



Procurement Educational Consortium for Innovation-sourcing using Sustainability



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PRECIOUS

Procurement Educational Consortium for Innovation sourcing
Using Sustainability

Intellectual Output 2

Qualitative Pre-study by conducting World Café Sessions
and Expert Interviews as a Starting point for the Survey



kaunas
university of
technology



UNIVERSITY
OF TWENTE.

Lead Beneficiary	Universiteit Twente
Author(s)/Organisation(s)	Aki Jääskeläinen, Tampere University Kati Loijas, Tampere University Zaneta Stasiskiene, Kauno Technologijos Universitetas Akvile Feiferyte Skiriene, Kauno Technologijos Universitetas Myriam Lopes, Universidade de Aveiro Sara Moreno Pires, Universidade de Aveiro Ana Paula Gomes, Universidade de Aveiro Helder Relvas, Universidade de Aveiro Santosh Bhandari, Universidade de Aveiro Klaas Stek, University of Twente Jakub Sieber, University of Twente
Contact Email	klaas.stek@utwente.nl
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PRECIUS Consortium			
#	Participant Organisation Name	Short Name	Country
1	Universiteit Twente	UT	NL
2	Tampere University	TAU	FI
3	Kauno Technologijos Universitetas	KTU	LT
4	Universidade de Aveiro	UAVR	PT

List of Abbreviations

Abbreviation	Meaning
IO	Intellectual Output
PSM	Purchasing and Supply Management
SME	Small and Medium Enterprises
MOOC	Massive Open Online Courses
RQ	Research Question
SPSM	Sustainable Purchasing Supply Management

Table of Contents

List of Abbreviations	2
Table of Contents	3
Abstract	4
1. Intellectual Output 2: Qualitative Pre-study by conducting World Café Sessions and Expert Interviews 4	
1.1 Introduction	4
1.2 Background	5
1.3 Research objective for IO2	6
1.4 Research questions	6
1.5 Structure of the white paper	7
2. World Cafés and expert interviews.....	7
2.1 Overview of the methodology	7
2.2 University specific methods	8
2.2.1. World Café and expert interviews on Public Procurement, Organized by Tampere University in Finland8	
2.2.2. World Café on Environmental Engineering, Organized by University of Aveiro in Portugal 9	
2.2.3. World Café on Environmental Engineering, Organized by Kaunas University of Technology in Lithuania.....	12
2.2.4. World Café on SMEs, procurement professionals and interviews, Organized by University of Twente in the Netherlands	13
3. Results by universities.....	14
3.1 Results on Public Procurement, by Tampere University (Finland)	14
3.2 Results on Environmental Engineering, by University of Aveiro (Portugal)	19
3.3 Results on Environmental Engineering, by Kaunas University of Technology (Lithuania)	23
3.4 Results on Public Procurement and SMEs, by University of Twente (Netherlands).....	29
4. Discussion and conclusions.....	37
4.1 Discussion and conclusions	37
4.2 Managerial implications.....	38
4.3 Handover to IO3, IO4 and IO5.....	39
References	44
Attachment 1	45

Abstract

Bringing together the expertise of three communities, public procurement, environmental engineering and SMEs, PRECIUS project creates opportunities to succeed in creating meaningful environmental impact. The design for the qualitative empirical part of the project, IO2, was developed based on the literature and publication study conducted during the IO1. The aim of the IO2 study was to identify the insights of informants of all three communities on the key competences in providing innovative and environmentally sustainable solutions for society, especially through collaboration between these three communities. During the study, we added a further objective to identify relevant sustainability levers and related competences. The study also provided information on the development activities of relevant competencies.

The empirical data collection started by organizing a World Café in each of the countries where a university is involved in the project. Totally 106 experts participated the World Café sessions. The competences identified as the most important in the World Café voting, the related competence development possibilities, and other topics that seemed relevant for the project PRECIUS were complemented, where necessary, in a total of 25 semi-structured theme interviews. After data collection, each university analyzed its own results, and a common synthesis was formulated by identifying competencies which are relevant for two or more communities. Further, the findings were synthesized by differentiating competence development activities, competences itself and proposed consequences of the competences in each three community.

Many of the key competences identified appeared to be community-specific, but shared competences were also identified. The study identified competence needs shared by two or more communities in areas such as risk-taking, creativity, anticipation, flexibility, communication and overall management and holistic thinking. In addition, in relation to the green levers, the results identified competence needs in terms of product, solution and process optimization highlighting not only cost-effectiveness but also the functional specification fit for sustainability levers. These IO2 results will be used as a basis for designing the survey in IO3.

1. Intellectual Output 2: Qualitative Pre-study by conducting World Café Sessions and Expert Interviews

1.1 Introduction

This white paper reports the results of Intellectual Output 2 (IO2) of the PRECIUS project, including the main findings of the World Café workshops and expert interviews conducted during 2023. The focus of the project PRECIUS is stimulating the interaction between three communities: environmental engineers as a generator of sustainable innovations, public procurement officers in acquiring sustainable innovations from the market, and entrepreneurs and sales personnel of privately-held SMEs in selling sustainable solutions to public authorities. Consequently, *all three communities are represented in the empirical IO2 work package.*

This paper reports on the World Café sessions held and interviews conducted by the participants. The methods and the research questions for World Cafés and/or expert interviews are chosen to reflect and develop the results of the literature study of IO1 and collect additional remarks from the participants. The participants of the World Cafés and/or expert interviews will consist of experts and practitioners in the field of the three communities to discuss the competences needed in creating, buying and selling innovative sustainable solutions. The expert interviews provide a targeted deeper discussion of individual skills and organizational needs. The results of IO2 will be used in the design of IO3.

1.2 Background

In conclusion of IO1, the overlapping competences required across three communities: public procurement, environmental engineering, and the SME sector were found. These competences encompass a wide range of skills and qualities essential for individuals working in these fields to succeed and make a meaningful impact.

Regarding Sustainable Purchasing Supply Management (SPSM) competences, several authors proposed a classification according to social, meta, functional, and cognition-oriented competences (Schulze & Bals, 2020; Schulze et al., 2019; Schulze et al., 2022). The classification in the framework of IO1 was done based on the model by Le Deist & Winterton (2005). Based on the literature study, social-oriented competences found are related to interaction and the ability to experience and shape relationships, and these competences are necessary when interacting. In addition, meta-oriented competences recognized from the literature are on a personal level, which are competences between an individual and himself, such as dealing with uncertainty, reflection, and learning. Furthermore, functional-oriented competences identified are technical competences related to an occupational context, also called “know-how” skills. Moreover, cognition-oriented competences found are knowledge competences related to a conceptual and systematic way of thinking.

Social competences highlight the significance of effective communication, conflict management, teamwork, and customer focus. These competences enable professionals to build positive relationships, resolve conflicts, collaborate effectively, and meet the needs of their stakeholders. Additionally, resilience, empathy, inclusivity, and ethical behavior create a harmonious work environment and promote societal well-being.

Meta competences play a crucial role in personal and professional development. Creativity, problem-solving, self-awareness, self-reflection, and goal-setting enhance an individual's ability to think innovatively, adapt to new situations, and continuously grow. These competences foster a mindset of learning agility, enabling individuals to acquire new knowledge and skills in a rapidly evolving environment.

Functional competences encompass diverse skills related to analytics, technical expertise, data and systems management, project management, innovation, and leadership. These competences are essential for individuals working in public procurement, environmental engineering, and the SME sector to effectively carry out their responsibilities, manage resources, ensure compliance, and drive innovation.

Cognitive competences are critical for decision-making and strategic thinking. The ability to make informed decisions, think critically, manage risks, and employ systems thinking allows professionals to navigate complex challenges and identify opportunities for growth and improvement.

By recognizing and cultivating these necessary competences, individuals can enhance their professional capabilities and contribute effectively to their respective communities. Moreover, integrating social, meta, functional, and cognitive competences fosters a well-rounded and holistic approach to work, enabling individuals to excel in their roles and positively impact public procurement, environmental engineering, and the SME sector.

1.3 Research objective for IO2

Regarding the project plan, the objective of the empirical research during IO2 was to reflect and develop the results of the literature study of IO1. The aim of IO2 is also to provide the basis for future IOs, such as a survey (IO3), later the design of an online course (IO4) and finally the construction of the MOOC (IO5).

IO2 data were collected in two ways to increase understanding of the future skills and capability requirements of the PSM, particularly in the case of sustainable and innovative procurement. First, the World Cafés were organized to find out what competences participants identified as necessary to identify opportunities for innovative and sustainable solutions, to develop/buy/sell innovative and sustainable solutions, and to co-create solutions in cooperation with two other communities. The World Café also provided information on which of these identified competences the participants of each community collectively considered the most important. In addition, the expert interviews were conducted where necessary to deepen the understanding of these most essential ranked competences by exploring what these competences could mean in practice, especially from the perspective of sustainable procurement, and how interviewees thought such competences could be enhanced.

1.4 Research questions

To support the aim, the research questions were first formulated at a general level into three main themes, which were then further developed into community-specific questions. For the environmental engineering and SME communities, private customers were allowed to be considered if the respondent has no experience with public customers.

Research questions at the general level:

RQ1: What specific competences do you need to buy/develop/sell novel sustainable solutions?

RQ2: What specific competences do you need to identify novel sustainable technologies/solutions?

RQ3: What specific competences do you need to co-create novel sustainable solutions together with other communities?

We included green levers in the topics in the last two World Cafés in Table A (University of Twente and Kaunas University) to identify the levers and related competences relevant for sustainability even better. The research questions adapted to community-specific questions are presented in Chapter 2.2.

1.5 Structure of the white paper

After the introduction and presenting the research aims and questions, Sections 2 and 3 discuss the methodology, implementation of World Cafés and Expert Interviews, and results. Section 4 includes overall discussion, conclusions, some key managerial implications, and handover to later IOs.

2. World Cafés and expert interviews

2.1 Overview of the methodology

The IO2 data collection started in World Cafés, essentially following the "the Research World Café" method introduced by Schiele et al (2022) as a technique to accelerate data collection. This method of data collection was seen as a good way of combining the collection of ideas that develop through professional practitioners' interaction with an understanding of collective priorities.

First, it is important that the practitioners participating in the World Café session have sufficient understanding/experience of the phenomenon under study. In World Café sessions in general, discussions are first held at small group ("table") conversations, with a maximum of six people at each table (example in Figure 1). Participants rotate in discussion tables, with participants mixing during the rotation. In a World Café, each table has a moderator representing the research team, whose role is to ensure the process and encourage participants to contribute to the discussion, without contributing their own opinions. During the table sessions, all observations related to the research question are written down. Finally, the findings will be brought to the summary session, where participants will also vote on the findings, they consider most important (Schiele et al., 2022).

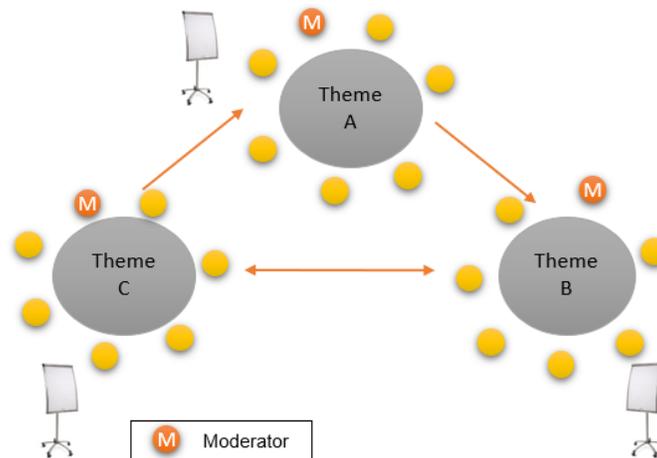


Figure 1. Example of World Café tables.

The PRECIUS World Cafés took place in February – September 2023. Five World Cafés were organized in total. All World Cafés have been conducted as physical sessions and no online participation was available. The duration of World Cafés was approximately 4 hours each. The samples represented the views of 43 public procurement professionals, 16 environmental engineering experts and 44 representatives of SMEs. All participants were selected based on their experience and ability to discuss the topic, and the topics of

table discussions followed the research questions adapted to the community. Table discussions were not recorded nor transcribed.

Next, the expert interviews were conducted to deepen the understanding of the competences identified as the most important by practitioners in the World Cafés. The interview questions were adapted for each community in a way that would build on previous data. The interviews were conducted as semi-structured theme interviews. In addition, interview frames were adapted to reflect the community and to complement the results of each community World Café. The total of 25 interviews were reported from Netherlands, Portugal and Finland. The duration of these interviews was 30-60min. The interviews were recorded and transcribed.

2.2 University specific methods

2.2.1. World Café and expert interviews on Public Procurement, Organized by Tampere University in Finland

First research World Café for public procurement professionals was organized in Tampere, Finland, in February 2023. In this World Café, there were 18 participants representing procurement experts, managers or directors with first-hand knowledge/experience of innovative and/or sustainable public procurement. Three moderators from the Tampere University operated the opening, table discussions and summary session. The topic of discussion at each table followed the research questions:

RQ1: What specific competences do you need to buy novel sustainable solutions?

RQ2: What specific competences do you need to identify novel sustainable technologies/solutions on the market?

RQ3: What specific competences do you need to co-create novel sustainable solutions together with suppliers and development engineers?

Finally, participants voted with stickers for the competences they considered most important for innovative and sustainable procurement. The duration of the World Café was 4 hours, including breaks.

Second, the expert interviews followed. Public procurement expert interviews were planned to explore what the most important competences identified in the World Café could mean in practice, especially from a sustainable procurement perspective, and how interviewees thought these competences could be improved. Participants were selected from the research world café participants based on their job descriptions, so that in-depth answers could be obtained for each theme of the research question (purposive sampling). A total of six interviews are reported, two for each theme, and the durations were 30-45min. All interviews were conducted via Teams. The interviews were recorded and manually corrected from automatic Teams transcriptions.

Interview themes

- Background of interviewee
- Theme “finding from the market” questions
 - How to develop these competences
 - clarifying questions

- Theme "procurement"
 - How to develop these competences
 - clarifying questions
 - a specific question on sustainability
 - A specific question(s) about procurement competences supporting circular economy
- Theme "co-creation"
 - How to develop these competences
 - clarifying questions

No specific content analysis was carried out on this interview data, but they were used to increase understanding of the phenomenon and to supplement the findings of the World Café. Finally, the results were summarized in a table to draw conclusions.

2.2.2. World Café on Environmental Engineering, Organized by University of Aveiro in Portugal

World Café:

University of Aveiro organized a World Café under the activity of project PRECIUS on Friday, the 31st of March 2023 at the department of Environment and Planning. 16 environmental engineering professionals attended the world café and played active roles in different rounds of discussion. The goal of the World Café was to connect environmental engineering professionals by exchanging experience and knowledge related to innovative competences. The PRECIUS Project team from the University of Aveiro operated opening, table discussions and summary session. The topic of discussion at each table followed one of the general level research questions. The World Café started with a brief introduction to competences and innovative sustainable solutions. Later, the team of Aveiro explained the World Café method, and a shared understanding of the process became apparent. Then, the team divided the participants into three tables for discussion. The questions on the tables were as follows:

- What do we need to invent sustainable solutions?
- What are the competences to co-create innovative sustainable solutions in the supply chain?
- Which competences are needed for innovative sustainable solutions for the public sector?

The moderators wrote the participant's responses on paper during the table discussions. After the three rounds of discussion among the participants, the voting round started, where each participant voted for the best answer to each question. Finally, the moderator shared the result, and the formal World Café was closed. The duration of the World Café was 4 hours, including breaks.

Expert's Interview:

As a second step, followed the expert interviews. Environmental engineers having some experience in the field of public procurement were interviewed to explore what the most important competences identified in the World Café, especially from a sustainable procurement perspective, and ways interviewees thought

these competences could be developed. Participants were selected from the research world café participants invitation list who were unable to join the World Café, based on their job descriptions, so that in-depth answers could be obtained for each theme of the research question. It is a method of purposive sampling. Five interviews were reported, and the durations were 40-60 minutes each. All interviews were conducted via Teams. The interviews were recorded and transcribed by using the software Happy Scribe. Then, the detail analysis was done manually.

Interview thematic questions:

OPTION 1: Under the theme “invent sustainable solutions”, we focused on what competences are needed for sustainable innovations among environmental engineers. The highest scores were for open mindedness and creativity.

- a. *How do these competences translate into practice? Can you identify examples where these competences have been successfully used to find innovative sustainable solutions in the organization?*
- b. *What benefits can be achieved with these competences? Are the benefits in some way related to sustainability or the circular economy?*
- c. *How can open-mindedness and creativity be developed in your organization? How can people be encouraged to procure innovative sustainable solutions? Can it be supported through provided training/education?*

2. Alternatives framed in circular economy(eco-design) also scored high.

- a. *How does this competence translate into practice? Can you identify examples where competence has been successfully used to find innovative sustainable solutions in the organization?*
- b. *What benefits can be achieved with this competence? Are the benefits in some way related to sustainability or the circular economy?*
- c. *How can eco-design related competences be developed? What does it require from individuals or organizations? Can it be supported through provided training/education?*

OPTION 2: Under the theme "innovative sustainable solutions for the public sector (BUY) ", we focused on what competences are needed to procure sustainable innovations.

3. The competences related to the Being part of the management team for ecological purchases, influencing the budget allocation scored the highest.

- a. *How do these competences translate into practice? Can you identify examples where these competences have been successfully applied in the procurement of innovative sustainable solutions?*
- b. *What benefits can be achieved through the use of these competences in the different procurement procedures? Are the benefits in some way related to sustainability or the circular economy?*

c. How can competences Being part of the management team for ecological purchases, influencing the budget allocation be developed? Can it be supported through provided training/education?

4. Marketing: Make known solutions, scored the next highest.

a. How do these competences translate into practice? Can you think of examples where this competence has been successfully used to procure innovative sustainable solutions?

b. What benefits can be achieved with these competences? Are the benefits in some way related to sustainability or the circular economy?

c. How can this competence be improved? Can it be supported through provided training/education?

5. Ability to change the mindsets of policy makers scored the next highest.

a. How does this competence translate into practice? Can you think of any examples where Ability to change the mindsets of policy makers has been successfully used to procure innovative sustainable solutions?

b. What benefits can be achieved with these competences? Are the benefits in some way related to sustainability or the circular economy?

c. How can this competence be developed? Can it be supported through provided training/education?

OPTION 3: Under the theme "co-create innovative sustainable solution ", we focused on what competences are needed to develop sustainable innovations together with providers/suppliers and buyers.

6. Critical thinking scored the highest.

a. How does this competence translate into practice? Can you think of examples where critical thinking has been successfully used to co-create innovative sustainable solutions?

b. What benefits can be achieved by being able to think critically? Are the benefits related in some way to sustainability or the circular economy?

c. How can this competence be developed? Can it be supported through provided training/education?

7. The next highest score was the versatility and flexibility

a. How does this competence translate into practice? Can you think of examples where versatility and flexibility has been successfully used in the co-creation of innovative sustainable solutions?

b. What benefits can be gained from the ability to manage the whole? Are the benefits related in some way to sustainability or the circular economy?

c. How can this competence be developed? Can it be supported through provided training/education?

8. Skills related to Strategic Vision also scored high.

a. How does this competence translate into practice in the context of co-development? Can you think of examples where Strategic Vision has been successfully used in the co-creation of innovative sustainable solutions?

b. What benefits can be achieved by these Strategic Vision related competences? Are the benefits in some way related to sustainability or the circular economy?

c. How can these Strategic Vision competences be developed? Can it be supported through provided training/education?

9. Communication and sharing of knowledge between companies also scored high.

a. How does this competence translate into practice in the context of co-creation? Can you think of examples where Sharing of knowledge between companies has been successfully used to co-create innovative and sustainable solutions?

b. What benefits can be achieved through this competence? Are the benefits in some way related to sustainability or the circular economy?

c. How can change management competences be developed? Can it be supported through provided training/education?

Specific content analysis was carried out on this interview data and was used to increase understanding of the phenomenon and to enhance the findings of the World Café. Finally, the results were summarized in a table to draw conclusions.

2.2.3. World Café on Environmental Engineering, Organized by Kaunas University of Technology in Lithuania

The World Café for environmental engineers was organized in Kaunas University of Technology (Kaunas, Lithuania) on 14th of September 2023. The World Café consisted of 31 participants and 3 moderators for each table. Participants represented SMEs, students, scientists, innovators, private business owners (IT and Artificial Intelligence). Prior to the World Café execution, an introduction on objectives, sustainable solutions, and questions for each of the 3 tables were presented and discussed. Each table was assigned to a specific question where participants had to rotate after each session and provide their responses. Duration for each session was 20 minutes. Questions were designed as follows:

Table A – How to systematically identify novel sustainable technologies/solutions to offer, which are both sustainable and cost saving? (green levers)

Table B - What specific competences do you need to sell novel sustainable solutions for *public customers?

Table C - What specific competences do you need to co-create novel sustainable solutions together with public customers and R&D engineers?

Finally, each participant was assigned to 10 votes and had to rate listed competences. The total duration of the World Café with final discussion on results was 3.5 hours.

2.2.4. World Café on SMEs, procurement professionals and interviews, Organized by University of Twente in the Netherlands

World Café on SMEs was organized on October 20th, 2022, with 13 participants. Interview themes for tables were as proposed in research questions in Chapter 1.4.

Table A was dealing with the question: "How do you identify the gap between the skills you have ("what is") and "should" have? And how do you do that in a team?". This question is related to the theme of personal knowledge. Table B reflected on the question related to the product knowledge theme "How do you identify new sustainable technologies?" Table C was asking question "How do you identify the experiences of fellow public purchasers with the co-development of sustainable solutions with companies or scientists?" Related to the theme of co-developing skills.

Second World Café with public procurement professionals (25) on the theme "How can governments purchase more sustainably" took place in Rotterdam on June 2nd, 2023, in cooperation with *Holland Inkoop Professionals* (HIP).

Table A was focusing on the question "What sustainability "levers" can governments implement to buy more sustainably?" The (semi) government has a constant need for innovative sustainable solutions from the business community. Desired outcomes should have address the insights on how governments can work on sustainability by: I. product improvements; II. Process improvements; III. Optimization of supplier relationships. Table B dealt with the question "What hard and soft skills do public buyers need to buy more sustainably?". Reasoning of this questions lays within the constant needs of government for innovative solutions from the business community. Desired outcomes of Table B should have provide information on what skills and knowledge fields does a buyer in the public domain need to identify and acquire sustainable innovations in the market. What are the "bottlenecks" in finding innovations from market participants, and what are successful examples of innovations in government, and with which skills did this become possible. Table C presented the question "Cross-functional collaboration – how can governments enter into partnerships with entrepreneurs in SMEs and with environmental scientists to purchase more sustainably?" The explanation of proposed question is again in a constant need of (semi) government need for innovative sustainable solutions devised by environmental scientists and implemented by the business community. The outcomes of Table C would provide answers on How can governments use their public procurement function to collaborate with environmental scientists and SMEs in order to ultimately arrive at sustainable cost-saving solutions.

Fourteen in-depth semi-structured interviews were conducted with representatives from SMEs in the Netherlands organized by the University of Twente. The interviews were conducted in Dutch and transcribed verbatim for analysis. After transcription, the Dutch interview transcripts were inductively coded and analyzed. Subsequently, the relevant quotes were translated into English for reporting and dissemination. Themes for the conducted interviews were:

- Barriers to SME Participation in Public Procurement;
- Attraction Factors for SME Participation in Public Procurement

3. Results by universities

3.1 Results on Public Procurement, by Tampere University (Finland)

In the World Café in Finland, participants identified a total of 114 different competences needed in relation to finding from the market (34), co-creation (47) and procurement (33). When voting on the most important competences, 85 competences scored points. The competences that received votes are presented in Attachment 1. Across all the themes, identified competences represented all Le Deist & Winterton (2005) competence categories: social, meta, functional and cognitive.

First, under the theme of finding from the market, the most important competences voted by the participants can all be classified as meta (3) competences. Second, in the procurement theme, the highest scored competences represented the cognitive (1), functional (1) and social (1) competence categories. Third, due to the equal scores, the five most scored competences were identified in the co-creation theme, divided into social (3) and cognitive (2) competences.

Based on a vote at the World Café, the most important competences identified in relation to innovative and sustainable procurement were further discussed with public procurement experts in the expert interviews. The interviewees gave examples of how this specific competence manifests itself in practice, why it is relevant and how they think it could be developed. The competences voted as most important, complemented by a selection of six interview data, are presented in the results below, in table 1.

The ways to develop the competences found from the World Café and presented in the Table 1 are most associated with practical experiences, real-life cases, learning by doing, collaboration and communication, strategic procurement management and project management. At the time of the World Café, green levers were not included in this sample, but interviewees were specifically asked whether some of the competences could be related to the circular economy or sustainability. Based on all the interviews, competences related to the circular economy, sustainability, and thus to sustainability levers can be linked to the topics:

- Ability to use recycled materials in infrastructure projects, supported and encouraged by management and through target setting
- Ability to identify and test new sustainable materials proactively for future infrastructure projects
- Ability to follow global sustainability development trends and proactively develop own actions in the same direction (e.g. reducing fossil fuels)
- Ability to allow possible future sustainability-oriented change needs during the contract period in the purchasing contracts
- Ability to encourage suppliers to propose more sustainable solutions
- Ability to identify and focus efforts on procurements relevant to the circular economy
- Ability to utilize the knowledge of circular economy experts

As use cases for the sustainability levers, interviewees mentioned:

- Distributing leased computers to students after the leasing period
- Extending the life of cleaning equipment through maintenance
- Food-related sustainability requirements for care unit

- Taking process cost into account in cost-effectiveness
- Reuse of material removed from one infrastructure site on another infrastructure site

In addition, interviewees mentioned the development of carbon neutrality indicators for procurements, biodiversity indicators, green deal targets, and procurement category specific environmental criteria, are topical sustainability areas which all also set new competence requirements for procurement. Moreover, interviewees pointed out that in the context of sustainable public procurement, training on cost structures, price formulation and especially measuring impact on a practical and concrete level would also be seen as useful. However, the question of how to monitor market developments beyond land borders was also raised.

Table 1. Interview results from the data collection of Tampere University for the highest ranked skills, complemented by examples and development methods.

Competence (world cafe results, most scored)	Theme in the World Café	Le Deist & Winterton 2005 competence category	Manifestations in an example context/situation	Justification for importance (and/or relevance for other community)	Ways to develop the competence
Courage and ability to take risks	Finding from the market	Meta	Systematic risk assessment for strategically important procurements before starting to prepare for tendering. The courage of the environment department to allow, for example, exceptions for the materials used can speed up or allow circular economy operations in projects.	New procedures or approaches can be developed to solve innovation or environmental challenges or problems.	Support and encouragement from management, also through target setting. Practical examples and experiences. Training in legal and financial knowledge.
Culture of experimentation	Finding from the market	Meta	An organization encourages ideas, experimentation and suggestions, and allows mistakes.	New things and good service providers can be found.	Mentoring by an enthusiastic innovator Transferring attitudes within the organization. Trainings use real-life cases
Ability to anticipate changes in the operating environment	Finding from the market	Meta	Environmental guidelines and specifications (e.g., new permitted materials) will be updated up front to be ready for future projects (new solutions can be searched for on the market). Market surveys and dialogues with stakeholders will be carried out to identify trends and new ideas, for example to exploit digitalization.	Obtaining environmental permits is a slow process and requires testing, which requires proactivity. Getting new ideas from the market into strategic planning	Participating in practical development workshops such as the Keino Academy Training on project management and current changes in legislation
Knowledge of different types of procurement procedures	Procurement	Cognitive	In the search for a new solution that is not already available, ability to identify the best procedure from the mix is needed and the application of, for	Knowledge of procurement procedures has a positive impact on the success of the	Targeted training, successful/failed case studies, practical exercises, simulations. Theory alone is not enough; you learn this by doing.

			example, a negotiation procedure, an innovation partnership or a design competition to the procurement.	procurement outcome. It is the outcome that matters, not the procedure.	
Ability to anticipate and document possible changes	Procurement	Functional	<p>We actively look for and watch for signs and interpret how things might change in the future. For example, trends such as fossil fuel reduction targets can be sensed even before they are set as actual targets for organizations.</p> <p>Long-term contracts must be able to account for possible future changes so that the supplier has the opportunity to upgrade to a newer technology or choose new greener options during the contract period.</p>	<p>The better we can anticipate the future, the easier it is to act. For example, recruitment can consider what kind of substantive skills may be needed in the future.</p> <p>Enabling change during the contract period supports organizations in achieving their objectives.</p>	<p>Training on the interpretation of weak signals</p> <p>By talking about innovation and eco-sustainability, it is slowly becoming an organizational activity.</p>
Ability to cooperate with suppliers during the contract period	Procurement	Social	Discussions will take place during the contract period on how to develop the activities. Allowing and even rewarding suppliers' suggestions for improvement during the contract period.	Contribute to the achievement of the organization's objectives.	<p>Practical guidance, the emphasis is on communication</p> <p>Training: supplier categorization and collaboration, legal/contract management, monitoring, reporting, data analysis and how to use data for management</p>
Ability to communicate the objective to the supplier	Co-creation	Social	<p>Communicating the objective, not just go for the solution.</p> <p>Formulating the objective in a way that is attractive to the supplier, but also reflects the city's intentions.</p>	An impact on the outcome, getting what you want and being able to implement the strategy.	Strengthening communication skills, service design skills and understanding of the co-creation process
Skills to manage the big picture	Co-creation	Cognitive	In promoting circular economy, the buyer needs to identify which are the strategic procurements, important from a circular economy point of view, and put effort into them.	Implementation of the municipal strategy and procurement strategy can be made possible through strategic management of procurement	<p>Developing skills in strategic procurement management through peer learning</p> <p>Strengthening project management skills</p>

			Project-based approach to co-creation, including a plan, a schedule and resources.		
Change management skills	Co-creation	Social	Change management skills are needed to identify co-creation as a new part of way of working. Ability to communicate why co-creation is strategically important and what it can achieve, support the adoption of the new approach, and consider whether any training is needed or what risks are associated.	Achieve the desired change	Learning change management by seeing how someone else does it, by example
Ability to build, manage and lead a network	Co-creation	Social	Someone in the network may know more about the circular economy or has done things differently. So you don't have to do it all from scratch.	A network will produce more if it has a clear mission and objectives.	Developing cooperation, communication and facilitation skills
Ability to understand the benefits and business logic of suppliers	Co-creation	Cognitive	The more customized the solution, the more it often costs. When co-developing a solution, it is good to understand how the supplier can scale the solution and sell it to others or even know whether each customization is needed.	When you understand what makes sense for the supplier, you can achieve savings. It helps you to think about what is worthwhile for the supplier and how to get them inspired.	Could be developed by training and maintaining skills in the "basics" of business.

3.2 Results on Environmental Engineering, by University of Aveiro (Portugal)

In the research World Café in Aveiro, Portugal, participants identified a total of 92 different competences from the Theme 1: What competences do we need to invent sustainable solutions (30), Theme 2: What are the main competences to co-create innovative sustainable solution in supply chain (34) and Theme 3: What are the competences needed for innovative sustainable solutions for the public sector (28). As an outcome of voting, 86 competences scored points, but 6 competences didn't score any. The competences that received votes are presented below.

Based on a vote at the World Café, the most important competences identified in relation to innovative and sustainable procurement were further discussed with environmental engineering experts in the expert's interviews. The interviewees gave examples of how this specific competence manifests itself in practice, why it is relevant and how they think it could be developed. The competences voted as most important, complemented by selected interview data, are presented in the results below.

Table 2. World Café results from the data collection of University of Aveiro.

	Theme 1: What competences do we need to invent sustainable solutions		Theme 2: What are the main competences to co-create innovative sustainable solution in supply chain		Theme 3: What are the competences needed for innovative sustainable solutions for the public sector (BUY)	
SN	Competence	Score	Competence	Score	Competence	Score
1	Open mind	14	Critical thinking/ analytical skills/ critical thought	14	Being part of the management team	16
2	Creativity	11	Versatility + Flexibility	13	Marketing: Make known solutions	13
3	Proposals and alternatives framed in circular economy and eco-design	11	Strategic/ Strategic Vision	11	Ability to change the mindsets of policy makers	12
4	Team building and teamwork	11	Sharing of knowledge between companies	10	Ability to work in a team	12
5	Strategic planning	11	Good communication	9	Ability to establish partnerships	12
6	Adaptability	10	Know-how	9	Be patient	11

7	Leadership	10	Versatility	9	Ability to add lifecycle analysis criteria to purchases	11
8	Time to think - Availability to think	10	Creativity	8	Flexibility	10
9	Be innovative, think outside the box, apply technical principles	9	Conflict management	7	Capacity to adapt	11
10	Ability (power) to argue and communicate	9	Knowledge of sustainable solutions in the market	7	Ethics and deontology in basic training	9
11	Overview (puzzle)	8	Problem-solving ability/ competency	6	Have decision-making power	8
12	Apply Life Cycle Analysis	7	Proactivity	6	Extended training for discussion of multiple criteria	8
13	Knowledge: strategic, organizational, target audience	7	Availability	6	Putting the environment in other engineering training	7
14	Good communication between all parties	7	Adaptability	6	Know the National Strategy for Ecological Purchasing	7
15	Focus	7	Disruption	6	To have credibility	7
16	Lead by example (leading by example)	6	Reliable/ Predictable	5	Knowledge and research in new materials	5
17	Persistent / resilient	6	Disciplinarity	5	Familiarization with collaborative platforms	5
18	Ability to communicate the future - advantages and disadvantages	5	Ability to communicate a farsighted vision	5	Ability to establish partnerships with SMEs and Industry	5
19	Competency of teaching (addressing subjects)	5	Leadership	5	Have holistic thinking (think in an integrated way)	5
20	Specialized knowledge (of product and processes)	5	Professional ethics and beyond	5	To have common sense	5
21	Partnerships with universities	3	Resilience/ Persistence	4	Ability to change specifications of public	5

					purchase criteria and terms	
22	Social skills (communication)	3	Common sense	4	Promote the dematerialization of processes and digital tools	3
23	Willingness to invest	4	Partnerships with universities	4	Knowledge of the organization to be able to know where to act to reduce costs	2
24	Investment in innovation and sustainability	4	Assertiveness	4	Knowing what the public sector is during basic training	2
25	Critical thinking and technical and market knowledge	4	Techniques/ Knowledge	4	Greater pronunciation ability to make criteria more flexible	2
26	Visibility in the media of environmental conditions	4	Teamwork skills	4	Financial management skills	0
27	Be self-taught	2	Organizational skills	3	IT knowledge	0
28	Stimulate in training/teaching the competences of autonomy, creativity, invention,	1	Planning	3	Ability to know the "world" of technological solutions	0
29	Ability to convince through communication	1	Aligning (knowing) Expectations	2		
30	Appreciation of innovation in all sectors	0	Knowledge of information and communication technologies	2		
31			Office 365 - Ability and skills to use internet-based	1		
32			Membership in O.E.	1		
33			Innovative life cycle analysis	0		
			The competencies of companies are the	0		

			competences of their workers			
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Table 3 below explains the competences as perceived from the interview.

Table 3. Interview results from the data collection of University of Aveiro, complemented by ways to develop.

Indicators in a situation	Justification for importance	Ways to develop the competences
An organization boosts ideas, experimentation and suggestions	Innovative measures are created.	Mentoring by passionate and visionary personnel Transferring attitudes within the organization using real-life incidents
Environmental guidelines and specifications (e.g., new permitted materials) will be updated up front to be ready for future projects.	Obtaining environmental permits is a slow process and requires testing, so requires proactivity.	Organizing and participating on practical development workshops Disseminating contemporary method of supply chain management
Discussions will take place during the contract period on how to develop the activities.	Contribute to the achievement of the organization's objectives.	Practical guidance, the emphasis to be on communication
Surveys and dialogues with Environmental engineers will be carried out to identify trends and ideas, modern technologies.	Perceiving noble ideas for strategic planning	Training on project management and current changes in legislation
Allowing and even rewarding costumers` suggestions for improvement	Motivation can trigger in wider acceptance of solution ideas	Training: the suppliers and consumers understanding can be achieved on common ground
When co-developing a solution, it is good to understand how the innovators can scale the solution and present it to others.	When you understand what makes sense for the suppliers and buyers, you can make difference	Could be developed by training and maintaining skills in the "basics" of design.

Discussion on process to develop the action plan. Allowing and even rewarding suppliers and consumers for improvement.	Contribute to the achievement of the sustainable objectives.	Practical guidance, the emphasis is on communication and the training to suppliers specially to make aware about the how to use data for management
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The ways to develop the competences presented in the Table above are mostly associated with practical experiences, real-life cases, learning by doing, collaboration and communication, strategic procurement management and project management.

3.3 Results on Environmental Engineering, by Kaunas University of Technology (Lithuania)

The World Café in Kaunas happened on 14th of September 2023 with 30 participants from SMEs, master's degree students from the Environmental engineering program, Artificial Intelligence program specialists, identified 33 competences. Table A – Green Levers identifies separate competences necessary for products and processes optimizations. A product optimization contains the following: market research and trends analysis, Life Cycle Assessment (LCA), collaboration and innovation, material substitution, energy efficiency and design optimization.

Table 4. Environmental engineers' competences necessary for product optimization.

Table #	Identified competences	Competences' description
Table A	Market Research and Trends Analysis	Analysis of market trends and emerging technologies in specific industry, with a focus on sustainability; identification of gaps in the market where sustainable products are needed or where existing solutions can be improved.
	Life Cycle Assessment	Application of LCA to assess the environmental impact of existing products and identify areas for improvement; comparison of existing product's life cycle to alternatives to determine if a sustainable change would be cost-effective in the long run.
	Collaboration and Innovation	Collaboration with suppliers, research institutions, and other companies to explore new materials and technologies; improvement of culture of innovation within organization to encourage employees to propose sustainable ideas.
	Material substitution	Investigation of alternative materials that are more sustainable, cost-effective, and readily available; analysis

		of possibilities to use recycled, bio-based, or renewable materials (Circular economy).
	Energy Efficiency and Design Optimization	Optimization of product design to reduce energy consumption during manufacturing, use, and disposal; implementation of energy-efficient components or systems to decrease operational costs.

Process optimization competences include energy & resource audit, lean & green manufacturing, automation & robotics, supply chain optimization, circular economy strategies, data analytics & Artificial Intelligence, employee training & engagement, regulatory compliance.

Table 5. Environmental engineers' competences necessary for process optimization.

Table #	Identified competences	Competences' description
Table A	Energy and resource audit	Audit of manufacturing or operational processes to identify areas where energy and resources can be conserved; identification of opportunities to reduce waste and improve resource efficiency.
	Lean and green manufacturing	Implementation of Lean Six Sigma (or similar) principles to streamline processes and eliminate waste; incorporation of green manufacturing practices to reduce environmental impact and costs simultaneously.
	Automation and robotics	Exploration of automation and robotics to enhance efficiency, reduce labor costs, and minimize errors in manufacturing; implementation of predictive maintenance to avoid costly breakdowns.
	Supply chain optimization	Optimization of supply chain to reduce transportation costs and emissions; work with suppliers that prioritize sustainability and can offer cost-effective, eco-friendly materials or parts of products.
	Circular economy strategies	Implementation of circular economy principles like product take-back programs and recycling initiatives; repurpose waste materials and by-products to create new revenue streams.
	Data analytics & AI	Application of data analytics and artificial intelligence to optimize processes, predict maintenance needs, and identify areas for improvement; leverage data to make informed decisions that can save costs.

	Employee training and engagement	Training and engagement of employees in sustainability initiatives to generate innovative cost-saving ideas from within an organization.
	Regulatory compliance	Continuous update on environmental regulations and incentives that can promote sustainability and offer cost-saving opportunities.

Also, participants stressed that in many cases, sustainable practices can lead to long-term cost savings through reduced resource consumption, enhanced efficiency, and improved brand reputation. A holistic approach that combines product and process optimization is often the most effective way to identify and implement such solutions.

When it came to prioritization of the above-mentioned suggestions, the participants agreed that for small and medium-sized enterprises (SMEs), it's essential to focus on sustainable and cost-saving solutions that are feasible and manageable given their resources and capabilities. Here is a prioritized list of the options from both the product and process optimization perspectives, with SMEs in mind:

Product Optimization:

- Market Research and Trends Analysis
- Energy Efficiency and Design Optimization
- Collaboration and Innovation
- Material Substitution
- Life Cycle Assessment (LCA)

Process Optimization:

- Energy and Resource Audit
- Lean and Green Manufacturing
- Employee Training and Engagement
- Automation and Robotics
- Data Analytics and AI
- Supply Chain Optimization
- Circular Economy Strategies
- Regulatory Compliance

Prioritizing these options was based on participants' experiences and expectations. They stressed that it is important to start with initiatives that offer the most significant cost savings and require the least upfront investment, gradually expanding into more comprehensive sustainability strategies.

Table B participants discussed what specific competences you need to sell novel sustainable solutions for public customers and identified 10 specific competences crucial for selling sustainable solutions for customers.

Table 6. Competences necessary for selling sustainable solutions.

Table #	Identified competences	Competences' description
Table B	Subject matter expertise	A deep understanding of sustainability, environmental issues, and the specific solutions offered is essential. A seller needs to be able to articulate the benefits and advantages of the solutions convincingly.
	Market knowledge	A seller should be informed about market trends, regulations, and government policies related to sustainability.
	Networking	Building and maintaining relationships with key stakeholders, such as government officials, procurement officers, and sustainability advocates, is crucial. Networking can open doors to potential customers and partners.
	Communication skills	The ability to communicate the value proposition of sustainable solutions clearly and persuasively is vital. This includes written and verbal communication, and the ability to tailor a message to different audiences.
	Proposal and Grant writing	Public customers often require detailed proposals or grant applications. Proficiency in writing compelling proposals and grant applications can significantly enhance chances of success.
	Financial acumen	Understand the financial aspects of sustainability projects, including cost-benefit analyses, return on investment (ROI), and funding mechanisms. Public customers often need to justify expenditure based on financial considerations.
	Project management	Ability to manage sustainability projects effectively, including planning, execution, and monitoring. This skill ensures that the solutions are implemented successfully and deliver the promised benefits.
	Regulatory compliance	Knowledge of environmental regulations, permitting processes, and compliance requirements is essential to navigate the regulatory landscape and ensure that the solutions meet legal standards.

	Negotiation skills	Negotiating contracts, pricing, and terms with public customers can be complex. Strong negotiation skills are crucial to reach mutually beneficial agreements.
	Problem-solving	Sustainability projects often encounter challenges and obstacles. Being adept at problem-solving and finding creative solutions is valuable in overcoming these hurdles and ensuring project success.

Additionally, adaptability, resilience, and a commitment to the values of sustainability are essential qualities for success in this field. Selling sustainable solutions to public customers often requires a long-term perspective and the ability to persevere in the face of challenges and changing circumstances.

When it came to define the importance of these competences, the participants agreed that they can vary depending on the specific context and the nature of the sustainable solutions which are on sale. However, in a general sense, they defined the five most important competences for selling novel sustainable solutions to public customers: subject matter expertise, communication skills, market knowledge, networking, and financial acumen. These competences are foundational and can greatly enhance an ability to sell sustainable solutions successfully to public customers. Depending on the specific situation and the complexity of the offerings, other competences from the list may become more important.

Table C discussed specific competences needed to co-create novel sustainable solutions together with public customers and R&D engineers. Co-creating novel sustainable solutions with public customers and R&D engineers involves a collaborative and multidisciplinary approach. Here are ten specific competences that were defined by the participants as crucial for successful co-creation in this context.

Table 7. Competences necessary for co-creation of sustainable solutions together with public customers and R&D engineers.

Table #	Identified competences	Competences' description
Table C	Interdisciplinary Collaboration	The ability to work effectively with a diverse team of professionals, including public sector stakeholders, engineers, scientists, and policymakers, is essential for integrating various perspectives into the solution.
	System thinking	Understanding the interconnectedness of various elements in a sustainability context is key. This competence allows to identify potential impacts and trade-offs across different parts of a system.
	Stakeholder engagement	Proficiency in engaging and involving all relevant stakeholders, including the public, in the co-creation process. This involves effective communication, active listening, and the ability to address diverse viewpoints.
	Design thinking	Applying design thinking methodologies to empathize with end-users, define problems, ideate solutions, prototype,

		and test iteratively. This approach fosters user-centered and innovative solutions.
	Sustainability science	A solid foundation in sustainability science, including knowledge of environmental, social, and economic sustainability principles, helps guide the development of holistic and effective solutions.
	Project management	Managing collaborative projects effectively, including setting goals, timelines, and deliverables, and ensuring that all stakeholders are aligned and working toward a common vision.
	Data analytics	The ability to analyze and interpret data is critical for evidence-based decision-making. Data analysis can inform the design and assessment of sustainable solutions.
	Regulatory compliance	Understanding the relevant regulatory frameworks and compliance requirements is important, especially when co-creating solutions in the public sector, which often involves adherence to legal standards.
	Communication and facilitation	Strong communication skills, including facilitation, presentation, and documentation, are necessary for conveying ideas, progress, and results to all stakeholders involved in the co-creation process.
	Conflict resolution	Proficiency in conflict resolution and negotiation is valuable when differing viewpoints or interests arise during the co-creation process. This skill can help maintain a collaborative and productive atmosphere.

These competences together enable a collaborative and effective approach to co-creating sustainable solutions with public customers and R&D engineers. They allow for the integration of diverse perspectives, the development of innovative solutions, and the alignment of efforts toward shared sustainability goals.

When it came to prioritizing the competences for co-creating novel sustainable solutions with public customers and R&D engineers the participants stressed several times that it depends on the specific context and project requirements. However, they agreed on five of the most important competences for successful co-creation in this context: interdisciplinary collaboration, stakeholder engagement, design thinking, system thinking, communication and facilitation.

These competences provide a strong foundation for successful co-creation by facilitating collaboration, ensuring stakeholder engagement, fostering innovation, and promoting effective communication—all of which are essential for developing novel sustainable solutions.

3.4 Results on Public Procurement and SMEs, by University of Twente (Netherlands)

The results of the World Café conducted with SMEs are summarized in the following Table , Table 9, Table 10 divided accordingly to the topics of Tables A, B and C. Table A focusing on the personal knowledge found at the forefront of the outcomes the unanimous recognition of the significance of Diverse Project Engagement and Creating a Safe Environment (both scoring 17). SMEs emphasized that by involving employees in a broad spectrum of projects, ranging from diverse industries to varied responsibilities, individuals could naturally identify gaps in their skillsets. Simultaneously, creating a safe environment where taking risks and making mistakes are not only tolerated but encouraged proved crucial. This atmosphere fosters an agile and fearless workforce, enabling continuous learning and skill improvement.

The strategy of Establishing "Intervision" and Feedback Sessions (score: 14) emerged as another prominent outcome. Internally, SMEs recognized the value of candid feedback sessions, or "intervision," as a means to self-assess skills and identify areas for improvement. Externally, benchmarking against industry standards was considered essential for ensuring that the company's skillset aligns with best practices, fostering competitiveness.

Furthermore, SMEs emphasized the importance of Creating Development Trajectories for Juniors (score: 14). This strategy involves structured mentorship programs and learning paths for junior team members. By investing in their growth, organizations not only nurture future leaders but also identify and bridge skills gaps more effectively. Innovative approaches also found their place in the discussion. Applying Other Working Methods Like Serious Games (score: 12) and Establishing Multi-disciplinary Project Groups (score: 12) were recognized as creative means to encourage skill development. Serious games make learning engaging and fun, while multi-disciplinary project groups expose individuals to diverse skills and perspectives, thus broadening their knowledge base.

Table 8. World Café on SMEs: Personal knowledge outcomes.

Table A - How do you identify the gap between the skills you have ("what is") and actually "should" have? And how do you do that in a team?	Score
<u>Theme: Personal knowledge</u>	
Focus on different projects; a variety of projects	17
Creating a safe environment (being able to make mistakes)	17
Establish "intervision", i.e., feedback sessions internally and benchmarking externally	14
Creating development trajectories for juniors	14
Apply other working methods like serious games	12
Establishing multi-disciplinary project groups	12
Applying self-reflection and coaching	10
Establishing assessment	5
Attending knowledge meetings	5
Keeping HR profiles up to date	3

Organizing team building at special (remote, non-luxury) locations	3
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As we delve into the outcomes of Table B focused on product knowledge (Table 9), each scored based on its perceived importance, it becomes evident that SMEs are not just adapting to change; they are actively shaping the future of sustainability. At the top of these outcomes is the resounding imperative that "A Purchaser Must Be Professionally Curious, Continuously" (Score: 18). This concept, rooted in the ceaseless pursuit of knowledge, emphasizes that those responsible for procurement must possess an unrelenting curiosity. It's this curiosity that propels them to explore uncharted territories, continually seeking new sustainable technologies to integrate into their supply chains.

To stay ahead in the sustainable technology race, SMEs underscore the importance of "Reading Practitioners and Trade Journals and Visiting Fairs" (Score: 14). Through these actions, SMEs are not just passive observers but active participants in the ever-evolving landscape of sustainable innovations. They recognize that to be at the forefront, one must immerse oneself in the wealth of knowledge and networking opportunities that trade journals and industry fairs provide.

Breaking free from the constraints of organizational "silos" is another standout outcome (Score: 13). SMEs encourage "Breaking 'Silo' Thinking and Searching within Other Departments". This strategy compels organizations to connect similar internal business partners and gather insights from different sectors, even venturing to "Visit Competitors and Colleagues". The key here is to break down boundaries, harnessing collective wisdom to uncover sustainable technologies that might remain concealed within traditional departmental confines. The practice of "Performing Market Consultation" (Score: 12) emerged as a vital component of the sustainable technology pursuit. By engaging with stakeholders, SMEs access external knowledge and gain insights that guide them toward sustainable solutions aligned with market needs and expectations.

Table 9. World Café on SMEs: product knowledge outcomes.

Table B - How do you identify new sustainable technologies?	Score
<u>Theme: Product knowledge</u>	
A purchaser must be professionally curious, continuously	18
Read practitioners and trade journals and visit fairs	14
Break "silo" thinking and search within other departments in the organization, combine similar internal business partners and bring insights from different sectors together (visit competitors and colleagues)	13
Perform market consultation	12
Connect with research universities and universities of applied sciences	11
Realize that the knowledge lies outside yourself	10
Regard procurement as "reversed marketing"	10
Purchasers must have a vulnerable attitude to identify new sustainable tech	8
Connect with investment companies	7
Perform stakeholder analysis	5
Take part in LinkedIn group posts	5

Try to find partners for collective objectives	4
Visit competitors and colleagues in the same sector	4

At the forefront of outcomes from Table C dealing with the co-developing skills (Table 10) is a resounding call for "Increasing Knowledge Exchange and Assurance" (Score: 18). Recognizing the impending generational shift in the workforce, SMEs stressed the importance of involving more younger purchasers in decision-making units. This strategy fosters a dynamic knowledge exchange that not only taps into the energy and fresh perspectives of the younger generation but also ensures continuity in sustainable solution co-development. A provocative assertion that a "Purchaser Does Not Need Substantive Knowledge of the Products or Services Purchased" (Score: 14) challenges conventional wisdom. SMEs suggest that while expertise is valuable, a purchaser's role should encompass a broader skill set, including the ability to facilitate collaboration, negotiate effectively, and communicate clearly. This perspective opens the door to a more inclusive approach to co-development.

The significance of "Keeping an Eye on the Regional Tender Calendar" (Score: 13) cannot be overstated. SMEs recognize that staying informed about tender opportunities through sector organizations and social media channels, as well as nurturing collegial networks, is essential. This practice allows them to proactively identify opportunities for collaboration in the co-development of sustainable solutions. Balancing expertise with collaboration is a recurring theme. SMEs propose that a purchaser should entertain a "Dialogue with the Internal Business Partner" (Score: 11) while also possessing a certain degree of substantive knowledge about the products or services being procured. This duality ensures effective communication and synergy in co-development efforts.

Active participation in "Sector Dialogues" (Score: 10) is another strategy advocated by SMEs. These dialogues provide a platform for stakeholders to collaboratively shape the future of sustainable solutions. This collective effort can lead to the emergence of innovative ideas and strategies that benefit both public purchasers and SMEs. Emphasizing the importance of role clarity, SMEs assert that "Purchasers Must Realize They Do Not Have the Same Role as the Internal Business Partner" (Score: 10). This recognition avoids potential conflicts of interest and promotes a healthy division of responsibilities in the co-development process.

Interestingly, it was also noted that "Public Procurement Deviates from Private Purchasing" (Score: 4). SMEs pointed out that experiences can be more readily shared in public procurement due to its collaborative nature. This distinction highlights the unique opportunities for knowledge exchange and skill development in the public sector.

Table 10. World Café on SMEs: Co-developing skills outcomes.

Table C - How do you identify the experiences of fellow public purchasers with the co-development of sustainable solutions with companies or scientists?	Score
<u>Theme: Co-developing skills</u>	
Increase the knowledge exchange and assurance. Due to the ageing workforce, a larger number of younger purchasers should participate in decision-making units.	18
A purchaser does not need substantive knowledge of the products or services purchased.	14

Keep an eye on the regional tender calendar, e.g., of sector organisations (VNG), CoBouw); social media, and collegial networks.	13
A purchaser entertains a dialogue with the internal business partner and must have a certain degree of substantive knowledge of the products or services purchased.	11
Participation in sector dialogue	10
Purchasers must realize they do not have the same role as the internal business partner	10
Public procurement deviates from private purchasing. In public procurement experiences easily can be shared.	4

The results of conducted World Café with public procurement professionals, focused on the theme of how governments can purchase more sustainably are presented in the following section.

Table 11. World Café on public procurement specialists: Sustainability levers outcomes.

Table A - What sustainability "levers" can governments implement to buy more sustainably?		Score
1)	Functional specification with sustainability as a precondition and awarding on sustainability	22
2)	From the R-ladder the points R0 to R5 (R0 refuse, R1 rethink, R2 reduce, R4 reuse, R5 repair) in award criteria and assign weight and value to them	15
3)	Applying innovation partnerships more often	13
4)	Enforce cooperation between suppliers (e.g. in transport	11
5)	Managing KPIs, drawing up in collaboration	10
6)	Longer-term contracts with favorable conditions for the supplier	5
7)	Entering a partnership with parties that have already progressed with sustainability	0
8)	Looking at what you can do with already purchased products	0
9)	Monitoring compliance with agreements	0
10)	Database of solutions	0

Table A which was focused on sustainability levers outcomes (Table 11). At the core of these outcomes is a resounding call for "Functional Specification with Sustainability as a Precondition and Awarding on Sustainability" (Score: 22). This was the highest-scoring strategy, underscoring its paramount importance. Public procurement professionals recognized that by making sustainability an essential criterion from the outset, governments can drive suppliers to prioritize eco-friendly practices. The act of awarding contracts based on sustainability performance holds the potential to reshape entire industries toward more sustainable solutions.

The sustainability journey, as represented by the R-ladder, emerged as a valuable tool (Score: 15). Professionals suggested integrating "Points R0 to R5 (R0 Refuse, R1 Rethink, R2 Reduce, R4 Reuse, R5 Repair)" into award criteria, assigning weights and values to them. This approach promotes the adoption of circular economy principles, ensuring that products and services are designed with sustainability in mind, from inception to disposal. Applying innovation partnerships more often (Score: 13) was another noteworthy outcome. The importance of fostering innovation through collaboration with external partners was emphasized. Governments can harness the creative potential of the private sector and academia to drive sustainable solutions.

To enhance sustainability further, the enforcement of cooperation between suppliers (Score: 11) was proposed. This encourages collaboration, particularly in sectors like transport, to reduce emissions and improve overall sustainability performance. The management of Key Performance Indicators (KPIs), drawn up in collaboration (Score: 10), emerged as a fundamental practice. Public procurement professionals recognized the importance of setting clear sustainability metrics and working collaboratively with suppliers to achieve mutual sustainability objectives.

Table 12. World Café on public procurement specialists: Hard- and soft-skills for sustainability outcomes.

Table B - What hard and soft skills do public buyers need to buy more sustainably?		Score
Soft skills		
1)	Daring (collaborating with suppliers), taking risks and being enterprising	26
2)	Out-of-the-box, creative, open-minded	19
3)	Connecting and organization-sensitive	12
4)	Result and purpose	6
5)	Proactive, cooperative and initiative-oriented	4
Hard skills		
1)	Knowledge of the CSR manifesto (Manifesto Socially Responsible Commissioning and Purchasing)	17
2)	Knowledge of the specific market	15
3)	Knowledge of laws and regulations	8
4)	Be able to benchmark your own organization	7
5)	Sustainability policy (own organization)	4
6)	SDG knowledge	2

At the forefront of the outcomes from Table B discussing the importance of soft- and hard-skills for buying in a more sustainable way (Table 12) is a resounding call for "Daring, taking risks and being enterprising" (Score: 26). This tops the list among soft skills, emphasizing the need for public buyers to be courageous

in collaborating with suppliers, taking calculated risks, and fostering an enterprising spirit. The world of sustainability often requires bold initiatives and innovative partnerships, and daring individuals are the trailblazers of this transformation. On the second place is the imperative for public buyers to be "Out-of-the-Box, Creative, and Open-Minded" (Score: 19). Sustainability challenges are often multifaceted, requiring creative solutions that transcend conventional boundaries. Open-mindedness and creative thinking are essential for envisioning novel ways to procure sustainably. "Connecting and Organization-Sensitive" (Score: 12) also emerges as a key soft skill. Public buyers must navigate complex organizational structures and build bridges between stakeholders with differing priorities. Being organization-sensitive fosters smoother collaboration and ensures sustainability objectives align with broader goals.

In the realm of hard skills, familiarity with the "CSR Manifesto" (Score: 17) was deemed essential. This knowledge forms the foundation for ethically responsible procurement, ensuring that public buyers adhere to socially responsible principles in their procurement processes. A deep understanding of the "Specific Market" (Score: 15) is equally crucial. Public buyers need to be well-versed in the nuances of the market they operate in to make informed decisions that drive sustainability. This knowledge allows for the identification of sustainable suppliers and practices. Knowledge of "Laws and Regulations" (Score: 8) also ranks high among hard skills. Compliance with legal frameworks is fundamental to sustainable procurement. Public buyers must be well-informed about the legal obligations that govern their procurement activities. Beyond the essentials, the ability to "Benchmark Your Own Organization" (Score: 7) emerged as another vital hard skill. By measuring their organization's sustainability performance against industry standards and best practices, public buyers can identify areas for improvement and drive progress.

While not as highly prioritized, familiarity with "Sustainability Policy" (Score: 4) within their organization is still important. It ensures alignment with the overarching sustainability goals and objectives of their entity.

Table C on the World Café with public procurement professionals which was dealing with Cross-functional collaboration how can market participants purchase more sustainably (Table 13) came with the outcomes led with the resounding call for "Opening Up Data and Knowledge Sharing to the Entire Market" (Score: 25). Public procurement professionals emphasized the need for governments to create platforms where data and knowledge are openly shared between public entities (VNG and Government), suppliers, and environmental scientists. This knowledge network platform facilitates collaboration and ensures that the entire market is well-informed and engaged in sustainable procurement practices. The symbiotic relationship between government and SMEs, fueled by shared insights, fosters innovation and sustainability.

Following closely, the imperative for "More Innovation Partnerships" (Score: 18) emerged as a transformative strategy in cross-functional collaboration. Public procurement professionals recognized the value of establishing joint ventures with SMEs and universities. These partnerships are incubators of innovative solutions and drive sustainability through collaborative research and development efforts. "Reimbursement of Tender Costs Facilitated by the Client" (Score: 17) was deemed an important enabler of sustainability. By facilitating the reimbursement of tender costs, governments incentivize

environmental experts and SMEs to participate in sustainability-focused procurement processes. This approach not only encourages competition but also ensures that expertise is valued and accessible. As a key to sustainable procurement cross-functional collaboration is the "Lowering of Thresholds for More Sustainable Solutions" (Score: 16). By streamlining and expediting procurement processes, governments make it easier for suppliers to propose and implement sustainable solutions. Shorter processes reduce barriers to entry for SMEs and other innovative suppliers, fostering a more agile and sustainable procurement ecosystem.

The idea of forming "Buyer Groups" (Score: 8) to engage in G-consultation on Corporate Social Responsibility (CSR) themes, as outlined in the Manifesto Socially Responsible Commissioning and Purchasing, gained traction. These groups provide a collaborative platform for buyers to share insights and best practices, ensuring that sustainability remains at the forefront of procurement decisions.

Table 13. World Café on public procurement specialists: Cross-functional collaboration outcomes.

Table C - Cross-functional collaboration - how can governments enter into partnerships with entrepreneurs in SMEs and with environmental scientists to purchase more sustainably?		Score
1)	Opening up (sharing) data (tool) to the entire market (knowledge network platform) --> VNG, Government, and suppliers // Using each other's knowledge (government and SMEs)	25
2)	More innovation partnerships (setting up joint ventures with SMEs and universities)	18
3)	Reimbursement of tender costs (high sustainability requirements) (environmental experts) facilitated by the client	17
4)	Lowering the threshold for more sustainable solutions (shorter processes)	16
5)	Buyer-groups --> G-consultation on CSR themes (Manifesto Socially Responsible Commissioning and Purchasing)	8
6)	Clear, unambiguous policy within universities	1
7)	Accountability and awareness of sustainability among suppliers and government / Preferred supplier (score on SDG > sustainability)	0
8)	Regionally active, consultation with SMEs on sustainability	0
9)	More World Cafés, conferences, sessions and discussions	0

Regarding the results of interviews with SMEs, while interviewing about the topic "Barriers to SME Participation in Public Procurement", bureaucracy was the most frequently mentioned barrier by the SME representatives. Unlike the relatively straightforward bidding process in the private sector, public procurement procedures can be overwhelming for smaller companies:

“But the biggest bottleneck lies in describing those documents. That is truly the most significant problem for companies like ours. It is much work.” [Design Company 1].

Although only sometimes mentioned, representatives still perceived large contract sizes as barriers to participation in public procurement tenders.

“The problem is, when you take on such a project, you must give up other things. And those might be things that could be much more lucrative” [Design Company 2].

Other significant barriers the SMEs' representatives mentioned were unfair bidding process practices and an excessive focus on price.

“There are companies widely known in the market, called “bidding pirates”. They know exactly how to tender” [Clothing Company 1].

“The problem with bidding is often that you submit with ten parties, and they only look at the bottom right corner of the Excel sheet to see the bidding price, and the three cheapest ones get called for an interview” [Cleaning Company 1].

While asking about the topic of "Attraction Factors for SME Participation in Public Procurement", the most compelling attraction factor for SMEs to participate in public procurement is the stable revenue stream from securing a public contract.

“The advantage of the public sector is that it is a constant and is not dependent on the economy. It's not like an educational institution receives fewer budgets in a bad economy or suddenly must be more careful with spending. They are less affected by that” [Design Company 2].

Long-term contracts serve as another attraction factor for SMEs. By securing contracts with government entities, SMEs can count on a continuous flow of work and revenue, creating a stable financial environment.

Q: “However, initially, you focused on tenders instead of commercial companies. How did that happen?”

R: “Well, ultimately, because of having a fixed source of income for four years. Well, it's not always fixed for four years, but usually, it works out that way” [Marketing Company 1].

Clear expectations are the final attraction factor the results show that could attract SMEs to public procurement. The public sector's requirements, guidelines, and processes are well-defined and transparent.

“Of course, it can be tiring at times, but everything, the whole process, is completely framed. In the end, there's a plan. A hundred persons have looked at it” [Contractor 1].

A simplified view of the main barriers and attraction factors experienced by the representatives of the SMEs is displayed in Table 14. Several barriers were identified, including bureaucracy, unfair practices, an excessive focus on price, and extensive contract sizes. The identified attraction factors were stable revenue streams, long-term contracts and clearly defined expectations. Conclusively, SMEs have a

declining interest in public procurement tenders due to the financial risk attached to a public tender. Due to the bureaucracy, many resources must be invested in the preparations, the preliminary reports, and the presentations. The odds, however, of winning a tender offer are reduced due to unfair competition and an excessive focus on price. On the other hand, winning the contract does provide grounds for a long-term, well-established business relationship with a public organization.

Table 14. Barriers and Attraction factors perceived by SMEs: Outcomes of conducted interviews.

Barriers	n	Attraction factors	n
Bureaucracy	10 (71%)	Stable revenue stream	6 (43%)
Unfair practices	6 (43%)	Long-term contracts	3 (21%)
Excessive focus on price	6 (43%)	Clear expectations	2 (14%)
Large contract size	3 (21%)		

To increase the attractiveness of public procurement tenders for SMEs, it is essential that the administrative burden is reduced, that unfair practices are eliminated, and that the bidding process focuses less on price. Reducing these barriers will allow SMEs to recognize the attraction factors that public procurement offers. This will allow for a more inclusive procurement landscape where SMEs could help solve some challenges facing public organizations.

4. Discussion and conclusions

4.1 Discussion and conclusions

Table 15 presents competences which resemble each other in different groups of experts involved in this study. It can be seen that procurement and environmental engineering especially have some similar competence requirements such as risk taking and creativity. Communication and stakeholder management related skills seem to be required from all the studied communities, in line with the findings of the literature study in IO1. Many of the similar competences relate to meta competences or social competences whereas cognitive and functional competences are often community specific (Le Deist and Winterton, 2005). One of the main observations is that most of the identified competences are different for different communities. It should be noted that even if the competences may be similar, they can still serve different purposes and objectives among different experts. Furthermore, the ways of developing the competences may be different.

Table 15. Similar competences in two or more communities.

Competence description	Identified in communities
Ability to take risks and support experimentation	Procurement, Environmental engineering
Creative mindset	Procurement, Environmental engineering

Anticipation of changes, flexibility	Procurement, Environmental engineering
Change management skills	Procurement, Environmental engineering
Communication skills	Procurement, Sales, Environmental engineering
Stakeholder management skills	Procurement, Sales, Environmental engineering
Ability to understand the big picture of creating value, systems thinking	Procurement, Environmental engineering

In relation to the green levers, the results identify common knowledge needs from the perspective of both public procurement and SME communities, both in terms of product/solution optimization and process optimization. The design of a product or solution must meet not only the requirement for a cost-effective solution, but also that the functional specification must meet the sustainability levers. On the other hand, the designing or optimization of product or solution requires collaboration and innovation competences, or even innovation partnership skills, which is similar to the other results. In addition, the buyer and supplier can jointly review previously purchased products or solutions, audit related processes and, through process optimization, aim for optimal and sustainable use of energy or other resources. The knowledge related to solution specification or process is context-specific, but the optimization competence related to sustainability emerges as a new functional competence in addition to the common competence needs identified above, when looking competences through the green levers. Possible ways of developing optimization competences were not explored in the interviews.

4.2 Managerial implications

Managers can use the results for example by first examining what is their target in competence development. The world café table themes specified various activities which are relevant in creating sustainable innovations. Many of these activities are connected between different communities although the perspective is different. For example, the identification of novel technologies and solutions and co-creating solutions between at least two actors such as buyer and seller. By selecting the most relevant activities, managers can identify the most essential competences for them both generally and for different actors.

The results also give insights on how to develop the identified competences. This is crucial in planning the best possible approach for specific organizations and purposes. For example, competences may be developed through learning, building and acquiring (Momeni et al., 2023). The most cost-effective way to develop competence needs to be defined for each identified competence and community. According to the results, it is clear that many of the competences can be developed at the workplace without formal training, for example through workshop sessions or mentoring. However, many of the identified competences can also be improved through formal training. For example, sharing of experiences of good cases seems to be an example to train professionals in this area.

4.3 Handover to IO3, IO4 and IO5

The following tables overview the results with the idea that competences can be developed with different means and at the same time they can have somewhat different implications of innovative and sustainable solutions. The tables are built upon findings from world cafes and interviews conducted at different communities involved in the project. The three first tables cover competences in general in the three different communities of the project. The fourth table summarizes main observations regarding green levers. If the data did not cover certain aspect of the tables, abbreviation N.A. is used. Such open cell may be regarded as an area for future research. Future research could also test some selected connections between competence training, competence and its consequences. For the IO3 the suggested idea is to include at least those competencies which overlap two or more communities (as presented in Table 15). For the final aim of PRECIUS project, those competences which can be developed through training and education activities are potential to be considered in the planned MOOC (IO4, IO5). Table 16 overviews the results regarding procurement competences which were presented in the University of Tampere (world café, interviews) and University of Twente (procurement world café tables B, C) research.

Table 16. Procurement competences in creating sustainable innovations.

Competence development	Competence description	Potential consequences
Management support Case examples for comparison Legal and financial training	Courage and ability to take risks to identify solutions from the market	Environmental and innovative solutions
N.A.	Capability to take risks and being entrepreneurial	Getting novel sustainable solutions
N.A.	Out-of-the-box thinking, being creative and open minded	Getting novel sustainable solutions
Innovation mentoring Real life cases for training Building supportive attitude across the organization	Experimental culture to identify solutions from the market	Innovative solutions and capable suppliers identified
Practical development workshops with stakeholders Project management and legislation training	Ability to anticipate changes in the operational environment to identify solutions from the market	Environmental compliance New ideas for utilizing technology
N.A.	Knowledge of the supplier market	Making procurement decisions supporting sustainability
N.A.	Ability to connect and to be organization-sensitive	Building bridges between stakeholders with different priorities and aligning goals
N.A.	Ability to benchmark own organization	Identification of areas for improvement in sustainable procurement
Success and failure cases Practical exercises, learning by doing	Knowledge of procurement procedure types	Expected procurement targets are met.

Simulations		
N.A.	Ability to set up innovation partnerships	Getting innovative solutions through collaborative research and development
N.A.	Knowledge of the CSR manifesto	Compliance to sustainability goals
N.A.	Knowledge of laws and regulations	Compliance to legislation
Training on interpreting weak signals Talking about innovations and environmental issues in the organization	Ability to anticipate and document possible changes in procurement	Organization achieves its objectives better Flexibility to upgrade to a newer technology during the contract
N.A.	Ability to share data with suppliers via network platform	Ensuring that the whole market is well-informed and engaged in sustainable procurement
N.A.	Ability to reduce the barriers for entry of innovative SMEs	Get more innovative suppliers involved
Training on supplier categorization and collaboration, legal/contract management, monitoring, reporting, data analysis and how to use data for management	Ability to cooperate with suppliers during the contract period	Organization achieves its objectives better
Strengthening communication skills, service design skills and understanding of the co-creation process	Ability to communicate the objective to the supplier	Expected procurement targets are met
Developing skills in strategic procurement management and project management Peer learning	Skills to manage the big picture in value co-creation	Implementation of organizational strategic objectives, such as circular economy
Learning from successful change management cases	Change management in value co-creation	Implementing a change related to a new innovation
Development of cooperation and communication skills	Network management in value co-creation	Clear objectives for the network Learning from others in the network
Training the basics of business	Understanding of the business logic of suppliers	Getting the best solution from the suppliers

Table 17 overviews sales competences which were found in the research conducted by University of Twente (world café on SME competencies) and Kaunas University (world café table B).

Table 17. Sales competences relevant for sustainable innovations.

Competence development	Competence description	Potential consequences
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N.A.	Sustainability subject matter expertise	Articulation of benefits and advantages of solutions
N.A.	Communication skills	Communication of value proposition of sustainable solutions
N.A.	Market knowledge	Understanding of market trends, regulations and policies
N.A.	Networking with key stakeholders	Open doors to potential customers and partners
	Financial acumen, understanding of financial aspects of sustainability projects	Support public customers in justifying expenditure of sustainable solutions
Creation of safe environment allowing mistakes Internal feedback sessions Development trajectories for juniors	Personal knowledge	N.A.
Participation in a broad spectrum of projects	Personal knowledge	N.A.
Reading of practitioners and trade journals and visiting in fairs	Product knowledge	N.A.
Cross-functional collaboration and interaction	Product knowledge, sustainable technologies	N.A.
Customer market consultation	Product knowledge	N.A.
Keeping track of regional tender calendar	Co-development skills	N.A.
Participation to sector dialogues	Co-development skills	N.A.

Table 18 summarizes the identified environmental engineering competences based on the research by Aveiro University (world café, interviews) and Kaunas University (World café table C).

Table 18. Environmental engineering competences in creating sustainable innovations.

Competence development	Competence description	Potential consequences
N.A.	Open mind	Inventing sustainable solutions
N.A.	Creativity	Inventing sustainable solutions
N.A.	Ability to frame proposals in circular economy and eco-design	Inventing sustainable solutions

N.A.	Critical thinking	Co-creation of solutions
N.A.	Versatility and flexibility	Co-creation of solutions
N.A.	Strategic vision	Co-creation of solutions
N.A.	Interdisciplinary collaboration including a diverse team of professionals	Co-creation of solutions, integrating various perspectives into the solution
N.A.	Stakeholder engagement including effective communication, active listening and ability to address diverse viewpoints	Co-creation of solutions
N.A.	Design thinking methodologies	Co-creation of user-centered and innovative solutions
N.A.	System thinking including understanding of the interconnectedness of various elements in a sustainability context.	Co-creation of solutions taking into account the potential impacts and tradeoffs across different parts of a system
N.A.	Communication and facilitation	Conveying ideas, progress, and results to all stakeholders involved in the co-creation process
N.A.	Participation in management team	Facilitation of public customers in understanding the value of sustainable innovation
N.A.	Marketing known solutions	Facilitation of public customers in understanding the value of sustainable innovation
N.A.	Ability to change the mindsets of policy makers	Facilitation of public customers in understanding the value of sustainable innovation
Mentoring Transferring attitudes by using real-life incident	Organizational ability to boost ideas, experimentation and suggestions	Creation of innovative measures
Development workshops Dissemination contemporary methods	Ability to update environmental guidelines and specifications	More proactivity in getting environmental permits
Practical guidance	Ability to discuss during the contract period on developing activities	Achievement of organizational objectives

Training for common understanding between suppliers and consumers	Ability to motivate consumer suggestions for improvement	Wider acceptance of solution ideas
Training and maintaining skills in the "basics" of design.	Ability to scale solution and to present it to others in co-development.	Making common understanding of value creation
Practical guidance, the emphasis is on communication and the training to suppliers	Ability to reward for improvement.	Achieving of sustainable objectives.

The results on the topic of sustainability included the concept of green levers. However, as the findings do not always explicitly specify the levers they are presented at more general level. Anyways, the findings give insights on the requirements for covering sustainability issues in buyer-supplier relationships. Results summarized in Table 19 include findings from green lever world café table results by University of Twente and Kaunas University.

Table 19. Essential buyer-supplier activities for sustainability outcomes.

Identified green lever related activity	Purpose/potential outcome
Sustainability as a Precondition and Awarding on Sustainability	Getting more sustainable solutions through better contracts
Integrating Points R0 to R5 into award criteria by assigning weights and values to them	Adoption of circular economy principles in procurement award criteria
Implementation of innovation partnerships	Procurement approach for driving sustainable innovations by suppliers
Market research and emerging technology trend analysis. For example, ability to follow global sustainability development trends and proactively develop own actions in the same direction	Product optimization
Energy Efficiency and Design Optimization	Product optimization
Collaboration and innovation with key stakeholders, for example ability to utilize the knowledge of circular economy experts.	Product optimization
Energy and Resource Audit of manufacturing or operational processes	Production process optimization
Lean and Green Manufacturing for streamlining the process	Production process optimization
Employee Training and Engagement to sustainability initiatives	Production process optimization

In the future work in PRECIUS project, the green lever results can be used to complement the original research plan in IO3 survey (testing selected parts of IO2 results) where green levers can be seen as activities supported by the identified competences of the three communities. Furthermore, the proposed outcomes of the activities in the form of innovations may be included in the future research considerations.

References

Le Deist, F. D., & Winterton, J. (2005). What Is Competence? Human Resource Development International, 8(1), 27-46. <https://doi.org/10.1080/1367886042000338227>

Momeni, K., Raddats, C., Martinsuo, M., 2023. Mechanisms for developing operational capabilities in digital servitization. International Journal of Operations & Production Management 43, 101–127. <https://doi.org/10.1108/IJOPM-04-2022-0259>

Schiele, H., Krummacker, S., Hoffmann, P. & Kowalski, R. (2022). The “research world café” as method of scientific enquiry: Combining rigor with relevance and speed. Journal of Business Research, 140(1), 280-296. <https://doi.org/10.1016/j.jbusres.2021.10.075>

Schulze, H., & Bals, L. (2020). Implementing sustainable purchasing and supply management (SPSM): A Delphi study on competences needed by purchasing and supply management (PSM) professionals. Journal of Purchasing and Supply Management, 26(4), 100625.

Schulze, H., Bals, L., & Johnsen, T. E. (2019). Individual competences for sustainable purchasing and supply management (SPSM). International Journal of Physical Distribution & Logistics Management, 49(3), 287-304. <https://doi.org/10.1108/IJPDLM01-2018-0036>

Schulze, H., Bals, L., & Warwick, J. (2022). A sustainable sourcing competence model for purchasing and supply management professionals. Operations Management Research, 15(3), 1418-1444. <https://doi.org/10.1007/s12063-022-00256-w>

Attachment 1

The World Café results / Tampere University

Theme A - "finding from the market"		Theme B - "Co-creation"		Theme C - "Procurement"	
Score		Score		Score	
15	courage and ability to take risks	15	ability to communicate the objective to the supplier	20	knowledge of different types of procurement procedures
14	culture of experimentation (allowing time usage)	12	skills to manage the big picture	15	ability to anticipate and document possible changes
14	ability to anticipate changes in the operating environment	11	change management skills	15	ability to cooperate with suppliers during the contract period
13	competence in strategic procurement	11	ability to build, manage and lead a network	13	project skills and management (process)
11	ability to proactive market dialogue + communication	11	ability to understand the benefits and business logic of suppliers	13	specification skills in tendering, requirements and conditions
9	identification of the current situation, current solutions and problems	10	understanding on the need/mission	9	network skills and management
9	ability to anticipate changes in needs	9	collaboration skills	9	monitoring and measurement skills from a sustainability perspective
9	ability to continuous needs assessment (not just at the end of the contract)	8	ability to leave the comfort zone/resilience	9	contract management, steering and control skills
8	ability to create and utilize networks	8	budgetary expertise	8	ability to change own thinking
7	ability to use the right channels for market research	7	documentation skills (including workshops, etc.)	7	contract knowledge and knowledge of contract law
7	communication skills	6	ability to sell ideas: suppliers own organisation/management/policy makers	7	end-user knowledge
6	ability to use "the old" in new ways, replication -> transfer of the old to the new environment	6	dialogue skills (before and during procurement)	7	ability to manage and implement change
6	ability to create attractive market potential	5	understanding on the target	6	understanding and knowledge of the product life cycle
5	ability to articulate things in a plain and harmonious language	5	ability to support cooperation between service providers (reducing competition)	5	courage and daring
5	ability to see the big picture	5	facilitation skills	5	ability to build a balance between sufficient flexibility and comparability
5	ability to cooperate with other buying organizations	5	project management skills	5	risk management and valuation skills, ability to continuity planning
4	market knowledge	5	ability to understand life cycles	4	negotiation skills
4	ability to compromise, balancing, prioritising	5	knowledge of specific sustainability issues (throughout the supply chain)	4	financial expertise, long-term effectiveness (-> strategic leadership skills)
4	service design competence	4	ability to involve end customers/end users	4	reporting skills, what we learned
4	category management skills (for market scanning)	4	risk management skills	4	ability to exploit procurement law
4	sustainability verification skills	3	skills of service design and its methods	2	piloting skills
4	ability to engage in dialogue with policy makers (e.g. what is possible)	3	communication skills	2	involvement skills at the definition phase
3	benchmarking skills (other countries, private sector)	3	expectation management skills	2	environmental knowledge
3	ability to communicate needs - what it means in different sectors	3	long-term planning skills	1	communication skills (funding, end-use)
3	team leadership skills	2	ability to identify own competences -> using teams, bought services, additional training	1	ability to communicate the use of the agreement, the environmental perspective
2	new kinds of financial skills (investment, long-term orientation)	2	knowledge of governance, rules and objectives of own organisation and suppliers		
2	need definition skills in the buying organisation	2	skills of balancing and appropriately addressing different needs		
		2	skills to consider the verification and measurement of benefits at the development phase		
		1	sustainability competences		
		1	ability to apply the methods		
		1	process description/modification skills, understanding of Enterprise Architecture		
		1	scoping skills		
		1	ability to plan the skills needed at the beginning of the project (organisational skills)		