:

First, the framework by Wiek et al. (2011 & 2016) that focuses on sustainability competences in higher education. Their framework originally included five key competences, namely (1) systems thinking, (2) anticipatory, (3) normative, (4) strategic, and (5) interpersonal competences, with a sixth added in 2016, promoting (6) integrated problem-solving. These competences are closely connected and mutually dependent, with each playing a vital role in addressing and solving sustainability-related challenges.

In this framework, Wiek et al. (2011 & 2016) focus on “key competences in sustainability” as opposed to “regular or basic” competences, such as, but not confined to “critical thinking, communication, pluralistic thinking, research, data management, etc.” (Wiek et al., p.211). This is not to suggest that these subjects lack critical importance to sustainability. Rather, they can typically be acquired through standard academic pathways and are not unique to sustainability-focused education. From their perspective, "sustainability education should equip learners to critically assess and address sustainability challenges, anticipate and adapt to emerging sustainability issues, and proactively identify and pursue opportunities that advance sustainability." (Wiek et al., 2011, p. 204, as cited by Bianchi, 2020, p.12). Importantly, the framework by Wiek et al. (2011 & 2016) is focused specifically on higher education, and not on a full range of other education levels.

Second, the framework by Brundiers et al. (2020) that further develops the first framework. These experts conducted a study based on using Delphi method and agreed with the framework by Wiek et al. (2011 & 2016) adding two additional competences to the framework, namely (7) intrapersonal and (8) implementation competences.

In this framework, “the key competences in sustainability relate to basic competences and topical knowledge. Key competences in sustainability are interdependent and related to *academic competency* which can be acquired in any academic setting (as in Wiek et al., 2011)”. In addition to the original study by Wiek et al. (2011), Brundiers et al. (2020) openly point to the need for student to develop *topical knowledge*, such as, knowledge of environmental sciences, chemistry, international development, and other related fields. However, according to Bianchi (2020, p.16), “key competences in

sustainability are independent of any specific knowledge, meaning that the framework can be used for sustainability-related courses in any academic program."

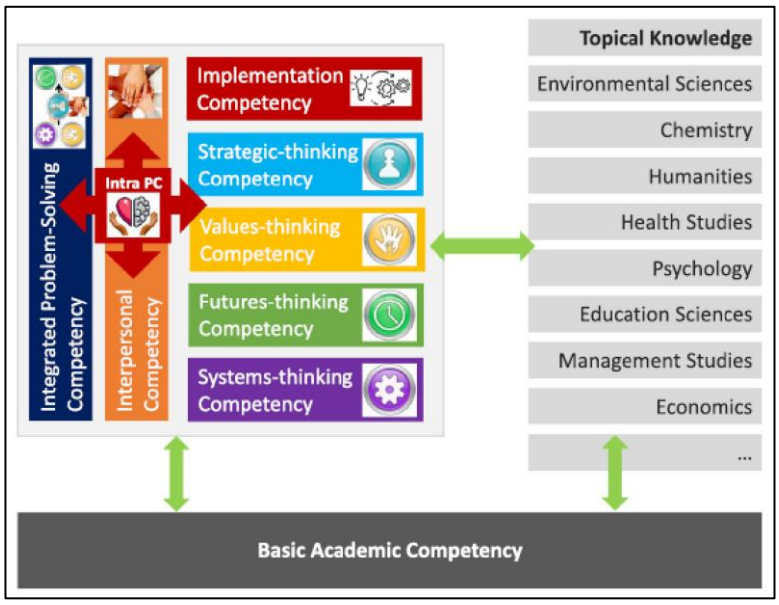


Figure 2. Key sustainability competences (according to Brundiers et al. 2020).

Third, the framework by Redman and Wiek (2020) further explored and then supported the two previous frameworks by drawing own similar framework of key sustainability competences. The new element was that the implementation competence and intra-personal competence were categorized as professional skills.

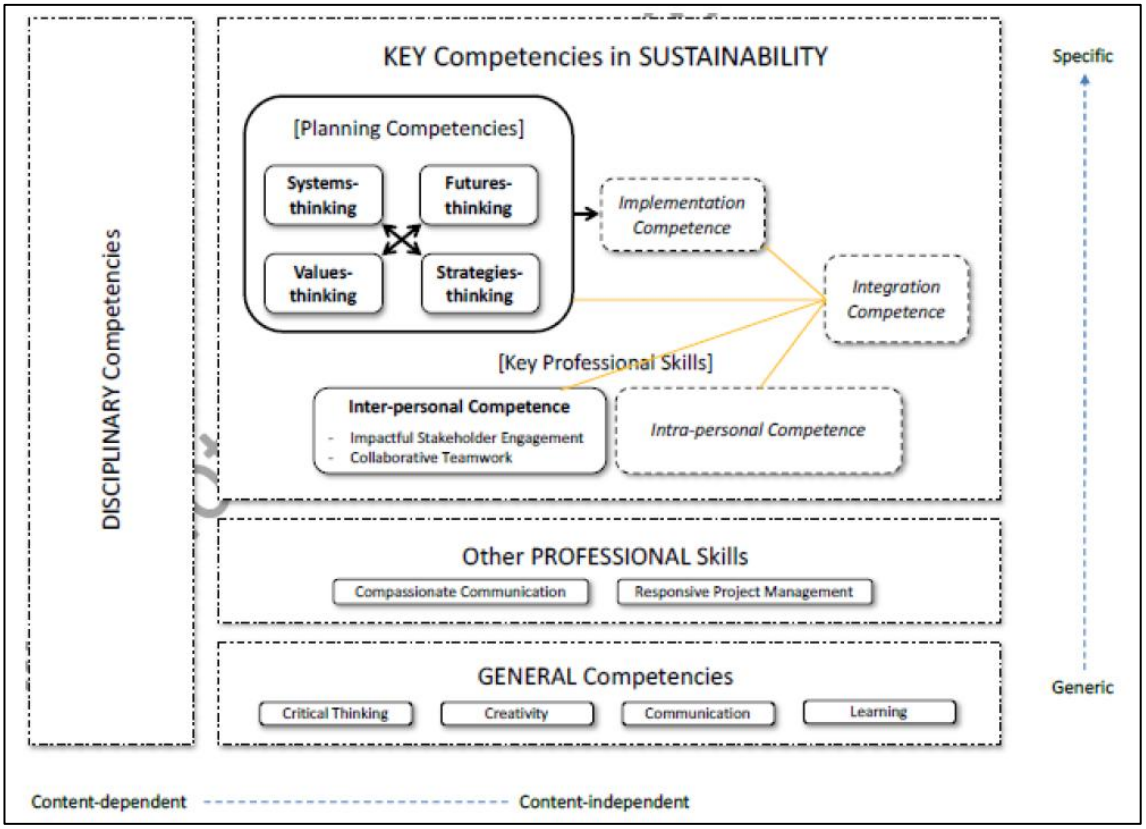


Figure 3. Key sustainability competences (according to Redman and Wiek 2020, as cited from: Bianchi 2020, 17).

As seen from Figure 3, in this framework, “systems thinking, futures thinking, values thinking, and strategies thinking” play a central role in shaping sustainability action plans. When effectively applied, these can result in meaningful sustainability outcomes—this reflects what is termed implementation competence. Essential professional skills in the sustainability field, such as inter- and intrapersonal competences, support collaboration and personal wellbeing, both of which are vital for sustained success. Integration competence, meanwhile, ensures that planning and implementation efforts are cohesively aligned.

In addition to core sustainability competences, several complementary skills are identified along two axes. These include generic competences commonly taught in higher education (Brundiers et al., 2020; Murga-Menoyo, 2014; Wiek et al., 2011, 2016), disciplinary knowledge or subject-specific skills (Brundiers et al., 2020; Demssie et al., 2019; Heiskanen et al., 2016; Kerry et al., 2012; Murga-Menoyo, 2014; Roorda, 2013), and broader professional abilities. General competences supporting sustainability transitions include critical thinking, creativity, communication, and learning, while

professional skills such as compassionate communication and responsive project management also play a vital role (Brundiers & Wiek, 2010). Disciplinary expertise, such as knowledge of climate, water, energy, food systems, or international development, is equally essential for driving sustainability efforts (Bianchi, 2020, p.17).

As seen from Figure 3, this approach adopts a more sophisticated picture between generic and specific elements in sustainability competences, allowing for some more gradation in competences. Yet, sustainability competences are firmly places at the "specific" end of array, rather than relating to "generic" competences. This fits with the views of the other two approaches that link substitutability commences to sustainability-related courses (Brundiers et al. 2020) and sustainability education (Wiek et al. 2011; 2016).

Table 2 below summarizes the categorization of key sustainability competences into eight sustainability competences based on the three leading frameworks mentioned above.

Table 2. Identifying Key sustainability competences groups, based on three leading Sustainability Competences frameworks (Bianchi 2020, p.18).

Wiek et 2011, 2016	**Brundiers et al., 2020**	**Redman & Wiek, under review**
Most influential framework	*Delphi study of 14 experts to review Wiek et al., 2011, 2016*	*Literature review to find convergence over Wiek et al., 2011*
Framework on **Key** Competences in Sustainability for **academic** program development		
Systems-thinking competence	Systems-thinking competency	Systems-thinking competence
Anticipatory competence	Futures thinking competency	Futures thinking competence
Normative competence	Values thinking competency*	Values thinking competence
Strategic competence	Strategic competency	Strategic competence
Interpersonal competence	Interpersonal competency	Interpersonal competence
Integrated problem-solving competence	Integrated problem-solving competency	Integrated problem-solving competence
	Implementation competency**	Implementation competence****
	Intra-personal competency***	Intra-personal competence****

The definitions of the identified key sustainability competence groups are summarized in Tables 3 and 4 below.

Table 3. Definitions of eight Key sustainability competences groups, based on three leading Sustainability Competences frameworks (Source: Bianchi 2020, p. 15).

1.Systems-thinking	To be able to collectively analyze complex systems across different domains (society, environment, economy, etc.) and across different scales (local to global), thereby considering cascading effects, inertia, feedback loops and other systemic features related to sustainability issues and sustainability problem-solving frameworks.
2.Futures-thinking	To be able to iterate and continuously refine one's own futures thinking (visions, scenarios, etc.), in productive and explicit tension to the status quo; recognizing the implicitly held (and largely unrecognized) assumptions about how society works and how they influence the status quo and critically reflecting how they might influence futures thinking.
3.Values-Thinking	To be able to differentiate between intrinsic and extrinsic values in the social and natural world; to recognize normalized oppressive structures; to identify and clarify one's own values; to explain how values are contextually, culturally, and historically reinforced; to critically evaluate how particular stated values align with agreed-upon sustainability values; and to differentiate between espoused values and practiced values.
4.Strategic thinking	To be able to recognize the historical roots and embedded resilience of deliberate and unintended unsustainability and the barriers to change; to creatively plan innovative experiments to test strategies.
5.Interpersonal	To be able to apply the concepts and methods of each competency not merely as "technical skills," but in ways that truly engage and motivate diverse stakeholders and to empathically work with collaborators' and citizens' different ways of knowing and communication.
6.Integrated Problem-Solving	To be able to combine and integrate steps of the sustainability problem solving process or competences, while drawing on pertinent disciplinary, interdisciplinary, transdisciplinary, and other ways of knowing.
7.Implementation	The collective ability to realize a planned solution toward a sustainability-informed vision, to monitor and evaluate the realization process, and to address emerging challenges (adjustments), recognizing that sustainability problem-solving is a long-term, iterative process between planning, realization, and evaluation
8.Intra-personal or Self Awareness	The ability to be aware of one's own emotions, desires, thoughts, behaviors, and personality, as well as to regulate, motivate, and continually improve oneself drawing on competences related to emotional intelligence and social and emotional learning.

Table 4. Definitions of Key Sustainability Competences groups by Brundiers et al. 2020, p.23-27.

Competency	Cognitive outcome	Behavioural outcome
Systems thinking	Ability to understand the components and interaction of differing systems across domains and scales	Ability to generate and interpret results showing how differing systems interact across domains and scales
Anticipatory/futures thinking	Ability to understand differing future visions, states and impacts related to sustainability	Ability to generate and interpret results showing differing future visions, states and impacts related to sustainability
Normative/values thinking	Ability to understand the (un)sustainability of current/future states, values, ethics, principles, lifestyles, etc.	Ability to generate and interpret results showing the (un)sustainability of current/future states, values, ethics, principles, lifestyles, etc.
Strategic thinking	Ability to understand the design and implementation of interventions and transformative strategies for sustainability	Ability to generate change and evaluate the design and implementation of interventions and transformative strategies for sustainability
Interpersonal competencies	Ability to understand the needs of collaborative and participatory problem-solving for sustainability	Ability to facilitate collaborative and participatory problem-solving for sustainability
Intrapersonal competency or mindset	Ability to reflect on transformative learning when engaging with sustainability issues and competencies	Self-awareness of one's own values (equity, consumption, human-nature connections, etc.), motivation, and attitudes when engaging with sustainability issues and competencies
Implementation competency	Ability to apply actionable knowledge created through strategic thinking competency	Ability to catalyze cognitively driven and integrated problem-solving competencies towards manifest changes on the ground (hands-on practice)

It would be fair to note that there are more sustainability competence frameworks in available literature, beyond these leading three. Other frameworks have emerged from research focused on sustainability education (SE) and education for sustainable development (ESD) and were published between 2012 and 2020. It is worth noting that most of the sustainability competences identified in these other frameworks, for example, systemic thinking, have been identified in almost all frameworks. Therefore, the other frameworks are not discussed here but their short overview can be found in Appendix 1.

Summing up, as pointed out by researchers, the **main weaknesses** of the 8 sustainability competences generalized approach that was discussed above relate to: (a) “no *in-depth definition of components* of the aforementioned competences”, and (b) “each discipline has *to tailor sustainability-related content knowledge* according to its subject.” (Bianchi (2020, 18). Thus, although the eight sustainability competences draw significant support in available literature and thus can be considered as the leading, prevailing approach to identifying sustainability competences, they need **further exploring and detailing** before they can be reliable applied for curricula development. This will be the topic of the next sub-section, how to further identify and detail the sustainability competences.

3.2 Methods for Identifying Sustainability Competences in HEIs

Finland is recognized to be at the forefront in the discussion of sustainability which encompasses across sectors and industries, with a growing body of literature on its pioneering role in making sustainability integral to its education system. In 2017, the Ministry of Education of Finland published the Government’s 2030 Vision for Higher Education, positioning the key role higher education institutions plays in promoting sustainable growth (Roadmap for Implementing Vision 2030, Ministry of Education, 2017). Jónsson et al (2024) emphasized that sustainability is embedded in the education policy and curriculum, particularly for basic education. Jónsson et al. (2024) highlighted that the Finnish National Agency for Education, along with the 2018 national Core Curriculum for Early Childhood Education and Care, underscores the importance of promoting ecologically, culturally, and economically sustainable ways of living across all early childhood and pre-primary education activities. Reflecting this emphasis, the Finnish Ministry of Education and Culture has initiated a comprehensive development project focused on futures-oriented work within comprehensive schools (Jónsson et al., 2024, p. 38).

Despite progress, the challenge of aligning policy with practice remains in Finland. Some studies also identified the gaps in fully integrating sustainability in school curriculum. In a paper entitled “Sustainable development within Finland’s Primary Teacher Education – An analysis of university level teacher education,” Cockerell (2020) concluded that sustainable development is insufficiently integrated into primary teacher education to be able to enable Finland to adequately respond to Agenda 2030 and SDG 4.7. The improvements have not been made to fully to ensure that learners acquire the knowledge and skills necessary to foster sustainable development through education (Cockerell, 2020, p.3).

Ratinen and Linnanen (2022) stress that “sustainability education requires new values and modes of thoughts and actions that foster individuals’ sustainability competences.” According to their analysis, in the Finnish context, tackling climate change and biodiversity loss issues at the systems level arise from Finns’ individual values and that actions are carried out in an ethically just way (Ratinen and Linnanen, 2022, p.287).

In HEIs, researchers use various methods and approaches for exploring and understanding competences. Specifically, in the area of sustainability competence, based on studies conducted between 2012 and 2020, (as indicated in Tables 2, 4, and 5), the most frequently employed methods were surveys, Delphi method, and also literature reviews. In addition, workshops and focus group discussions were also used to gather qualitative insights to sustainability competences.

For instance, Wiek et al. (2011) conducted a comprehensive literature review drawing from academic articles, grey literature, university websites, and curriculum documents. Their work identified key literature on sustainability competences, organized the findings into a structured framework, and highlighted conceptual gaps. Similarly, Bianchi (2020) carried out an exploratory review for the European Commission, analyzing academic and grey sources to examine existing definitions and frameworks of sustainability competences in education, offering evidence to support future discussions.

Rieckmann (2012), used *a Delphi method* to identify which key competencies should be fostered through university teaching and learning. Seventy (70) experts from Latin America (Chile, Ecuador, Mexico) and Europe (Germany, Great Britain) took part in this multi-round questioning procedure. According to Rieckmann (2012, p.8), the main idea of the Delphi method is to gather experts´ opinion and eventually consensus of opinion,

using a systematic and iterative approach. Experts answer questionnaires in the first round, then in the next round get an anonymous summary of the experts' answers from the previous round and are encouraged to revise their earlier answers in light of the replies of other members of their panel. Brundiers et al. (2020) also used *a Delphi method* to review existing literature on sustainability competences, in particular, those by Arnim Wiek in years 2011 and 2016. In summary, the Delphi method offer a structured and systematic approach to tapping into the collective wisdom of experts to address complex and uncertain issues, for example, sustainability and competences.

Quendler and Lamb (2016, pp. 273 - 293) explore how lifelong learning is important in the face of evolving job trends and the need for competences, skills, and knowledge that support sustainable development. To gather information about these needs, they used *surveys* targeting both Higher Education Institutions (HEIs) and companies. Biasutti and Surian (2012) used *a questionnaire* called" Student Survey of Education for Sustainable Development Competencies" (SSESDC) to assess *existing* student's attitudes, knowledge, and competences related to sustainable development. The students surveyed in this study belonged to social sciences, educational sciences, applied sciences, engineering and health sciences. Overall, the study explored the competences and attitudes of university students in the context of sustainable development. Results of the study show significant differences between students of different areas in their competences about sustainable development. Engineering students indicated a more enhanced pro-sustainability attitude. While students in social sciences showed a more enhanced pro-social attitude, meaning they are more socially oriented.

While conventional Delphi method was used by many studies to identify competences, such as in Rickman (2012) and Brudiers et al. (2020), advancements in digital technology have transformed data-gathering methods across different fields, including studies focused on sustainability competences. Korhonen-Yrjänheikki (2011) mentioned the extensive use of eDelfoi in Finland. This method is conducted online using the software Real Time Delphi. The eDelfoi facilitates rapid and efficient gathering of experts insights. It has been use in studies in sustainability and environment fields, such as the Millenium Project of the United Nations (Korhonen-Yrjänheikki, 2011, p.270).

Needs analysis serves as a methodical approach to collecting information aimed at identifying particular skill gaps and knowledge shortcomings. For instance, Huhta (2010) applied needs analysis within project groups to explore the language and communication

requirements essential for professional settings in business and industry. This approach was intended to generate insights into language and communication objectives specific to the Finnish business context. As noted by Huhta (2010, p. 43), “questionnaire surveys are the most widely used needs analysis method.” From an educational standpoint, Brown (2006) defines needs analysis as “a systematic collection and analysis of all subjective and objective information necessary to define and validate defensible curriculum purposes that satisfy the language” (Brown, 2006, as cited in Huhta, 2010, p. 32).

Needs analysis is widely applied in research on sustainability competences to identify existings gaps. In a paper entitled “A Needs Analysis for Embedding Sustainable Finance Competences into Vocational Business Education in the Baltic Region” by Siirilä et. al (2022), a needs analysis was conducted to identify the specific sustainable finance skills required by current and future professionals. A survey involving professionals from the financial services sector across Finland, Latvia, Estonia, and the Åland Islands identified intra-personal and inter-personal competences as the most essential. The quantitative analysis of the data showed that the three most sought-after sustainable finance skills within the respondents’ organisations were: understanding key drivers of sustainability, the ability to think and act with a long-term outlook, and effectively communicating sustainable financial information (Siirilä et al., 2022, p. 186).In the study “CASE Needs Analysis finished: Findings on Competencies for Sustainability-driven Entrepreneurship,” a needs analysis was used to identify the necessary competencies for a sustainability-driven entrepreneurship to support the development of modules for a future master’s program in entrepreneurship (Bernhardt et. al., 2015, p.27)

The needs analysis was also employed to identify the generic and sustainability-oriented skills and competencies required of business graduates by employers in North Queensland, Australia (McCarty et al. 2021). The study employed a tool to gather data from employers, an online survey. The study found that employers attach importance to a wide range of skills and competencies and see sustainability as a key factor in future business success McCarty et al. (2021, p.1).

Another valuable method is the survey. Shang et al. (2022) employed this approach to carry out a needs analysis aimed at identifying gaps in sustainability competencies among engineering graduates as required by industry. As noted by Shang et al. (2022, p. 1), a model of generic engineering competencies was developed, along with a scale

consisting of 55 specific skills. This tool was used to survey two groups of engineering graduates working in the Chinese industrial sector—746 participants in the first round and 1,183 in the second. Through exploratory factor analysis (EFA), seven subscales emerged: (1) leadership, (2) engineering design, (3) professionalism, (4) problem-solving, (5) lifelong learning, (6) technical theory, and (7) communication. Confirmatory factor analysis (CFA) further indicated that these competencies could be effectively represented by a second-order, single-factor model that showed a good fit with the data.

As an example of this method, *a Survey Questionnaire*, was utilized in the study of Alm et al. (2021) called *"Students' Learning Sustainability- implicit, explicit or non-existent: a case Study approach on students' key competencies addressing the SDGs in HEI program".* This study used an online survey method to gather data in Kristianstad University (HKR) in Sweden. The study used a quantitative case study design to examine how sustainability-related competencies align with students' learning experiences and future career expectations. An online survey was used as the primary data gathering tool in the study.

Through the student platform EvaSys, the master´s level students were surveyed to assesses their perception on the education integrating sustainability into programs and curricula. The questionnaire used has 13 questions and was divided into three main sections, namely, demographics and control variables, general knowledge on sustainability, and assessment of key competencies. A total of 742 students received the survey, and 30 responses were returned, resulting in a response rate of 4%. The sample was composed mainly of full-time students (70%) and those studying on campus (76.7%). A 5-point Likert scale was used to measure student perceptions of the readiness of own sustainability-related skills after graduation. Almost all or 93% of those surveyed indicated familiarity with the SDGs. Respondents also have high rating in terms of the relevance of sustainability to their future professional careers. (Alm et al. 2021.)

Findings of the study suggest that students perceive themselves as well-equipped with sustainability competencies, particularly in normative and strategic aspects. The high scores on system-thinking and anticipatory competence indicate that students understand sustainability as a long-term, globally relevant issue. The integration of work-integrated learning (WIL) in the curriculum appears to enhance students' confidence in applying sustainability principles in their future careers. With 30% response rate, the study underscores the importance of experiential learning methods, such as real-world

case studies and industry collaborations, in fostering sustainability competencies. The authors argue that such pedagogical approaches support students in becoming change agents who can implement sustainability principles in their respective fields. (Alm et al. 2021.)

The research highlights the critical role of WIL and real-life experiences in enhancing sustainability competencies among higher education students. The study reinforces that higher education institutions (HEIs) must take an active role in competency-based education, ensuring that students acquire system-thinking, anticipatory, normative, strategic, and interpersonal skills. In addition, the study also emphasizes the need for HEIs to align curricula with sustainability goals through interdisciplinary learning, problem-based education, and work-integrated learning opportunities. It proposes that HEIs prioritize pedagogical methods that foster not only knowledge acquisition but also critical thinking, leadership, and practical application of sustainability principles. (Alm et al. 2021.)

The above-mentioned examples demonstrate the increasing use of needs analyses and surveys in research on sustainability competences. As highlighted in this research, needs analysis is valuable in identifying and understanding the gap between existing competences and what are needed in education, industry, or government policy, across different time horizons, from short-term to long-term. A properly executed needs analysis improves the relevance of planned changes and interventions, e.g. curriculum changes, or policy-changes, by aligning them with actual needs and priorities.

3.3 Conceptual Framework 1

For outlining Conceptual framework-1, this study uses the comparison of Wiek et al. (2011 & 2016), Brundiers et al. (2020) and Redman & Wiek (under review) frameworks as its foundation, which all examined how integrating sustainability in HEIs' teaching could facilitate students' key competencies for internal change to support a transition toward sustainable development. Wiek et al. (2011 & 2016) define sustainability as "a functionally linked complex of knowledge, skills, and attitudes that enable successful task performance and problem-solving" (2011, p. 204). Especially Wiek´s (2011 & 2016) seems to be a convenient model as it is based on students' five key sustainability competencies: *systems-thinking competence, anticipatory competence, normative competence, strategic competence* and *interpersonal competence* (Alm et al. 2021).

Figure 4 shows Conceptual framework-1 for the next step in this thesis. It summarizes the list of key sustainability competences, based on the most reputable literature, and points to the methods for exploring them that were frequently used in available literature. The methods for exploring sustainability competences frequently include: (1) Needs analysis (e.g interviews, survey, workshops, focus group discussions used to identify the needs); (2) Delphi method; and (3) Literature review. Table 3 in Section 3.1.2 lists the specific definition of these competences.

Identification of sustainability topics/areas provide the context and focus of sustainability competences, while sustainability competences provide the means to understand and address these topics.

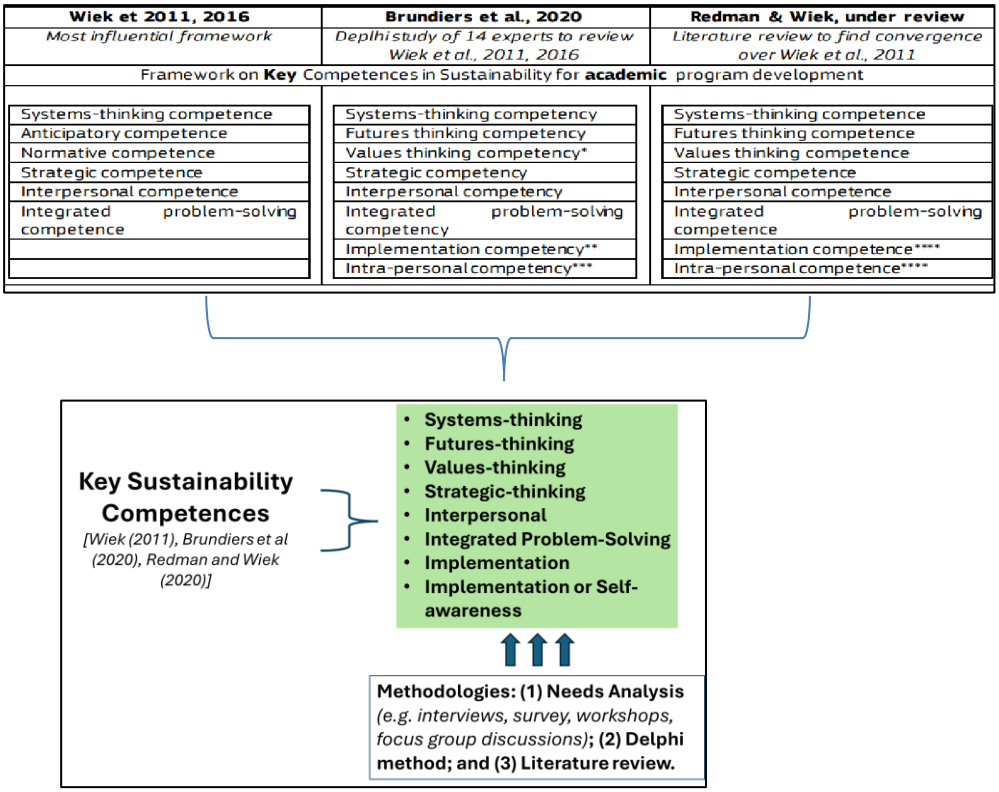


Figure 4. Conceptual framework 1 for sustainability competences and methods for exploring them in HEIs.

4 Analysis of Sustainability Competences (Needs Analysis and Prioritization) from the Internal Stakeholder Perspective

This section explains what a Current State Analysis (CSA) is and outlines how it was carried out in this thesis. It also gives more background and context for the main questions explored in the thesis. Most importantly, it presents the key findings from the CSA.

4.1 Overview of the Current State Analysis

The goal of the Current State Analysis is to conduct the needs analysis in order (i) identify sustainability competences of MBS Masters students; and (ii) identify sustainability competences and topics based on the perspective of MBS teaching staff. The CSA follows the flow of the research design presented in Section 2.2 and the overview of the CSA is presented below.

The CSA was conducted in two steps from October to December 2022 and engaged two key groups of stakeholders: the MBS Masters students and the MBS faculty. The key stakeholders are the two main data sources of the CSA.

In this thesis, Conceptual framework-1, as described in Section 3, provides the theoretical foundation for outlining sustainable competences. To specify these competences for the case organization, the CSA was conducted based on the results of the (i) Sustainability Competences Survey (SCS) with MBS Masters Students, and (ii) interviews with MBS teaching staff.

First Step: A Sustainability Competences Survey with MBS students

In the first step, a survey using the survey questionnaire Sustainability Competences Survey (SCS) was conducted among MBS Masters students. The objective of the SCS is to identify sustainability competences that are important at present and are deemed as important in the near future based on the perspectives of MBS Masters students. The MBS Masters students come from diverse professional backgrounds, hence, it is expected that they bring broad and complex insights. To address this, the SCS was developed to facilitate collection of standardized and simplified responses.

The survey was developed based on the Conceptual framework that selectively summarized the Key Sustainability Competences from three frameworks (of Wiek 2011; Brundiers et al. 2020, and Redman and Wiek 2020). The questions are based on the Sustainability Survey used by Alm et al (2021) in *"Students' Learning Sustainability-implicit, explicit or non-existent: a case Study approach on students' key competencies addressing the SDGs in HEI program"* an online survey method was employed to gather data in Kristianstad University (HKR) in Sweden.

The Sustainability Competences Survey (SCS) is an online questionnaire designed for this thesis to gather data from MBS Master's students, allowing for systematic and structured analysis and interpretation. Moreover, the SCS enables objective analysis of responses, which is key in making this study robust. The list of questions is available in Appendix 4.

The (SCS) comprised 41 questions and was subdivided into three parts. Part I consisted of Demographic Questions, specifically asking the age and the profession/s of the survey respondents. There were five (5) age groups, from 20 years old to above 60 years old. In addition, respondents were to indicate the sector or group of profession where they belong.

The MBS Masters students were requested to participate in the SCS which was rolled out in Metropolia student platform in November 2022. A total of forty-nine (49) responses were gathered.

The Part II of SCS covers the General Knowledge on Sustainability and is divided to two (2) sub-parts. Part II.A is a self-assessment on the respondents knowledge on eight (8) general topics on sustainability and the perceived importance of sustainability to their respective professional careers. In this part, respondents were asked to indicate the degree of their agreement or disagreement with specific statements. On the other hand, Part II.B is a self-assessment on sustainability-related activities. In this sub-section, the respondents are asked to indicate the degree and frequency of their participation and engagement to activities related to sustainability. In addition, an open-ended question where respondents are asked to identify three (3) sustainability topics where they feel that they need to develop competences.

The Part III focuses on Sustainability Competences for Master´s students as industry professionals. This section is divided into two (2) sub-sections. Part III.A is comprised of statements representing sustainability related knowledge, skills, abilities and values, that collectively constitute what referred to in this thesis as “competences.” Respondents were asked to rate their current level of competences using a scale ranging from “No Competences” to “Strong Level of Competences.” In the same manner, Part III.B uses an identical set of statements from Part III.A. However, in this sub-section, the timescale in assessing the importance of competences was extended to ten (10) years. Respondents are asked to consider their perspective as career professionals and assess the importance of these at present and in the future. Specifically, they are asked to assess the importance of these competences at present, in the next three (3) to five (5) years, and in the subsequent five (5) to ten (10) years.

In Part III.B, are two (2) additional questions. The first is an open-ended question where respondents are asked to give their opinions regarding the specific topics, needs, and competences (i.e. knowledge, skills, abilities, and values) related to sustainability that they personally would like to develop as a student at Metropolia for professional advancement. The reason for asking this question is to identify competences that are not included or covered by the statements presented in Part III.B. The second question asked respondents to indicate if they are interested to learn toward a certification in sustainability topics. This question sought to determine respondents' interest in obtaining certifications in specific areas related to sustainability.

Parts II and III were developed using the questionnaire from Alm et al. (2021), titled *“Students’ Learning Sustainability – implicit, explicit or non-existent: a case study approach on students’ key competencies addressing the SDGs in HEI programs.”* Their findings showed that work-integrated learning and real-life experiences helped students better understand sustainability. They also highlighted that teaching the SDGs can help universities shape students’ key competencies, particularly in building interpersonal skills needed to act as sustainability ambassadors in their future careers (Alm et al., 2021, p. 60).

Step 2: Interviews

In the second step, the survey was followed by a series of interviews for prioritization conducted among the MBS teaching staff. Prioritization is a tool commonly used to ensure focus on issues that are important and relevant to stakeholders.

The MBS teaching staff were interviewed based on a list of questions prepared for efficient and structured conduct of the interviews. The interview facilitated direct engagement with MBS teaching staff. Their inputs and insights collected during the interview enabled broader understanding of sustainability competences based on their perspectives, concerns, experiences, and expectations as faculties of the MBS. The results also allowed for prioritization of issues that are important to MBS teaching staff and their perspective on the importance of these competences to MBS Masters students.

The questionnaire included twenty-eight (28) general sustainability topics, aiming to identify priority areas based on the Sustainability Accounting Standards Board (SASB) Industry Standards and disclosure frameworks. According to the SASB website (https://sasb.ifrs.org/about/), these standards act as a practical ESG guide by highlighting sustainability issues that may impact a company's financial outcomes and overall value. Covering 77 industries, the framework features 6 main disclosure topics and 13 accounting metrics, structured around five key areas: environment, social capital, human capital, business model & innovation, and leadership & governance. It is an industry-focused approach linking sustainability to financial relevance.

For the guided interviews, these topics are grouped into three (3) sub-categories, namely Environment, Social and Human Capital, and Governance and Economics. The respondents assessed (i) the importance of the abovementioned sustainability issues to them personally; and (ii) the importance of these sustainability to MBS Masters students based on their perspective, using a scale that ranges from" Extremely Important" to" Not at all Important."

An open question is included at the end to invite the respondents to identify sustainability issues that are important to them and to the professional development of Metropolia Business School Master's students.

These two methods were used with the two stakeholder groups in the case organization. First, *MBS Master Students* are the Master's students at Metropolia Business School who come from various professional backgrounds. They include both full-time and part-time students, many of whom are working alongside their studies. The group consists of individuals with experience in business, management, entrepreneurship, and other related fields, at different stages of their careers. Students come from diverse cultures, including local Finnish students and international students from Asia, Europe, the Middle East, Latin America, and North America.

For Autumn Semester 2022, a total of 394 MBS Master's students were enrolled, of which 381 were actively attending (Appendix 5). A total of 49 survey responses were received, which gives the survey a response rate of 12.86%. This rate can be considered low but still provides a starting point for understanding stakeholder views on sustainability.

Second, *MBS Teaching staff* is a group of teaching staff at Metropolia Business School. This is a multicultural group of experts, each specializing in their respective fields. Many have extensive experience working and collaborating across different industries, bringing valuable real-world insights into the classroom. Some are also in the process of completing their doctoral dissertations, further strengthening their academic expertise. MBS teaching staff is known for industry expertise, strong academic connections, practical approach to teaching, and commitment to bridging theory with real-world applications.

4.2 Results from the Needs analysis (Sustainability Competences Survey)

This section reports on the results of the Sustainability Competences Survey (conducted in November 2022) among MBS Masters Students about the current and desired states of their sustainability competences. To discuss the results logically, each section below is divided into two subsections: the first explores the current sustainability competences, while the second delves into the future sustainability competences.

4.2.1 Current Sustainability Competences

The current MBS Master's curriculum already includes topics and courses related to sustainability. They include "Sustainability", "Circular Economy", and "Corporate Social

Responsibility” courses, as well as multiple topics related to Sustainable Development Goals. These courses are meant to address the immediate needs of the industry professionals, which are the MBS Masters students. Sustainability topics are also included in other courses, content elements, guest presentations, and other program learning materials and platforms.

The survey results demonstrate that, on a general level, most of the respondents indicated “neutral” stance or lack of strong opinion, in terms of their familiarity with the topics on UN Sustainable Goals (SDGs), sustainability, Corporate Social Responsibility, and Circular economy. While, around 25% of the respondents indicated their familiarity with SDGs and Circular economy, respectively. Note that these topics are offered as courses in MBS Master´s programs.

The respondents also confirmed that sustainability competences are going to be important to their future careers. Furthermore, they also expect that sustainability competences will have more significant impact on their professional lives in 5 to 10 years.

For assessing their sustainability competences, the respondents were asked to rate their current competence level on a scale from 'No Competences' to 'Strong Level of Competences' on statements representing competences in sustainability-related knowledge, skills, abilities, and values. The results are presented in Table 5.

Table 5. Self-Assessment of the Level of Competences by MBS students

		No competences		Not enough competences		Quite enough competences		Good Level of Competences		Strong Level of Competences		No Answer		Total	
		Frequency Distribution	%	Frequency Distribution	%	Frequency Distribution	%	Frequency Distribution	%	Frequency Distribution	%	Frequency Distribution	%	Frequency Distribution	%
C1	I am able to analyze, evaluate collectively, and build visions and strategies related to sustainability	0	-	16	33	19	39	13	27	1	2	0	-	49	100
C2	I feel responsibility to act sustainably at work	0	-	6	12	14	29	19	39	10	20	0	-	49	100
C3	I am aware of innovations and new technologies that play a critical role in sustainability	0	-	9	18	16	33	19	39	5	10	0	-	49	100
C4	I know sustainability principles in the local and global context, and how human actions affect sustainability	0	-	8	16	14	29	21	43	5	10	1	2	48	98
C5	I know organizations´ responsibilities in sustainability	1	2	11	22	13	27	18	37	6	12	0	-	49	100
C6	I know the government’s responsibility in sustainability	2	4	9	18	16	33	17	35	3	6	2	4	47	96
C7	I know how to relate and implement 17 SDGs in my work/ professional life	3	6	21	43	12	24	10	20	1	2	2	4	47	96
C8	I know how my professional activities can contribute to increasing sustainability	1	2	17	35	11	22	16	33	4	8	0	-	49	100
C9	I am able to introduce and implement sustainable ideas and concepts in my workplace and community	1	2	16	33	13	27	15	31	4	8	0	-	49	100
C10	I feel responsible and accountable for implementing sustainability principles in my professional activities	1	2	11	22	14	29	17	35	5	10	1	2	48	98
C11	I feel confident to lead sustainability-related matters	4	8	14	29	13	27	13	27	4	8	1	2	48	98
C12	I am able to network and develop alliances with different stakeholders to solve sustainability issues together	2	4	18	37	13	27	13	27	2	4	1	2	48	98

Nearly all, i.e. approximately 95% of the respondents, indicated that they possess competences to varying degrees in relation to the sustainability competences statements, C1 to C12, listed in Table 8.

For C1 statement: *"I am able to analyze, evaluate collectively, and build visions and strategies related to sustainability"*, all respondents assessed that they possess, at varying degrees, the ability to analyze, evaluate collectively and build visions and strategies related to sustainability. Most assessed that they have sufficient level for this competence.

For C2 statement: *"I feel responsibility to act sustainably at work,"* majority of the respondents have enough competences to act sustainably at work. In other words, they feel responsible for making environmentally and socially responsible choices and taking actions that promote sustainability within their workplace.

Their responses to C3 ("*I am aware of innovations and new technologies"*) and C4 ("*I know sustainability principles in the local and global context, and how human actions affect sustainability"*) indicate a high level of awareness among the respondents in terms of the role of innovations and technologies in sustainability, and a good knowledge in terms of the principles of sustainability in the local and global context, and how human actions affect sustainability.

In terms of responsibility of organizations and governments (C5), the respondents indicated to have sufficient knowledge. This indicates that the respondents have a good grasp of what organizations and governments are expected to do or are accountable for in the area of sustainability.

The C7 statement is related to the respondent's competence to connect and put into practice the seventeen (17) Sustainable Development Goals (SDGs) in their job or career. Majority, i.e. approximately 43%, indicated they don't have enough competences in this area, with 6% indicated having no competences at all.

Questions C8 to C10 refer to the competence to integrate sustainability into professional activities, introduce sustainable ideas, and foster sustainability in both workplace and community. Most respondents indicated from *enough* to *good* level of such competence.

Question C11 refers to the competence to lead sustainability-related matters. Most respondents indicated varying level of competence, 29% indicated not enough competence, 27% indicated quite enough competence, and another 27% indicated good level of competence. Only 8% of the respondents are self-assured of their capability to take charge of issues or initiatives that are related to sustainability; with 8% indicating a lack of competence in this area.

Question C12 refers to the competence use collaboration with different groups and individuals as a means to find solutions to sustainability-related problems. Approximately 37% indicated not having enough competences in this area. On the other hand, 27% indicated having good level of competence in collaborating with different stakeholders, and another 27% indicated strong level of competence in this area.

Importantly, the survey results also indicate that the majority of participants are actively involved in sustainability matters both at work and in their personal lives. Respondents primarily engage in sustainability-related activities within their households, in their personal behaviors, and at their workplaces.

In summary, most of the respondents recognize the relevance of sustainability and believe they already possess a baseline of related competencies. Strong level of competences are indicated in areas of strategic thinking (C1), responsibility at work (C2), and awareness of innovations and sustainability principles in local and global context (C3–C5).

On the other hand, the results also indicate that the majority of respondents believe that they have no competence or they lack competence in connecting their work to the SDGs (C7), leading sustainability initiatives (C11), and working collaboratively across stakeholder groups (C12) areas.

4.2.2 Needed Sustainability Competences (Future)

As for the sustainability competences needed at present and in the future by MBS master students in their professional life, the SCS respondents were asked to answer the question *“to indicate three or more sustainability topics/areas where you need to develop competences.”*

Table 6 presents the list of sustainability topics identified by respondents where they want to develop competences. Note that Table 9 is organized using there dimensions: Environment, Social and Human Capital, and Governance & Economics.

Table 6. Sustainability Areas and Topics for Developing Competences by MBS students.

Environment	Social and Human Capital	Governance & Economics
• Life cycle assessment • Lifecycle of work devices eg. Computers, printers, phone etc. remote work • New energy sources for industrial business • Reducing carbon dioxide emissions • renewable energy - new energy sources for industrial business • Scope 3 • Planet • Chemical waste management • Circular economy • Climate change • Climate-smart solutions • Compensation of carbon footprint • Deforestation • Energy Management • Environment • Fossil-free transportation • Water conservation • Sustainable power generation	• Ability to develop managerial skills • Analyze the status quo of an organization's sustainability • Balance life environment • Balance work environment • Corporate Sustainability • Creative problem solving • Current business practices regarding sustainability • Decision-making development • Living sustainably • People • SDGs • Ethical aspects of sustainability • Food and nutrition ensurement • Forward-Thinking • Setting up and prioritizing sustainability goals in the company • Strong leadership • Improve ability for decision making • Leadership skills • Learning Development	• Ability to Identify Strategic Opportunities • Basic data skills • Management development • Marketing • Design sustainability into education curricula. • Develop technical skills • Economics • Integration of ESG with procurement • Identifying strategic opportunities for sustainability in the company • Sustainability as competitive advantage • Sustainability in Business • Sustainability in change management • Sustainability in information systems • Sustainability in procurement • Sustainable communities (like stewardship) • Sustainable E-commerce • Sustainable government procurement • Sustainable innovation in living climate • Sustainable supply chain • Sustainability framework for local government

Sustainability topics or areas in the environment dimension relates to various aspects of the natural environment, its sustainability, and the impact of human activities on it. This dimension also includes efforts to manage, protect, and sustainably use environmental resources.

Social and human capital dimension covers areas that impacts people and the community. It has its focus on the well-being, development, and rights of people within a society, as well as the value and capabilities of individuals and communities.

The Governance dimension covers areas that are instrumental to implementing sustainability in organizations, as well as those that relate to economic factors.

Notice that several sustainability topics listed in Table 9 are already part of the curriculum at MBS. For example, Circular Economy is a mandatory course in the MBA in Business Informatics program. While Sustainable Development Goals (SDGs) and Corporate

Social Responsibility (CSR) are available as elective courses in the Masters in Procurement and the MBA in Business Informatics programs.

In the Environment dimension, competence for sustainable energy and circular economy, are the most prominent themes. Three most prominent themes in the responses in the Social and Human capital dimension are: leadership and managerial competence in the context of sustainability, organizational skills to integrate sustainability into business practices, and the competence to handle personal and social responsibility in sustainability. For the Governance and Economics dimension, competence to incorporate sustainability into business operation and strategy, and competence in public governance are prominent.

Using the twelve (12) statements representing competences in sustainability-related knowledge, skills, abilities, and values, identified in Table 8, the time horizon to assess the importance of sustainability competence extended to up to ten (10) years. Respondents consider their perspective as career professionals, rating competence importance in the present, as well as looking 3-5 years and 5-10 years ahead. The tabulated results are in Appendix 6, Tables A to C.

Importance of these competences now (November 2022)

Around 80% of the respondents recognize the importance of the ability to analyze, evaluate collectively, and build visions and strategies related to sustainability in their professional life. This indicates the increasing value of strategic thinking in sustainability as a professional core skill.

Competences statements related to understanding the role of organizations and governments, as well as awareness of innovations in sustainability, were also marked as very important by around 40–43% of participants. On the other hand, 25% of respondents felt that the ability to relate and implement the 17 SDGs in professional life is not important. In the same manner, 14.29% considered networking with stakeholders on sustainability issues to be not important.

Importance of these competences in the coming 3-5 years (as of November 2022)

Looking ahead to the next 3 to 5 years, the majority of respondents expected sustainability competences to become even more important in their professional lives. Compared with the answers in previous data, the percentage of respondents selecting “very important” significantly increased.

Almost 88% recognizes the importance of strategic thinking. Around 63% considered it very important to contribute to sustainability through their work, and the same percentage felt that introducing and implementing sustainable ideas in the workplace and community would be very important. Additionally, 61.22% saw acting sustainably at work as very important, and 59.18% valued awareness of innovations and new technologies that support sustainability. These results suggest that sustainability was not just seen as relevant, but as a growing priority requiring practical skills and active engagement. This shift in perception reflects a growing professional awareness that sustainability is becoming increasingly essential in daily work and leadership roles.

On the other hand, around 51% of the respondents view that the competence of applying the 17 SDGs remained as moderately important.

Importance of these competences in 5-10 years (as of November 2022)

Based on the ratings of respondents on this part, there is a noticeable strengthening in how respondents rate the importance of sustainability competences. For example, the percentage marking the ability to build sustainability strategies increased as very important increased to 59.18%, and feeling responsible to act sustainably rose to 63.27%. The competence "knowing organizations’ responsibilities in sustainability" is considered as very important by 57% of the respondents. In short, as the time horizon extends, sustainability appears to become increasingly important.

Overall, the responses from participants that sustainability competences are expected to become increasingly important to them as professionals in the coming years. Ratings on the importance of competences of acting sustainable at work (C1), contributing to sustainability through professional activities (C8), and implementing sustainable ideas in workplace and community (C8), increased over the survey time horizon.

Open-ended Question

The respondents were also asked an open-ended question *"to give your opinion on the specific topics, needs, and competences (i.e. knowledge, skills, abilities, and values) related to sustainability that you, personally, want to develop as a student at Metropolia to benefit your professional life?"* This question yielded diverse topics and needs, ranging from highly specific responses like "Life Cycle Analysis" and "Process Charts" to more general ones such as career direction, education, and technical skills. Competences on communication and interpersonal skills to support knowledge sharing were mentioned. The responses indicate that the overarching motivation for identifying these specific needs are mainly related to professional growth and career advancement. The full list is presented in Table 7.

Table 7. Summary on MBS Students Reasons Why Sustainability Competences are Needed

Dimensions	Specific needs/topics and cited reasons for needing the competency
Environment	▪ Lifecycle of technology and environmental process to aid in decision-making ▪ Energy-efficient industrial solutions because of interest on latest improvement in industrial processes. ▪ Develop technical skills (formal problem-solving techniques, technology systems and other tools) ▪ Understand sustainability in ICT is relevant because of today's tech-driven industries
Social and Human	▪ Emphasis on quality education (SDG 4) to ensure our society is sustainably educated ▪ Effective communication of sustainability purpose and wanting knowledge that is easily shareable and applicable ▪ Interpersonal skill development to better connect and lead in professional environments ▪ To have organized knowledge and practical approaches" – seeking clarity and usability
Governance and Economic	▪ Sustainability related business analysis, accounting, and auditing ▪ Corporate sustainability and ESG integration in procurement ▪ Policy frameworks awareness and understanding Strategic thinking and future-readiness because "sustainability will have increasing importance in the future" ▪ Career-focused knowledge development ▪ Data literacy in sustainability to aid informed decisions and reporting

In the last part of the SCS, the respondents were asked *"Will you be interested to learn toward a certification in sustainability topics?"* This question aimed to gauge their interest in obtaining certifications in specific sustainability-related areas. The data indicated that the majority of respondents, accounting for 74%, expressed interest in pursuing certifications in sustainability-related topics. While 18% indicated that they do not know and 8% are not interested.

4.3 Results from the Needs analysis (Sustainability Competences Interviews)

In this thesis, the categorization of results is a process of structuring the sustainability topics based on the perspective of the MBS teaching staff done via individual interviews.

To facilitate the conduct of interview, a prioritization questionnaire was developed. The Prioritization Interview Questionnaire, herein referred to as Questionnaire, was developed to guide the conduct of the interviews. In addition, an explanatory note is created to provide clarity and context for the sustainability issues identified in the questionnaire. This note aids in supporting the prioritization assessment. A copy of the Questionnaire and the Explanatory Notes are in Appendix 2.

The Questionnaire and the Explanatory Notes are created based on collected information from various sources, such as, reports and research of multi-lateral organizations, surveys, interviews, public reports, industry benchmarks, legislations, and regulatory requirements. The main references used in developing the questionnaire were resources from the United Nations (UN) website on sustainable development, https://sdgs.un.org/goals, in particular, the 17 Sustainable Development Goals (SDGs) and information from SASB Standards website, https://sasb.org/about/.

The 2030 Agenda for Sustainable Development, adopted by all UN Member States in 2015, sets out 17 Sustainable Development Goals (SDGs). These goals guide global efforts to improve well-being, reduce inequality, drive economic growth, tackle climate change, and protect the planet. Meanwhile, the SASB Standards apply to 77 industries. They highlight sustainability risks and opportunities that could influence an organization's cash flow, access to funding, and cost of capital in the short, medium, or long term. They also define disclosure topics and metrics that are most relevant to investors (https://sasb.org/about/).

The Prioritization Interview Questionnaire is comprised of twenty-eight sustainability issues. These issues are grouped into three (3) sub-categories, namely Environment, Social and Human Capital, and Governance and Economics. The respondents assessed the importance of the abovementioned sustainability issues using a scale that ranges from ”Extremely Important” to ”Not at all Important.” In addition, they also evaluated the importance of these sustainability to MBS Masters students based on their perspective, using the same ”Extremely Important” to ”Not at all Important” scale.

Results of the Prioritization Analysis

The prioritization assessment has identified key sustainability topics and issues that have the most significance to both, MBS Teaching staff and to the MBS Master students. The heatmap in Table 8 indicates how MBS teaching staff prioritizes the sustainability issues based on the interview results.

Table 8. Heat Map showing prioritization.

Dimensions	Sustainability Topics	Importance to MBS Teaching Staff	Importance to MBS Students	Note
I. Environment	GHG Emissions	23	22	Low priority
	Air Quality	23	18	Low priority
	Energy Mngt	24	21	Low priority
	Water & Wastewater Mngt	22	19	Low priority
	Waste & Hazardous Materials Mngt	21	18	Low priority
	Biodiversity Impacts	23	21	Low priority
	Circular Economy	25	26	High-priority
II. Social Capital and Human Capital	Human Rights & Community Relations	26	23	Teaching Staff-focused priority
	Customer Privacy	24	27	Student-focused priority
	Data Security	27	30	High-priority
	Access & Affordability	24	23	Low priority
	Product Quality & Safety	26	24	Teaching Staff-focused priority
	Customer Welfare	25	23	Low priority
	Selling Practices & Product Labeling [Responsible Marketing]	26	23	Teaching Staff-focused priority
	CSR	27	27	Low priority
	Social entrepreneurship	25	23	Low priority
	Labor Practices	27	22	Teaching Staff-focused priority
	Employee Health & Safety	27	23	Teaching Staff-focused priority
	Employee Engagement, Diversity & Inclusion	27	26	High-priority
III. Governance and Economic	Product Design & Lifecycle Management	28	28	High-priority
	Business Model Resilience	25	25	Low priority
	Supply Chain Management	22	25	Student-focused priority
	Materials Sourcing & Efficiency	22	22	Low priority
	Physical Impacts of Climate Change	25	23	Teaching Staff-focused priority
	Investments in innovation and enabling technologies	28	26	High-priority
	Business Ethics	26	27	High-priority
	Competitive Behavior	23	24	Low priority
	Management of the Legal & Regulatory Environment	23	23	Low priority

The assessment, identified four levels of prioritization. First, the *“High Priority”* are topics highly valued by both the teaching staff and the MBS masters students. Second, *“Teaching Staff-focused priority”* are topics highly valued by MBS teaching staff, but not of students. Third, *“Student-focused priority”* are topics highly valued by students but not of MBS teaching staff. And fourth, *“Low Priority”* are topics not prioritized by either group.

The heat map indicates that topics in Environment dimension generally received the lowest prioritization rating in both groups. This includes environmental topics such as GHG emissions, energy, water management, and waste.

Social Capital and Human Capital dimension, came out as top priority for both groups. Specifically, “data security,” received the highest prioritization rating. This indicates a strong regard on human-centered sustainability. Other high-priority topics in this dimension are Human Rights & Community relations, labor practices, employee health and safety, product quality and safety, and responsible marketing. This suggests the importance of social responsibility and workplace wellbeing to the respondents.

In the Governance and Economics dimension, investments in Innovation and enabling technologies, product design and lifecycle, and business ethics are of high priority to both MBS teaching staff and the students.

During the interview, the MBS teaching staff also indicated the need for clearer, more structured, and more practical guide in integrating sustainability in the subjects that they teach. Questions were also raised on how these sustainability topics will be integrated in the specific courses and formal curriculum. Additionally, the importance of cooperation between the teaching staff and the school administration to successfully integrate sustainability issues in the curriculum was also underscored.

4.4 Key Findings: What Current & Future Sustainability Competences were Identified & How Prioritized

As for *the Survey of MBS Students*, the key results demonstrate the following. First, nearly all, i.e. approximately 95% of the respondents, indicated that they possess competences to varying degrees in relation to the sustainability competences statements in the survey questionnaire. Strong level of competences are indicated in areas of strategic thinking (C1), responsibility at work (C2), and awareness of innovations and sustainability principles in local and global context (C3–C5).

Second, the MBS students identified specific areas where they view that they need to build their competences. In the environment dimension, the most prominent subjects are sustainable energy and circular economy. On the other hand, when asked to rate the importance of the sustainability topics in several time horizons, topics in the area of

environment dimension, received the lowest rate of importance, compared to the Social and human dimension, and the governance and economic dimension.

Third, the respondents are confident that sustainability competences are going to be important overtime for their future career. In addition, the respondents also indicated that sustainability competences are expected to have a more significant impact on their professional lives in 5 to 10 years.

Fourth, the respondents were asked to identify sustainability topics where they want to develop competencies. Three most prominent topics in the responses in *the Social and Human capital* dimension listed: leadership and managerial competence in the context of sustainability, organizational skills to integrate sustainability into business practices, and the competence to handle personal and social responsibility in sustainability. For *the Governance and Economics* dimension, the desired topics relates to the competence to incorporate sustainability into business operation and strategy, and the competence in public governance are prominent. Importantly, sustainable topics in both Social and Cultural dimension and Governance and Economic dimension were indicated to have increasing importance to MBS students all the time horizons.

Fifth, the MBS students indicated the growing importance of strategic thinking in sustainability as well as having the understanding on the roles of organizations and governments, as professional core skills are growing in importance.

Sixth, in terms of the SDGs, most of the respondents are familiar with SDGs. However, in terms of competence, most respondents indicated that they do not have enough competences to incorporate these global goals into their professional activities. Summarizing the ratings across, the importance attributed to the competence to apply SDGs to actual work roles showed a flat growth across the three time horizons. In comparison to other competencies, it lags behind other competences. This indicates that the respondents are not clear on how the SDGs are connected to their work.

Seventh, MBS students indicated that sustainability competences are going to be important to their future career and are expected to have a more significant impact on their professional lives in 5 to 10 years. However, many of the respondents indicated low level of competence in the application of SDGs in their professional life, as well as in

sustainability initiatives that requires leadership and cross-collaboration with various stakeholders.

Eight, despite having a strong baseline knowledge and awareness on sustainability topics MBS students expressed the need for organized, practical, and structured sustainability knowledge that they can easily apply and share.

Finally, there is an interest for formal recognition in sustainability learning as majority or 75% of the respondents expressed interest in pursuing certifications in sustainability-related topics.

As for *the* Sustainability Competences Interviews *with MBS Teaching Staff,* the key results demonstrate the following. First, *the Environment* dimension generally received the lowest prioritization rating in both groups. This includes environmental topics such as GHG emissions, energy, water management, and waste.

Second, *the Social Capital and Human Capital* dimension, came out as top priority for both groups. Specifically, “data security,” received the highest prioritization rating. This indicates a strong regard on human-centered sustainability. Other high-priority topics in this dimension are Human Rights & Community relations, labor practices, employee health and safety, product quality and safety, and responsible marketing. This suggests the importance of social responsibility and workplace wellbeing to the respondents.

Third, in *the Governance and Economics* dimension, investments in Innovation and enabling technologies, product design and lifecycle, and business ethics are of high priority to both MBS teaching staff and the students.

Fourth, the MBS teaching staff indicated the need for clearer, more structured, and more practical guide in integrating sustainability in the subjects that they teach. Questions were raised on how sustainability topics can be integrated in the specific courses and formal curriculum.

Finally, the importance of cooperation and the need for collaboration among MBS teaching staff to successfully integrate sustainability issues in the curriculum was also underscored during the interview.

4.5 Summary of the Current State Analysis (CSA) Results

This results of the current state analysis is summarized in this section, identifying the main areas where the perceptions of *MBS students* from the survey results, and the perspective of *the MBS teaching staff* gathered in the guided interview, were aligned, as well as the deviations identified in the perceptions from the survey (students) and the interviews (staff).

As for the list of sustainability competences (current/future), nearly all, or approximately 95% of the MBS students who responded to the survey, indicated that they possess sustainability competences to varying degrees. This indicates a high degree of foundational awareness, related knowledge and skills among MBS students. In the same manner, the MBS teaching staff affirmed that most MBS students are expected to have at least baseline knowledge on sustainability.

All the MBS students have experiences as working professionals, some might be working in sectors that are directly related to the sustainability topics listed in the survey. This strengthens the applicability of their responses to actual work situations. This view is also affirmed by MBS teaching staff during the guided interviews.

As for *the Topics prioritized*, the heat map analysis based on the interview with MBS teaching staff highlighted that topics in the social and human capital dimensions ranked as high priority. While those in the environment dimension ranked low. This is similar to the findings of the SCS where students perceived competences in the environment dimension.

5 Existing Knowledge and Best Practice on Developing Sustainability Competences in HEIs

This section discusses developing sustainability competences with a specific focus on HEIs and the segmentation of these sustainability competences as a basis for curriculum development.

5.1 Developing Sustainability Competences in HEIs

As defined by The European tertiary Education Register (ETER), *a Higher Education Institute (HEI)* is “an entity that has full degree awarding powers at higher education level (i.e. EQF levels 5 to 8; QF-EHEA cycle first to third) recognized by at least one national authority.”

Since the 1970s, “policies introducing sustainability themes into education have been in place and have continued to evolve over time” (Scott, 2009, cited in Bianchi 2020, p. 11). In Bianchi (2020, p.11), three key phases in the evolution of education for sustainable development that were identified earlier by Michelsen (2016) was cited, namely: “(i) the orientation and experimental phase, spanning from the 1970 to 1990, with a focus on environmental issues and which culminated with the publication of Brundtland Report (1987); (ii) the transition phase, ranging from 1990 to 2000, with the introduction of development related themes; and (iii) the expansionary phase from 2014 (and onwards) where the focus is on sustainability.”

According Alm et. Al., (2021, p. 61), “the development of sustainability competences in HEIs has become significant because it creates awareness of environmental challenges, supports knowledge about sustainability and raises critical-thinking among students.” At present, HEIs are in a unique position to equip students with knowledge and skills that can directly influence policies, industries and communities, this includes solutions to sustainability problems.

5.1.1 Examples of Developing Sustainability Competences in HEIs from EU and Finland

In the 1970s, many higher education institutions (HEIs) in Europe have integrated sustainability competencies into their curricula through diverse approaches. For

example, the ETH Zurich started offering a Master in Environmental Sciences program in 1987; the Lund University in Sweden started offering a Master in Environmental Science and Sustainability Science in 1997, and eventually created a separate Lund University Center of Sustainability Studies in 2005 (Trencher et al., 2018, p.832).

While these approaches laid the foundation for integrating sustainability into HEIs, the lack of a standardized framework meant that practices varied widely in terms of depth, focus, and consistency. The study by Trencher et al. (2018) assessed the effectiveness of 14 master's program from leading universities in Europe, Asia and North America in building key sustainability competencies. Trencher et al. (2018) categorized the master's programs into: (i) research-oriented; (ii) neutrally-oriented; and (iii) practice oriented (see Appendix 7 for the detailed list of programs).

Using sustainability competences framework of Wiek et al. (2011), Trencher et al. (2018) concluded that the programs are generally ineffective in fostering *anticipatory* competencies and that practice-oriented programs are better in building *interpersonal, strategic*, and *normative* skills. The study also highlights a strong student demand for more practice-based learning and collaboration with societal stakeholders. It also emphasizes the importance of incorporating hands-on teaching approaches to develop practical skills through real-world projects with external partners. Additionally, the study underscores the need for universities to strike a balance current societal expectations and scientific traditions (Trencher et al., 2018, p. 839).

In the early 2000s, many European countries adopted a competence-based approach in their national curricula. Higher education experts began identifying key sustainability competences to equip students and professionals to drive sustainable change (Joint Research Centre (European Commission), 2022, p.12).

Higher Education Institutions (HEIs) in the EU play an important role in developing sustainability competences by promoting various efforts to embed sustainability into higher education. Brundiers et al. (2023, pp. 7–8) introduced a "shared reference framework" to support the growth of sustainability-focused programs. This framework brings together a set of distinct but interconnected sustainability competencies, offering a unified approach. It also highlights the value of involving key stakeholders—such as students, faculty, instructional designers, administrators, staff, and the wider community—in advancing sustainability in education (Brundiers et al., 2023, p. 14).

GreenComp was created as a common framework to support sustainability competences for both educators and learners. It aims to guide education and training programs focused on lifelong learning. EU member states are encouraged to use GreenComp as a reference when developing sustainability education initiatives (Joint Research Centre, European Commission, 2022, pp. 1–2). As shown in Table 9, GreenComp includes four competence areas that reflect the concept of sustainability, along with 12 key competences that form the foundation for sustainability learning for everyone.

Table 9. GreenComp Four Areas (Source: These areas are from *GreenComp: The European Sustainability Competence Framework* (European Commission, 2022, pp. 14–15).).

AREA	COMPETENCE	DESCRIPTOR
1. Embodying sustainability values *"involves transformative learning process. It advocates equity and justice for current and future generations, and supports the interconnectedness of humans and nature."*	1.1 Valuing sustainability	To reflect on personal values; identify an explain how values vary among people and overtime, while critically evaluating how they align with sustainability values.
	1.2 Supporting fairness	To support equity and justice for current and future generations and learn from previous generations for sustainability.
	1.3Promoting nature	To acknowledge that humans are part of nature; and to respect the needs and rights of other species and of nature itself in order to restore and regenerate healthy and resilient ecosystems.
2. Embracing complexity in sustainability *"focuses on systemic and critical thinking. Enable learners to recognize the interconnectedness of economy, society, and environment in solving complex problems."*	2.1 Systems thinking	To approach a sustainability problem from all sides; to consider time, space and context in order to understand how elements interact within and between systems.
	2.2 Critical thinking	To assess information and arguments, identify assumptions, challenge the status quo, and reflect on how personal, social and cultural backgrounds influence thinking and conclusions.
	2.3 Problem framing	To formulate current or potential challenges as a sustainability problem in terms of difficulty, people involved, time and geographical scope, in order to identify suitable approaches to anticipating and preventing problems, and to mitigating and adapting to already existing problems.
3. Envisioning sustainable futures *"requires the competence of adaptability to embrace uncertainty. It involves the use of creativity to explore approaches and understand interconnected systems."*	3.1 Futures literacy	To envision alternative sustainable futures by imagining and developing alternative scenarios and identifying the steps needed to achieve a preferred sustainable future.
	3.2 Adaptability	To manage transitions and challenges in complex sustainability situations and make decisions related to the future in the face of uncertainty, ambiguity and risk.
	3.3 Exploratory thinking	To adopt a relational way of thinking by exploring and linking different disciplines, using creativity and experimentation with novel ideas or methods.
4. Acting for sustainability *"encourages learners to take action at individual and collective level to shape sustainable futures, to the extent possible. It also invites learners to demand action from those responsible to make change happen."*	4.1 Political agency	To navigate the political system, identify political responsibility and accountability for unsustainable "encourages learners to take action at individual and collective level to shape sustainable futures, to the extent possible. It also invites learners to demand action from those responsible to make change happen. behaviour, and demand effective policies for sustainability.
	4.2 Collective action	To act for change in collaboration with others.
	4.3 Individual initiative	To identify own potential for sustainability and to actively contribute to improving prospects for the community and the plane

Lund University in Sweden has incorporated GreenComp into its curriculum. Courses like “Knowledge to Action,” part of the International Master’s in Environmental and Sustainability, give students practical experience in real-world contexts (Joint Research Centre (European Commission), 2022, p.28).

In 2024, the European Commission published a report called “GreenComp in Practice: Case studies on the use of the European competence framework.” The paper examines 12 case studies, pointed that the GreenComp offers structure and language that can be adapted into different learning and teaching contexts in HEIs. (Appendix 8 lists the case studies, their organizational types, and geographical coverage).

In Finland, some studies attempted to describe how sustainability competences are developed in HEIs in various contexts.

The study “Fostering Sustainability Competencies and Ethical Thinking in Higher Education: Case Sustainable Chocolate”, published by Haaga-Helia in 2021, aimed to “find out what kind of sustainability competencies higher education students can develop in university-business collaboration, with special focus on ethical thinking” (Vesala-Varttala et. al. 2021). It is based on the assumption by Burden & Sprei (2021) that “entrepreneurial experiences can be used to motivate students in mandatory courses on sustainable development and ethics” (Vesala-Varttala et. al. 2021).

The study by Vesala-Varttala et. al. (2021) found that Education for Sustainable Development in higher education is effective when it is action-oriented, linking formal with informal learning, supportive of self-directed learning, participatory and collaborative, and embracing transformative teaching. Providing theoretical materials and pedagogical guidance enhances students’ reflective and metacognitive abilities, and aids deeper conceptual insight into sustainability competencies and ethical thinking. This could support fostering their ethical understanding of the complexities of sustainability challenges and bolster their courage to implement their competencies with more confidence and impact. Using competency framework of Wiek et al. (2011) and Brundiers et al. (2021), the study by Vesala-Varttala et. al. (2021) segmented and categorized the competencies as follows

Table 10. Segmenting/categorizing the Key Sustainability Competencies of Students in the Sustainable Chocolate Project (Vesala-Varttala et. al. 2021, p.6-7).

Main category	Sub-category
Systemic curiosity	- understanding of the need for continuous knowledge seeking and sharing - systemic knowledge about sustainability issues - systemic knowledge about sustainability challenges in the cocoa industry - awareness of the impact of consumption on sustainable change
Ethical commitment	–understanding of the urgent need for systemic change – courage to critically evaluate sustainability actions – skills in assessing one's own values, principles, and lifestyles – skills in reflecting on one's own feelings, emotions and motives – motivation to change one's own attitudes and behavior – motivation to enact sustainable change collectively with others
Moral vision	– ability to envision fairer business models and forms of collaboration – ability to envision a healthier and more ecologically sustainable future – ability to envision threats to the planet and people – ability to envision obstacles to human capacity for change – understanding of the need to increase people's awareness of sustainability issues
Creative readiness	– understanding of the need for inspiring and trustworthy messages to generate change – knowledge about more sustainable options for production and consumption – skills to gain insight into consumer attitudes and behavior – skills in planning strategic and creative solutions for sustainability marketing and communication
Collaborative acumen	– skills in multicultural team communication to facilitate collaborative problem-solving – insight into the importance of empathy and intercultural sensitivity – insight into the importance of situational, contextual and cultural knowledge – insight into effective means of persuasion and motivation – knowledge and skills in change communication
Reflective learning	– skills in reflecting on and regulating one's transformative learning process on both individual and collaborative levels through semi-structured learning journals – skills to experiment with pedagogical tools to support self-directed learning and uncertainty tolerance – critical awareness of one's own values, motivation, attitudes, consumption preferences, and lifestyle choices through customer experience research, empathy mapping, team discussions, and self and peer evaluation exercises
Hands-on change communication	– hands-on experience in designing a customer-focused marketing solution – hands-on experience in producing digital storytelling to increase people's awareness of the sustainability challenges in the cocoa business and to persuade them to change their purchasing behavior – ability to evaluate the development of the creative strategy and its practical implementation through pedagogical tools supporting multi-stakeholder co-creation, collaborative learning, creative planning, digital storytelling, multicultural teamwork, and project management

In another Finnish study by Friman et al. (2018) called ”Steering sustainable development in higher education – Outcomes from Brazil and Finland,” the authors examined how sustainability is integrated in certain curricula in HAMK. It measured the number of hours a student spends studying the UNECE themes in 2005 (refer to Appendix 9). The study pointed out that the agreement between HAMK and the Ministry of Education and Culture was an effective way to steer HAMK’s sustainability-related actions. It also found that HAMK supported the development of sustainability expertise through a broad, competence-based approach. The study further pointed out that HAMK balanced external pressures and internal teaching limitations to shape their sustainable development (SD) education. This approach, according to Friman et al. (2018, p.371), created a distinctive foundation for developing SD expertise.

This study can be compared to a report by Argento et al. (2020) who assessed “how sustainability is integrated into the courses/programmes of HEIs in Sweden,” using Kristianstad University (Sweden) as a case and focusing on the role of academics in sustainability issues.

Argento et al. (2020, pp. 6–7) noted that Kristianstad University’s main sustainability strategy allows each faculty the flexibility to integrate sustainability in their own way. Teaching staff saw the importance of aligning their courses with the SDGs. This process involved self-reflection and collaborative discussions on how to embed sustainability in teaching in line with Agenda 2030. The study also pointed out that six courses, namely, Business Administration, Computer Science, Education Science, Environmental Science, Food and Meal Science, and Nursing Science—already address or are positioned to address the SDGs. Table 11 outlines the SDG-related topics covered in each course.

Table 11. Contribution to 17 SDGs of each academic discipline (Argento et al. 2020, p.12).

SDGs \ Discipline	Business administration	Computer science	Education science	Environmental science	Food and meal science	Nursing science
No poverty						
Zero hunger					X	X
Good health and well-being		X	X		X	X
Quality education			X			X
Gender equality						
Clean water and sanitation				X		
Affordable and clean energy						
Decent work and economic growth	X					
Industry, innovation and infrastructure		X				
Reduces inequalities						
Sustainable cities and communities		X		X		
Responsible consumption and production	X		X			
Climate action				X	X	
Life below water						
Life on land						
Peace, justice and strong institutions						
Partnerships for the goals	X					

The case of Kristianstad University shows that continuous collaboration is essential when integrating sustainability into education. Joining networks can help drive change and encourage academics to reflect on their roles as educators and researchers. Still, these efforts alone are not enough to create lasting and meaningful change. Argento et al. (2020, p. 17) emphasized that academics need additional support. The study also found that academics from different fields face the sustainability challenge in their own ways, shaped by their specific traditions and methods. While they work toward shared sustainability goals, their differences should be seen as strengths that can help build true transdisciplinary collaboration (Argento et al., 2020, p. 17).

5.2 Other Principles of Categorization of Sustainability Competences in HEIs

Researchers and policy-makers widely recognize the importance of embedding sustainability concepts and competences into education. Yet, they admit to "**lack of an agreed and common direction** for a framework on competences for sustainability"

(Cebrian et al., 2019; Cebrian & Junyent, 2015; Mochizuki & Fadeeva, 2010, as cited from: Bianchi (2020, p10). Educators´ role is not limited to imparting knowledge as they impact values and mindsets of students. However, according to Bianchi (2020, p10), the current level of directive documents fails to provide adequate guidance to educators.

In Finland, The Rectors' Conference of Finnish Universities of Applied Sciences Arene ry (ARENE) was established in 1996 with the main goal to protect the common interests of Finnish universities of applied sciences. Arene is consists of 24 rectors of Finland's universities of applied sciences and the universities of applied sciences themselves (Arene, 2022 p4).

Students in Universities of Applied Sciences (UAS) in Finland are expected to develop two kinds of competences: programme-specific competences; and shared competences. Arene (2022, p.4) defines the programme-specific competences as "the basis of a student's professional expertise." While the shared competences are "the common competence areas for different programmes and degrees, and they create the foundation for operating in a workplace, cooperation and the development of expertise," Arene (2022, p.4).

Table 12. Arene's Shared Competences (Source: ARENE 2010 p.7 vs. ARENE 2022, p.5).

2011	2022
1. Learning Skills *(Oppimisen Taidot)* 2. Ethical Competence *(Eettinen Osaaminen)* 3. Work Community Competence *(Työyhteisöosaaminen)* 4. Innovation Skills *(Innovaatioosaaminen)* 5. Internationalization Competence *(Kansainvälistymisosaaminen)*	1. Learning to Learn 2. Operating in the Workplace 3. Ethics **4. Sustainable Development** 5. Internationality Multiculturalism 6. Proactive Development

In 2011, Arene released a recommendation on how to apply the shared competences in universities of applied sciences degrees. It supported a unified approach to using the National Qualifications Framework (NQF) descriptors in curriculum design, competence profiling, and competence assessment. Later in 2022, ARENE published updated the earlier (2011) proposed competences, where sustainability competences are recognized separately (as compared to the previous version). Table 12 above lists the shared competences recommended by Arene in 2011 and 2022.

ARENE (2022) also distinguishes between the shared competences of bachelor's and master's graduates. Bachelor's graduates are expected to apply their knowledge in various settings with the stress on the shared competences. Table 13 shows the comparison of the two levels, highlighting the Sustainable Development competence.

Table 13. Arene's Recommendation on Shared Competences (2022).

Shared Competences	Arene's Recommendation	
	Bachelor's degree	Master's Degree
Learning to Learn	*The graduating student recognises the strengths and development areas of their competence and learning methods, and they utilise the opportunities communities and digitalisation provide in their learning.* - Assesses and develops their competence and learning methods in different learning environments. - Is able to acquire, critically assess and appropriately apply the national and international knowledge base and practices of their field. - Also takes responsibility for group learning and sharing what has been learned.	*The graduating student promotes their own and their community's continuous learning and competence development, drawing on knowledge from different fields and the opportunities of digitalisation.* - Is able to assess and develop their expertise diversely and in a goal-oriented manner at different stages of their career and life. - Is able to acquire, critically assess and produce information while taking into account the perspectives of different fields. - Is able to develop and manage goal-oriented, continuous learning in their community.
Operating in the Workplace	*The graduating student has versatile working life skills and is able to operate in work communities of their field.* - Is able to work constructively in a work community and promotes their own and their work community's well-being. - Is able to act professionally in communication and interaction situations at a workplace. - Utilises the opportunities offered by technology and digitalisation in their work. - Understands the complexity of changing working life and their own resilience in changing working life situations. - Has capabilities for an entrepreneurial approach.	*The graduating student is able to develop and manage their work community and reforms working life.* - Is able to develop and manage multidisciplinary teams and work communities. - Is able to develop the communication and interaction culture of work communities. - Is able to develop and manage the comprehensive well-being of a work community. - Utilises the opportunities of technology and digitalisation in development and management. - Promotes the resilience of a work community.
Ethics	*The graduating student adheres to the ethical principles and values of their field of profession, taking the principles of equality and non-discrimination into account.* - Is able to take responsibility for their own actions and their consequences and reflects on them in accordance with the ethical principles and values of their field. - Takes others into account and promotes equality and non-discrimination.	*The graduating student assesses and promotes the realisation* of ethical principles and values of their field of profession, taking equality and non-discrimination into account. - Is able to promote ethically sustainable activities and the realisation of ethical reflection in their different operating environments. - Promotes the realisation of the ethical principles and values of their field.

	- Take into account the realisation of diversity and accessibility in their actions. - Understands the principles of responsible conduct of research and adheres to them. - Is able to influence society based on ethical values.	- Makes decisions taking individual, communal and societal perspectives into account. - Promotes the realisation of diversity and accessibility. - Implements the principles of responsible conduct of research and promotes their application in their work community. - Is able to manage societally influential activities based on ethical values.
Sustainable Development	*The graduating student is familiar with the principles of sustainable development, promotes their implementation and acts responsibly as a professional and a member of society.* - Is able to use information related to their field in finding, implementing and establishing sustainable solutions and operating models. - Understands sustainability challenges, their interdependencies and the various aspects of issues and problem	*The graduating student develops and manages sustainable and responsible operating methods in their work and promotes sustainable change in their work community and society.* - Is able to apply the knowledge and future visions of sustainable development comprehensively as a basis for sustainable solutions. - Is able to analyse and assess systemic dependencies of complex multidisciplinary problems and the different dimensions of solutions - Is able to manage the search, implementation and establishment of sustainable solutions and operating models in their work community.
Internationality Multiculturalism	The graduating student is able to operate in multicultural and international operating environments and networks. - Is familiar with the impacts of their cultural background on their activities and is able to develop operating methods that take multiculturalism into account in their work community. - Is able to monitor and utilise the international development of their field in their work. - Is able to communicate internationally in their work tasks.	The graduating student is able to develop and manage multicultural and international operating environments and networks. - Is able to develop operating methods that take multiculturalism into account in their work community. - Is able to anticipate the impacts and opportunities of global development and phenomena. - Is able to interact, communicate and develop activities internationally in their own field.
Proactive Development	*The graduating student is able to develop solutions that anticipate the future of their own field, applying existing knowledge and research and development methods.* - Solves problem situations creatively and reforms operating methods together with others. - Is able to work in projects in cooperation with actors of different fields. - Is able to apply existing knowledge in the field in development and utilises research and development methods. - Is able to seek customer-oriented, sustainable and economically viable solutions, anticipating the future of their field.	The graduating student is able to manage the development of new solutions that anticipate the future and produces new information using different research and development methods. - Produces new information and reforms operating methods, combining competence in different fields. - Is able to implement research, development and innovation projects and apply different research and development methods. - Is able to develop new customer-oriented, sustainable and economically viable solutions, anticipating the future. - Is able to analyse the current situation and anticipate the future of their field and changes in the operating environment.

As seen from Table 13, ARENE´s (2022) competence in Sustainable development, requires students in the master's level to be able to develop solutions to complex sustainability problems in the workplace and community, involving a higher level of strategic thinking and leadership role. The master's level competences emphasize leadership, foresight in addressing challenges, and the ability to solve complex problems. In addition, master's graduates should be capable to generate and contribute new knowledge, and to solve more advanced and complex problems in a practical way, in their work community.

In summary, ARENE´s (2022) competences on Sustainable Development can be categorized into three logical steps, namely, (1) acquire knowledge, (2) analyze and asses knowledge, (3) manage and implement. First, *"acquire knowledge"* refers to the importance of acquiring sustainability knowledge and being used to searching for and finding knowledge for creating real solutions. Second, *"analyze and assess knowledge"* focuses on the critical thinking ability, understanding how different factors are connected, and evaluating complex knowledge and problems from multiple angles. Third, *"manage and implement"* emphasizes the need to take action — by leading, implementing, and embedding sustainable practices in the work community.

5.3 Conceptual Framework-2 of This Thesis

Taking into account the abovementioned literature on sustainability competences in HEIs, Conceptual framework-2 of this thesis builds on the recommended goals of the shared competences on sustainable development of ARENE (2022) for the Master´s level studies. These shared competences can be interpreted or translated to learning objectives.

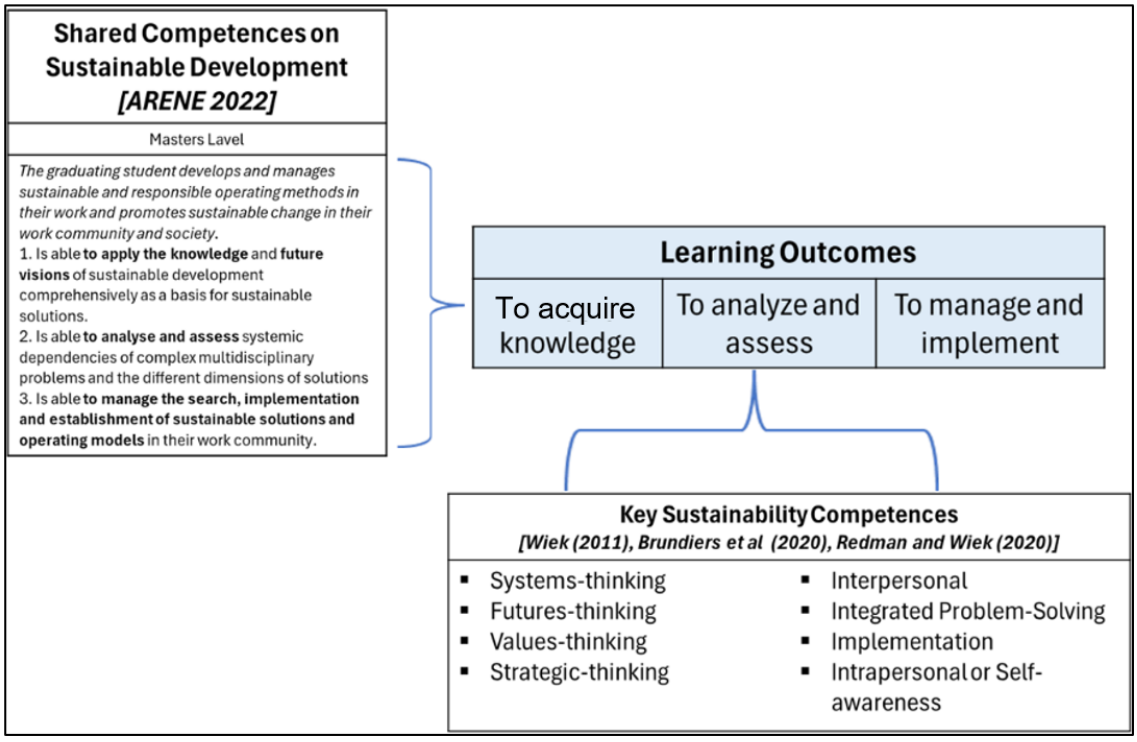


Figure 5. Conceptual framework 2 for sustainability competences and methods for segmenting them in HEIs.

Conceptual framework-2 (CF2) outlines ARENE 2022 into a logical learning outcomes framework of (1) to acquire knowledge, (2) analyze and asses, (3) manage and implement. This framework reflects and connects the envisioned learning outcomes of ARENE (2022) for Masters Level in Finnish HEIs. Starting from the learning outcome of being able to acquire sustainability knowledge, progressing to critical assessment and analysis of challenges, and finally, in managing and implementing solutions in both work environments and society.

In addition, the ARENE learning outcomes are aligned with the policy of the Finnish government on education, in particular for HEIs, which emphasizes the competence of students of transforming sustainability knowledge to real-work application and responding to the industry needs.

The key Sustainability competences (Wiek 2011; Brundiers et al. 2020; Redman and Wiek 2020) in CF1 are the competences needed to achieve these expected outcomes. Note that these competences are from literatures focusing on the sustainability competences as thoroughly described in Section 3. These sustainability competences are the actual sustainability competences needed to achieve the learning goals of ARENE.

In summary, CF2 provides a practical approach for segmenting sustainability competences for incorporating sustainability content into curriculum development for MBS students. Building on the key sustainability competences identified in CF1, CF2 can be useful for creating the sustainability content in MBS courses.

6 Building Proposal for the Segmentation and Prioritization of Sustainability Competences for the Case Organization

This section integrates the results of the current state analysis with the conceptual frameworks (CF1 and CF2) to build the Proposal. The process involves internal co-creation and discussions.

6.1 Overview of the Proposal Building

Given the broad nature of the concept of “sustainability” and how it has evolved, two levels of literature review were conducted in this thesis to serve as the basis for the creation of CF1 and CF2.

The first literature review looked at sustainability competences across various groups and settings, which is the basis in developing CF1. Eight (8) sustainability competences, namely, *Systems-thinking, Futures-thinking, Values-thinking, Strategic-thinking, Interpersonal, Integrated Problem-Solving, Implementation,* and *Intrapersonal or Self-awareness*, from Wiek (2011), Brundiers et al (2020), Redman and Wiek (2020)] were identified. The CF1 supported the development of survey and questionnaires for the CSA.

The second literature review looked at sustainability competences in HEIs. CF2 examined the ARENE recommended learning outcomes on the shared competences on Sustainability for Master’s Level (NQF7) as an applicable framework that offers structure and practical guide to align courses with sustainability competences needs of MBS students as professionals. These learning outcomes are, to apply knowledge, to analyze and assess, and to manage and implement.

To analyze current state in the case organization (CSA), a survey among MBS Master´s students and a guided interview among MBS teaching staff were conducted. The CSA results revealed that MBS students expressed high interest for organized, practical, and structured sustainability knowledge that they can easily apply and share. In the interview with the MBS teaching staff, the need for clearer, more structured, and more practical guide in integrating sustainability in the subjects that they teach was underscored.

The CSA identified two key focus areas of this thesis. First, the need of MBS students for organized, practical, and structured sustainability knowledge that they can easily

apply and share. And second is the need of MBS teaching staff, the need for clearer, more structured, and more practical guide in integrating sustainability in the subjects that they teach.

In the Proposal building stage, Data 2 was gathered during the co-creation workshop with three (3) MBS key stakeholders (teaching staff). The highlights of the workshop are gathered in Appendix 10. The discussion underscored two focal areas: first, the need for sustainability competences to be rooted in what businesses and industries need; and second, the practical need for visualization tools that will facilitate integration of sustainability competences into MBS curricula.

The proposal came as a result of combining CSA (Data 1), CF1 and 2, and Data 2 (for proposal building) and was brainstormed with MBS key stakeholders (teaching staff).

6.2 Findings from Data 2 (pulling together CSA, CF and Data 2 for the Proposal)

The CSA identified the needs of MBS students and MBS teaching staff in developing sustainability competences. As most MBS students are industry professionals and have sustainability competences at varying degrees, they have indicated the need for organized, practical, and structured sustainability knowledge that can be easily applied and shared. They need tools and insights that are applicable to their work environment.

On the other hand, the MBS teaching staff agree that sustainability should be embedded into MBS curriculum. However, they have indicated the need for clearer, more structured, and more practical guide in integrating sustainability in the courses that they teach.

After examining the available tools (as discussed in CF-1 & CF-2), MBS teaching staff agreed that the GreenComp framework is a comprehensive and good foundation framework to build more specialized business aligned sustainability competences. In addition, GreenComp is also personally relatable to them because it identifies values that relates to sustainability topics that they personally care about. However, it was also pointed out that there are competences in GreenComp that are still vague and do not seem to directly link to business and industry needs. In addition, the visualization presented in the EU GreenComp materials does not seem to put clarity on the framework. A more simplified visualization is needed to help MBS instructors internalize sustainability competences and clarify the actual meaning.

Table 14. Key stakeholder suggestions (findings of Data 2) for Proposal building in relation to findings from the CSA (Data 1) and the Conceptual framework.

	*Key focus areas from **CSA** (from **Data 1**)*	*Inputs from literature (**CF**)*	*Suggestions from stakeholders for the Proposal (from **Data 2**)*	*Descriptions of their suggestions (in more detail)*
1	MBS students, view that they possess have sustainability competences at varying degrees. MBS students needs organized, practical, and structured sustainability knowledge that can be easily applied and shared.	Key sustainability competences as basis of these knowledge: *Systems-thinking, Futures-thinking, Values-thinking, Strategic-thinking, Interpersonal, Integrated Problem-Solving, Implementation,* and *Intrapersonal or Self-awareness.*	Sustainability competences should be rooted in what businesses and industries need.	It is expected that MBS students possess a diverse range of competences. They bring with them knowledge that are good source of learning from other students as well. But there is a need to merge or integrate these knowledge with a more comprehensive and systemic meaning of sustainability.
2	MBS teaching staff need clearer, more structured, and more practical guide in integrating sustainability in the subjects that they teach.	ARENE recommended learning outcomes for the shared competence of sustainability development: to apply knowledge, to analyze and assess, and to manage and implement.	GreenComp is a good foundation framework to build more specialized business aligned competences	There is a need to make GreenComp framework more rooted in business and industry in order to make it more meaningful and useful for MBS teaching staff.

6.3 Initial Proposal

The initial proposal is a reference material on Sustainability Competences Definition and Segmentation which will serve as a practical guide for MBS teaching staff.

6.3.1 Definition of Sustainability Competence

This reference material provides a definition of sustainability competence to support MBS instructors in designing and planning their courses. This thesis recommends to use two well-known and most cited definitions of sustainability competences; those of Bianchi (2020) and the EU GreenComp (2022).

> Bianchi (2020, p2) defines *sustainability competences* as “the interlinked set of knowledge, skills, attitudes, and values that enable effective, embodied action in the world with respect to real-world sustainability problems, challenges, and opportunities, according to the context.”
>
> The GreenComp (2022, p12) states that “*a sustainability competence* empowers learners to embody sustainability values, and embrace complex systems, in order to take or request action that restores and maintains ecosystem health and enhances justice, generating visions for sustainable futures.”

According to the EC GreenComp, this definition highlights the development of sustainability-related knowledge, skills, and attitudes to help individuals think, plan, and act with the planet in mind. It views all learning types—formal, non-formal, and informal—as pathways to build this competence, starting in early childhood, evolving through adolescence, and continuing throughout adulthood. Sustainability, as a competence, is relevant in both personal and collective contexts.

The combination of these two definitions capture sustainability competences in a comprehensive, practical and future focused way. Both emphasize that sustainability competence is not only about acquiring knowledge and underscore moving beyond the academic context to real-world impact. The abovementioned definitions are consistently use across academic and industry-related studies, hence, are credible as a foundation for this thesis

Instructors and teams at MBS were identified to request a clear Sustainability competence definition, and these two definitions point not only to the content, but also toward meaningful learning outcomes and connect the academic courses with the practical impact in real world.

6.3.2 Segmentation of Sustainability Competence

This reference material compiles and segments the contents of sustainability competence taken from leading sustainability competences frameworks and publications

from Finnish and EU sources, especially relying on the ARENE (2022) and the GreenComp (2022). Appendix 11 lists in details these sustainability competences from the three leading frameworks, namely, Wiek, Brundliers, & Redman (2020), ARENE (2022), and GreenComp (2022).

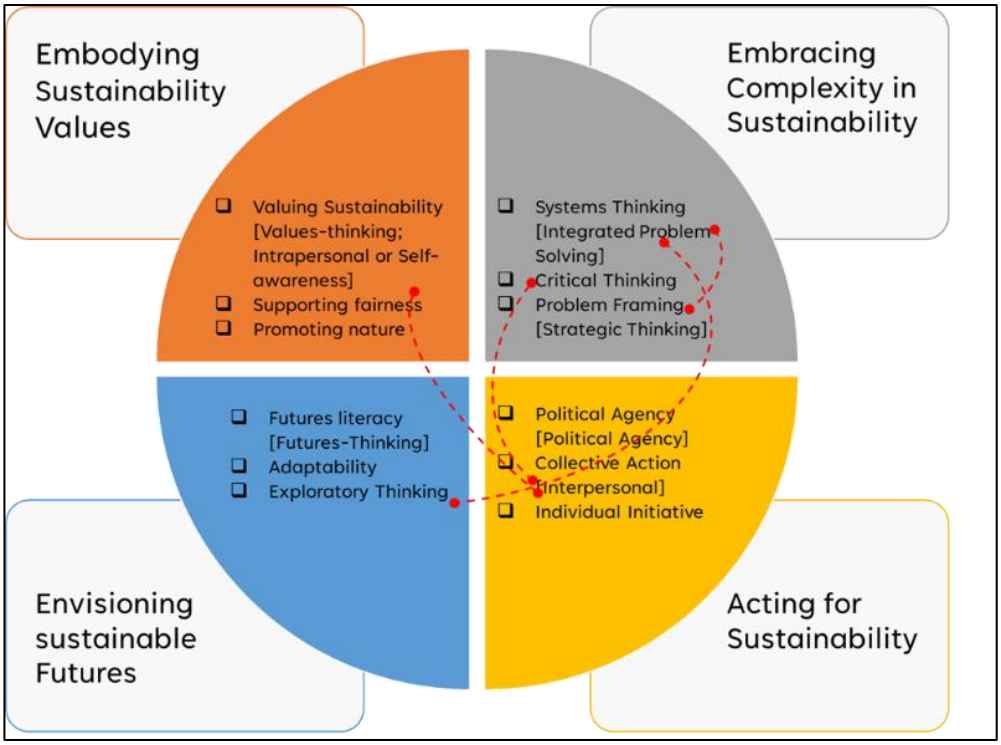


Figure 6. Sustainability Competences Compass.

Figure 6 combines these frameworks into a tool called Sustainability competences compass. This Sustainability Competences Compass aims to provide a clearer picture on how sustainability competence can support MBS instructors in designing and planning their courses.

As for *the instruction how to apply the Compass,* the MBS "Competence areas" teams that currently engage MBS teaching staff into development work on projects, courses, and curricula were identified as potential beneficiaries of the Compass. The Competence area teams gather together the instructors belonging to certain competence areas (e.g. marketing, accounting, analytics, management and leadership, SCM and logistics, etc) and aim at developing the teaching, these competencies, and disseminating these competences to improve the quality of education. The competence teams meet every second week and need tools for effective work. The Compass is the tools that is aimed to be used for supporting Competence teams analysis and development (along with

other stakeholders). This group of stakeholders is the most prominent beneficiary of the tool, as it aims at developing specific, targeted competencies.

> *Example:* when conducting internal discussions, the Compass can help the MBS teaching staff identify *the segments in sustainability competences* that are overly emphasized and also those that are untouched or under-covered. This can be done via the exposure and analysis of the segments that the Compass identities. Such analysis and discussions around it will help prevent over-focusing on developing just one competency and would instead help identify and integrate a broader range of *sustainable competence segments* into courses, theses, and projects that are taught in MBS.

Summing up, the Proposal consists of two elements: the selected *Sustainability competence* definition and *The Sustainability Competences Compass.* Both aim to provide a clearer picture on how sustainability competence can support MBS instructors in designing and planning their courses. For example, the compass would help the MBS teaching staff identify areas that are over-emphasized and also those competences that are currently untouched. It will help prevent over-focusing on developing just one competence and would instead help identify and integrate a broader range of skills into courses that are taught in MBS.

7 Validation of the Proposal

This section presents the validation and further improvements to the initial Proposal.

7.1 Overview of the Validation Stage

The initial proposal is presented in the validation stage, together with its origins in CF1, CF2, Data 1 and Data 2 - were presented to a group of MBS teaching staff and also some students.

First, the expert stakeholders were briefed on the initial objectives of the thesis. Second, the methodology of the thesis was presented. Third, the foundations for establishing CF1 by reviewing existing literature on sustainability competence definition were presented. Fourth, there was a walkthrough of the data and data analysis results from CSA. Fifth, there was a presentation of the second round of literature review that looked at sustainability competences in HEIs and the basis for CF2 and sustainability competences segmentation. Sixth, the presentation of the? initial proposal was conducted.

The initial proposal proposed (a) the selected Sustainability competence definition for use in MBS and (b) a Sustainability Competence Compass to provide a clearer picture on how “sustainability” competence can be approached to support MBS instructors in designing of and planning for courses. The compass would help the MBS teaching staff identify the competences and areas that are already addressed and those that are untouched or under-covered. This will help prevent over-focusing on developing just one competency and would instead help identify and integrate a broader range of skills into courses that are taught in MBS.

During the presentation, questions were raised to further clarify how the initial proposal could be applied in actual teaching scenarios. These questions focused on the practical application of the initial proposal in the light of the existing guidelines that MBS teaching staff were given in designing and evaluating their courses.

7.2 Developments to the Proposal (based on Data Collection 3)

(a) Sustainability competence definition for use in MBS

The selected definitions were approved for use and there were no changes suggested from the validation stage, as both definitions were clear and widely cited in literature on sustainability competences. This indicated agreement with its relevance and clarity. The accepted definiotn were as follows:

> Bianchi (2020, p.2) defines "*sustainability competences"* as "the interlinked set of knowledge, skills, attitudes, and values that enable effective, embodied action in the world with respect to real-world sustainability problems, challenges, and opportunities, according to the context" (Bianchi, 2020, p.2)
>
> The GreenComp points out that "*a sustainability competence* empowers learners to embody sustainability values, and embrace complex systems, in order to take or request action that restores and maintains ecosystem health and enhances justice, generating visions for sustainable futures" (Joint Research Centre, European Commission, 2022, p. 12).

(b) Sustainability Competence Compass

The Sustainability Competence Compass aims to provide a clearer picture on how "sustainability" competence can be approached to support MBS instructors in designing and planning their courses. During the validation, the discussion revealed a need to clarify how the proposed Sustainability Competence Compass align with, enhance, or can be integrated into the existing course development framework, without overwhelming MBS teaching staff or duplicating efforts.

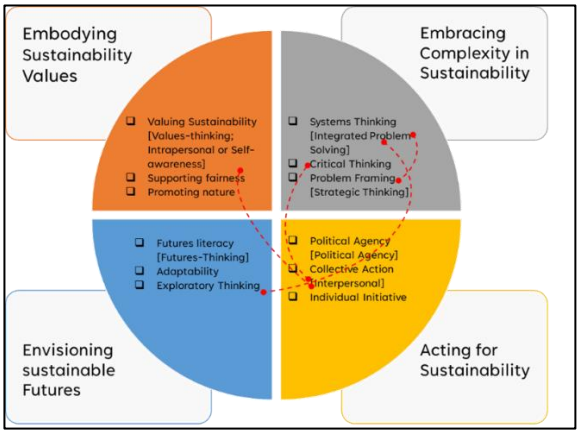
It is indicated that, while MBS teaching staff instructors are already working within existing structures or guidelines, there is room for a tool that can enhance rather than complicate their workflow. This feedback underscored that the tools, like the proposed Sustainability Competences Compass, provide practical help and align with current practices, offering actionable steps for incorporating sustainability into course offerings in MBS.

7.3 Final Proposal

The final proposal is comprised of (a) Sustainability Competence definition recommended for MBS; and (b) Sustainability Competences Compass.

Table 15. Final Proposal of the Thesis

<table>
<tr><th>(a) “Sustainability” competence definition recommended for MBS</th><th>(b) Sustainability Competence Compass</th></tr>
<tr><td>Sustainability competences is the interlinked set of knowledge, skills, attitudes, and values that enable effective, embodied action in the world with respect to real-world sustainability problems, challenges, and opportunities, according to the context (Bianchi 2020, p.2).

A sustainability competence empowers learners to embody sustainability values, and embrace complex systems, in order to take or request action that restores and maintains ecosystem health and enhances justice, generating visions for sustainable futures (GreenComp2022, p.12).</td><td> 
</td></tr>
<tr><td>1.Current sustainability competences:
1. Ability to analyze, evaluate collectively, and build visions and strategies related to sustainability
2. act sustainably at work
3. aware of innovations and new technologies
4. knowledge of sustainability principles in the local and global context, and how human actions affect sustainability
5. knowledge of responsibility of organizations in sustainability
6. Knowledge of responsibility of governments in sustainability
7. Competence to connect and put into practice the SDGs) at work
8. Knowledge on how professional activities can contribute to increasing sustainability
9. Able to introduce and implement sustainable ideas and concepts in workplace and community
10. Feeling responsible and accountable for implementing sustainability principles in professional activities
11. Leading sustainability-related matters
12. Ability to dnetwork and devlop alliance with different stakeholders to solve sustainability issues together</td><td>2.Future sustainability competences:
1. Ability to analyze, evaluate collectively, and build visions and strategies related to sustainability
2. act sustainably at work
3. aware of innovations and new technologies
4. knowledge of sustainability principles in the local and global context, and how human actions affect sustainability
5. knowledge of responsibility of organizations in sustainability
6. Knowledge of responsibility of governments in sustainability
7. competence to connect and put into practice the SDGs) at work
8. knowledge on how professional activities can contribute to increasing sustainability
9. able to introduce and implement sustainable ideas and concepts in workplace and community
10. feeling responsible and accountable for implementing sustainability principles in professional activities
11. Leading sustainability-related matters
12. Ability to dnetwork and devlop alliance with different stakeholders to solve sustainability issues together
13. Sustainability in the context of well-being (e.g. work-lie balance)</td></tr>
</table>

	14. Competence in dealing with policy and market-level sustainability aspects

First, the sustainability competence definitions and, second, the Sustainability Competencies Compass were developed in co-creation with the key stakeholders and further refined following the validation inputs from MBS teaching staff.

The definitions by Bianchi (2020) and the GreenComp (2022) were selected as well-established definitions in the area of sustainability competences and frequently cited in research related to sustainability in the context of education and policy development. The consistent use of these definitions across academic and organizational settings makes their definition of sustainability competence credible and suitable for the case organization as well. The MBS teaching staff pointed out that Green Comp is a useful framework because it breaks down sustainability competences into detailed areas. It speaks systemic professional language, such as problem framing, critical thinking, and exploratory thinking, which are easy to recognize. The MBS teaching staff feel that the GreenComp framework also fits better to the existing approaches at MBS.

Third, as discussed in Section 4.2 of the CSA, the MBS Maser's students identified their current competences in relation to sustainability that they either developed during their studies or already had when entered their studies (also listed in Table 8). Strong level of current sustainability competences were indicated in the areas of strategic thinking, responsibility at work, and awareness of innovations, and sustainability principles in local and global context.

Fourth, the MBS Master´s students also stressed that sustainability competences are going to be important to their future professional career. They indicated their future needed competences in relation to sustainability that they want to either develop during their studies or otherwise acquire for the needs of their professional work.

In this context, the Sustainability Competence Compass can also be used by students as a tool for self-evaluation and assessment in terms of their development in sustainability in different subject areas. The definitions and the compass provide common language and clarity in the area of sustainability that are going to help both

MBS teaching staff bit also students to articulate how they can develop for the future, for example, futures-thinking and problem-framing skills. The students can also use the Compass to align their personal learning goals with industry expectations.

8 Conclusion

This section summarizes the thesis study and also includes the thesis evaluation and closing words.

8.1 Summary

The objective of this thesis was to identify the current and future sustainability competences that need to be acquired by MBS Master´s students, from the stakeholders´ perspectives, to better incorporate sustainability expertise into the existing MBS Master´s curricula. Specifically, the goal was to identify and more clearly point to those areas and competences that will need more attention or further development, from the stakeholders´ perspectives, and it will thus contribute to better alignment of the existing sustainability contents with the stakeholders´ needs. The stakeholders in this Thesis are internal, and they include: (1) the staff, (2) the students. These groups of stakeholders influence the study contents and thus their perspectives were important to explore.

Given the broad nature of the concept of “sustainability” and how it has evolved, two levels of literature review were conducted in this thesis to serve as the basis for the creation of CF1 and CF2. The first literature review looked at sustainability competences across various EU documents for the HEI education settings. This was the basis in developing Conceptual framework 1 (CF1). Eight sustainability competences, namely, *Systems-thinking, Futures-thinking, Values-thinking, Strategic-thinking, Interpersonal, Integrated Problem-Solving, Implementation,* and *Intrapersonal or Self-awareness*, from Wiek (2011), Brundiers et al. (2020), Redman and Wiek (2020) were utilized. The CF1 the supported the development of the survey and questions for the interview utilized in CSA (Data 1).

To conduct the analysis of current and future sustainability competences at MBS, Data 1 included a survey among MBS Master´s students and semi-structured interviews among MBS Master´s teaching. The CSA results revealed that MBS students expressed high interest for organized, practical, and structured sustainability knowledge that they can easily apply and share. In the interviews with the MBS teaching staff, the need for clearer, more structured, and more practical guide in integrating sustainability in the teaching subjects was underscored.

The second literature review looked into segmenting the sustainability competences in HEIs. CF2 utilized the ARENE recommended learning outcomes on the shared competences on sustainability for the Master's level studies as the most applicable framework that offers structure and practical guide to align courses with sustainability competences & needs of MBS students as professionals. These learning outcomes are (a) to apply sustainability knowledge, (b) to analyze and assess, and (c) to manage and implement it.

Data 2 identified the practical need for visualization tools that would facilitate integration of sustainability competences into different courses in MBS. Thus, the Sustainability Competences Compass shown in Figure 6, in Section 6.3, was so-created together with the MBS teaching staff representatives. This Sustainability Competences Compass segments the sustainability competences and thus provides a clearer picture on how "sustainability competence" can be more refinely defined to support MBS instructors in designing and planning their courses. The compass would help the MBS teaching staff identify the areas that are addressed and also those that are untouched. This will help prevent over-focusing on developing just one competency and would instead help identify and integrate a broader range of skills into courses that are taught in MBS. The MBS teaching staff may use this compass as a quick guide to point out sustainability competences and those where gaps exist. The compass can be utilized, for example, in "Competence areas" teams in MBS to facilitate sharing of teaching contents, strategies and practices among MBS teaching staff.

8.2 Thesis Evaluation

The initial objective of this thesis was to identify the current and future sustainability competences that needed to be acquired by MBS Master´s students, from the stakeholders´ perspectives. The findings outlined in the thesis report on the lists of both, current and future competences identified in the thesis. In addition, the outcome of the thesis is a practical reference tool for MBS teaching staff to facilitate identification of sustainability competences and identify possible gaps.

On the one hand, given the broad coverage of sustainability competences as a topic, the review of literature provided an overview on the concept of sustainability competences and on the practical way of incorporating it into education. On the other hand, the thesis demonstrated that the discussion on sustainability competence concept is expected to

continue, ushering in new ideas and directions. The thesis focused on two main internal stakeholders, the MBS students and the MBS teaching staff. The perspectives of external stakeholders, such as, MBS alumni and industry partners were not captured. Given the growing impact of sustainability topics or issues in the business landscape, the perspective of external stakeholders would broaden the findings on sustainability.

As sustainability is a fast evolving field, its concept, tools and the business relevance requires regular updating to have better value in terms of curriculum development in MBS, as well as in meeting and industry needs. This is the area where this thesis tried to contribute.

8.3 Closing Words

The concept of sustainability is never static. As seen in history, it will continue to evolve as time progresses to incorporate changes in the real world. The advancement of AI for example. And this will create a need for new competences that were not taken into account of earlier frameworks. New competences that are needed by industries that have changed because of AI.

There might not be enough data yet for now, however, it might be meaningful for future research to look into the competences needed to make education better aligned with the goals of sustainability.

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WRITTEN STATEMENT
on the use of AI-based tools in this thesis

By Karen Espiritu, the student of BI Master´s Degree Programme
Thesis title: Current and Future Sustainability Competences at MBS

According to the *"Guidance for addressing the use of AI-based tools in studies at Metropolia Business School (for written submissions)"* from August 2023, I make this statement on the use of AI-based tools in my submitted Master´s thesis.

1) Which AI-bases large language models or other AI-based tools I used
   ChatGPT and Google Gemini

2) In which parts of the thesis which tools were used, and for which tasks *(please make a list)*
   I used ChatGPT mainly to search for literature related to sustainability competences, in checking grammar and in translating Finnish texts to English . ChatGPT was also used to identify portions of studies that are related to sustainability competences.

   Google Gemini was used for grammar corrections

3) What portion of the text was helped with these tools, for each use
   Mostly in the literature review
   Some of the documents I found are in Finnish so I use ChatGPT to translate

4) Which prompts were asked, exactly
   - List studies on sustainability competences in HEI's in Finland, in Europe.
   - Translate this sentence/phrase to Finnish

5) Here, I describe what continues an ethical and reliable use of AI-based tools that I used *(use, for example, the recommended documents from "MBS Guidance" referred to above)*
   The AI generated content could be incorrect or inaccurate. The context and the language of the thesis is always a responsibility of the human author.

6) Here, I describe how ethically and reliably I used the AI-based tools in my thesis submission
   AI was used in a transparent and ethical manner to support understanding of terms and their meanings, to translate some texts into English, and to point out grammatical errors.

This written statement makes part of my thesis and is done to help in evaluation and assessment.

28 May 2025/Helsinki
(Date and place)

(Signature)

Prioritization Interview Questionnaire

Please rate how important each of the following issues is to you as a stakeholder (teaching staff) in Metropolia Business School and to the professional development of Metropolia Business School Master's students.

Sustainability Issues	Importance to the Stakeholder (Teaching Staff)					Importance to the professional development of Metropolia Business School Master's students					Material SDGs
	Extremely important	Very important	Somewhat important	Not so important	Not at all important	Extremely important	Very important	Somewhat important	Not so important	Not at all important	
	5	4	3	2	1	5	4	3	2	1	
I. Environment											
1) Green House Gas (GHG) Emissions											9, 11, 13, 12
2) Air Quality											3, 9, 11, 13, 12
3) Energy Management											7, 9, 13, 12
4) Water & Wastewater Management [includes water conservation]											3, 6, 9, 11, 13, 12, 14
5) Waste & Hazardous Materials Management											3, 6, 9, 11, 13, 12, 14
6) Ecological/Biodiversity Impacts											9,13,12,14,15
7) Circular Economy											9,13,12,15
II. Social and Human Capital											
8) Human Rights & Community Relations											1, 2, 3, 4, 6, 8, 9, 10, 16
9) Customer Privacy											16
10) Data Security											16
11) Access & Affordability											1, 2, 9, 10, 11, 17
12) Product Quality & Safety											1, 2, 3
13) Customer Welfare											1, 2, 3, 16
14) Selling Practices & Product Labeling [includes responsible marketing]											1, 2, 3
15) Corporate Social Responsibility											1, 2, 3, 4, 6, 8, 9, 13, 12, 17
16) Social entrepreneurship											1, 2, 3, 4, 8, 9, 12
17) Labor Practices											1, 2, 3, 5, 8, 10, 12
18) Employee Health & Safety											1, 2, 3, 5, 6, 8, 9, 13

19)	Employee Engagement, Diversity & Inclusion											1,2,3,4,5, 8,10,11
III.	**Governance and Economic**											
20)	Product Design & Lifecycle Management											2, 7, 8, 12
21)	Business Model Resilience											8,12,13
22)	Supply Chain Management											6, 8, 11, 12, 13
23)	Materials Sourcing & Efficiency											2, 7, 12, 13
24)	Physical Impacts of Climate Change											9, 11, 13
25)	Investments in innovation and enabling technologies											1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 17
26)	Business Ethics											1, 2, 3, 4, 8, 10, 15, 16,
27)	Competitive Behavior											1, 10, 16
28)	Management of the Legal & Regulatory Environment											1, 2, 4, 6, 7, 8, 9, 10, 11, 13, 12, 15, 16, 17

Please identify, other issues that are important to you as a stakeholder and to the professional development of Metropolia Business School Master's students.

Explanatory Notes and Definition of General Categories

1) Green House Gas (GHG) Emissions	Refers to greenhouse gas (GHG) emissions that companies/industries generate. The category further includes management of regulatory risks, environmental compliance, and reputational risks and opportunities, as they related to direct GHG emissions.
2) Air Quality	Refers to the management of air quality and airborne pollutants.
3) Energy Management	Environmental impacts associated with energy consumption. It includes management of energy efficiency and intensity.
4) Water & Wastewater Management	Refers to water use, water consumption, wastewater generation, and other impacts of operations on water resources, which may be influenced by regional differences in the availability and quality of and competition for water resources. More specifically, it addresses management strategies including, but not limited to, water efficiency, intensity, and recycling. Lastly, the category also addresses management of wastewater treatment and discharge, including groundwater and aquifer pollution.
5) Waste & Hazardous Materials Management	Environmental issues associated with hazardous and non-hazardous waste generated by companies. It addresses a company's management of solid wastes in manufacturing, agriculture, and other industrial processes. It covers treatment, handling, storage, disposal, and regulatory compliance.

6) Ecological/Biodiversity Impacts	Management of a company's/industry's impacts on ecosystems and biodiversity through activities including, but not limited to, land use for exploration, natural resource extraction, and cultivation, as well as project development, construction, and siting. The impacts include, but are not limited to, biodiversity loss, habitat destruction, and deforestation at all stages – planning, land acquisition, permitting, development, operations, and site remediation. The category does not cover impacts of climate change on ecosystems and biodiversity.
7) Circular Economy	The CE is expected to bring benefits to companies and municipalities due to a reduction in the need for waste management, resource efficiency gains and reductions in environmental externalities such as pollution. Further, the CE has potential to create economic and social benefits such as new jobs, opportunities and increased welfare for low income households and improvement in trade balances. [aligning with CE]
8) Human Rights & Community Relations	Refers to the management of the relationship between businesses and the communities in which they operate, including, but not limited to, management of direct and indirect impacts on core human rights and the treatment of indigenous peoples. More specifically, such management may cover socio-economic community impacts, community engagement, environmental justice, cultivation of local workforces, impact on local businesses, license to operate, and environmental/social impact assessments.
9) Customer Privacy	Includes management of risks related to the use of personally identifiable information (PII) and other customer or user data for secondary purposes including but not limited to marketing through affiliates and non-affiliates. The scope of the category includes social issues that may arise from a company's approach to collecting data, obtaining consent (e.g., opt-in policies), managing user and customer expectations regarding how their data is used, and managing evolving regulation.
10) Data Security	Refers to management of risks related to collection, retention, and use of sensitive, confidential, and/or proprietary customer or user data. It includes social issues that may arise from incidents such as data breaches in which personally identifiable information (PII) and other user or customer data may be exposed. It addresses a company's strategy, policies, and practices related to IT infrastructure, staff training, record keeping, cooperation with law enforcement, and other mechanisms used to ensure security of customer or user data.
11) Access & Affordability	Refers to a company's ability to ensure broad access to its products and services, specifically in the context of underserved markets and/or population groups. It includes the management of issues related to universal needs, such as the accessibility and affordability of health care, financial services, utilities, education, and telecommunications.
12) Product Quality & Safety	Issues involving unintended characteristics of products sold or services provided that may create health or safety risks to end-users. It addresses a company's ability to offer manufactured products and/or services that meet customer expectations with respect to their health and safety characteristics. It includes, but is not limited to, issues involving liability, management of recalls and market withdrawals, product testing, and chemicals/content/ingredient management in products.
13) Customer Welfare	Refers to a company's/an industry's ability to provide consumers with manufactured products and services that are aligned with societal expectations. It does not include issues directly related to quality and safety malfunctions of manufactured products and services, but instead addresses qualities inherent to the design and delivery of products and services where customer welfare may be in question. The scope of the category also captures companies' ability to prevent counterfeit products.
14) Selling Practices & Product Labeling	Refers to social issues that may arise from a failure to manage the transparency, accuracy, and comprehensibility of marketing statements, advertising, and labeling of products and services. It includes, but is not limited to, advertising standards and regulations, ethical and responsible marketing practices, misleading or deceptive labeling, as well as discriminatory or predatory selling and lending practices. This may include deceptive or aggressive selling practices in which incentive structures for employees could encourage the sale of products or services that are not in the best interest of customers or clients.
15) Corporate Social Responsibility	(CSR) describes how a company manages its industry and takes responsibility for its social impact. Corporate social responsibility encompasses various characteristics like economic dependence, legal conformity, ethical requirement, and societal influences The goal of CSR is to voluntarily incorporate economic, social and environmental responsibilities into business operations to build sustainable growth of business and show positive impact to the environment, employees, consumers, shareholders and communities.

16) Social entrepreneurship	The category includes the promotion of social entrepreneurship. Social entrepreneurship is the process of recognizing and resourcefully pursuing opportunities to create social value. Social entrepreneurs are innovative, resourceful, and results oriented. Social entrepreneurs are already taking strides toward reducing impact on the environment while boosting local communities.
17) Labor Practices	The category addresses the company's ability to uphold commonly accepted labor standards in the workplace, including compliance with labor laws and internationally accepted norms and standards. This includes, but is not limited to, ensuring basic human rights related to child labor, forced or bonded labor, exploitative labor, fair wages and overtime pay, and other basic workers' rights. It also includes minimum wage policies and provision of benefits, which may influence how a workforce is attracted, retained, and motivated. The category further addresses a company's relationship with organized labor and freedom of association.
18) Employee Health & Safety	The category addresses a company's ability to create and maintain a safe and healthy workplace environment that is free of injuries, fatalities, and illness (both chronic and acute). It is traditionally accomplished through implementing safety management plans, developing training requirements for employees and contractors, and conducting regular audits of their own practices as well as those of their subcontractors. The category further captures how companies ensure physical and mental health of workforce through technology, training, corporate culture, regulatory compliance, monitoring and testing, and personal protective equipment.
19) Employee Engagement, Diversity & Inclusion	Refers to a company's ability to ensure that its culture and hiring and promotion practices embrace the building of a diverse and inclusive workforce that reflects the makeup of local talent pools and its customer base. It addresses the issues of discriminatory practices on the bases of race, gender, ethnicity, religion, sexual orientation, and other factors. Includes inequalities arising from gender, opportunities, and income.
20) Product Design & Lifecycle Management	The category addresses incorporation of environmental, social, and governance (ESG) considerations in characteristics of products and services provided or sold by the company. It includes, but is not limited to, managing the lifecycle impacts of products and services, such as those related to packaging, distribution, use-phase resource intensity, and other environmental and social externalities that may occur during their use-phase or at the end of life. The category captures a company's ability to address customer and societal demand for more sustainable products and services as well as to meet evolving environmental and social regulation. It does not address direct environmental or social impacts of the company's operations nor does it address health and safety risks to consumers from product use, which are covered in other categories.
21) Business Model Resilience	Refers to industry's capacity to manage risks and opportunities associated with incorporating social, environmental, and political transitions into long-term business model planning. This includes responsiveness to the transition to a low-carbon and climate-constrained economy, as well as growth and creation of new markets among unserved and underserved socio-economic populations. The category highlights industries in which evolving environmental and social realities may challenge companies to fundamentally adapt or may put their business models at risk.
22) Supply Chain Management	Management of environmental, social, and governance (ESG) risks within a company's supply chain. It addresses issues associated with environmental and social externalities created by suppliers through their operational activities. Such issues include, but are not limited to, environmental responsibility, human rights, labor practices, and ethics and corruption. Management may involve screening, selection, monitoring, and engagement with suppliers on their environmental and social impacts. The category does not address the impacts of external factors – such as climate change and other environmental and social factors – on suppliers' operations and/or on the availability and pricing of key resources, which is covered in a separate category.
23) Materials Sourcing & Efficiency	Refers to the resilience of materials supply chains to impacts of climate change and other external environmental and social factors. It captures the impacts of such external factors on operational activity of suppliers, which can further affect availability and pricing of key resources. It addresses a company's ability to manage these risks through product design, manufacturing, and end-of-life management, such as by using of recycled and renewable materials, reducing the use of key materials (dematerialization), maximizing resource efficiency in manufacturing, and making R&D investments in substitute materials. Additionally, companies can manage these issues by screening, selection, monitoring, and engagement with suppliers to ensure their resilience to external risks. It does not address issues associated with environmental and social externalities created by operational activity of individual suppliers, which is covered in a separate category.

24) Physical Impacts of Climate Change	The category addresses the company's ability to manage risks and opportunities associated with direct exposure of its owned or controlled assets and operations to actual or potential physical impacts of climate change. It captures environmental and social issues that may arise from operational disruptions due to physical impacts of climate change. It further captures socio-economic issues resulting from companies failing to incorporate climate change consideration in products and services sold, such as insurance policies and mortgages. The category relates to the company's ability to adapt to increased frequency and severity of extreme weather, shifting climate, sea level risk, and other expected physical impacts of climate change. Management may involve enhancing resiliency of physical assets and/or surrounding infrastructure as well as incorporation of climate change-related considerations into key business activities (e.g., mortgage and insurance underwriting, planning and development of real estate projects).
25) Investments in innovation and enabling technologies	This category refers to initiatives that support innovation and technology that accelerates the transition of businesses toward sustainable operations and provide solutions to sustainability-related issues [e.g. Internet of Things and Artificial Intelligence]
26) Business Ethics	The category addresses the company's approach to managing risks and opportunities surrounding ethical conduct of business, including fraud, corruption, bribery and facilitation payments, fiduciary responsibilities, and other behavior that may have an ethical component. This includes sensitivity to business norms and standards as they shift over time, jurisdiction, and culture. It addresses the company's ability to provide services that satisfy the highest professional and ethical standards of the industry, which means to avoid conflicts of interest, misrepresentation, bias, and negligence through training employees adequately and implementing policies and procedures to ensure employees provide services free from bias and error.
27) Competitive Behavior	Social issues associated with existence of monopolies, which may include, but are not limited to, excessive prices, poor quality of service, and inefficiencies. It addresses a company's management of legal and social expectation around monopolistic and anti-competitive practices, including issues related to bargaining power, collusion, price fixing or manipulation, and protection of patents and intellectual property (IP).
28) Management of the Legal & Regulatory Environment	The approach to engaging with regulators in cases where conflicting corporate and public interests may have the potential for long-term adverse direct or indirect environmental and social impacts. Refers to a company's level of reliance upon regulatory policy or monetary incentives (such as subsidies and taxes), actions to influence industry policy (such as through lobbying), overall reliance on a favorable regulatory environment for business competitiveness, and ability to comply with relevant regulations. It may relate to the alignment of management and investor views of regulatory engagement and compliance at large.

Source: https://www.sasb.org/standards/materiality-finder/?lang=en-us

Highlights of the Interview with MBS Teaching Staff

1. Important Sustainability Topics. MBS teaching staff identified several sustainability topics they view as important to teaching staff and for the professional development of MBS students: Circular Economy, Climate Change Mitigation and Adaptation, Business Ethics & Transparency, Social Entrepreneurship & CSR, Innovation & Enabling Technologies.

2. The following topics were mentioned to be of moderate importance: Data Security & Digital Competence, Employee Health & Labour Practices, Supply Chain Management.

3. The following topics were not prioritized because these are technical areas that are not within the direct teaching scope of MBS teaching staff: air quality, wastewater management, biodiversity.

4. Integrate sustainability across the curriculum, not as standalone courses. For example, embed sustainability when teaching strategy, marketing, analytics, etc.

5. Use case-based and problem-based learning to tackle sustainability from a systems perspective.

6. Develop faculty competence through access to ready-made materials and continuous training.

7. Encourage cross-disciplinary learning (e.g., engineers and business students collaborating).

8. Strong call for closer cooperation with industry leaders, who are often ahead of academia in sustainability innovation.

9. Industry partnerships offer practical insight and motivation for students, especially those already working.

10. Tie sustainability topics to real business needs and SDGs for coherence and relevance.

11. Flexibility and relevance in learning were valued—many students are already employed and seek practical, applicable skills.

12. There’s a need to shift the mindset of business education from traditional models to one rooted in resilience, ethics, and long-term sustainability.

Metropolia

Form is scheduled: publicity starts 7.11.2022 16.05 and ends 20.11.2023 23.59

Sustainability Competences Survey

Dear survey participant,

This is a survey to explore your expectations and opinions as to which Sustainability competences that Master´s students at Metropolia should develop. Sustainability competences are needed for every industry professional. When studying at Metropolia, you have an opportunity to acquire the needed competences and thus prepare for the future. Please respond **which sustainability competences you believe are important to you** to have right now as an industry professional, and **which competences you will need in the future**.

Participation in the survey is voluntary and completely anonymous. The data collected will be used as research material in the study that will define which Sustainability competences are needed for Master´s students.

Background of the survey

This survey is part of a Master´s thesis called "Current and Future Sustainability Competences" conducted by your fellow student Karen Espiritu, BI 1st year student. This study isdone to benefit all Master´s students at Metropolia Business School and the survey makes part of it.By filling in this survey, you give an opportunity to develop your Master´s studies, so that you and the next generations of students will develop the needed sustainability competences.

Should you require additional information on the survey, please direct your questions to the thesis writer or her supervisor:

Karen Espiritu, a thesis researcher, a 1st student in the Master´s Programme in Business Informatics, Metropolia UAS, tel. 046 644 7358, Karen.Espiritu@metropolia.fi

Zinaida Grabovskaia, a thesis supervisor, Metropolia UAS, tel. 040 198 4008, Zinaida.Grabovskaia@metropolia.fi

The survey takes about 5-10 mins. to fill in.

We look forward to knowing **what sustainability competences you need**!

Part I. Demographic Questions

1) Age Group *

- [ ] 20-30
- [ ] 31-40
- [ ] 41-50
- [ ] 51-60
- [ ] Above 60

2) Profession/work Industry *

- [ ] Admin and Support Services
- [ ] ICT, SW Development, and Data
- [ ] Professional (knowledge intensive) services (e.g., accounting, management consulting, legal, teaching etc.)
- [ ] Media & Marketing
- [ ] Manufacturing
- [ ] Technology and Engineering
- [ ] Construction
- [ ] Wholesale, Retail, Supply Chains, Procurement
- [ ] Transportation and Logistics
- [ ] Tourism, Accommodation, and Food
- [ ] Sustainability related (e.g. water, sewerage, waste management, recycling, sustainability reporting etc)
- [ ] Prefer not to say
- [ ] Other (please specify in the box below)

Part II. General Knowledge on Sustainability

A. Please assess each statement and indicate how much you agree or disagree with it:

	Completely Disagree [0]	Disagree [1]	Neither Agree nor Disagree [2]	Agree [3]	Completely Agree [4]
3) I am familiar with the Sustainable Development Goals (17 SDGs)	○	○	○	○	○
4) I am familiar with Sustainability topics & challenges	○	○	○	○	○
5) I am familiar with Corporate Sustainability topics	○	○	○	○	○
6) I am familiar with the Circular Economy topics	○	○	○	○	○
7) Sustainability competences are important to my current career, now	○	○	○	○	○
8) Sustainability competences will be important to my future career (in 3 to 5 years)	○	○	○	○	○
9) Sustainability competences will beimportant to my future career (in 5 to 10 years)	○	○	○	○	○
10) Sustainability competences will be important to my future career (in more than 10 years)	○	○	○	○	○

B. **Sustainability-Related Activities**. Please choose your answer:

11) How often do you engage in issues around sustainability at work? *

- [ ] Not at all
- [ ] Occasionally
- [ ] On a regular basis, monthly
- [ ] Deeply involved, daily or weekly

12) How often do you engage in issues around sustainability in your private life? *

- [ ] Not at all
- [ ] Occasionally
- [ ] On a regular basis, monthly
- [ ] Deeply involved, daily or weekly

13) In which activities related to sustainability are you currently engaged? (You may check multiple boxes) *

- [ ] in my job
- [ ] as a volunteer
- [ ] at my university
- [ ] in my household
- [ ] in Non-Governmental Organizations (NGOs)
- [ ] in my individual responsible behavior
- [ ] via donations (monetary and including non-monetary)
- [ ] other (please specify in the box below)

14) Please indicate in how many courses or classes you came across Sustainability topics during your Master's studies at Metropolia UAS? *

- [ ] 1 to 2 courses
- [ ] 3 to 4 courses
- [ ] more than 4 courses
- [ ] not included or integrated in my studies
- [ ] only in a few classes/topics during my studies
- [ ] other (please specify in the box below)

15) Please indicate three (3) or more sustainability topics/areas where you need to develop competencies.

Part III. Sustainability Competences for Master´s Students as Industry Professionals

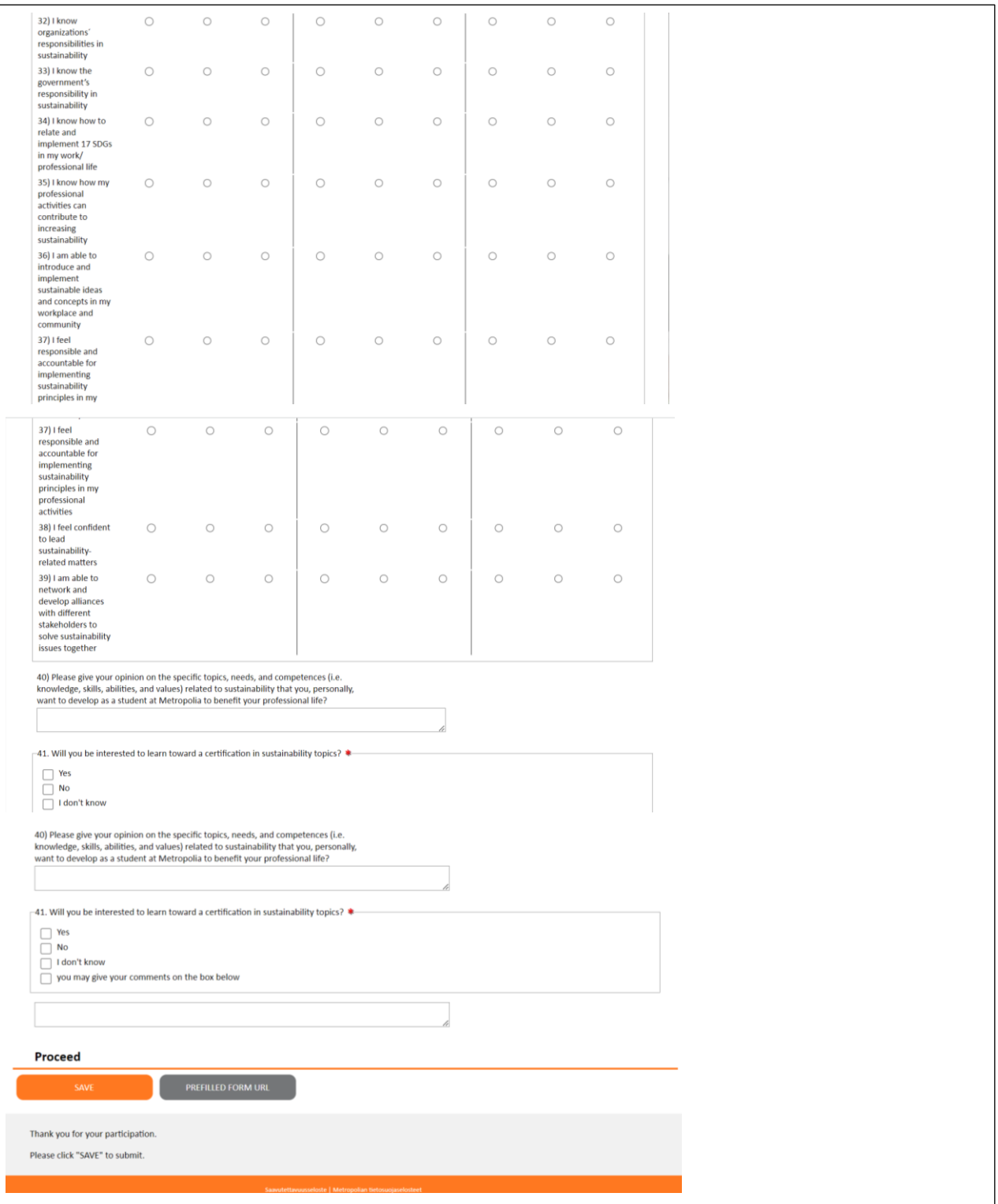
A. The following statements represent sustainability related **knowledge, skills, abilities and values** (that together constitute "competences"). Please assess the current state of your competences from 0 = No competences to 4 = Strong competences.

	No competences [0]	Not enough competences [1]	Quite enough competences [2]	Good level of competences [3]	Strong level of competences [4]
16) I am able to analyze, evaluate collectively, and build visions and strategies related to sustainability	○	○	○	○	○
17) I feel responsibility to act sustainably at work	○	○	○	○	○
18) I am aware of innovations and new technologies that play a critical role in sustainability	○	○	○	○	○
19) I know sustainability principles in the local and global context, and how human actions affect sustainability	○	○	○	○	○
20) I know organizations´ responsibilities in sustainability	○	○	○	○	○
21) I know the government's responsibility in sustainability	○	○	○	○	○
22) I know how to relate and implement 17 SDGs in my work/ professional life	○	○	○	○	○
23) I know how my professional activities can contribute to increasing sustainability	○	○	○	○	○
24) I am able to introduce and implement sustainable ideas and concepts in my workplace and community	○	○	○	○	○
25) I feel responsible and accountable for implementing sustainability principles in my professional activities	○	○	○	○	○
26) I feel confident to lead sustainability-related matters	○	○	○	○	○
27) I am able to network and develop alliances with different stakeholders to solve sustainability issues together	○	○	○	○	○

B. The following statements represent sustainability related **knowledge, skills, abilities and values** (that together constitute "competences"). Please rate these statements from 0 = Not Important to 3 = Very Important. Also, notice the time scale for assessing importance of these competences for you. Something may be not important to you now, but its importance can grow in the future.

Think from the perspective of the importance of these competences to you as a professional. Which are needed already now, and which will be needed in the future?

	Importance of these competences now (at present) for me as a professional			Importance of these competences in the next 3 to 5 years for me as a professional			Importance of these competences in the next 5 to 10 years for me as a professional		
	Not important [0]	Moderately important [2]	Very important [3]	Not important [0]	Moderately important [2]	Very important [3]	Not important [0]	Moderately important [2]	Very important [3]
28) I am able to analyze, evaluate collectively, and build visions and strategies related to sustainability	○	○	○	○	○	○	○	○	○
29) I feel responsibility to act sustainably at work	○	○	○	○	○	○	○	○	○
30) I am aware of innovations and new technologies that play a critical role in sustainability	○	○	○	○	○	○	○	○	○
31) I know sustainability principles in the local and global	○	○	○	○	○	○	○	○	○



32) I know organizations' responsibilities in sustainability	○	○	○	○	○	○	○	○	○
33) I know the government's responsibility in sustainability	○	○	○	○	○	○	○	○	○
34) I know how to relate and implement 17 SDGs in my work/ professional life	○	○	○	○	○	○	○	○	○
35) I know how my professional activities can contribute to increasing sustainability	○	○	○	○	○	○	○	○	○
36) I am able to introduce and implement sustainable ideas and concepts in my workplace and community	○	○	○	○	○	○	○	○	○
37) I feel responsible and accountable for implementing sustainability principles in my	○	○	○	○	○	○	○	○	○

37) I feel responsible and accountable for implementing sustainability principles in my professional activities	○	○	○	○	○	○	○	○	○
38) I feel confident to lead sustainability-related matters	○	○	○	○	○	○	○	○	○
39) I am able to network and develop alliances with different stakeholders to solve sustainability issues together	○	○	○	○	○	○	○	○	○

40) Please give your opinion on the specific topics, needs, and competences (i.e. knowledge, skills, abilities, and values) related to sustainability that you, personally, want to develop as a student at Metropolia to benefit your professional life?

41. Will you be interested to learn toward a certification in sustainability topics? *

- ☐ Yes
- ☐ No
- ☐ I don't know

40) Please give your opinion on the specific topics, needs, and competences (i.e. knowledge, skills, abilities, and values) related to sustainability that you, personally, want to develop as a student at Metropolia to benefit your professional life?

41. Will you be interested to learn toward a certification in sustainability topics? *

- ☐ Yes
- ☐ No
- ☐ I don't know
- ☐ you may give your comments on the box below

Proceed

SAVE PREFILLED FORM URL

Thank you for your participation.

Please click "SAVE" to submit.

Number of Masters Students in MBS

Degree Program in MBS	Autumn Semester 2022		Total Number
	Attending	Not Attending	
Liiketoiminnan kehittämisen tutkinto-ohjelma	105	4	109
Master's Degree Programme in Business Informatics, MBA	96	3	99
Hankintatoimen tutkinto-ohjelma (Yhteiskuntatieteiden, liiketalouden ja hallinnon ala)	21	0	21
Julkisten hankintojen tutkinto-ohjelma, insinööri	25	2	27
Master's Degree Programme in Business Informatics, MEng	38	1	39
Master's Degree Programme in Procurement	39	1	40
Julkisten hankintojen tutkinto-ohjelma, tradenomi	52	2	54
Hankintatoimen tutkinto-ohjelma (Tekniikan ja liikenteen ala)	5	0	5
Total	381	13	394

Tabulated Results of Part III.B

Table A

Importance of these competences now (at present) for me as a professional	Not Important	%	Moderately Important	%	Very Important	%	No answer	%	Total	
I am able to analyze, evaluate collectively, and build visions and strategies related to sustainability	4	8.16	27	55.10	12	24.49	6	12.24	49	100
I feel responsibility to act sustainably at work	1	2.04	16	32.65	27	55.10	5	10.20	49	100
I am aware of innovations and new technologies that play a critical role in sustainability	2	4.08	22	44.90	20	40.82	5	10.20	49	100
I know sustainability principles in the local and global context, and how human actions affect	4	8.16	23	46.94	17	34.69	5	10.20	49	100
I know organizations ´ responsibilities in sustainability	4	8.16	20	40.82	20	40.82	5	10.20	49	100
I know the government's responsibility in sustainability	3	6.12	21	42.86	20	40.82	5	10.20	49	100
I know how to relate and implement 17 SDGs in my work/ professional life	12	24.49	19	38.78	12	24.49	6	12.24	49	100
I know how my professional activities can contribute to increasing sustainability	5	10.20	18	36.73	21	42.86	5	10.20	49	100
I am able to introduce and implement sustainable ideas and concepts in my workplace and community	3	6.12	22	44.90	19	38.78	5	10.20	49	100
I feel responsible and accountable for implementing sustainability principles in my professional activities	3	6.12	19	38.78	22	44.90	5	10.20	49	100
I feel confident to lead sustainability-related matters	4	8.16	27	55.10	13	26.53	5	10.20	49	100
I am able to network and develop alliances with different stakeholders to solve sustainability issues together	7	14.29	22	44.90	13	26.53	7	14.29	49	100

Table B

Importance of these competences for me as a professional in the next 3-5 years	Not Important	%	Moderately Important	%	Very Important	%	No answer	%	Total	
I am able to analyze, evaluate collectively, and build visions and strategies related to sustainability	1	2.04	16	32.65	27	55.10	5	10.20	49	100
I feel responsibility to act sustainably at work	1	2.04	14	28.57	30	61.22	4	8.16	49	100
I am aware of innovations and new technologies that play a critical role in sustainability	1	2.04	15	30.61	29	59.18	4	8.16	49	100
I know sustainability principles in the local and global context, and how human actions affect	2	4.08	15	30.61	28	57.14	4	8.16	49	100
I know organizations ´ responsibilities in sustainability	1	2.04	16	32.65	26	53.06	6	12.24	49	100
I know the government's responsibility in sustainability	3	6.12	17	34.69	24	48.98	5	10.20	49	100
I know how to relate and implement 17 SDGs in my work/ professional life	4	8.16	25	51.02	15	30.61	5	10.20	49	100
I know how my professional activities can contribute to increasing sustainability	2	4.08	12	24.49	31	63.27	4	8.16	49	100
I am able to introduce and implement sustainable ideas and concepts in my workplace and community	4	8.16	10	20.41	31	63.27	4	8.16	49	100
I feel responsible and accountable for implementing sustainability principles in my professional activities	2	4.08	14	28.57	29	59.18	4	8.16	49	100
I feel confident to lead sustainability-related matters	3	6.12	17	34.69	25	51.02	4	8.16	49	100
I am able to network and develop alliances with different stakeholders to solve sustainability issues together	3	6.12	16	32.65	23	46.94	7	14.29	49	100

Table C

Importance of these competences for me as a professional in the next 5-10 years	Not Important	%	Moderately Important	%	Very Important	%	No answer	%	Total	
I am able to analyze, evaluate collectively, and build visions and strategies related to sustainability	1	2.04	13	26.53	29	59.18	6	12.24	49	100
I feel responsibility to act sustainably at work	1	2.04	12	24.49	31	63.27	5	10.20	49	100
I am aware of innovations and new technologies that play a critical role in sustainability	2	4.08	13	26.53	28	57.14	6	12.24	49	100
I know sustainability principles in the local and global context, and how human actions affect	2	4.08	14	28.57	28	57.14	5	10.20	49	100
I know organizations ´ responsibilities in sustainability	2	4.08	15	30.61	28	57.14	4	8.16	49	100
I know the government's responsibility in sustainability	3	6.12	15	30.61	27	55.10	4	8.16	49	100
I know how to relate and implement 17 SDGs in my work/ professional life	5	10.20	20	40.82	18	36.73	6	12.24	49	100
I know how my professional activities can contribute to increasing sustainability	3	6.12	10	20.41	29	59.18	7	14.29	49	100
I am able to introduce and implement sustainable ideas and concepts in my workplace and community	3	6.12	11	22.45	28	57.14	7	14.29	49	100
I feel responsible and accountable for implementing sustainability principles in my professional activities	2	4.08	12	24.49	30	61.22	5	10.20	49	100
I feel confident to lead sustainability-related matters	4	8.16	13	26.53	27	55.10	5	10.20	49	100
I am able to network and develop alliances with different stakeholders to solve sustainability issues together	3	6.12	15	30.61	24	48.98	7	14.29	49	100

List of Masters Degrees in the Study by Trencher

Category	University and Degree name
Research-Oriented	Australian National University College of Medicine, Biology and Environment (MSc) Master of Environment
	ETH Zurich Department of Environmental Systems Science (MSc) Master in Environmental Sciences
	Lund University Lund University Centre for Sustainability Studies (MSc) Master in Environmental Studies and Sustainability Science
	Oxford University School of Geography and the Environment (MSc) Master in Nature, Society and Environmental Governance
	Tohoku University Graduate School of Environmental Studies (MSc) International Environmental Leadership Program
	University of British Columbia Institute for Resources, Environment and Sustainability (MSc) Master in Resources, Environmental and Sustainability
	University of Tokyo Graduate School of Frontier Sciences (Department of Environmental Studies) (MSc) Master of Sustainability Science
Neutrally-Oriented	Clark University Department of International Development, Community, and Environment (MSc) Master in Environmental Science and Policy
	University of Melbourne Faculty of Science (Office for Environmental Programs) (MSc) Master of Environment
	National University of Singapore School of Design and Environment (MSc) Master of Environmental Management
Practice-Oriented	Blekinge Institute of Technology Department of Strategic Sustainable Development (MSc) Master in Strategic Leadership towards Sustainability
	Arizona State University School of Sustainability (MSUS) Master of Sustainability Solutions
	Duke University Nicholas School of Environment (MSc) Master of Environmental Management
	University of California, Santa Barbara Bren School of Environmental Science and Management (MSc) Master of Environmental Science and Management

Note: This table is from Trencher et al. (2018), *Evaluating core competencies development in sustainability and environmental master's programs: An empirical analysis*, published in the *Journal of Cleaner Production*.

List of Case Studies from Green Comp Paper

Name of the initiative	Summary	Level of education	Types of organisations	Geographical coverage
Single case studies				
Digital Environmental Education in VET (DEED) project	The Erasmus+ funded project is developing a green competence training programme, aligned with GreenComp. The training is structured into micro-lessons to allow VET teachers and trainers to pick and choose and incorporate them into their teaching.	VET	Private – training providers	Czechia, Italy, Romania, Spain, Poland, Portugal and Germany
TAP-TS – Developing sustainability competences among teachers, student teachers, and teacher educators	TAP-TS is an Erasmus+ Teacher Academy that is developing Learning & Teaching Packages consisting of seven open resource online courses and a Teacher Learning Programme. GreenComp is a main building block for the project's activities.	School education	Both public and private: HEIs, schools, a public authority, private companies, a CSO	Czechia, Germany, Italy, Poland, Portugal, Romania, Spain
GreenComp Enterprises - Boosting the start-up of green and ethical enterprises, based on GreenComp competences	The Erasmus+ funded project uses GreenComp as a strategic framework to the development of its learning materials designed for entrepreneurs. These include a business sustainability handbook and accompanying digital tools.	Adult learning	A Chamber of commerce, NGOs and private organisations	Denmark, Italy, Greece, Cyprus, Sweden and Bulgaria
EntreComp4Transition - Building upon the EntreComp Framework for a green and digital Transition	The project aims to combine EntreComp, DigComp and GreenComp in innovative learning materials along four learning paths to help develop entrepreneurial mindsets that support the green and digital transition	Higher education, and VET	Public and private – international associations, NGOs, public bodies, chambers of commerce, HEIs and a business organisation	An international association in addition to Austria, Belgium, Italy, Spain and Türkiye
Engineers4Europe	Three-year long Erasmus+ Alliances for Innovation project aims at operationalising the different EU competence frameworks (GreenComp, DigComp, LifeComp, EntreComp) for engineers.	Higher education	13 organisations	Eight countries, including the European remit on international associations involved
The Assessment of Sustainability Knowledge - TASK™	The online awareness test, TASK™ was developed for students and individuals who wish to assess their sustainability knowledge. To enhance a more structured take up of the test, a certification is being rolled out for HEIs.	Higher education, adult education	Private company - association	Belgium / international
Open Universiteit	Case study shows how the GreenComp Framework was adopted within an institutional setting. It was first adapted as a small-scale initiative at the Faculty of Management. Now GreenComp is being translated into all study programmes of the Open University	Higher education	Single HEI	The Netherlands
Greening the English classroom by making sustainability "visible"	Small scale bottom-up initiative of deploying GreenComp for specific training activities - one off event	Adult education	Public - authority	Regional, Italy
GreenSCENT – Smart Citizen Education for a Green Future	Horizon2020 research project that uses GreenComp as underpinning and integrates digital and green competences in the development of a competence framework	All levels	International consortium incl. HEIs, schools, private companies	International network
Education for Sustainable Development in the European School System	Multiple initiatives and activities focusing on embedding sustainability education in the European School System	School	Private – school	Belgium and other EU locations
NBS EduWorld - Developing learning scenarios	The case study focuses on the development of learning scenarios based on GreenComp by the project, led by the European Schoolnet	School	Public and private	International consortium covering 13 countries

Note: This table is from *GreenComp in Practice: Case Studies on the Use of the European Competence Framework* (2024, pp. 8–9).

UNECE SD Themes for HEIs (Friman et al. (2018), p.366).

UNECE theme	SD dimension
Biological and landscape diversity	ecology
Environmental protection	ecology
Natural resource management	ecology, economy
Rural and urban development	ecology, social
Production and consumption patterns	economy, social
Economy	economy
Corporate responsibility	economy
Poverty alleviation	social
Responsibility in local and global context	all
Democracy and governance	social
Justice	social
Security	social
Peace	social
Health	social
Citizenship	social
Human rights	social
Gender equality	social
Cultural diversity	social
Ethics	all

Established in 1947, the United Nations Economic Commission for Europe (UNECE) is one of the five regional commissions operating under the UN. Its primary mission is to advance economic integration across the pan-European region (Mission | UNECE, n.d.).

Highlights of the Co-Creation Workshop with MBS Teaching Staff on 12 May 2025

The highlights of the discussions are as follows:

- MBS instructors are faced with the task, at least twice a year, right, to tick these competencies in our course implementation descriptions. In the case of business courses like project management, Marketing, or Finance, instructors are often faced with the question on how these courses I relate to sustainability topic.
- Green Comp, is good framework because it splits this eight or more areas into sub areas. And then it speaks systemic professional language, like problem framing, critical thinking, and exploratory thinking, which are very easy to recognize. And then when you talk about like workplace community, work community, this collective action, individual initiative, the GreenComp framework sort of give a clue. The MBS teaching staff are of view that the GreemComp framework is personally relatable to them.
- A more simplified visualization is needed to help MBS instructors internalize sustainability competences and clarify the actual meaning. The visualslization presented in the EU GreenComp materials does not seem to put clarity on the framework.
- Value thinking is vague and a bit problematic. There is a need to add an actionable dimension. Because most of MBS instructors are teaching in areas that enable them to impact not only the environment and employees, but also the societies.
- Sustainability competences should be rooted on what businesses needs because MBS is a business school. MBS teaching staff recognize that from the European perspective, it is extremely important to develop as citizens competences on the value of self-consciousness and self-awareness . But there is a need to make it rooted in the business world. What the business world needs and expectations. GreenComp is great because it's a general human, however we need to pinpoint the business story invisibly to make it more meaningful for us.
- In general, not all the competences in the GreenComp can be present in one (1) course. And the GreenComp includes competences that are personally developed and not dependent on the course, for example, critical thinking. Although the MBS in an academic institution, competences in business courses should be related to industries. There are sustainability issues, like waste water and air pollution, that are beyond the scope of courses.
- It was also mentioned that MBS teaching staff should also discuss on how to roll or integrate the sustainability topics into the courses that they teach.
- The map or the compass would help the MBS teaching staff identify areas that are heavily emphasized and also those competences that are untouched. This will help prevent over-focusing on just one competency and would instead help identify and integrate a broader range of skills.
- MBS teaching staff also mentioned that there are competences, like for example, critical thinking, that are relatively straightforward to integrate into teaching. On the other hand, there are those that are more difficult to integrate, such as, systemic thinking.

- The World Economic Forum (WEF) might have a relevant framework or map related to **sustainability and business capabilities/competencies**. You believe this could be a valuable resource for your team to understand what competencies the WEF has identified in this area, which would be useful for your curriculum development.
- The competences are partly being done under the ARENE,
- The compass can facilitate sustainability competences mapping and will allow for a broader overview of sustainability competence development and identifies areas where MBS instructors focus and interests aligns. MBS instructors, using the compass can identify the competences they primarily focus on and develop in their courses. Then instructors share this information this information with their MBS colleagues to understand the broader landscape on what sustainability competences are being developed across different courses. The compass it will facilitate pointing-out of areas or competences where some MBS instructors can put more in-depth focus because not every MBS instructor can cover these in equal depth.
- The MBS instructors are of the view that the GreenComp and Wiek frameworks when used in professional evaluation of courses might enhance and accelerate the process. However, for purposes of MBS instructors preparation for courses that they teach, the ARENE guidelines seems to be enough for now, there is no need for additional checklist.

Sustainability Competences Definition

A. ARENE

The shared competence in Sustainable Development focuses on professional readiness and effectiveness, and community level change.

A. Competence areas for Bachelor's degree:

1) Is able to use information related to their field in finding, implementing and establishing sustainable solutions and operating models.
2) - Understands sustainability challenges, their interdependencies and the various aspects of issues and problems.

B. Competence areas for Master's degree:

1) Is able to apply the knowledge and future visions of sustainable development comprehensively as a basis for sustainable solutions
2) Is able to analyse and assess systematic dependencies of complex multidisciplinary problems and the different dimensions of solutions
3) Is able to manage the search, implementation and establishment of sustainable solutions and operating models in their work community

B. GreenComp (European Council)

The GreenComp consists of four competence 'areas' that correspond to the definition of sustainability; and 12 competences that are considered as the building blocks of sustainability competence for all people.

AREA	COMPETENCE	DESCRIPTOR
1. Embodying sustainability values *"involves transformative learning process. It advocates equity and justice for current and future generations, and supports the interconnectedness of humans and nature."*	1.1 Valuing sustainability	To reflect on personal values; identify an explain how values vary among people and overtime, while critically evaluating how they align with sustainability values.
	1.2 Supporting fairness	To support equity and justice for current and future generations and learn from previous generations for sustainability.
	1.3Promoting nature	To acknowledge that humans are part of nature; and to respect the needs and rights of other species and of nature itself in order to restore and regenerate healthy and resilient ecosystems.
2. Embracing complexity in sustainability *"focuses on systemic and critical thinking. Enable learners to recognize the interconnectedness of economy, society, and environment in solving complex problems."*	2.1 Systems thinking	To approach a sustainability problem from all sides; to consider time, space and context in order to understand how elements interact within and between systems.
	2.2 Critical thinking	To assess information and arguments, identify assumptions, challenge the status quo, and reflect on how personal, social and cultural backgrounds influence thinking and conclusions.
	2.3 Problem framing	To formulate current or potential challenges as a sustainability problem in terms of difficulty, people involved, time and geographical scope, in order to identify suitable approaches to anticipating and preventing problems, and to mitigating and adapting to already existing problems.

3. Envisioning sustainable futures *"requires the competence of adaptability to embrace uncertainty. It involves the use of creativity to explore approaches and understand interconnected systems."*	3.1 Futures literacy	To envision alternative sustainable futures by imagining and developing alternative scenarios and identifying the steps needed to achieve a preferred sustainable future.
	3.2 Adaptability	To manage transitions and challenges in complex sustainability situations and make decisions related to the future in the face of uncertainty, ambiguity and risk.
	3.3 Exploratory thinking	To adopt a relational way of thinking by exploring and linking different disciplines, using creativity and experimentation with novel ideas or methods.
4. Acting for sustainability *"encourages learners to take action at individual and collective level to shape sustainable futures, to the extent possible. It also invites learners to demand action from those responsible to make change happen."*	4.1 Political agency	To navigate the political system, identify political responsibility and accountability for unsustainable "encourages learners to take action at individual and collective level to shape sustainable futures, to the extent possible. It also invites learners to demand action from those responsible to make change happen. behaviour, and demand effective policies for sustainability.
	4.2 Collective action	To act for change in collaboration with others.
	4.3 Individual initiative	To identify own potential for sustainability and to actively contribute to improving prospects for the community and the plane

C. Definitions of eight Key sustainability competences groups, based on three leading Sustainability Competences frameworks (Wiek, Brundliers, & Redman)

Competences	Descriptors
1.Systems-thinking	To be able to collectively analyze complex systems across different domains (society, environment, economy, etc.) and across different scales (local to global), thereby considering cascading effects, inertia, feedback loops and other systemic features related to sustainability issues and sustainability problem-solving frameworks.
2.Futures-thinking	To be able to iterate and continuously refine one's own futures thinking (visions, scenarios, etc.), in productive and explicit tension to the status quo; recognizing the implicitly held (and largely unrecognized) assumptions about how society works and how they influence the status quo and critically reflecting how they might influence futures thinking.
3.Values-Thinking	To be able to differentiate between intrinsic and extrinsic values in the social and natural world; to recognize normalized oppressive structures; to identify and clarify one's own values; to explain how values are contextually, culturally, and historically reinforced; to critically evaluate how particular stated values align with agreed-upon sustainability values; and to differentiate between espoused values and practiced values.
4.Strategic thinking	To be able to recognize the historical roots and embedded resilience of deliberate and unintended unsustainability and the barriers to change; to creatively plan innovative experiments to test strategies.
5.Interpersonal	To be able to apply the concepts and methods of each competency not merely as "technical skills," but in ways that truly engage and motivate diverse stakeholders and to empathically work with collaborators' and citizens' different ways of knowing and communication.
6.Integrated Problem-Solving	To be able to combine and integrate steps of the sustainability problem solving process or competences, while drawing on pertinent disciplinary, interdisciplinary, transdisciplinary, and other ways of knowing.
7.Implementation	The collective ability to realize a planned solution toward a sustainability-informed vision, to monitor and evaluate the realization process, and to address emerging challenges (adjustments), recognizing that sustainability problem-solving is a long-term, iterative process between planning, realization, and evaluation
8.Intra-personal or Self Awareness	The ability to be aware of one's own emotions, desires, thoughts, behaviors, and personality, as well as to regulate, motivate, and continually improve oneself drawing on competences related to emotional intelligence and social and emotional learning.