PERISCOPE
FUNDED BY ERASMUS+

Project Purchasing Education and Research with an Innovative Sustainability Scope

The PERISCOPE Consortium

Intellectual Output 3

White paper

DELPHI STUDY

http://eu-periscope.essca.fr/

This research is part of Project PERISCOPE (eu-periscope.essca.fr), co-funded by the Erasmus+ Programme of the European Union with project number 2019-1-FR01-KA203-062990.

Erasmus+

Contents

1. Executive Summary

The Delphi study is a part of the third intellectual output (IO3) for Project PERISCOPE (Purchasing Education and Research with an Innovative Sustainability Scope). Funded by EU Erasmus +, Project PERISCOPE aims to prepare students in acquiring future Sustainability Purchasing and Supply Management (PSM) competences towards innovation.

This white paper presents the results of the first round of the Delphi study, which was carried out to explore future competence requirements for PSM managers towards innovative and sustainability solutions. The first round of the study consisted of eleven open-ended questions that were distributed to senior PSM professionals spanning multiple sectors, including professionals in manufacturing and service organizations as well as academic institutions, consultancies and non-governmental organizations.

The results of the first round of the Delphi Study show that the anticipated changes in the future business environment most significantly concern the application of digital technologies, increasing supply chain flexibility and transparency, sustainability impacts, and the need to develop internal and external business skills to be able to master these predicted changes. These preliminary results will be followed-up in a second round of the Delphi study planned for April-May 2021.

2. Introduction

The Delphi study aims to identify future skills and competencies for PSM to contribute effectively to innovation and sustainability. Based on the findings of the first intellectual output (IO1) and second intellectual output (IO2) the Delphi Study validates and completes the emerging skills and competences framework.

This white paper presents the results from the first exploratory round of the Delphi study, which will be followed by a second round which will consist of a structured on-line questionnaire. The methodology, findings and conclusions are drawn out of the data analysis and are outlined in this white paper. Following the introduction to the research methodology, the results and then conclusions are presented,

3. Methodology

The work reported in this white paper is part of the EU Erasmus+ funded Project “PERISCOPE”, which aims to develop learning objectives for procurement (or ‘purchasing and supply management’) education programs that focus on innovative and sustainable procurement. Thus, we need to understand future skills and competencies that purchasing needs to better contribute to innovation and to sustainability. The Delphi study forms a central element of the data collection. This section explains the Delphi study method, starting with a brief explanation of the Delphi approach, followed by an outline of the different stages involved.

3.1. The Delphi Approach

A Delphi study is a qualitative forecasting technique, incorporating subjective judgements of individuals. It is a systematic, iterative process to investigate a consensus view from a panel of experts (McCarthy and Atthirawong, 2003). The Delphi study leverages on a representative group of respondents to investigate a specific field, and to get a consensual view of future trends in a particular area. The Delphi technique is different from other methods such as brainstorming in that it avoids respondents interacting, so that answers are left un-biased and free of influences. The result of a Delphi study is considered as a consensus of expert opinions on a subjective topic (Green and Price, 2000).

Delphi studies have been used many times after World War II and demonstrated its usefulness. In the fields of operations and supply chain management, Delphi studies have been used to develop the concept of supply chain strategy (Harland et al., 1999), to investigate supply chain flexibility (Lummus et al., 2007), to identify core issues in sustainable supply chain management (Seuring and Muller, 2008) or to map the future of supply chain management (Melnyk et al., 2009).

Delphi studies are well-suited for research that seeks to examine a rapidly changing field, in order to predict which changes are going to occur in the future: a Delphi study aimed “to project ahead, 20 years into the future, and capture visions of the context and the implications” (Harland et al., 1999). For instance, the Delphi study method has been chosen by Ogden et al. (2005) to explore PSM strategies that could create significant improvements over the next ten years. They collected 80 different predictions and analyzed the likelihood of each prediction. Other studies in the PSM field were built on Delphi studies to predict the future and demonstrated their validity in that

objective: Monczka and Markham (2007) investigated 10-year future trends in supply management, building on a Delphi study. These authors collected data from senior PSM representatives who provided their views about future developments in PSM at that time.

3.2. The process used for the Delphi Study

A Delphi study is very exploratory and is built on different rounds. The following section describes the preliminary stages we went through to prepare and design the Delphi study, but also presents the precise methodology used for the first round.

3.2.1. A pre-Delphi study

For designing this Delphi study, several preliminary stages were conducted. The first stage was to review the literature of purchasing's contribution to sustainability, to innovation, or both. This helped to identify key constructs and to start shaping the objectives of the Delphi study. Then, we searched for job advertisements using keywords such as purchasing+innovation and purchasing+sustainability: this helped us to assess the current advance of the recruitment market on the targeted fields.

To complete these earlier stages of the project PERISCOPE, a "World Café" method was chosen to reflect and evaluate the results of the literature review and to collect additional remarks from the participants. The aim of the world café discussion was to explore the themes in the working field and provided input to the design of the Delphi study. The participants of the World Café were academics and practitioners in the field of PSM in order to critically discuss the results of the literature review and, if necessary, expand them by further aspects. An international panel of 16 experts were asked to discuss three themes. The expert meeting consisted of a plenary, introductory session, three parallel discussion session on the three themes and a plenary, evaluation session. The three questions that were discussed in the three, parallel discussion are:

1) Which skills are needed for purchasing to contribute to sustainability?

2) Which skills are needed for purchasing to contribute to innovation / co-development?

3) What is preventing companies from being simultaneously sustainable and innovative?

The outcome of these preliminary stages provided insights on how purchasing perceives its contribution to sustainability, to innovation and to both sustainability and innovation. This step

helped us to design the next step, i.e. the Delphi study, which is described in the following sections.

3.2.2. Delphi pilot study

The pilot study was designed to pre-test the questionnaire and to check the clarity and consistency of the questions. This pilot study was conducted before the real Delphi study. We have pre-selected five respondents to test the questionnaire, ensuring representation from academia and industry. These were all friendly personal contacts who had knowledge of Delphi studies and were able to provide recommendations to refine the questionnaire. The panel of pilot study respondents is presented in Table 1 below:

#	Respondent's position	Respondent's sector
1	Assistant professor	Academia
2	PhD student	Academia
3	Research assistant	Academia
4	Supply chain Director	Industry
5	Procurement senior Manager	Industry

Table 1. List of respondents to the pilot study

During this process, we discussed individually with each respondent to get their overall impressions about our study. Appropriate changes were made at the end of this pilot study: the pre-test phase provided us with valuable feed-back and comments, which we used to develop the questionnaire further, to improve its clarity and ultimately to reduce several ambiguities. Following the pilot study, modifications were made to the introduction text, and to improve the user friendliness of the online questionnaire. We also added a question about innovation to better balance the questions about sustainability and innovation.

3.2.3. The first round of the Delphi study: Questionnaire

The questionnaire for the first round of the Delphi study consisted of 11 questions in total. Out of the 11 questions, 4 were closed-ended and 7 were open-ended questions. The 4 closed ended questions were designed to collect background data about the respondents, such as job title, geographical location, etc. The 7 open-ended questions allowed the respondents to express their

views and provide their opinions freely. These open-ended questions were chosen to investigate the prospective vision of the respondent about how they imagined the future will look like in 2040: starting from a broad picture of business in general, then focusing on future supply chains, and finally narrowing down to the future of procurement. These questions were also adapted to collect data on procurement's contribution to both innovation and sustainability. The questionnaire is presented in the table 2 below:

Question #	Question	Question end	Question type
1	Which sector are you working in? (Please chose on from the dropdown list)	Closed	List of choice
2	What is your job title?	Closed	Text
3	What is the size of your organization (number of employees)?	Closed	List of choice
4	In which country are you based (work)?	Closed	Text
5	What three key changes do you imagine will characterize the business environment in 2040? – 1-2-3	Open	3 open slots
6	Please name three ways in which supply chains will be different in 2040. – 1-2-3	Open	3 open slots
7	What do you see as the three most important trends and innovations in sustainable procurement? – 1-2-3	Open	3 open slots
8	What do you see as new key skills and competences that procurement should develop to enable the transition towards sustainability?	Open	1 open slot
9	How does procurement need to change to contribute more effectively to the development of new innovations?	Open	1 open slot
10	What do you see as new key skills and competences that procurement should develop to enable the transition towards innovation?	Open	1 open slot
11	Are there any issues we have missed in our questions that are important to understand the need for future procurement skills and competences?	Open	1 open slot

Table 2. Questionnaire used for the Delphi study

3.2.4. The first round of the Delphi study: Delphi panel

The selection of the panel of expert is critical to the success of a Delphi study (Melnyk et al., 2009). The participants were targeted based on their experience and seniority in the fields of procurement, innovation or sustainability. The main idea of the PERISCOPE Delphi study is to collect the views of senior visionary professionals across sectors, all located in European Union. Thus, we targeted senior PSM practitioners, consultants, NGOs representatives or academic professionals, all showing a work location in the European Union.

To identify these experts, various sources of information were used. First, the personal network of each researcher was helpful to feed the list of potential respondents. Second, we approached senior professionals via LinkedIn, focusing on seniority, level of expertise and authority in their field of expertise.

About 250 potential respondents were identified initially: these were all contacted and asked whether they were willing to participate. Thus, we ended up sending the link to the online questionnaire to 60 people.

56 completed questionnaires were initially returned. Due to the location of the country or incompletion of the questionnaire, several completed questionnaires had to be discarded resulting in 38 useable questionnaires. The final list of respondents representing nine countries is presented in table 3 below:

Resp. #	Respondent's Sector	Respondent's position	Country
1	Construction	Head of Logistics	Austria
2	Manufacturing	Head of Purchasing	
3	Manufacturing	Program buyer	
4	Manufacturing	Program buyer	
5	Manufacturing	Supply Chain Director	
6	Other	CEO	Belgium
7	Other	CEO	Denmark
8	Other	CEO	
9	Professional, Scientific and Technical Activities	CEO	
10	Manufacturing	Head of Sustainability Procurement	
11	Human Health and Social Work Activities	Senior Procurement Manager, Pharma Industry	
12	Other	CEO	France
13	Activities of Extraterritorial Organizations & Bodies	CPO	
14	Manufacturing	Sustainable Purchasing Director	
15	Manufacturing	Design Manager	
16	Manufacturing	Group Innovation Director	
17	Public Administration and Defense; Compulsory Social Security	Head of Department	
18	Administrative and Support Service Activities	Head of procurement and sustainable program	
19	Electricity, Gas, Steam and Air Conditioning Supply	Lead Buyer	
20	Other	Marketing Manager	
21	Other	Product Sourcing Leader	
22	Other	Product Sourcing Leader	
23	Manufacturing	Purchaser	
24	Other	Sustainable Procurement Manager	
25	Other	SVP Research	
26	Activities of Extraterritorial Organizations and Bodies	Committee member	Germany
27	Human Health and Social Work Activities	CPO	
28	Other Service Activities	Head of Procurement Competence & Development	
29	Education	Head of Research Laboratory and Lecturer	
30	Education	Professor	
31	Education	Professor	
32	Transportation and Storage	Executive Director	Netherlands
33	Professional, Scientific and Technical Activities	Managing Partner - Senior Consultant	
34	Public Administration and Defence; Compulsory Social Security	Purchase advisor	
35	Manufacturing	Business Development Director	Spain
36	Construction	XXX	
37	Human Health and Social Work Activities	Purchaser	Switzerland
38	Manufacturing	Head of Procurement and Supply Chain	Wales

Table 3. List of respondents

3.2.5. Communication protocol

The first contact with the potential participants was done through a formal electronic message (email or text message via LinkedIn), briefly outlining the project. In case of agreement on the principle to participate, respondents received a link to the questionnaire online and a deadline. Participants completed the questionnaire online enabling the administrator to track the response rate on a daily basis. Contributions received by the administrator maintained the anonymity of the participants. Thus, respondents were approached individually, avoiding random distribution of the questionnaire to control the sample.

3.3. Data analysis

To efficiently analyze the qualitative data, a double coding method was chosen (Church et al., 2019). Having two coders improves data quality by exploring two interpretations of the patterns and relationships of words and phrases (Church et al., 2019; Voss et al., 2002). It is essential to have standard codes and then group these into constructed categories (Voss et al., 2002). Once the data is put into categories it provides a structured platform to analyze trends. The coding was used to understand and find common occurrences to summarize respondents' answers to each question, which helped to capture and categorize the responses. There were two coders assigned to ensure inter-rate reliability, which was important as some written answers were sometimes open to interpretation. The data was then analyzed by reading through each document to categorize emerging themes and concepts. The proceeding steps is described in the following:

In the first step, both coders read through each response to pick out potential codes. After each code was finalized, these were then counted and assigned to a category. Thus, the codes were first created and then assigned to a category that arose from similarity in codes. Some codes were categorized into an "Other" category when this could not easily be associated with any other code. Categories such as "External/Internal Business Skills", "Interpersonal Skills", "Technical Skills", and "Strategic Business Skills" and codes that fell in those categories were influenced by Tassabehji & Moorhouse's (2008) procurement skills effectiveness framework. This framework was based on identifying the skills of procurement professional need to develop, to successfully manage changes in the business enviroment. The remaining categories and codes were developed from the emerging themes and the data itself.

In the second step, both coders compared and contrasted their codes and categories. This was instrumental to agree on interpretation of the codes and guarantee that there were no missed codes. With the final selection of codes, the coders were able to select categories that best fit all codes.

As the last step, the categories and codes were put into diagrams and bar charts to bring a visual picture of the results.

4. Results

The results section reflects outcomes in the first round of the Delphi Study. As explained in Section 3.1, the Delphi study consisted of 11 questions in total out of which four were closed-ended and seven were open-ended questions. The four close-ended questions were based on the respondent criteria (Respondent Sector, Respondent Position, and Country) as seen in Table 3. This section presents the results of the opened-ended questions.

4.1. What three key changes do you imagine will characterize the business environment in 2040?

Table *4*. Categories and Codes

Digital Technologies	Economic	Social
AI	More pressure on costs	Ethical
Automation (robots, RPA)	Trade wars	Attracting future talent
IoT	Global economy recession	Sensitivity
Data analytics	Growth of emerging countries + china	Poverty
Industry 4.0	New markets	Being inclusive to minorities
Digital skills & competencies	Over supply	Smaller size of public sector
Better transparency with digital tools	Health sector will grow	manufacturing
3D printing/additive	Higher debt	
	Changing customer needs	

Table 4 shows each code extracted from the respondent's answers and assigned into nine categories.

Figure *1*. Countshows "Digitization Technologies" had the highest responses rate, with 38 responses. Out of the 38 responses in Figure 2, the code "digitization" was the highest with 12 occurrences. Many of the respondents, mentioned the words "Digital", "Digitization", or "Digital Technologies". Therefore, there could not be a detailed interpretation of that code. The second highest response rate was "Artificial intelligence (AI)", with 11 occurrences. Digitization Technologies are key changes that senior SPM professional foresee in the future business environment.

Table 4. Categories and Codes

Digital Technologies	Economic	Social
AI	More pressure on costs	Ethical
Automation (robots, RPA)	Trade wars	Attracting future talent
IoT	Global economy recession	Sensitivity
Data analytics	Growth of emerging countries + china	Poverty
Industry 4.0	New markets	Being inclusive to minorities
Digital skills & competencies	Over supply	Smaller size of public sector
Better transparency with digital tools	Health sector will grow	manufacturing
3D printing/additive	Higher debt	
	Changing customer needs	

Environmental	Political impact	Geographic Change
Climate Change	Regulations	Localization
Preservations	Legal	Globalization
Resources Efficiency	Protectionism	More innovations from emerging countries
Renewable Energies	Regional Conflicts	
Reused Materials & circular SC	Patent legislation in developing countries	
New modes of transportation	Political crisis	

Adoption of sustainability	New Supply Chains	Population
Responsible	Resilient supply chains	Over populations
Sustainable	Fragmented SC	Growth of elders
Holistic approach of CSR	Immediate decisions	

Figure 1. Count of Categories

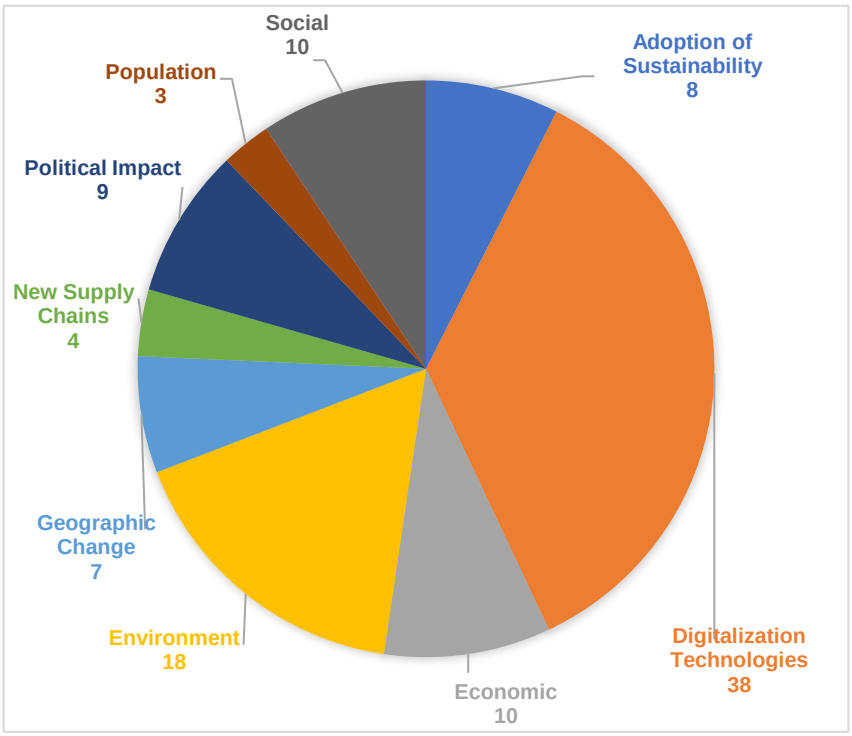
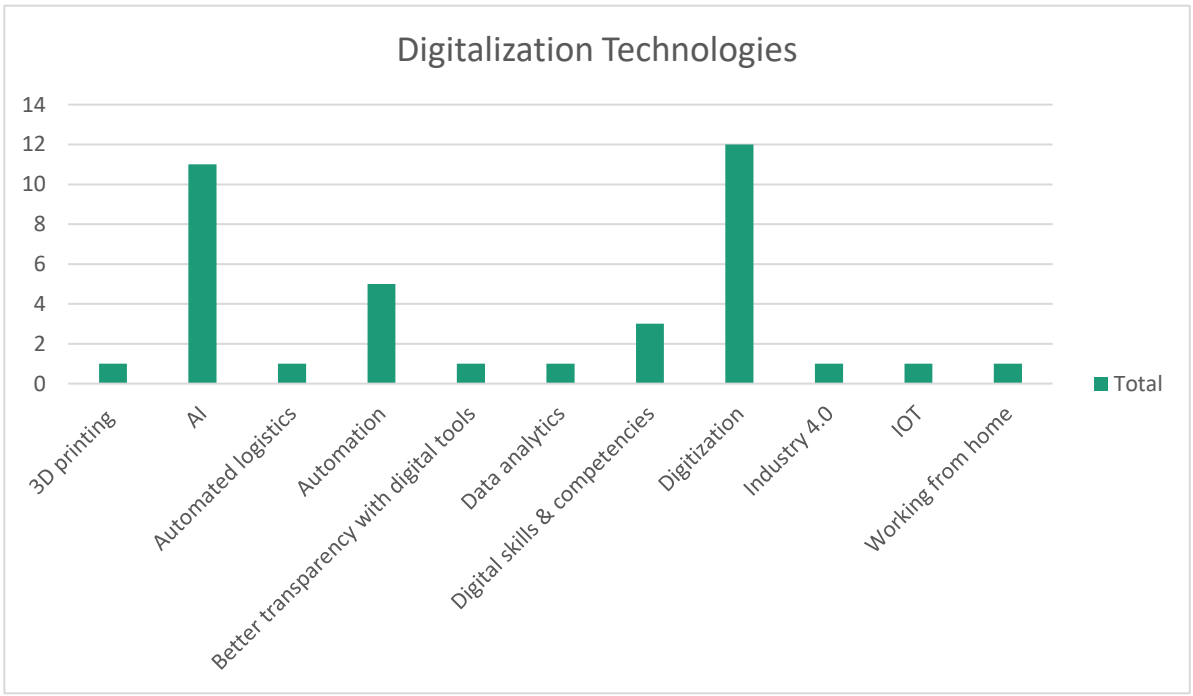


Figure 2. Digitalization Response Rate



4.2. Please name three ways in which supply chains will be different in 2040.

Table *4*. Categories and Codes

Digital Technologies	Economic	Social
AI	More pressure on costs	Ethical
Automation (robots, RPA)	Trade wars	Attracting future talent
IoT	Global economy recession	Sensitivity
Data analytics	Growth of emerging countries + china	Poverty
Industry 4.0	New markets	Being inclusive to minorities
Digital skills & competencies	Over supply	Smaller size of public sector
Better transparency with digital tools	Health sector will grow	manufacturing
3D printing/additive	Higher debt	
	Changing customer needs	

Table 5. Categories and Codesshows each code extracted from the respondent's answers and assigned into nine categories.

Figure *3* shows “Digitization Technologies” had the highest responses rate, with 28 responses. Out of the 28 responses in

Figure *4*, the code “digitization” was the highest with 12 occurrences. Again, many of the respondents mentioned the words “Digital”, “Digitization”, or “Digital Technologies” with no further explanation. Therefore, there could not be a detailed interpretation of that code. In Figure 5 “SC flexibility and transparency” shows the second highest response rate, with 20 responses. Out of the 20 response, the code “Transparency throughout SC” was the highest with 11 responses. Respondents foresee changes in digitalization technologies and better flexibility and transparency throughout supply chains.

Table 5. Categories and Codes

Digitalization Technologies	Ability to Collaborate Internal/ External	SC flexibility and transparency
AI	More mutual benefits principles	Proactivity
Automation	Customer Relationship	Increased Flexibility
Industry 4.0	More collab activities w/ suppliers	Agility
Integrated tools across SC	Partnership controlled supply chain	Better rationalized SC
SC cooperation	Better due diligence processes	Vertical Supply Chain
Digital tracking of suppliers	End to end value chain under control	More disruptions
Higher transparency w/ digital		Resilience
SC will be intelligent through machine learning		Full transparency
		Full Traceability

Localization	Environmental	Circular Economy
Redeveloping Local Supply Chains	Emissions	Eco-Design
Regional	Climate	New sustainable business models
Less Globalized	Use less resources	New packaging
Shorter SC	Growing concern about env.	
	Monitoring of raw materials	
	Dependency on raw materials	

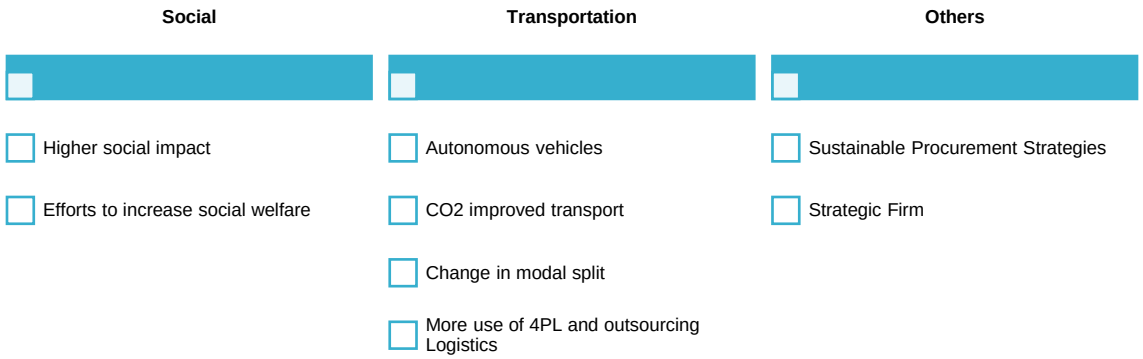


Figure 3. Count of Categories

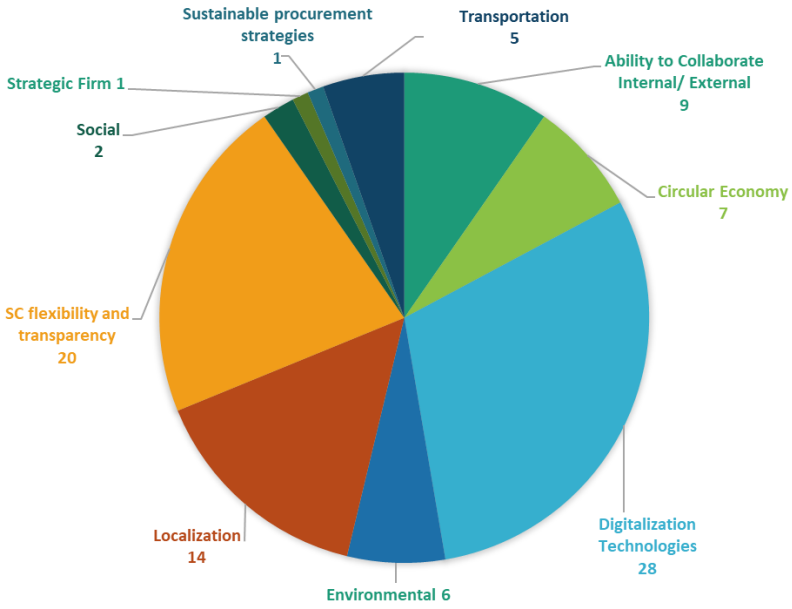


Figure 4. Digitalization Response Rate

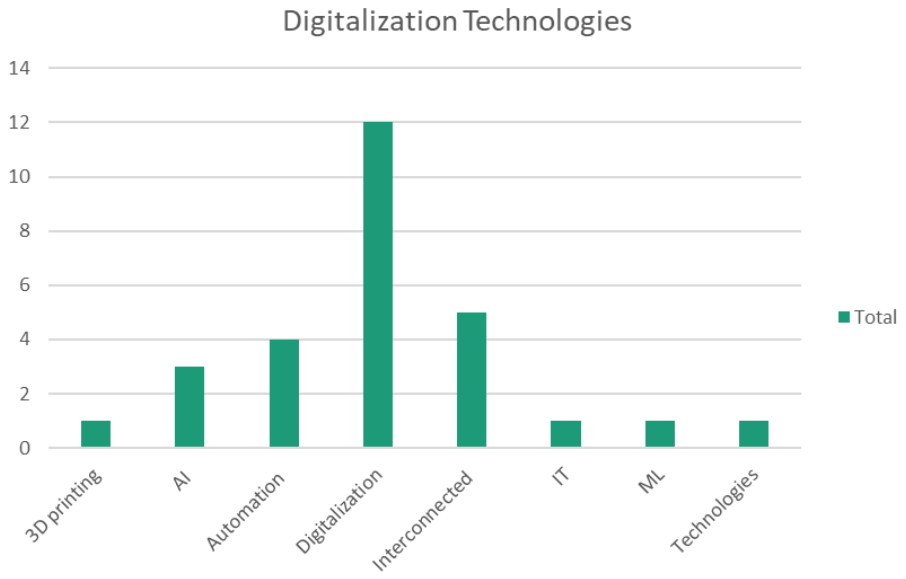
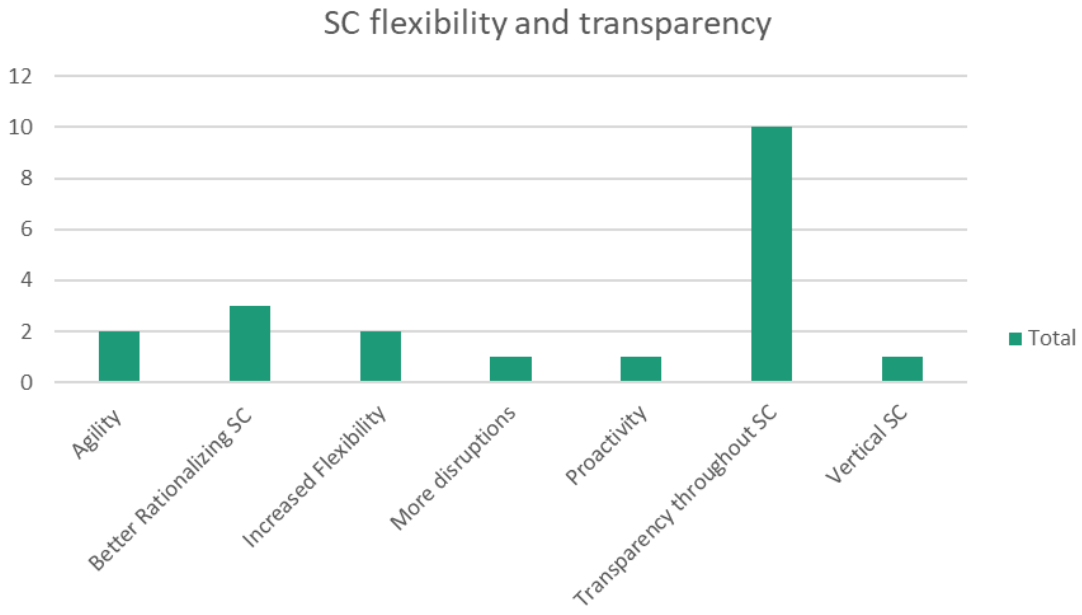


Figure 5. SC Flexibility and Transparency Response Rate



4.3. What do you see as the three most important trends and innovations in sustainable procurement?

Table *4*. Categories and Codes

Digital Technologies	Economic	Social
AI	More pressure on costs	Ethical
Automation (robots, RPA)	Trade wars	Attracting future talent
IoT	Global economy recession	Sensitivity
Data analytics	Growth of emerging countries + china	Poverty
Industry 4.0	New markets	Being inclusive to minorities
Digital skills & competencies	Over supply	Smaller size of public sector
Better transparency with digital tools	Health sector will grow	manufacturing
3D printing/additive	Higher debt	
	Changing customer needs	

Table 6 *shows each code extracted from the respondent's answers and assigned into nine categories. In* Figure 6. Count of Categories *"Sustainability Impact" had the highest responses rate, with 22 responses. Out of the 22 responses shown in* Figure 7

Figure *4*, the code "Avoidance of Fuel" was the highest with six occurrences. Respondents anticipate a high focus on Sustainability impacts relating to people, planet and profit as an important trend and innovation in sustainable procurement.

Table 6. Categories and Codes

Digitalization Technologies	Governance Mechanism/ Legal Standards	Sustainability Impact
Closed loops enabled by technologies	Evaluation	More focus on social impacts (welfare...)
Digital Platforms	Certification	Ethical impact considerations
Blockchain	Regulations and legislations	Avoidance of Fuels/Emissions
Digitalization of sustainable performance monitoring to N-tier	UN Goals	Focus on impact achieved, instead of risk mitigated
Data management	CSR topics in audit grids	Holistic impact
Digital Transparency	Global standards in sustainable procurement	Having more diversity
AI	New national due diligence	Add competitive advantage
More automated procurement decisions	Integration of sustainability indicators in RFP(request for proposal)	Increase operational efficiency

Circular Economy	Stakeholder Engagement	Risk Management
More recycled Goods	Increased customer interest/consciousness	Resilience
Renewable Energy	Stronger collaborative behaviors	Stronger risk management strategies
Reused Materials	Platform and sector initiatives	Just-in-time => Just-in-case
	New modes of transportation	

Localization	Transparency	Other
Local Sourcing	Visibility throughout SC Products/ supply goods/Raw material	Innovations
Regional Supply		Broaden purchasing competencies
Decentralization		

Figure 6. Count of Categories

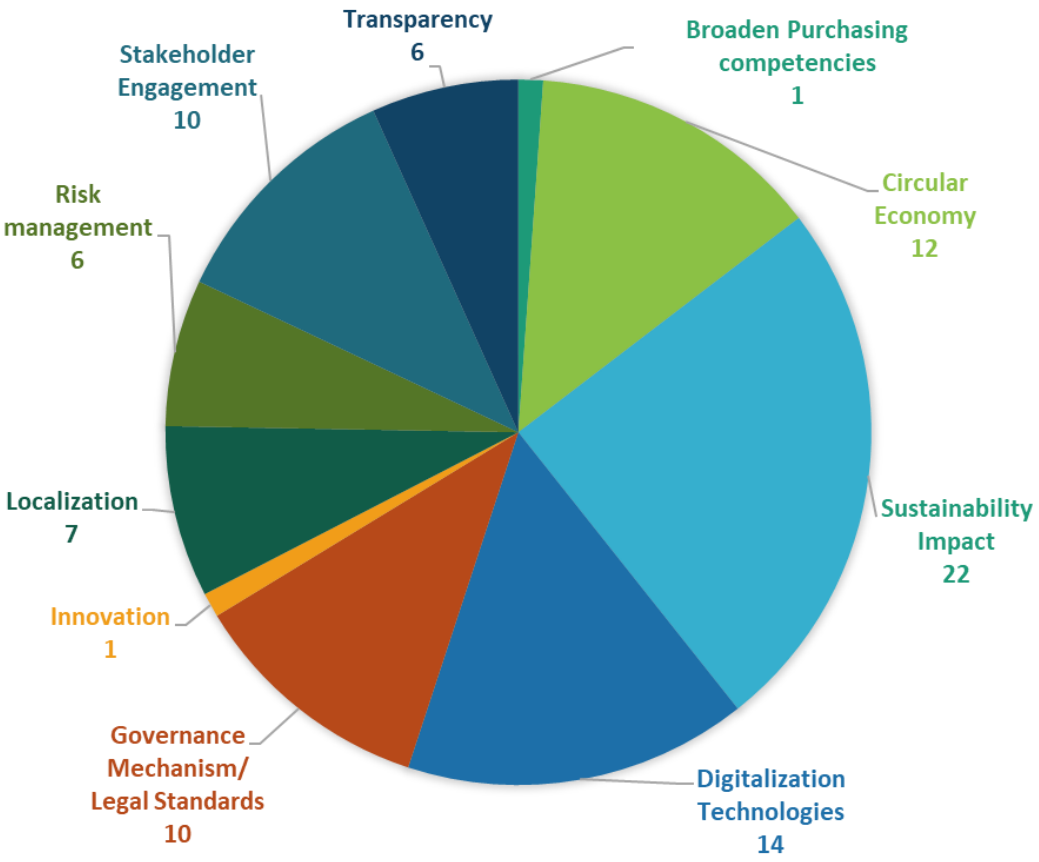
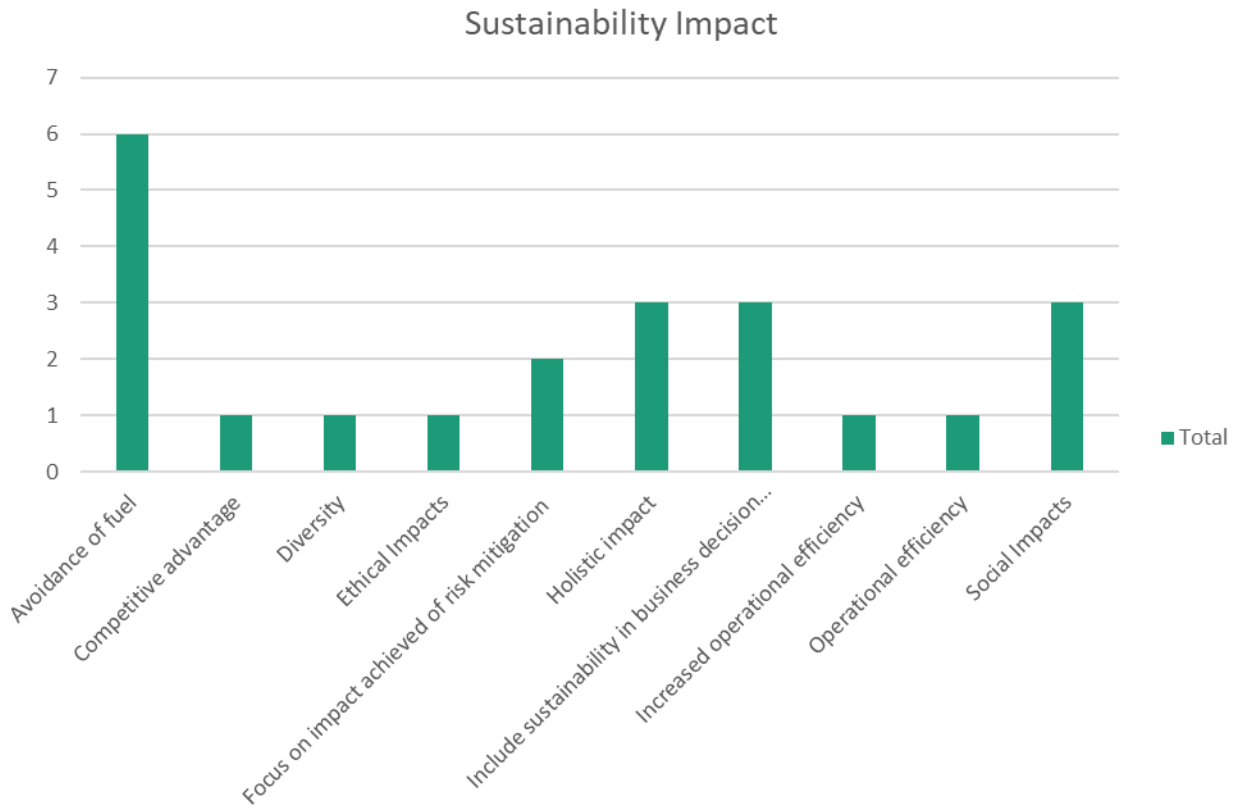


Figure 7. Sustainability Impact Response Rate


Sustainability Impact
7
6
5
4
3
2
1
0
Avoidance of fuel
Competitive advantage
Diversity
Ethical Impacts
Focus on impact achieved of risk mitigation
Holistic impact
Include sustainability in business decision...
Increased operational efficiency
Operational efficiency
Social Impacts
Total

4.4. What do you see as new key skills and competences that procurement should develop to enable the transition towards sustainability?

Table *4*. Categories and Codes

Digital Technologies	Economic	Social
AI	More pressure on costs	Ethical
Automation (robots, RPA)	Trade wars	Attracting future talent
IoT	Global economy recession	Sensitivity
Data analytics	Growth of emerging countries + china	Poverty
Industry 4.0	New markets	Being inclusive to minorities
Digital skills & competencies	Over supply	Smaller size of public sector
Better transparency with digital tools	Health sector will grow	manufacturing
3D printing/additive	Higher debt	
	Changing customer needs	

Table 7 shows each code extracted from the respondent's answers and assigned into nine categories.

Figure 8. Count of Categories Figure 6. Count of Categories *shows "Knowledge of Sustainability" had the highest responses rate, with 22 responses. Out of the 22 responses in* Figure 7

Figure *4*, the code "Knowledge of basic sustainable practices" was the highest with seven occurrences. In

Figure 8. Count of Categories Figure *6*. Count of Categories shows "External/ Internal Enterprise skills" had the second highest responses rate, with 19 responses. Out of the 19 response in Figure 10, the code "Supplier relationship Management skills" placed the highest with five occurrences. Respondents foresee key skills and competences in sustainability and having external and internal business skills.

Table 7.Categories and Codes

Purchasing Education and Research with
An Innovative Sustainability Scope

External/Internal Enterprise skills

- Ability to collaborate to achieve win-win
- Ability engage with stakeholders
- Internal Cross-Function collaborations
- Supplier relationship management skills
- Understanding the Customers needs/wants
- Change Management

Knowledge of Sustainability

- Knowledge of basic sustainable practices
- Understanding of sustainability trends
- Awareness in ethical, environmental, and human rights impacts
- Emissions Impacts
- Knowledge in Circular Economy
- Ability to developed circular value chains
- Understanding what is eco-design

New KPIs

- Knowledge product life cycle management/ assessment
- TEO: Total of Emission Ownership
- Life Cost Models
- TCO
- Understanding SDG reporting
- Performance metrics
- Calculate of sustainability impacts/progress
- New incentive systems to align firm with customers' sustainable orientations

Personal Traits

- Emotional Intelligence
- Time management
- Handling Change/ Flexible Adaptation
- Entrepreneurial mindset

Interpersonal Skills

- Leadership
- Communications
- Creativity
- Knowing how to influence

Strategic business skills

- Strategic Thinking
- Risk Management
- Ability to add value
- Procurement Strategies
- Understanding Companies Goals

Technical Skills

- Knowing how to negotiate
- Understanding Business Cases
- Category Management
- Understanding innovation influencing sourcing

Digital Skills and Competencies

- Knowledge of digital tools AI and ML
- Knowing how to identify new trends

Understanding of Governance Mechanism/ Legal Standards

- Knowledge of certifications to incorporate sustainability
- Knowledge of Audits to incorporate sustainability
- Knowledge of legal requirements
- Understanding how to develop contracts to incorporate sustainability

Figure 8. Count of Categories

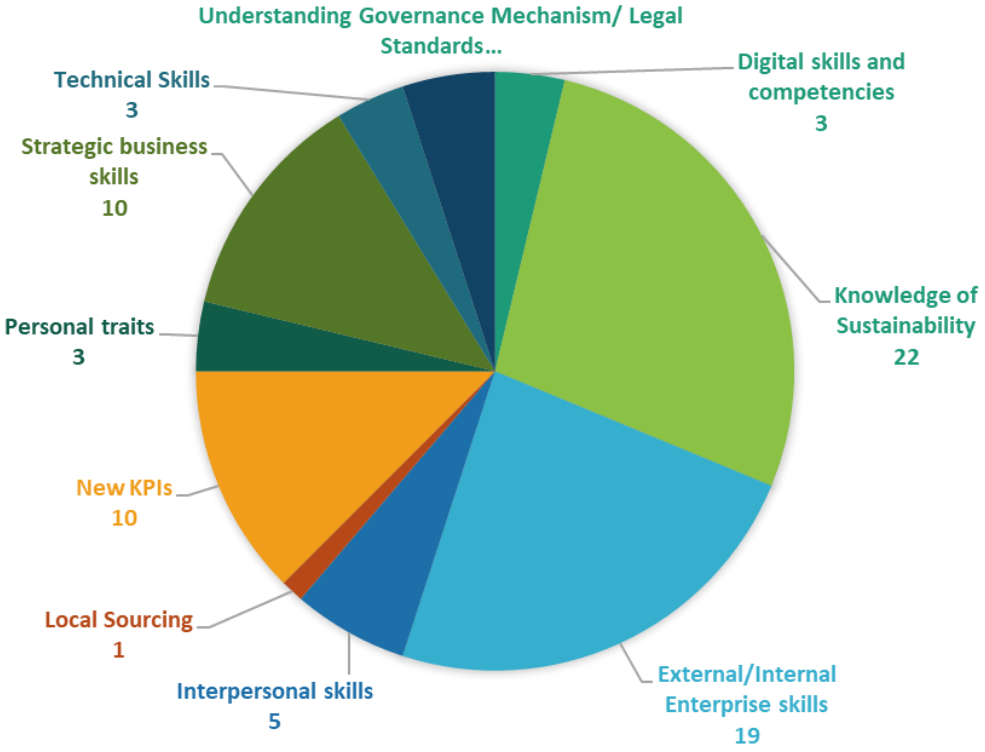
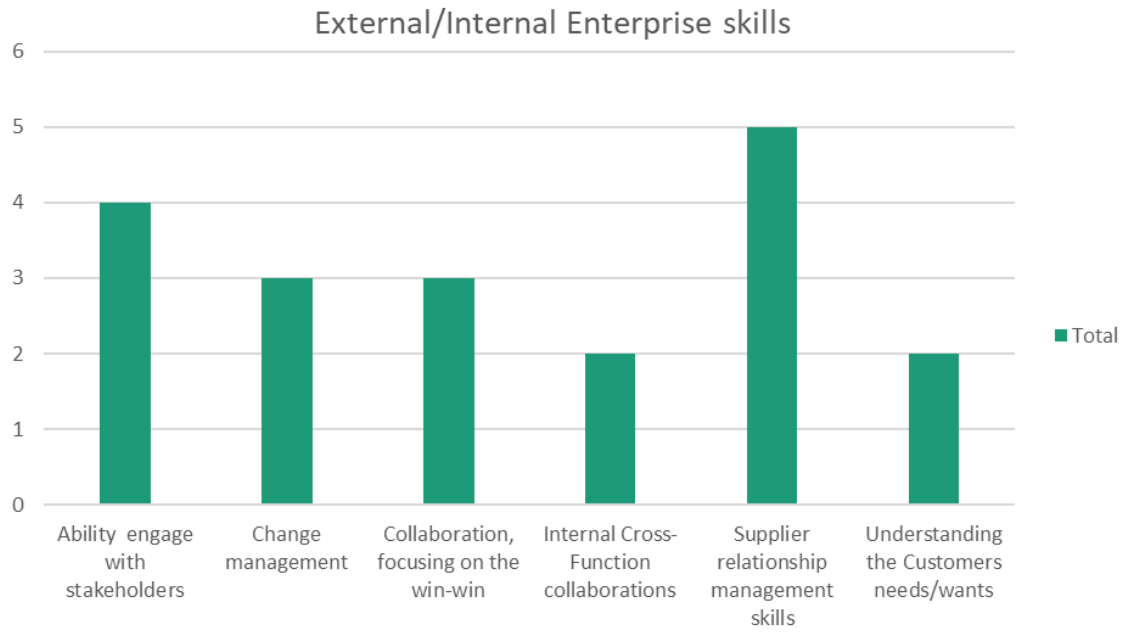


Figure 9. Knowledge of Sustainability Response Rate

Figure 10. External and Internal Enterprise Skills Response Rate



4.5. How does procurement need to change to contribute more effectively to the development of new innovations?

Table *4*. Categories and Codes

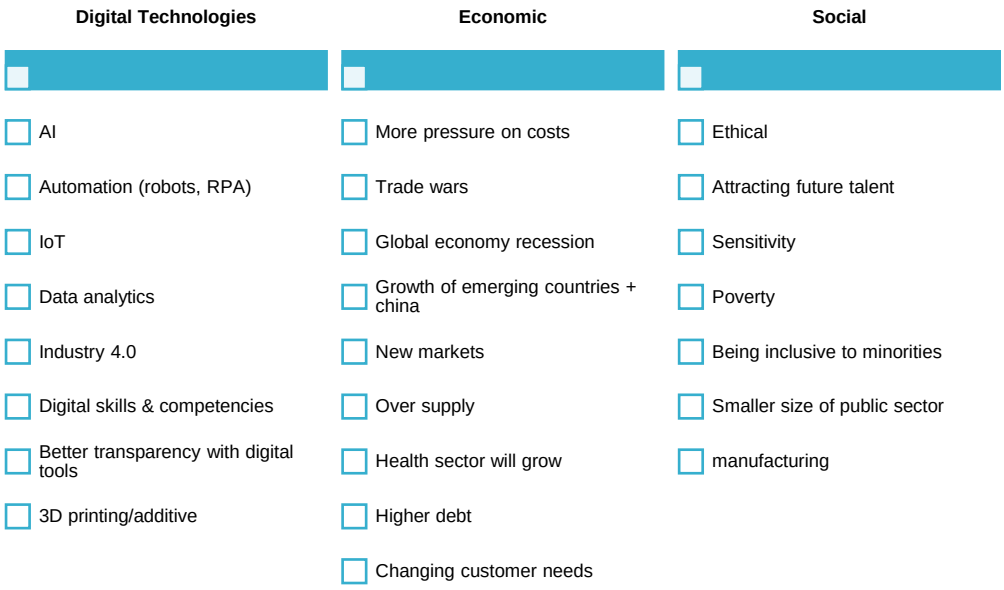


Table 8shows each code extracted from the respondent's answers and assigned into eight categories.

Figure 11 Figure 6. Count of Categories *shows "Ability to Collaborate Internal/External" had the highest responses rate, with 20 responses. Out of the 20 responses in* Figure 12

Figure *4*, the code "Use outside competencies and solutions to enable innovation" was the highest with nine occurrences. The respondents find future procurement professional should have an ability to collaborate externally and internally to develop new innovations.

Table 8. Categories and Codes

Ability to collaborate Internal/ External	Develop New Skills	Mentality Shift	Sustainability Awareness
Supplier Development to encouraging to be sustainable	Having courage	Understanding Procurement	Informed of ongoing changes of environmental and social issues
Being customer centric	Open to change	Think more upstream	Circular Economy
Use outside competencies & solutions to enable innovation	Less Risk averse	Think value I/o costs down	
Cross Functional integration with Sales & Marketing	Become more Strategic (facilitate new biz models)	Shifted focus more on customers wants/needs	
	Agility	Long term thinking	
	Ability to lobby / influence	Drive holistic values	
		Create Value through innovations	

New Sustainable Business Strategies	Governance Mechanism/ Legal Standards	Functional performance specifications	Digitalization Technologies
Not based off cost but resources	Develop New Contract for suppliers to be sustainable	Procure based on functional requirements	Embrace technology tools
Different ways of buying	More balanced terms of contract (win-win)	functional and performance specifications - rather than technical spec	Create user friendly technologies
Sustainability #1 in business strategies	Better share innovation risks through contract	Supplier selection criteria	Use more technology for sourcing
Project development/ innovation	Co-finance proofs of concepts		Shift from Manual to AI
FRP Processes (Fiber-reinforced plastic)	Ensure supplier commitment to innovation in contracts		

Figure 11. Count of Categories

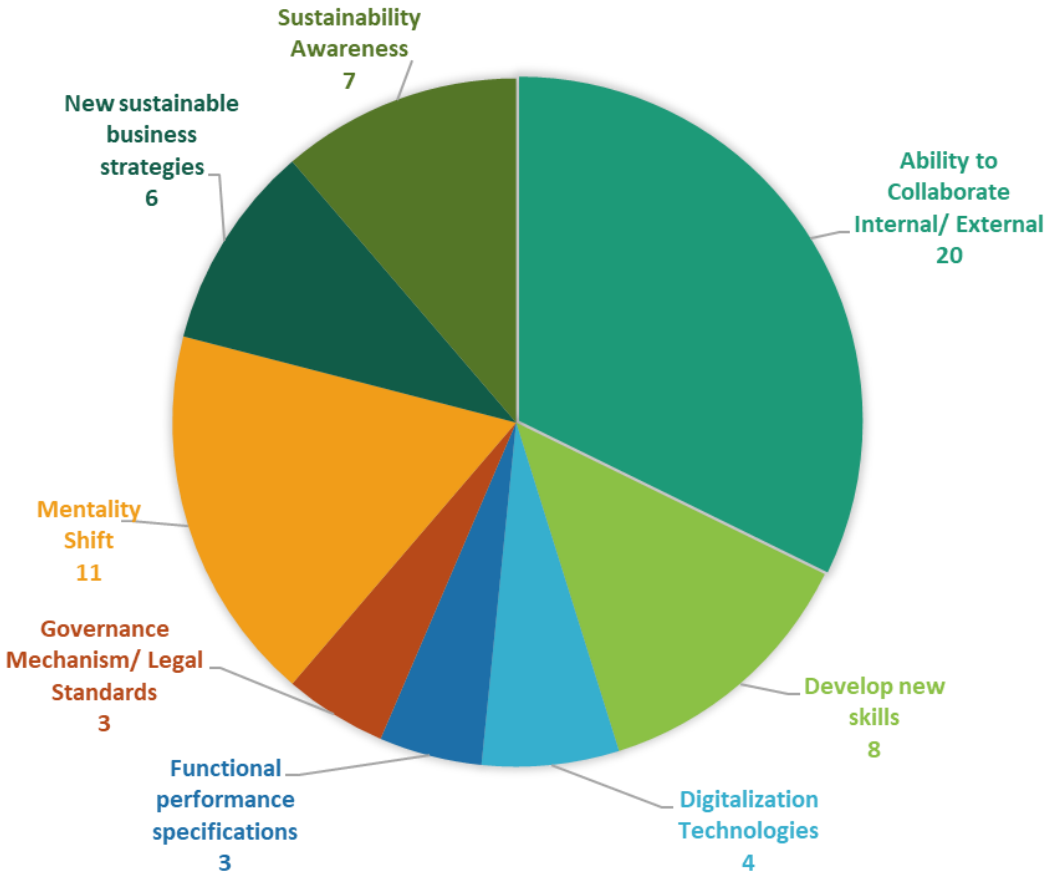
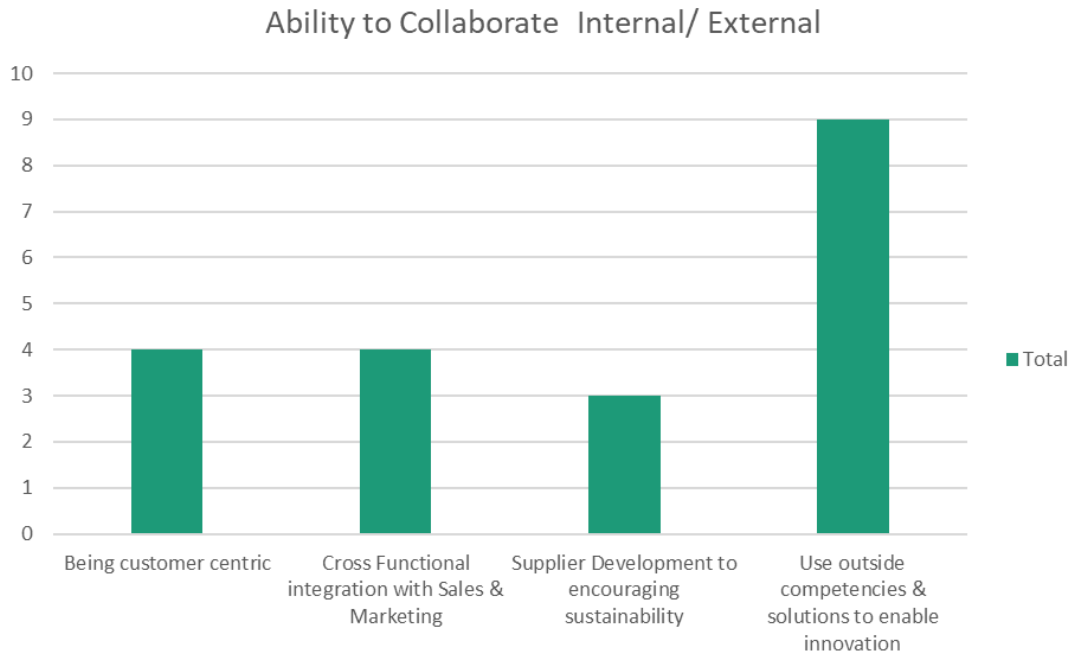


Figure 12. Ability to Collaborate Internal/External Response Rate



4.6. What do you see as new key skills and competences that procurement should develop to enable the transition towards innovation?

Table 4. Categories and Codes

Digital Technologies	Economic	Social
AI	More pressure on costs	Ethical
Automation (robots, RPA)	Trade wars	Attracting future talent
IoT	Global economy recession	Sensitivity
Data analytics	Growth of emerging countries + china	Poverty
Industry 4.0	New markets	Being inclusive to minorities
Digital skills & competencies	Over supply	Smaller size of public sector
Better transparency with digital tools	Health sector will grow	manufacturing
3D printing/additive	Higher debt	
	Changing customer needs	

Table 9 *shows each code extracted from the respondent's answers and assigned into eight categories.* Figure 13. Count of Categories Figure 6. Count of Categories *shows "External/ Internal Enterprise skills" had the highest responses rate, with 20 responses. Out of the 20 responses in* Figure 14. External/ Internal Enterprise Skills Response Rate

Figure *4*, the code "Ability to engage with Stakeholder" has the highest response rate with eight occurrences. The respondents foresee procurement professional learning how to develop external and internal business skills and competences.

Table 9. Categories and Codes

External/Internal Enterprise skills	Digital skills and competencies	Technical Skills	Strategic Business Skills
Ability to engage with stakeholders	Digital Technology Competencies	Value orientation mindset	Risk Management
Understanding the value of building a relationship	Survey new digital trends	Ability to Develop Innovation Awareness: Product Development	Understanding of Business Models
Supplier relationship management	Understanding of Analytics	Product/ Solution Marketing	Ability to add value
	IT and tech affinity	Ability to assess the potential of an innovation	Strategic Thinking
Manage internal customers: Engineering	Understanding of ML and AI		

Interpersonal Skills	Personal traits	Education in Sustainability	Analyzing Cost
Cross- culture Awareness	Being a creative thinker	Knowledge of basic sustainable practices	Affordable Sustainability
Intercultural competencies	Having Patience	Knowledge of Eco System	Cost Structures
Ability to influence	Taking Credibility	Understanding of Holistic Approach	Should cost models
Leadership	Having Curiosity	Education in Circular Economy	Cost Management
Communication	Time Management	Understanding of Eco-design	Sustainability Calculation
	Entrepreneurial mindset	Understanding of how localization contributes to sustainability	Design to cost expertise
	Adaptive capabilities		
	Eager to learn		

Figure 13. Count of Categories

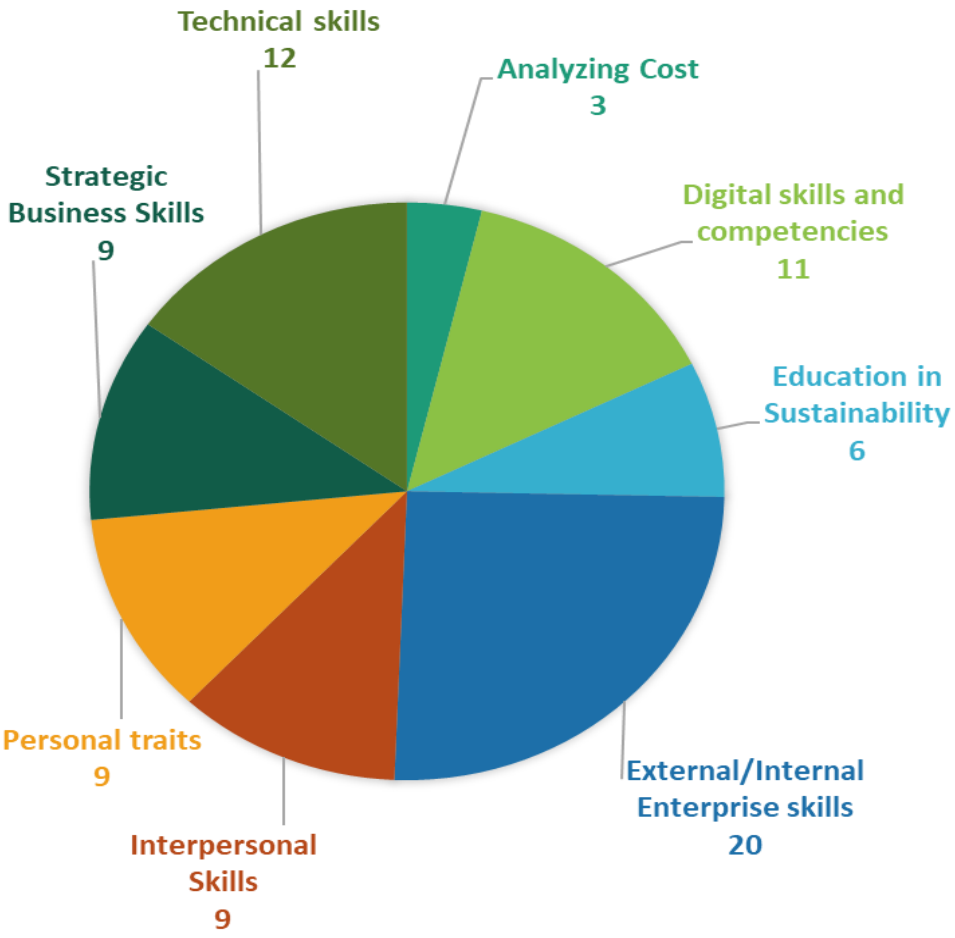
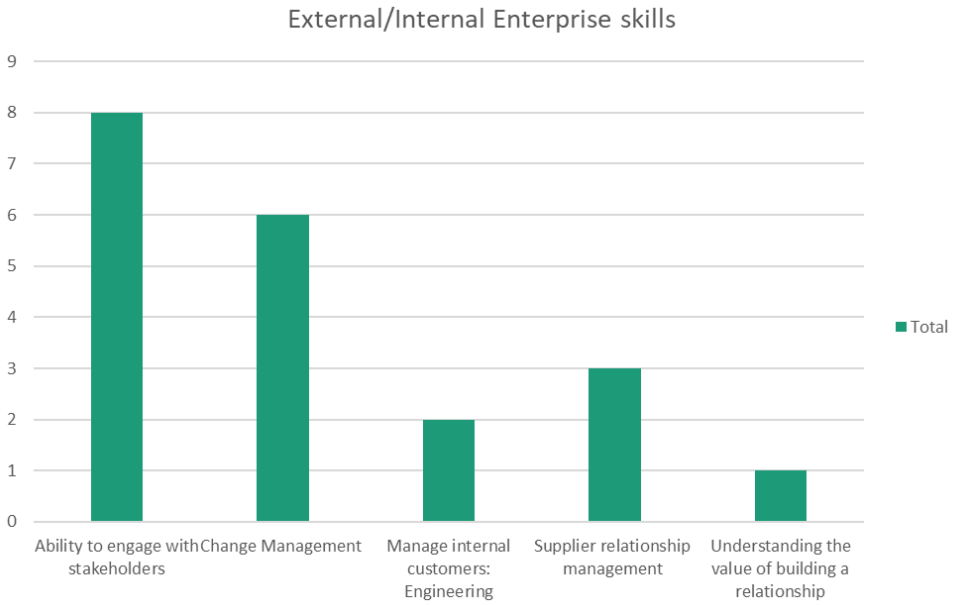


Figure 14. External/ Internal Enterprise Skills Response Rate



5. Conclusion

The Delphi study is a part of the third intellectual output (IO3) for Project PERISCOPE and is instrumental in helping gain insights of what senior visionary professionals see as future procurement skills and competencies that will enable innovation and sustainability. This section gives a short summary of the results and the outlook for the next Delphi Study.

5.1. Summary of the main results

The Delphi Study was sent out to PSM senior professionals that included practitioners, consultants, NGOs, and academics. Four trends stand out from the first round of the Delphi Study: “Digital Technologies”, “Supply Chain Flexibility and Transparency”, “Sustainability Impact”, and “Internal/Eternal Business Skills”.

The outstanding trend in the general business environment over the next 20 years foreseen by the respondents revolved around “Digital Technologies”. Specifically, digital technologies such as “AI” were predicted to enable more evidenced-based decision-making in supplier selection processes or to inform sustainable procurement decisions. This is supported by recent studies published in the field of purchasing, showing how AI can redefine the purchasing function (Allal-Cherif et al., 2021). Furthermore, digital technologies such as “automation” were predicted to be used more in automated logistics infrastructures, autonomous technologies (cars and trucks), and automation of production facilities. The Delphi study indicates that senior professionals believe that digitalization will also impact procurement in future. This ties in with existing literature on digitalization, which suggests that manual procurement processes can be substituted by automated processes using digital technologies, bots or RPA (robotic process automation), for instance, to reduce procurement cycle time significantly (Bag et al., 2019). Surprisingly, the Delphi study respondents did not emphasize the e-procurement tools, which are often viewed as a source of competitive advantage for purchasing functions: e-procurement tools help to reduce the lead time to place purchase orders, to optimize costs related to payment to suppliers, to eradicate transaction errors, to improve the data accuracy and quality (Sánchez-Rodríguez et al., 2019).

Additionally, the participants predicted that over the next 20 years “Supply Chain Flexibility and Transparency” will be key changes in sustainable procurement strategies. Participants foresee that supply chains flexibility and also supply chain transparency improvements will be key factors

in addressing significant sustainability issues. This is supported by existing studies such as Kashmanian (2017).

Participants set their views on “Sustainability Impacts” to become a major criterion in many companies’ decision-making. Where “Sustainability Impacts” can be seen as an umbrella term that relates to both social and environmental impacts (Pagell et al., 2010), the respondents in our Delphi study highlighted environmental impacts, including “avoidance of fuel” as a way to reduce greenhouse gas and carbon emissions. Similarly, many respondents also expect fossil energy to decrease over time: these expected trends clearly indicate changes in the environmental impact of physical distribution methods.

In order for future professionals to be prepared to adapt in the future business environment, participants foresee the need for what we describe as “Internal/Eternal Business Skills”. Internal business skills relate to the overall business and the cross- functional collaboration (Tassabehji & Moorhouse, 2008). For example, to manage internal relationships with marketing, sales, engineering and etc. External Business Skills relates to the supply chain network and the stakeholders. For example, these skills enable management of an external relationship such as suppliers or customers (Tassabehji & Moorhouse, 2008).

5.2. Outlook for next Delphi Study round

This white paper reports the results of the first round of the Delphi Study. In order to facilitate the second round, emerging themes and concepts coming out of the first round will be gathered into the design of a much more structured questionnaire containing closed-ended questions with answer options.

The most occurring themes that came from section 5.1 will be explored deeper:

- **Digital Technologies:** AI, Automation, Automated Procurement, Blockchain, Digital Transparency, IOT, Big data, ML, and Industry 4.0
- **Supply Chain Flexibility and Transparency**: Traceability, Flexibility, Agility, Rationalization, and Disruption
- **Sustainability Impact:** Reductions of carbon emissions, Localization, Circular Economy, Holistic Impact, and Social Impact
- **Internal/Eternal Business Skills:** Stakeholder engagement, Relationship building, Supplier management, and change management

The same participants will be invited to the second round, however it will not be compulsory. For the second round of the Delphi Study, the participants will receive a second questionnaire and will be asked to answer the questions that were based on the first round. The questions will apply ranking scales to determine the most important priorities of the codes in the categories mentioned above.

The aim of the second round of the Delphi Study will establish the findings and identify the areas of agreement and disagreement between the participants. In the second round, the outcome begins to form the results among the participants' responses. However, if there cannot be a clear result, a third Delphi study will then be conducted.

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