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IPR4SC Training Need Analysis

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1 Executive Summary

The report offers insights into the skill gaps connected to Intellectual Property (IP), Intellectual Property Rights (IPR), and circular and digital competencies of EU businesses and inventors needed to boost innovation performance. It focuses on the IP and IPR competencies, including General Knowledge of IPP, Searching skills, the IPR Registration Process, and IPR Utilisation in the innovation process and for green and digital transitioning.

Subsequently, these insights, based on the data collected through the “Survey on IPR Skills and Needs” (T2.2), allow for identifying the training needs which can be addressed by developing and implementing curricula and training materials aimed at higher education institutions (HEI) and vocational education (VET) students.

The main conclusions highlighted in the document are:

- The survey identified a skill gap between the learners (HEI and VET students), businesses and support organisations concerning competencies related to IPR.
- The most significant distinction between competencies is at the level of IPR familiarity, which reflects the respondent’s self-assessed knowledge of the field.
 - Unfamiliar – the group with no knowledge or very general perception of IPR;
 - Basic and Theoretic – respondents who received education in the field and have moderate to good theoretical knowledge;
 - Knowledgeable – the category of people with extensive theoretical expertise and/or practical experience in IPR utilisation.
- The stakeholders lack competencies in adopting technologies from registered (foreign/external) IPRs and have difficulties identifying business opportunities related to IPR utilisation. The report presented enough evidence to consider that these two issues might be creating a vicious cycle, discouraging the use of IPR and transitioning to the green, sustainable and circular business model.
- The IPR utilisation showed a discrepancy in IPR Skills between public and private stakeholders. Companies are more competent to utilise IPR in product/production innovation, such as adoption practices or in Research and Development (R&D). Support organisations excel at understanding alternative IPR utilisation, such as using it as a knowledge source or in green and digital innovations. Yet, this is the case for a selected minority of respondents.
- To develop the training materials and courses for HEI and VET students, the report suggests distinguishing between different levels of training complexity.
- Recommendations for the basic training level (targeting the Unfamiliar group):
 - Presenting the benefits of IPR for the technological and organisational innovation process.
 - Inclusion of case studies on how IPR, green and digital technology can be used to strengthen partnerships and collaborations.

- Focusing on explaining the reasons for registering IP, utilising IPR tools and databases for innovation, and reducing the impact of demotivational reasons for not using IPR, green and digital technologies.
- Recommendations for the more advanced level (for respondents with Basic and Theoretical knowledge):
 - Concentrate on boosting IPR-searching skills, knowledge of IPR databases and tools, and of the registration process.
 - Present available help for IPR, from support organisations to policy framework.
 - Include examples (in specific fields of study) on how to incorporate external knowledge (identified through IPR-search), green technology and pursue digitalisation in a company or an industry.
- Other relevant stakeholders (such as SMEs, TTOs, Professors, Trainers etc., who represent the Knowledgeable group) could benefit from IPR training. For these categories, we recommend focusing on the following:
 - Addressing the possibility of how to use IPR for strategic partnerships, building supply chains and innovation alliances.
 - Present case studies on how green and digital technologies benefit from IP registration and create conditions advancing a company's competitive position.
 - Present practical know-how and examples of successful transitions to sustainable models, green technology and digitalisation.
 - The training can be used for the "train the trainee" step. It can be delivered through workshops, informal training, the IP-Monitor platform, etc.

2 Introduction

The report is part of the “Developing Skills in Intellectual Property Rights Open Data for Sustainability and Circularity” (IPR4SC) project, co-funded by the Erasmus+ programme. The aims of the project are to boost the IPR, circular and digital competencies of EU businesses and inventors for greater innovation performance. This goal is to be achieved through developing teaching curricula and training materials for Higher Education Institutions (HEI) and Vocational Education (VET) students. An important part of this work is to try and bridge the established gap between the education system and business needs.

In this framework, the report focuses on presenting the results of the “Survey on IPR Needs and Skills.” The survey was implemented to define the severity of the aforementioned competence mismatch. This represents a preliminary analysis of describing the status quo on the application of Intellectual Property Rights (IPR) for innovation and business needs.

As such, the survey covered important aspects of IPR utilisation, concentrating on the performance of six main target groups. Defined by the project aims, the six groups are HEI students; VET students; HEI professors; VET professors; small and medium-sized enterprises (SMEs); and the representatives of relevant IPR organisations, such as technology transfer offices (TTO). Yet, the central attention will be on comparing the learners (students) with experienced groups and practitioners (SMEs) to detect important patterns in the application of skills and knowledge. As much as possible, the report will also try to uncover additional important differences in IPR, green and digital competencies that can be of use to a wider public.

The document limits itself solely to the presentation of the results and exploratory analysis based on the data from the survey. It also considers the information from the qualitative methodology (interviews, open questions, etc.) applied in parallel. The survey and data collection procedure were designed to serve the project goals. Therefore, the presented results, conclusions and discussions must be viewed within the constraints of the project’s framework. The report does not assume the responsibility of contrasting its findings against other research, reports or theories. Nevertheless, we encourage and consider it fundamental to carry out future research, gain additional knowledge and deepen the existing understanding of the topic of IPR, circularity and digitalisation, building upon the procedures, conclusions and results presented in this report.

2.1 Main Findings and Training Suggestions

This part introduces the main findings of the report and its suggestions for the development of the training materials. We will concentrate on answering the main questions formulated as the aims of the report. Thus, it will focus on presenting the identified problems, potential solutions and their impact on the status quo and suggest the best course of action for the training (based on the results).

The survey revealed a wide gap between the skill levels of the considered target groups. This is especially relevant in the context of respondents enrolled in a formal education programme, the

stakeholders active in the industry (SMEs) and support organisations. The division starts at the very basic level, i.e., familiarity with the term IPR. Eventually, the divide persists further in situations requiring the application of IPR-related skills, such as registration, defence and utilisation. Furthermore, the issue is affected by a genuine lack of understanding of the IPR process and poor recognition of business opportunities. A high percentage of SMEs, HEI and VET professors admitted their lack of knowledge in these regards. It is not only reflected in the IPR-utilisation competence for technological innovation. We also uncovered a low comprehension of business opportunities of IPR-utilisation in organisational innovation and implementing green and digital practices.

Based on insights from our data, we consider that these two conditions might reinforce each other in a vicious cycle, where being unaware of the benefits causes a low incentive to learn the relevant skill. And similarly, not knowing the practical aspects of these technologies and their potential application contributes to missing business benefits. If this assumption is correct, training can be one of the forces in breaking this cycle.

By raising awareness about good practices, explaining various positive combinations (e.g., of how IPR, green and digital solutions help secure profits) and presenting concrete cases, we could secure short- and long-term benefits for the business sector. Firstly, training will reduce (in the short term) the existing skill gap that is affecting businesses that apply such practices and utilise IP in their innovation process. This could increase the employability of HEI and VET students in these types of companies. Additionally, it would contribute to the knowledgeable firm's development by reducing the time and resources spent on finding and training relevant specialists.

And secondly, from a more distant perspective, training will improve the situation of the SMEs and industries that are yet inexperienced and unaware of the benefits of incorporating IPR skills in their innovation practices, transitioning to green models and digitalisation. Educating new students to recognise the business opportunities of green and digital technology, to become aware of possibilities to use IPR for an enterprise's benefit and to boost the knowledge of possible funding streams, support organisations' aid, and policy tips will affect the balance of the skill pool. As these students will get employed or become entrepreneurs, their knowledge will gradually change the perception of IPR in the marketplace.

The best way to consider the curricula and training materials is to follow the trail in the data pattern. The degree of familiarity with IPR – reflecting the self-assessed level of knowledge about IPR – best explains the patterns in the answers. The impact of the familiarity level can be seen in the way IPR skills are distributed in the sampled population. Also, it affects the extent of respondents' knowledge of green and digital trends.

The data from the survey indicates three levels of IPR familiarity. The Unfamiliar group is defined as being unaccustomed to the concept, representing those who have never heard of it or were merely affected as a consumer (had to pay for use). This group is heavily represented by HEI students and VET students but also includes significant proportions of HEI professors and SMEs. The Basic and Theoretical category can be described as having theoretical knowledge and solving easy practical issues related to IPR (e.g., identification of trends). This group is mainly formed of HEI and VET professors and SMEs. Finally, the Knowledgeable group incorporates 85% of the TTO representatives and includes a

decent percentage of SMEs, HEI and VET teachers. It can be characterised as the group that has practical experience working with IPR on a daily basis, owns IPR or has a very serious theoretical background. Conceptualising the curricula based on their best needs will answer two major questions in the project – namely, “how to proceed” and “when the training is needed.” This distinction might be the most suitable way to consider training timing as “when a certain skill becomes relevant” rather than a temporal dimension.

The fact that each familiarity level is well represented by a particular target group helps proceed with concrete suggestions for the curricula and teaching personnel. Therefore, we advise distinguishing between a few degrees of training complexity.

The basic training is best tailored for HEI and VET Students, as learners in the education system, and if possible open courses for the SMEs who are yet unfamiliar with IPR. The topics are best to be focused on presenting the full range of benefits of registering and utilising IPR. The idea is to clearly explain (preferably with distinct examples of green and digital applications) the business opportunities that come from intellectual property. This must expand over the technological and production fields and incorporate the possibilities for increasing market shares, improving marketing, management, R&D and soft innovation skills and strengthening business and co-creation relationships. Upon completion, this training level is to increase the motivation for using IPR, green and digital technology and reduce the impact of any demotivational factor.

The more advanced level of training is better suited for Students, Professors and SMEs, whose knowledge permits an understanding of the aforementioned benefits. It can be accomplished by introducing a specialised course at the Master's level, at the targeted field of study, and concentrating on presenting practical answers to existing problems. The possible range of topics might include IPR-searching skills in the selected area of application, competencies to critically read and analyse an IPR (e.g., a patent), information on whom to engage and where to search for IPR solutions and professional help. Among these, it will be beneficial to present examples and problem-solving cases that involve green and digital technology. Compared to the introductory course, these examples must focus on the application of such technologies into a company's routine and not on the exemplification of general benefits. Such courses can benefit from inviting experts and representatives of the Knowledgeable Category to present their expertise and express their interest in these practices.

The Knowledgeable group is the one that requires the most pragmatic approach. They are represented by specialists in the field or practitioners who already have a good understanding of the relevant concepts. However, this group will definitely benefit from raising awareness on where to find help for IPR, green and digital technology, how to build strategic partnerships for sustainable business models (and how to use IPR in this process), and from strengthening public-private cooperation. As two sides of the same coin, SMEs and TTOs have divergent but symbiotic competencies. On the one hand, SMEs are better at technical issues, such as the adoption of technology, transition and innovation application. On the other hand, support organisations are better equipped to suggest how to use IPR as an alternative knowledge source, how to integrate it into managerial and organisational innovation, as well as how to better perceive green and digital opportunities.

3 Data Collection

The data for the analysis was collected by implementing an IPR Needs and Skill Survey. Following the Project instructions, it aims to understand the needs of the learners (HEI and VET students) in carrying out IP-related tasks (in Circularity, Digitalisation and Entrepreneurship) to diminish the skill gap. Thus, the scope of the Survey was to perform a multiscale comparison between various practices, skills, competencies and understanding of IPR functionality among the perceived Target Groups (defined by occupation: HEI and VET students, HEI and VET professors, SMEs and TTOs).

The survey was developed based on the conclusions from the “Introductory training needs co-design event” (T2.1), where the partnership discussed the relevance of each stakeholder group and important topics at their level of competence. The final version addresses three main levels of IPR Skills: General Knowledge of IPR, Knowledge of the IPR Registration Process, and IP utilisation in the Innovation Process. Given the complexity of the topic and the different levels of knowledge and skills, the survey offers distinct pathways accounting for various stakeholders’ experiences (see Annex 1).

The survey was structured in four parts: I) Skills in Promotion of IPR and Understanding of IPR utility; II) Skills in Reading, Analysing, Comparing, Drafting and Defending IPR applications; III) Utilisation of IPR and IPR Management for Innovation (Knowledge and Technology- Creation, Adoption, Combination, and Commercialisation); and IV) Demographic information. Overall, the survey comprises 13 questions, divided unevenly among the first three parts (see Annex 2). Most of the questions include separate variables/items that measure various aspects of the main concept identified in the questionnaire.

To ensure the good quality of the results and offer empirical evidence for the aforementioned goals, project partners had to disseminate the survey among the main target groups. The minimal accepted amount to validate the results was to present the survey to 600 HEI students, 200 VET students, 60 HEI professors, 20 VET teachers, 100 SMEs, and 30 TTO representatives, a total of 1010 stakeholders. The consortia proceeded with an online survey to secure the dissemination goal. The final reach was 1769 respondents who opened the survey, which exceeds the initial dissemination goal (1010). Six hundred thirty-two (632) respondents proceeded with the survey, offering their answers. From this group, 469 completed the survey (74,2%), and 163 answers were partial (25,8%). The answer frequencies by occupation (target groups) and Geographical location are presented in Table 1.

Table 1: Answer Patterns by Occupation and Geographical Location

	Southern Europe	Central and Northern Europe	Frequency (identified)	Percent of Total	Valid Percent
University student	131	51	224	35,6%	45,7%
Vocational education learner/student	32	4	38	6%	7,8%
University lecturer (researcher/professor)	53	19	75	11,9%	15,3%
Vocational education trainer/teacher	15	0	15	2,4%	3,1%
Small and Medium Enterprises	64	19	103	16,3%	21%
Representative of a Technology Transfer Office	15	0	15	2,4%	3,1%
Other	15	1	20	3,2%	4,1%
Total	325	94	490	77,8%	100%

The dissemination of the survey was carried out by the project partners. Therefore, this affected the respondents' geographical representation. As it is clear from the table and partnership composition, Southern Europe has a bigger share of answers. Nevertheless, the consortia made an effort to incorporate stakeholders from various EU countries, to increase the diversity of the respondents as much as possible. In the end, the survey reached 26 European countries and also got answers from non-European residents on the continent (Table 2).

Table 2: Answer Rates by Country

Country	Frequency	Percent Total	of Valid Percent
Austria	1	0,2%	0,2%
Bosnia and Herzegovina	2	0,3%	0,4%
Bulgaria	4	0,6%	0,8%
Croatia	68	10,8%	13,3%
Czech Republic	2	0,3%	0,4%
Estonia	1	0,2%	0,2%
Finland	1	0,2%	0,2%
France	3	0,5%	0,6%
Germany	7	1,1%	1,4%
Greece	28	4,4%	5,5%
Hungary	69	11,0%	13,5%
Ireland	3	0,5%	0,6%
Italy	68	10,9%	13,5%
Moldova (Republic)	7	1,1%	1,4%
Montenegro	1	0,2%	0,2%
Netherlands	2	0,3%	0,4%
Norway	57	9,0%	11,2%
Portugal	3	0,5%	0,6%
Romania	25	4,0%	4,9%
Serbia	5	0,8%	1,0%
Slovakia	1	0,2%	0,2%
Slovenia	127	20,2%	24,9%

Spain	5	0,8%	1,0%
Switzerland	1	0,2%	0,2%
Ukraine	1	0,2%	0,2%
Poland	1	0,2%	0,2%
Non-European (Other Continent)	15	2,4%	2,9%
No Answer (e.g., Symbol, non-existent country, etc.)	3	0,5%	0,6%
Total	511	81,1%	100,0%

2.1 Limitations

Despite the consortia's efforts, the survey results are faced with severe limitations in generalisation potential. Firstly, given the interest in reaching specific experts, applicants and learners groups, the survey abandoned any ambitions for sample representativity. This concerns both national and EU levels. Secondly, the time constraints compelled the partnership to apply a strategy of Commodity Sampling – disseminating the survey among the network that is closest to a particular partner. Some active dissemination was done to reach larger networks, especially for the SME group. However, this effort is not enough to consider it a randomised sample. In other words, to ensure the survey dissemination quotas, coupled with sampling strategy and geographical coverage, the survey implementation had to sacrifice some of its methodological quality.

Another set of limitations is reflected in the survey structure. Given the diversified and very distinct target groups, the structure had to pursue various pathways for the respondents (see Annex 1). This includes the separation of experienced, knowledgeable, skilled and competent answers (providing separate questions to deepen the knowledge for these groups – marked as YES path in Annex 1) from the inexperienced respondents (marked as NO path). Although a necessary decision, it affected the pathway to some of the questions. Some paths were adequate only for a small proportion of respondents, which affects the results and raises the risks of misinterpretation.

Finally, a very crucial problem is the drop-out rate. Regretfully, many respondents were not interested in completing the survey. We encountered a heavy drop rate at the beginning of the survey (from the second to third questions). To some extent, the drop-out reflects the disinterest of some groups and partially explains the difficulties in the dissemination process. Based on the fact that this drop-out happened exactly between the second and third questions, where the questionnaire starts introducing more technical and direct topics, we can assume that many actors feel insecure in giving their opinions due to a lack of competence. The drop-out situation is presented in Table 3.

Table 3: Drop-Out rates by Occupation and Geographical Position

	Valid Answers (Q2)	Valid Answers (Q3)	Valid Answers (Q13)	Drop-out Loss on the first major step (Q2-Q3)	Drop-out Loss till the end (Q2-Q13)
Drop-Out by Occupation					
University student	217	197	174	9,22%	19,82%
Vocational education learner/student	37	35	35	5,41%	5,41%
University lecturer (researcher/professor)	74	69	63	6,76%	14,86%
Vocational education trainer/teacher	15	15	14	0,00%	6,67%
Small and Medium Enterprises	99	93	82	6,06%	17,17%
Representative of a Technology Transfer Office	14	14	14	0,00%	0,00%
Others	18	16	14	11,11%	22,22%
Drop-Out by North and South Dichotomy					
Northern and Central Europe	89	83	73	6,74%	17,98%
Southern Europe	319	303	278	5,02%	12,85%

The drop-out rates can be used to understand the respondents' attitudes to answering the IPR-related questions. The greater disinterest is seen with the HEI students, SMEs, and university lecturers' groups, raising critical questions about their motivation to speak about IPR and readiness to acknowledge its importance. Putting them in contrast with the most faithful group – the TTO representatives, who, despite low numbers, show 0% of dropouts – suggests an issue on the professional (even subcultural) level that might be important for future research.

With all the limitations, the generalisation of survey results is impossible, and therefore the report serves the interest of presenting preliminary results for exploratory purposes. The group differences in the analysis are relevant only to the implementation of project goals. In other words, the data is suited for the narrow interests of the report to present a descriptive picture and guide the project's decision-making. However, the results can be useful for future research, serving as a basic point for hypothesis formulation but not as a representative report. We also encourage future researchers to consider the survey's structure, topics and limitations as a preliminary effort while further improving their studies based on the lessons learned during the IPR4SC project.

4 General IPR Knowledge

4.1 Familiarity with IPR

The survey revealed that the majority of respondents are unfamiliar with the concept of Intellectual Property Rights. Only a limited portion are competent and have experience working with IPR (Fig.1¹). Up to 62.7% of the surveyed comprise the Unfamiliar group, with no or a very general understanding of the term. 2/3rds of this group professed that their knowledge is limited to practical experience while encountering a situation when they had to respect IPR regulation and pay-for-use. More than 100 respondents admitted that they had never heard of the concept before.

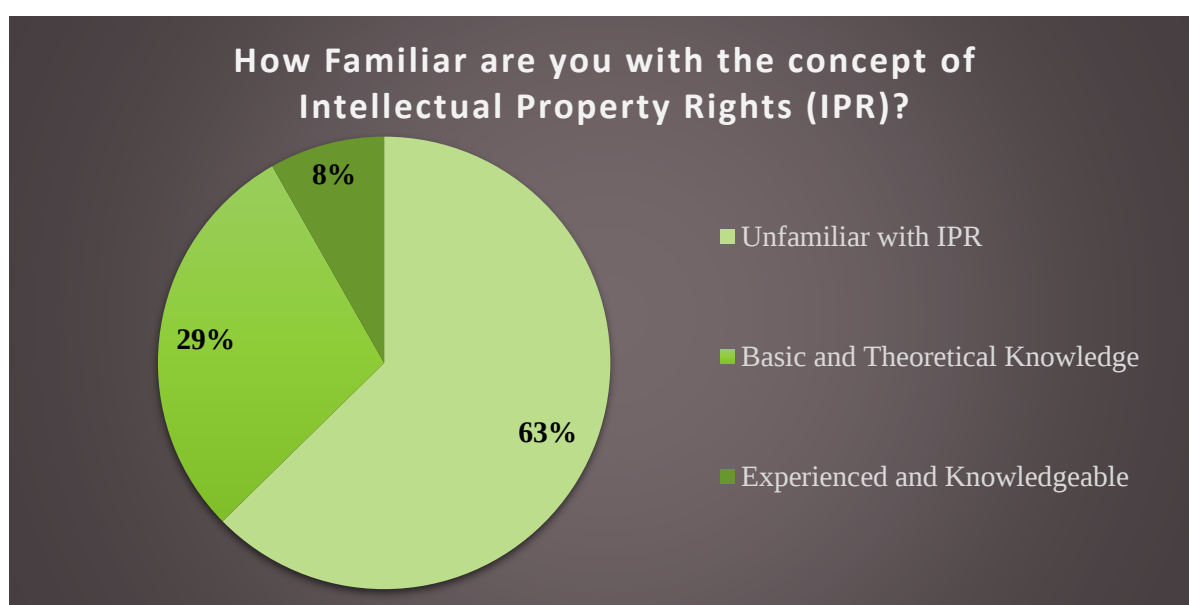


Figure 1: How Familiar are you with the concept of Intellectual Property Rights (IPR)?

The cumulative share of respondents with at least theoretical and basic knowledge of IPR is 37,3%. The most representative groups with significant experience in this area are the respondents associated with Technology Transfer Offices (TTOs) and small and medium-sized enterprises (SMEs) (Fig. 2). TTO

¹ The groups in the analysis correspond to the following answers to the second question in the Survey (Annex 2):
Unfamiliar with IPR: a) *I did not hear about this term before;* b) *I know only in very general terms – e.g., that I have to pay for music, videos, and photos that are (copyrighted) owned by other people*
Basic Knowledge: a) *I have basic knowledge – e.g., I had a class that introduced IPR, I can differentiate between types of Intellectual Property (IP) and navigate the terminology;* b) *I am knowledgeable or active in studying IPR on a theoretical level – I know and check relevant literature in the area; I can do a descriptive analysis; I can provide some introductory training; etc.*
Experienced and Knowledgeable: a) *I have (exploratory) experience working with IPR – e.g., reading a patent; identifying copyright; searching for a patent or technology; researching and analysis of trends; etc.;* b) *I own or deal with IPR regularly – e.g., I have a patent, copyright, etc.; I license or use licenses; I check for infringements and defend IP rights; etc.*

representatives are by far the most competent in dealing with IPR. Such a situation was expected, given their immediate interest and work responsibilities.

These groups are followed by the teaching personnel in higher education institutions (HEI) and the vocational educational (VET) trainers/teachers. Their share of expertise in working with IPR is roughly the same (over 13%). Although not a very high number, it can indicate a decent interest from the educational system in understanding the processes and practices associated with IPR. However, since a large group of teachers and lecturers are not familiar with the term IPR (in the range of 50-60%), it might be a sectoral or disciplinary interest in particular, with a lacking general/environmental importance in HEI and VET institutions.

Finally, the HEI and VET students are the least familiar with the concept. The vast majority of respondents enrolled in formal education comprise the unfamiliar group (Fig.2). The share of respondents with basic and above knowledge are barely above 20% in both groups.

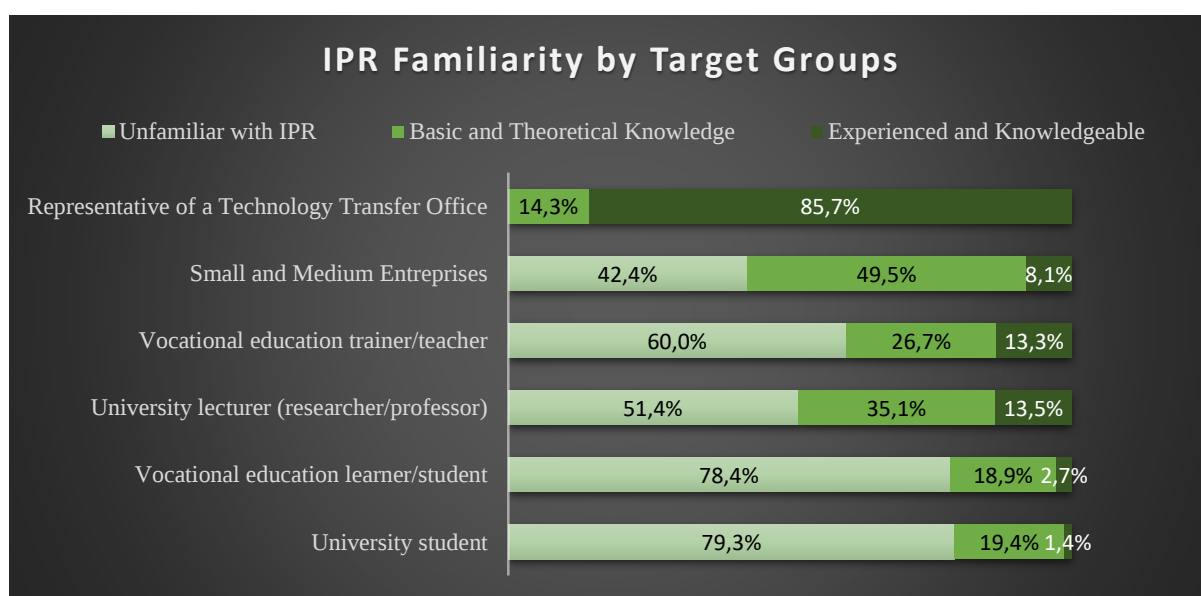


Figure 2: IPR Familiarity by Target Groups

The graph clearly highlights a discrepancy between the target groups. This is a severe gap between the educational system and the private sector (further addressed as Education/Implementation gap). The ANOVA test of group differences confirmed our suspicions, showing a statistically significant variation between considered target categories ($F=26.084$, $p=0.000$). Such a problem sits at the core of the project's aims, and the survey results confirm the relevance of pursuing IPR education. The statistical analysis did not reveal a significant difference neither between Southern and Northern Europe, nor based on the Educational Background.

A few of the reasons explaining respondents' unfamiliarity with the concept of Intellectual Property are of personal and environmental nature. We considered a separate path for the Unfamiliar group

and asked about their experience and incentives that they encountered, motivating them to get some information about IPR. Among some of the most important are Professional Needs, Innovation Needs, Organisational Interest, IPR Legislation, and a Sense of IPR Use in the Community they Live in (see Fig. 3). The most discouraging parameters are the environmental ones that act on the social level (e.g., legal framework and community pressure). These are also the least impactful to motivate someone to deepen their knowledge of the IPR issues. On the other side of this vector is the Organisational Interest, which creates direct pressure for someone to learn about IPR. It is followed by direct Professional and Innovation Needs. Indubitably, these three levels are related. In combination with the conclusions from the previous graph (Fig. 2), these findings allow us to stipulate that the motivation or discouragement to learn about IPR is generated mostly from the presence or absence of a direct need (or internal policy) of the organisation, institution or company where the respondent is active. This gives a good incentive to pursue the information efforts, mostly through raising awareness on the institutional and organisational levels. That can lead to a genuine spread of IPR topics further into the work-breakdown structure.

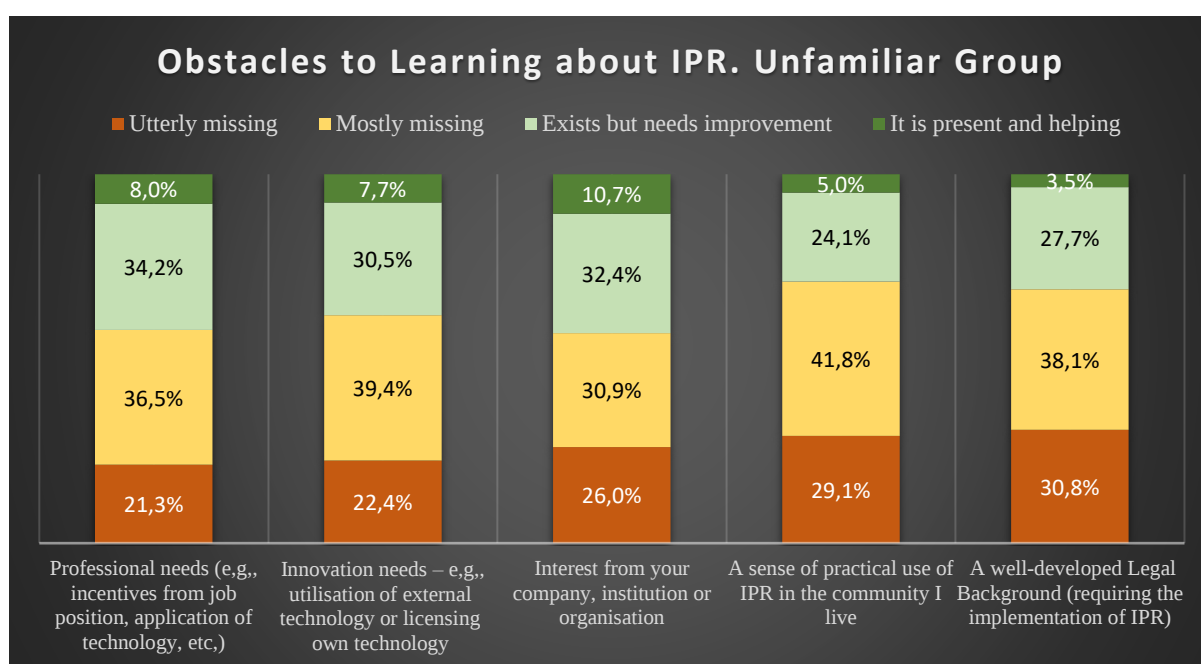


Figure 3: Obstacles to Learning about IPR. Unfamiliar Group

We further investigated the Education/Implementation gap that we observed earlier. Focusing on the environmental causes discouraging learning about IPR, we cannot conclude that the division of target groups is significant. Among the Unfamiliar group, both the respondents undergoing education and those employed in the private sector have similar issues in being motivated to learn about IPR (see Fig. 4). The greatest difference is in the case of Organisational interest, resonating with previous conclusions.

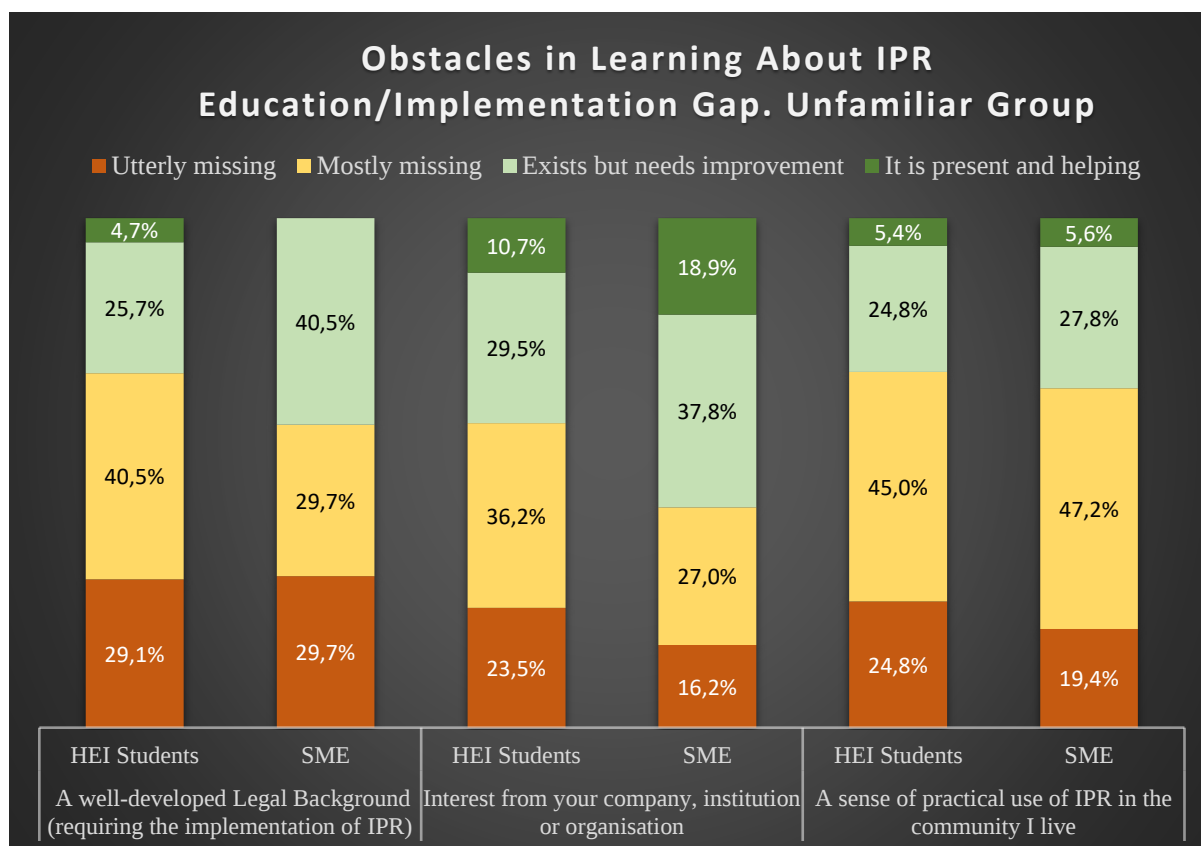


Figure 4: Obstacles in Learning About IPR. Education/Implementation Gap. Unfamiliar Group

The ANOVA test confirms this finding, as the differences are not statistically significant between the occupation groups. Only VET students show meaningful variation compared to other types of respondents. But given their small number and the methodological limitations of the survey, it is premature to conclude their status. Similarly, divisions by Geographical Positioning and Educational Background were unable to explain meaningful differences in respondents' answers (confidence level 95%). Therefore, we did not pursue a more detailed analysis in these directions.

On the opposite side of the argument, the groups that are familiar with IPR show good skills in comprehending the concept (Fig. 5). The respondents found it easiest to guide someone to organisations offering legal and active help. Roughly 2/3rds of the answers agreed that they have good knowledge about that. However, there is clearly a problem with identifying policy incentives that help in IPR registration. A possible explanation for this dilemma is the lack of communication and trust between public-private sectors. Therefore, the practitioners feel the need to address their problems with a specialist but are not monitoring important changes and public support offered to them.

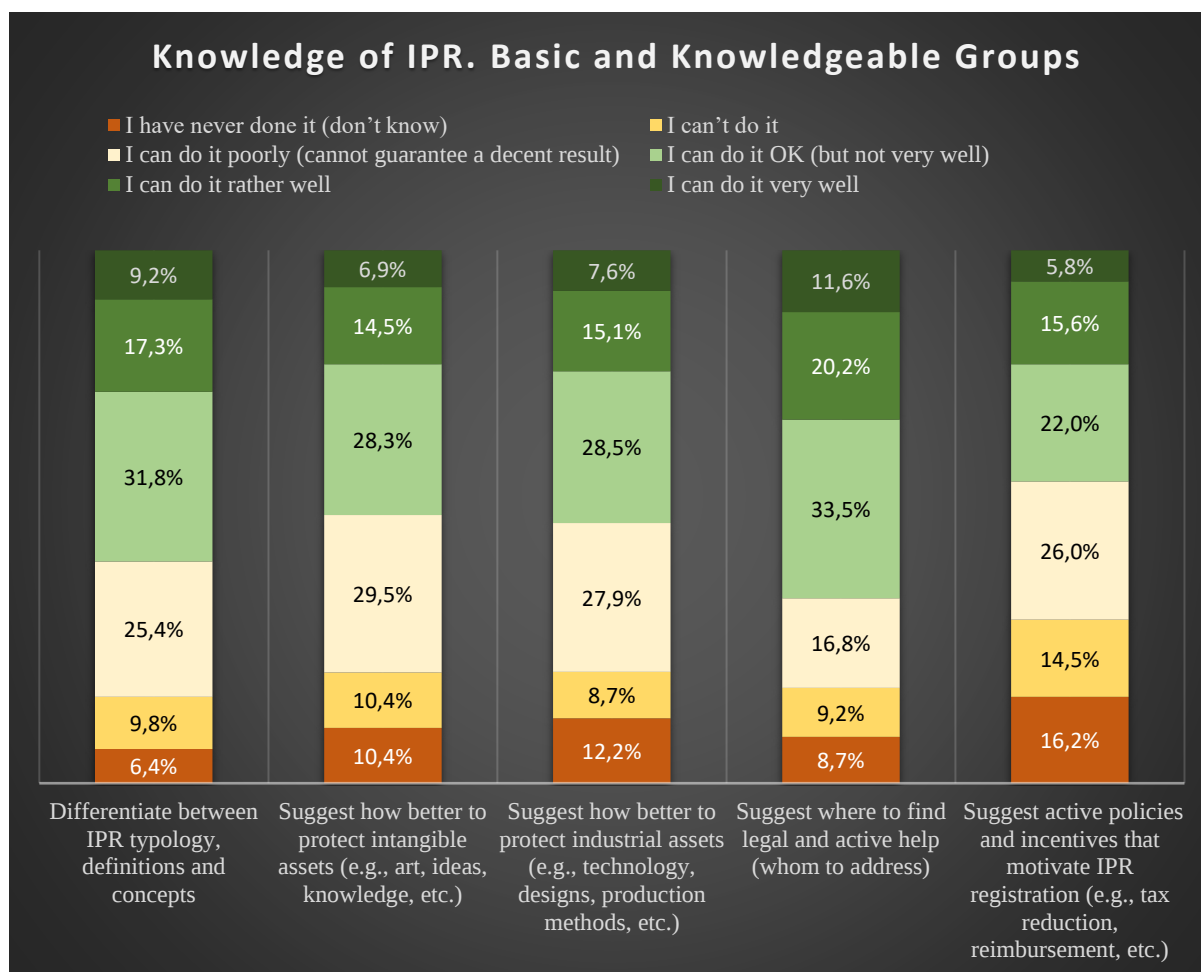


Figure 5: Knowledge of IPR. Basic and Knowledgeable Groups

40% of the respondents in these two categories find it hard to distinguish what protection is offered by different types of IPR. Even more (around 50%) have difficulties choosing the correct IPR strategy to protect tangible and intangible business assets. This is a very important finding for the project. Considering also the Unfamiliar group (and its overwhelming representation in the whole sample), the situation highlights a genuine problem – there is a lack of awareness related to IPR. Insufficient education and/or recognition of the importance of intellectual property rights might be relevant explanations for the created situation.

4.2 Information Sources

IPR skills are not the only important factor in developing training materials and curricula. Using adequate language, approaches, and ways to reach the target groups is similarly relevant. The format of the lectures can be (indirectly) improved by analysing the information sources used by the respondents.

The survey measured the importance of several most impactful information sources: Online General Search, Online Targeted Search, Educational System, Asking Specialised Organisations, and Consult Speciality Literature. Based on the results, a general online search is by far the most preferred alternative for informing about IPR (Fig. 6).

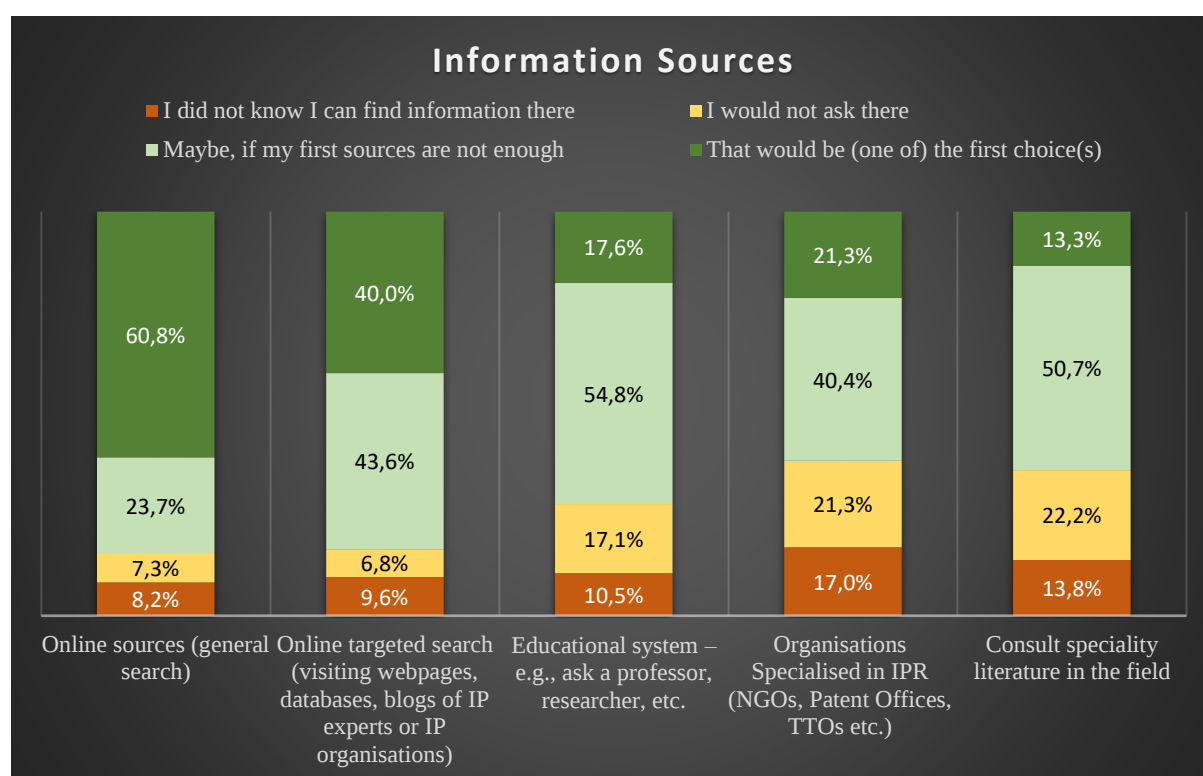


Figure 6: Information Sources

The general overview, however, hides a deeper distinction in searching patterns. The degree of IPR familiarity radically changes the information sources' preferences. The best examples to illustrate this discrepancy are the sources involving Specialised Organisations (Fig. 7) and Targeted Online Searches (Fig. 8).

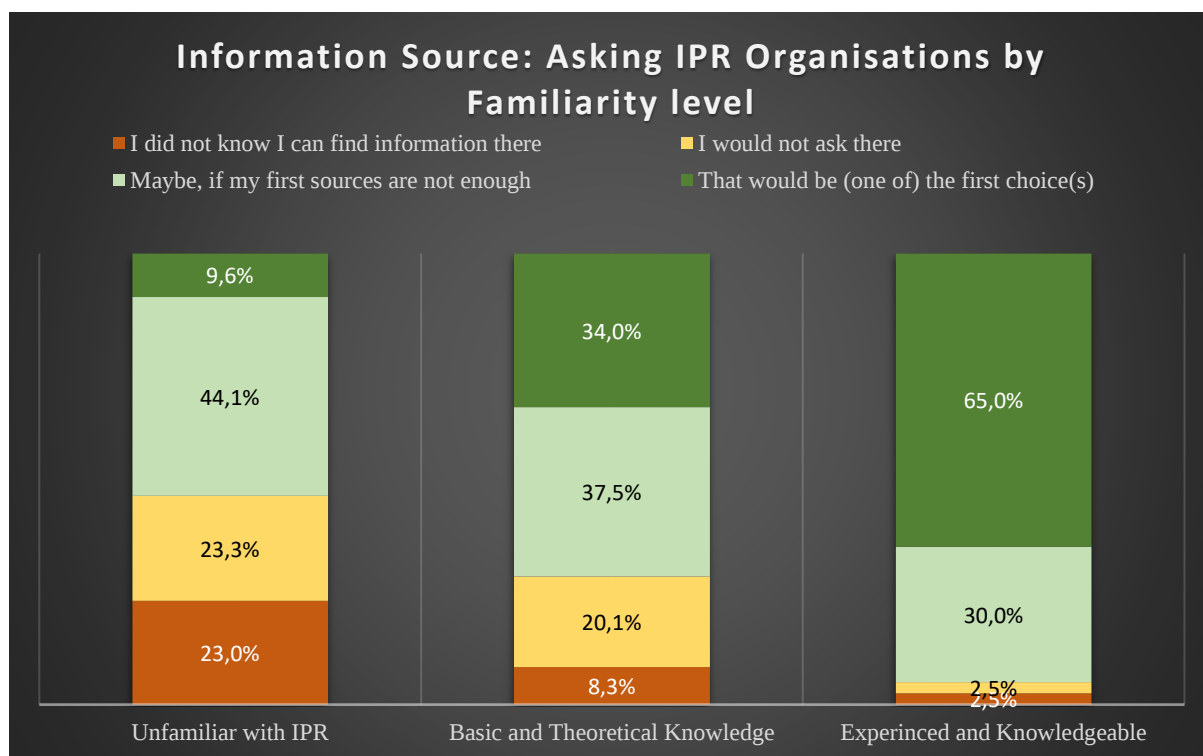


Figure 7: Information Source: Asking IPR Organisations by Familiarity level

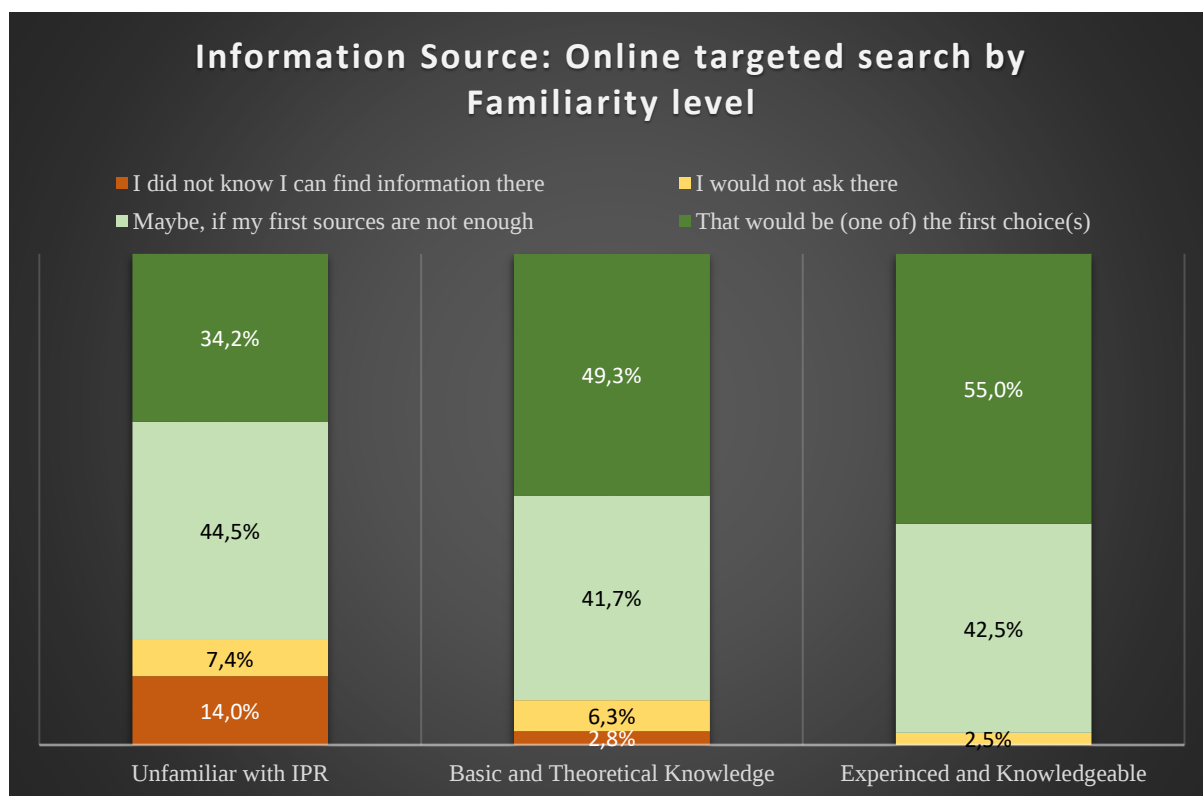


Figure 8: Information Source: Online targeted search by Familiarity level

The two graphs highlight the difference in information sources, as practised by the respondents with different levels of IPR familiarity. This is the only grouping factor that showed a statistically significant difference among the targeted categories. Dissecting the data based on Occupation, North-South dichotomy, or Educational Background did not present meaningful differences. At first glance, the conclusion is that with experience, the dependence on opinions and information from specialised professionals grows.

This can have practical implications on the decisions to build specialised training. As the differences are suggestive (general search is associated with easy and abstract concepts, and moving to targeted search and professional opinions implies complex and detailed solutions to practical problems), the provided training can be tailor-made to advance the complexity. The training materials could be inspired by “easy-to-understand” sources when developing the basic training curricula, moving to include more complex concepts from speciality literature (being an important influence for the Basic Knowledge group). Finally, an advanced course could be presented using information based on templates of training and articles provided by specialised organisations.

Besides the main answer categories, the respondents could identify their alternative information sources. These can be separated into three main groups: a) asking colleagues, peers (the ones that are knowledgeable of it or are working in the field) and personal network; b) asking business support organisations (e.g., chambers of commerce, TTOs, etc.); and c) alternative platforms (including educational content on YouTube).

4.3 Understanding IPR Importance and Benefits

Before assessing respondents’ practical skills concerning IPR utilisation, we committed to examining the level of understanding of the relevance of IP for innovation and entrepreneurship. This step acts as an important bridging factor between the levels of expertise that can give us an answer on what to expect concerning further discrepancies between Unfamiliar and Knowledgeable categories, as well as between the Target Groups identified in the project. As the understanding of benefits does not require practical experience to grasp some concepts, it is a proxy analysis to unravel the level of preparedness (motivation) of the surveyed population to apply IPR in their future professional careers and entrepreneurial endeavours.

This part concentrates on six common benefits that are applicable universally in any national or regional innovation systems (see Fig. 9). The graph reveals a sad situation concerning IPR utilisation. In five out of six indicators, the prevalence of answers that are unaware of possibilities on how to use IPR for their own benefit is very high (ranging between 60-70%). The exception is the understanding of the general benefits of IPR and IP registration (i.e., the unique rights it guarantees). Even in this case, more than 45% of the respondents lack a decent comprehension.

The figure suggests a genuine disinterest, but the survey limitations do not allow for drawing generalising conclusions for the EU level. Nevertheless, given the dissemination effort, it is possible to stipulate that these are preliminary basics for further studies in this field. Focused research can help spread light and acknowledge the lack of IPR awareness among EU inventors and SMEs.

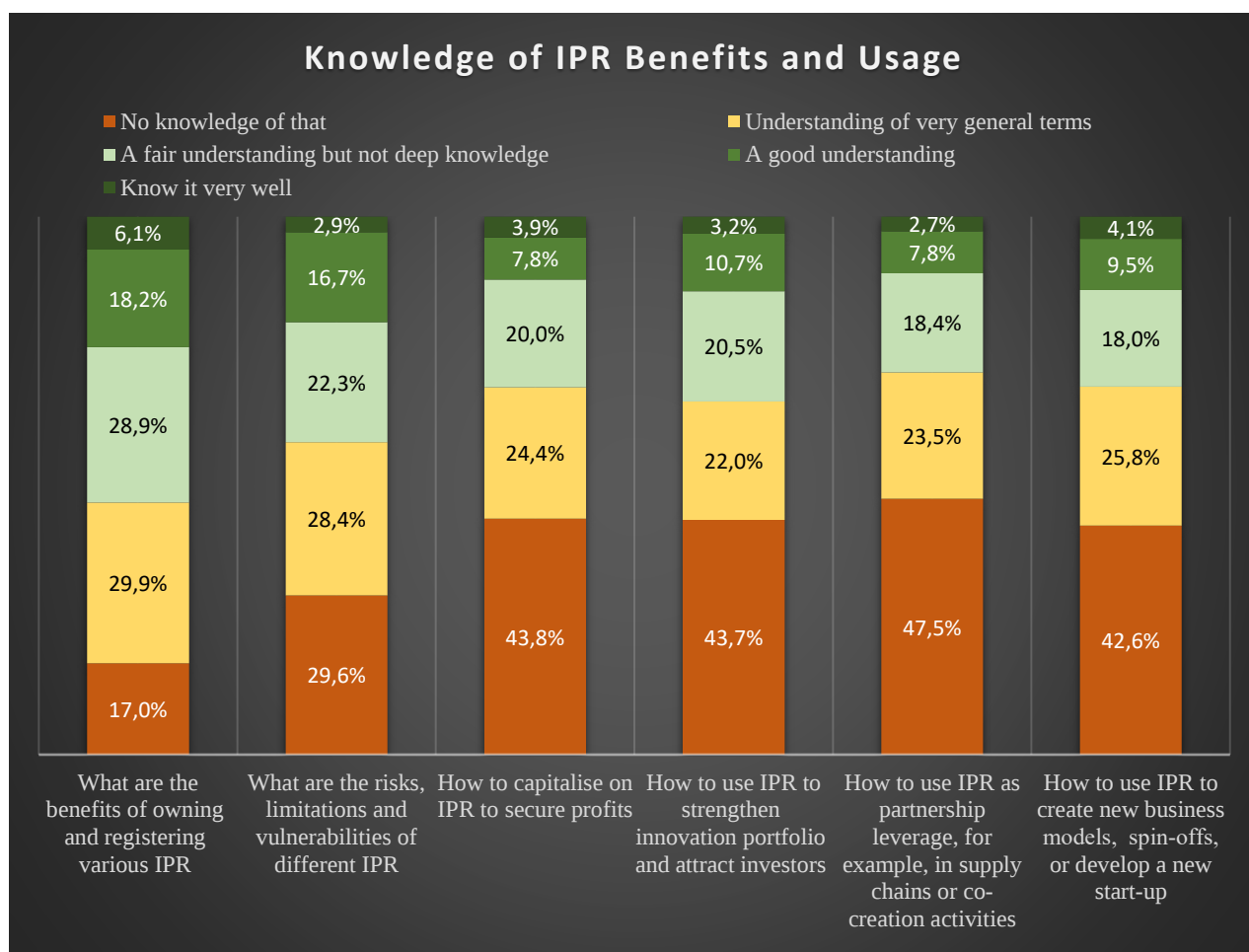


Figure 9: Knowledge of IPR Benefits and Usage

Statistical analysis revealed yet another discrepancy among the comparable groups (Table 4). The level of familiarity and the occupation or respondents affects the ability to focus on the benefits of registering/owning Intellectual Property. The impact is higher for the “Familiarity with IPR” (comparing the F values between analyses). Although it is to be expected that experienced groups will have a better understanding of the concepts and associated outcomes, the critical discrepancies still indicate a problem. The divide is wide enough to cause an issue for the general audience. Data indicates a niche of IPR practitioners and knowledgeable stakeholders, which is not supported by the pool of skills in the market. This issue is evident when comparing HEI students with SMEs (Fig. 10)

Table 4: ANOVA Test Results. Knowledge of IPR Benefits

Concept:	Familiarity with IPR		Target Groups	
	<i>F value</i>	<i>p-value</i>	<i>F value</i>	<i>p-value</i>
What are the benefits of owning and registering various IPR	42.050	0.000	11.362	0.000
What are the risks, limitations and vulnerabilities of different IPR	56.024	0.000	10.436	0.000
How to capitalise on IPR to secure profits	39.149	0.000	7.683	0.000
How to use IPR to strengthen innovation portfolio and attract investors	41.690	0.000	6.250	0.000
How to use IPR as partnership leverage, for example, in supply chains or co-creation activities	41.765	0.000	8.037	0.000
How to use IPR to create new business models, spin-offs, or develop a new start-up	51.421	0.000	9.659	0.000

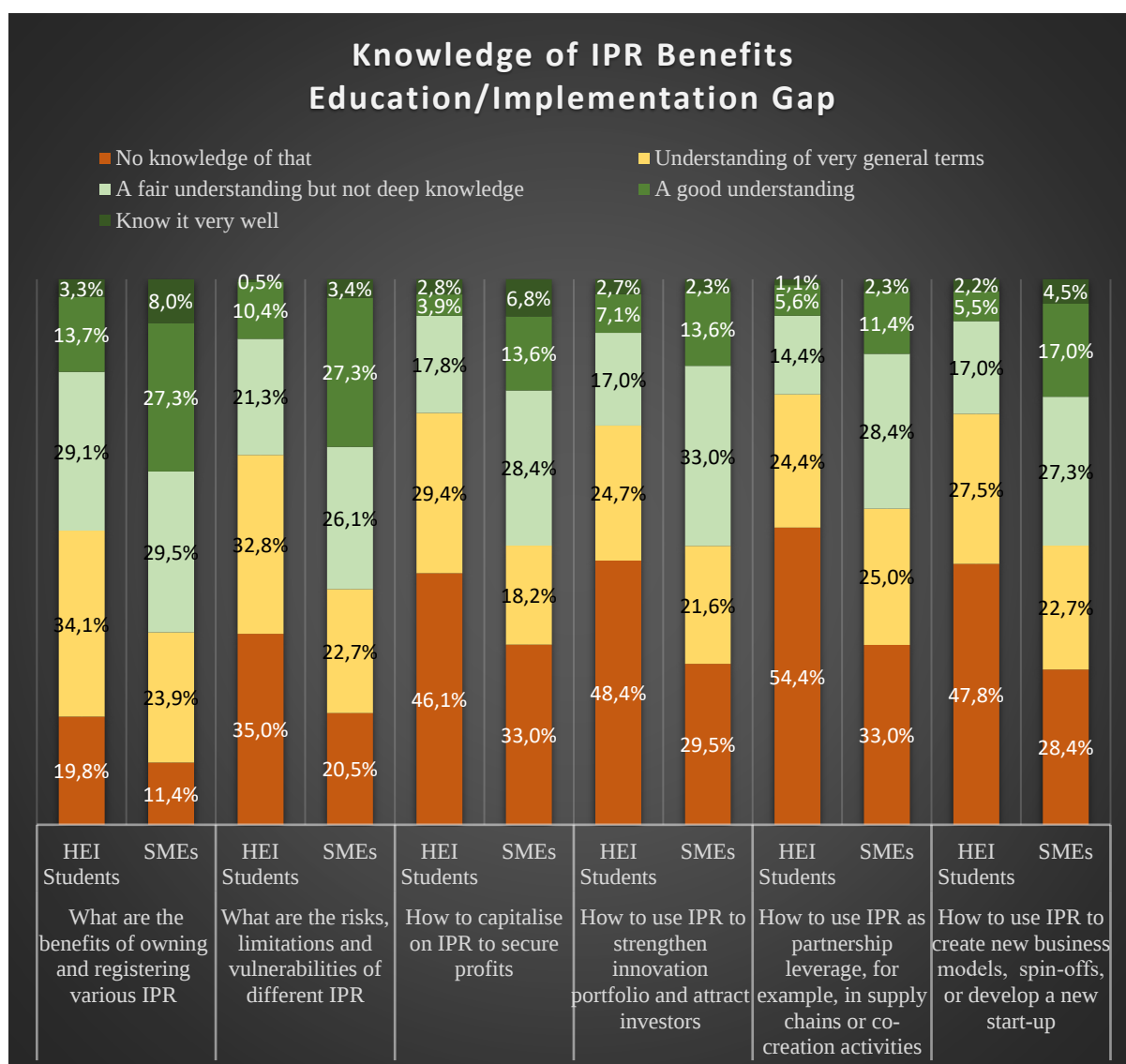


Figure 10: Knowledge of IPR Benefits Education/Implementation Gap

Statistical analysis revealed that the divide is mostly among the groups undergoing education (HEI and VET students) and the rest of the respondents. Even if the divide is clear and suggestive of Education/Implementation gap, another truth is that a significant proportion of Surveyed SMEs has trouble identifying potential ways to use IPR. For example, the case of Using IPR for Co-creation and Cooperation could indicate that there is a dominant mentality of sealing IPR inside a company and limiting its access to become a part of network knowledge circulation. Overall, the data can be interpreted as unveiling a preference to lock competitive advantages inside a firm, thus limiting the possibility of creating joint projects and even engaging in circular models.

4.4 Conclusions

The main conclusion to draw in this chapter is that there is a lack of knowledge about IPR and that the degree of knowledge is dictated by the practical need encountered by the respondent. Analysing the unfamiliar and experienced groups made it clear that the gap is manifested on two levels. Firstly, the division on “Familiarity with IPR” best explains the answer patterns. Therefore, an important element in developing the training curricula and additional materials is to separate between different training complexities, considering the descriptions of Unfamiliar with IPR, Basic and Theoretical, and Knowledgeable groups.

Secondly, an important reveal is the constitution of these three groups. The Unfamiliar level is comprised mostly of HEI students (58%), with HEI lecturers (13%) and SMEs (14%) being smaller but sizable parts of this group. SMEs (35,5%) represent the main part of the group with Basic Knowledge, followed by HEI students (30%) and university lecturers (19%). And finally, the Knowledgeable respondents are mostly representatives of the TTOs (31%), HEI and VET professors (30% cumulated), and SMEs (20,5%). HEI and VET students are the least experienced, jointly accumulating only 10% of the Knowledgeable group. The proportions indicate a gap in the application of IPR, especially in the transferability of skills from the Education System to the industry and private sector.

The recognition of IPR benefits contributes to this discussion. Considering that the perception is low even among the respondents in the private sector, the training should opt to raise awareness of the benefits of IPR that exceed the possibility of “limiting other’s rights”. Intellectual property can be utilised as an asset to boost competitiveness, networking, and knowledge exchange and bridge various organisational differences for cooperation. This can be accomplished by introducing discussions on various practices that involve IPR and providing/working on concrete empirical examples so as to raise the argumentation's credibility. Focusing on practical issues can also reduce the communication barriers between theory and practice. Moving to advanced levels of training implies a shift to sources that offer complex solutions in IPR utilisation and transition to sustainable and green business models.

5 IPR Skills and Needs

5.1 Skills in Searching and Identifying Technology Through IPR

The general patterns stayed the same when we considered the IPR-searching skills. Searching for IPR or through an IPR database is a hard task (to at least put significant effort into doing it) for the majority of the respondents. From 65% to 75% of the surveyed population encounter significant difficulties in searching for an intellectually protected technology or asset. Based on the general overview, the least complicated is to identify a proper Database to search for registered IP, and the hardest is to investigate if an IPR is commercialised (Fig. 11).

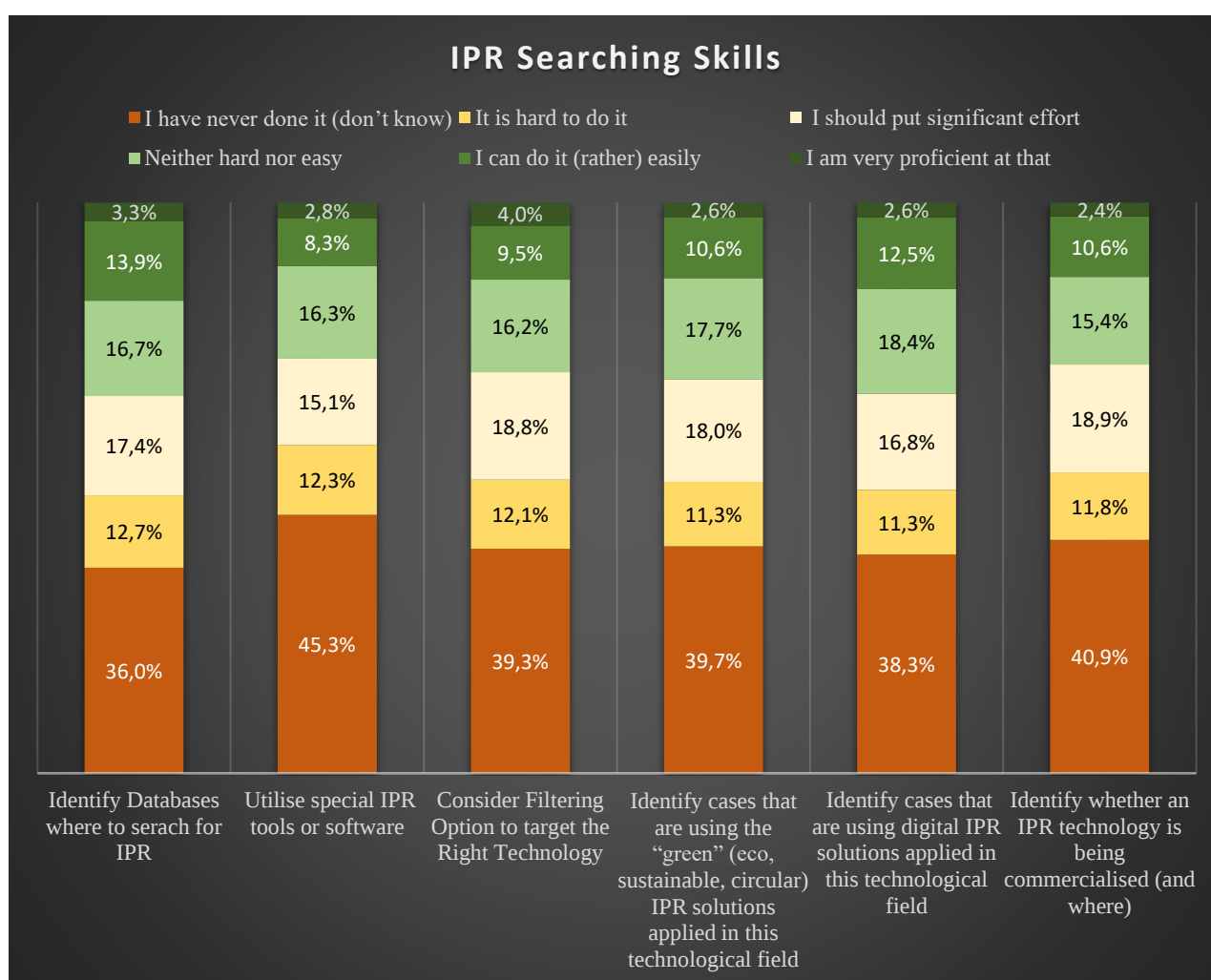


Figure 11: IPR Searching Skills

The dire situation with IPR-searching performance and lack of experience can be explained by the large number of HEI students in the surveyed sample. Their prevalence, and the skewness of data towards

the unfamiliar group, impact the general overview. To properly assess the existing status quo of Searching Skills, we considered analysing previous major grouping factors.

One of the interests of the IPR4SC project is to explore potential differences in skill levels, primarily between searching/identifying green and digital IPR and an unspecified technology. Splitting the data by Familiarity Level and by Target Groups (occupation) revealed a situation very similar to the previous part (Table 5). Once more, Familiarity has the strongest statistical impact on data interpretation. Division on the three groups of familiarity with IPR is continuously significant across all questions and factors within the ANOVA post hoc Tukey analysis. For the Target Groups split, the main outliers are TTO representatives and VET students, who present significant differences across the analysis.

Table 5: ANOVA Test Results. Searching skills for Undefined, Green and Digital technology

Concept:	Familiarity with IPR		Target Groups	
	<i>F value</i>	<i>p-value</i>	<i>F value</i>	<i>p-value</i>
Consider Filtering Option to target the Right Technology	60.179	0.000	8.917	0.000
Identify cases that are using the “green” (eco, sustainable, circular) IPR solutions applied in this technological field	40.305	0.000	6.655	0.000
Identify cases that are using digital IPR solutions applied in this technological field	33.000	0.000	5.283	0.000

A deeper analysis of the differences in searching for unspecified, green and digital technologies revealed an important distinction. On the level of application of skills, the difference is most representative of the Knowledgeable group (Fig. 12). Respondents falling into Unfamiliar and Basic Knowledge groups have roughly the same pattern concerning all three types of technology. For the expert group, the proportion of unskilled answers (that have to put at least significant effort into searching) grows by more than 5% when moving to the identification of green technology and digital IPR. The percentage of “proficient” responses is also affected, dropping by 10% when focusing on digital and green solutions. This graph underlines an important finding in the framework of the IPR4SC project. A potential explanation can be a genuine lack of experience working with sustainable and digital patents compared to other IPRs, among the SMEs with experience. Another important subgroup (that heavily represents the Knowledgeable category) is the TTO representatives. This also raises questions on whether they have sufficient knowledge of the distinction between technology types. The cumulative percentage of positive performance (green-coloured answers) is rather high, but the particular skills on green and digital seem to be affected nonetheless (the percentage of respondents who would not find it too difficult to search for unspecified technology: 86%; green technology: 76%;

and digital solutions: 69%). This can be reflected in the industry distinction and discipline differences, as such technologies might be of interest in some sectors more than in others. Yet, in this regard, ANOVA post hoc tests did not see meaningful differences when grouping the data by Educational Background.

This highlights the need to introduce new curricula on IPR education that will focus on including searching “tips and hints” for all groups. When developing training materials, we might consider focusing on examples that will help respondents identify green and digital technology while searching. The last step is especially important for the Knowledgeable category, which has good searching skills but encounters difficulties in spotting green and digital technology.

The same problem was identified when splitting the groups based on the Education/Implementation dichotomy (Fig. 13). The graph shows a very bad situation for the searching skills of students and SMEs. For the latter, the important distinction is a considerable reduction in “proficient” quotas and an increase in the “rather easily” percentage. The potential explanation is a lack of confidence in the SME employees and managers to distinguish between their targeted technology and green and digital ideas. It supports the previous conclusion, as the private sector is not too hasty to perform such innovation steps. This is continuous across Northern and Southern Europe, as the groups show no significant difference in Green ($p=0.251$) and Digital Technologies ($p=0.079$) searching competencies.

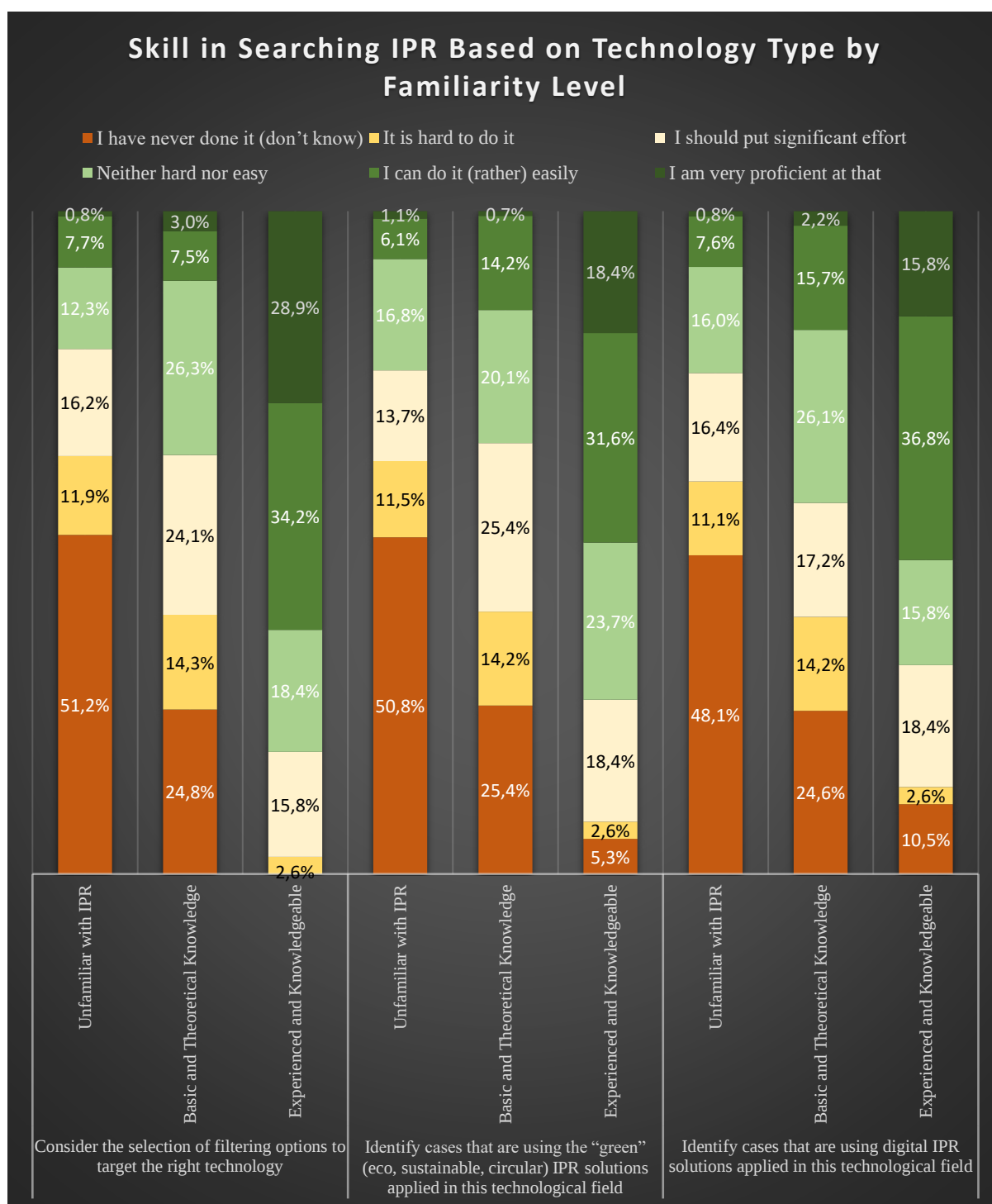


Figure 12: Skill in Searching IPR Based on Technology Type by Familiarity Level

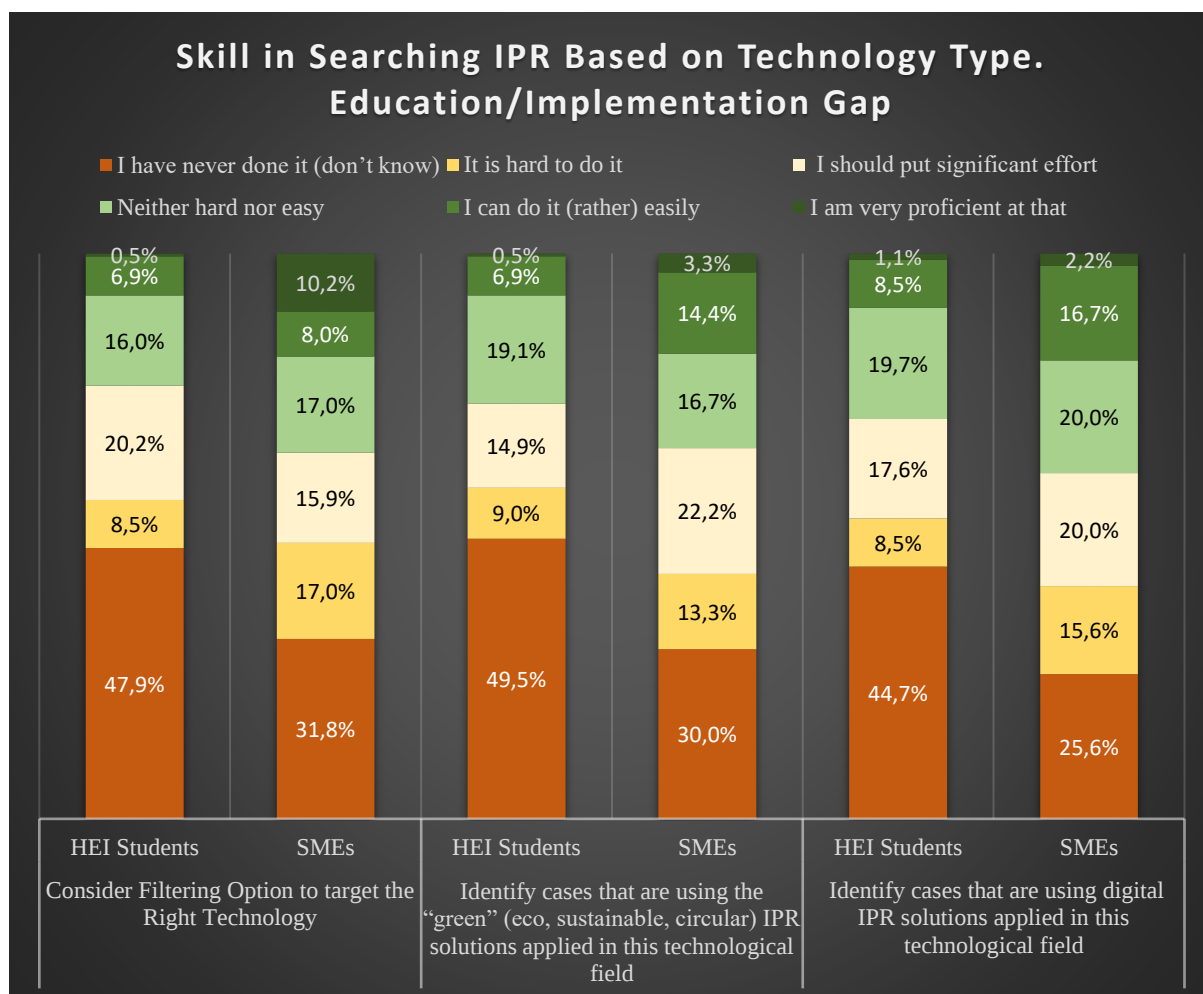


Figure 13: IPR-Searching Skill based on Technology Type. Education/Implementation Gap

Concerning the respondents enrolled in formal education, they feel most confident in identifying digital IPR. This can be the results of the selected survey population, as the data collection was set to concentrate on students of IT and business programmes.

5.2 Knowledge and Skills in the Registration Process

To proceed with the assessment of the skills and competencies reflecting respondents' experience with the IPR application, we started with understanding the situation concerning relevant legal and procedural knowledge in the field. Similar to previous findings, this stage also shows a low overall comprehension of the legal and registration practices. The percentage of the respondents with no or very general knowledge overwhelms the experienced groups (Fig. 14). Respondents feel most confident in perceiving the national legal framework on IPR. This can be an intuitive conceptualisation, as national regulation affects their daily activity and creates pressures (in the form of sanctions) to consider their relevance. Once more, the Degree of Familiarity with IPR is the most potent grouping

factor to explain the answer patterns (ANOVA F-values range from 62.172 to 82.137 for the items in Fig. 14). The difference between the Target Groups is generally significant (F-values from 5.375 to 12.073, for the items in Fig. 4), but it did not show enough variation in post hoc test (except for VET Students and TTO representatives²) to consider additional analysis.

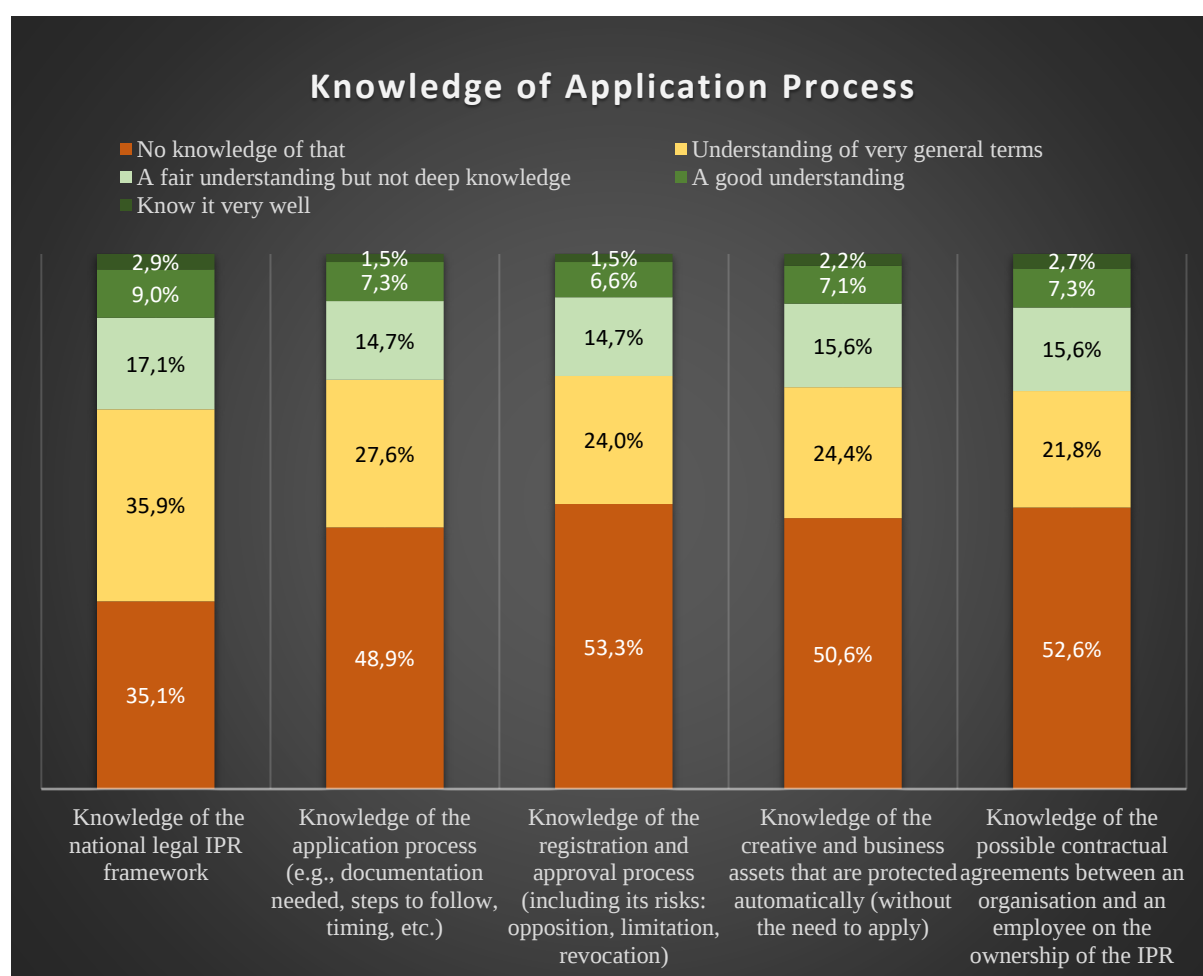


Figure 14: Knowledge of Application Process

In regard to actual experience in IPR registration, 85% of the respondents declared that they were never engaged in the IPR registration process. Only 15% have actual experience (Fig. 15).

² This conceptualisation reflects the limitations of the Survey. The aforementioned groups are more attached to one Familiarity Category (VET students to Unfamiliar, and TTOs to Knowledgeable) more than respondents from other occupation categories.

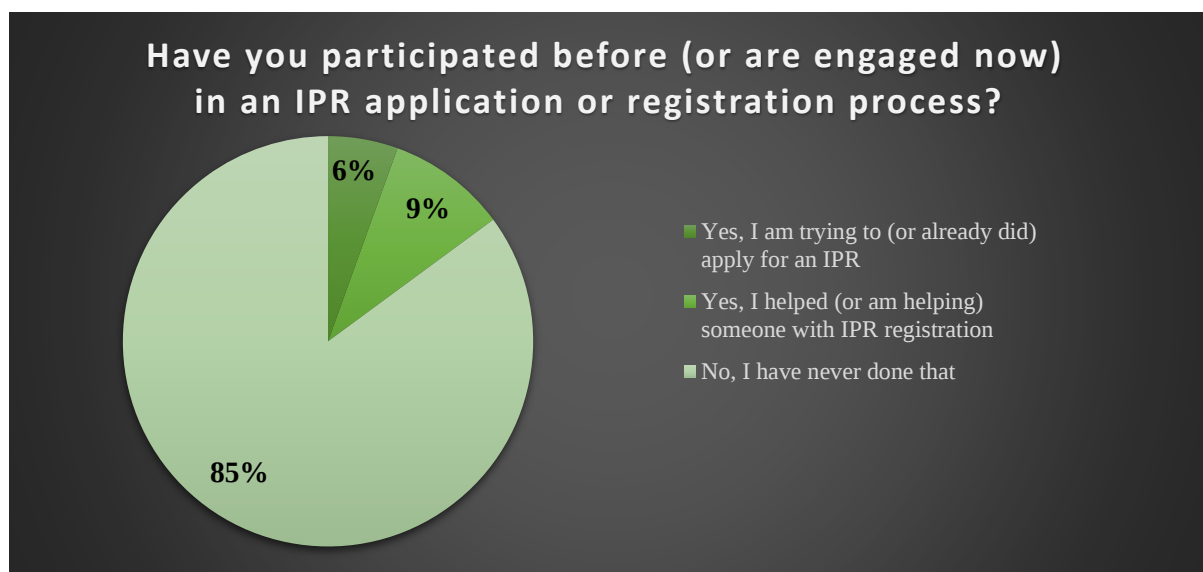


Figure 15: Experience in the IPR application or registration process

It is important to remember that the data is not representative of the EU or any national population. The percentages are skewed due to the selection of Target Groups and big representation of non-expert groups, such as HEI students, HEI professors, etc. This is especially evident when looking at the expertise per Occupation categories (Fig. 16). Only a small fraction of HEI and VET students have any experience with IPR registration (5-6%). The situation with Education Personnel is not very different. Among HEI and VET professors, roughly 15% have registered or helped apply for IPR. It is totally different for the TTO representatives. Their work positions require direct involvement, so only 7% of them have never been engaged in such practices. The most important is the situation with SMEs. Although they are the second most experienced group, the proportion of non-applicants represents 3/4ths of the surveyed SME sample. An interesting finding is their engagement in helping others with IPR registration. This probably represents the degree of participation in the IPR registration process by the individual involved in the process (e.g., helping their colleagues, taking care of a specific task, etc.).

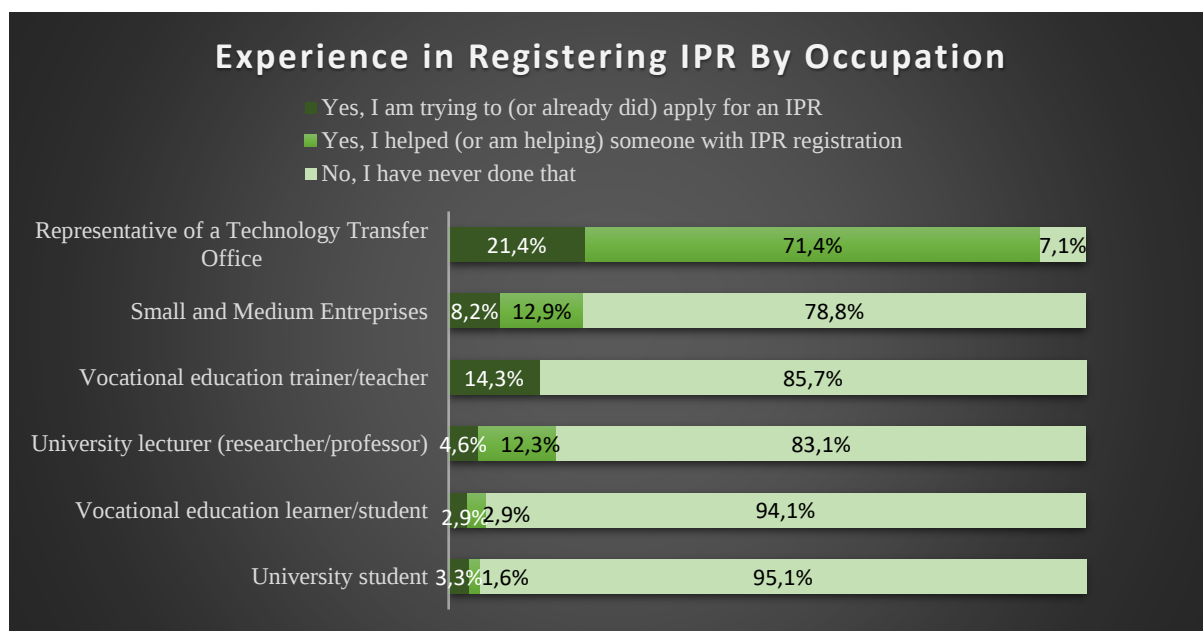


Figure 16: Experience in Registering IPR By Occupation

The previous question did not consider the possibility of certain groups abandoning the application efforts. Deepening the analysis revealed that a total of 7,4% (from the group that answered negatively) reconsidered the decision or discontinued their registration attempts (Fig. 17). According to the answer patterns, the four main reasons for abandoning IPR registration are: Technology is under Protection Already; Timing Required for Registration; Registration is too Expensive; Uncertainty if Technology is Worth Protecting (Fig. 18). The issue of expensive registration was the main reason for refusal among the SMEs (75%). If we consider the low perception of IPR benefits (Fig. 10), the financial issues could reflect a misinterpreted cost-benefit analysis, as SMEs do not perceive all the usefulness to cover the costs.

The least impactful demotivators are the fear of revealing internal secrets, illiterateness to interpret the regulation, unawareness of the registration process, and worry about registering illegal technology.

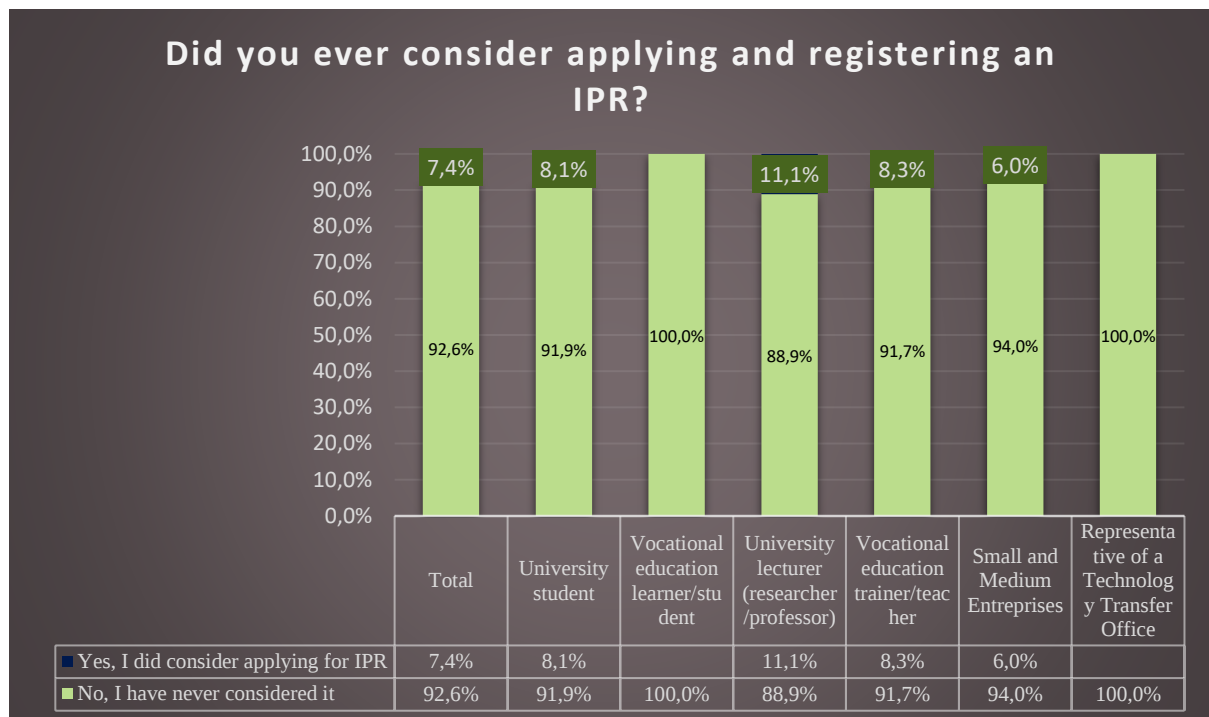


Figure 17: Considered Registration Among “Did Not Apply” Group

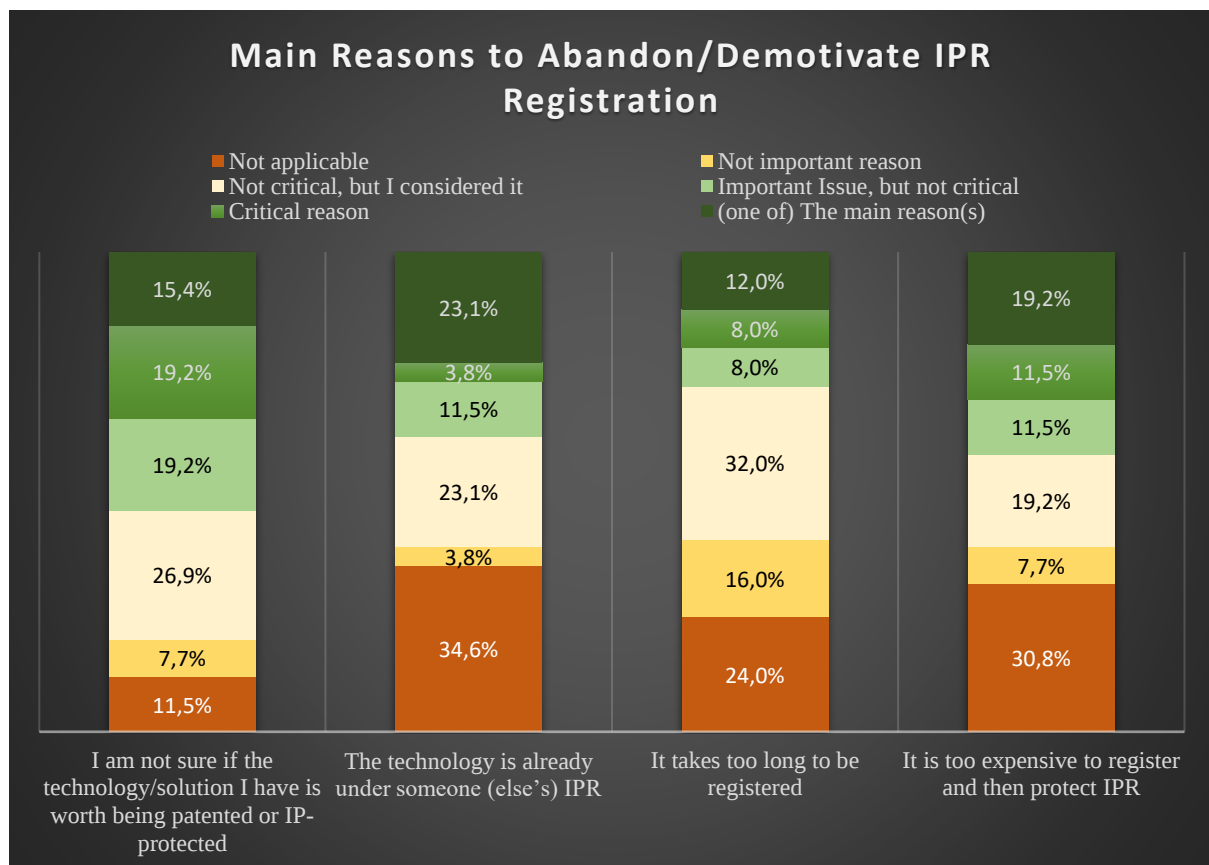


Figure 18: Main reasons to Abandon/Demotivate IPR Registration

To assess the status of IPR registration skills, we looked only among the groups who had experience in applying for protection (for themselves and helping others) and the respondents who seriously considered this step. Therefore, the grouping came naturally based on the split in the previous questions (Fig19).

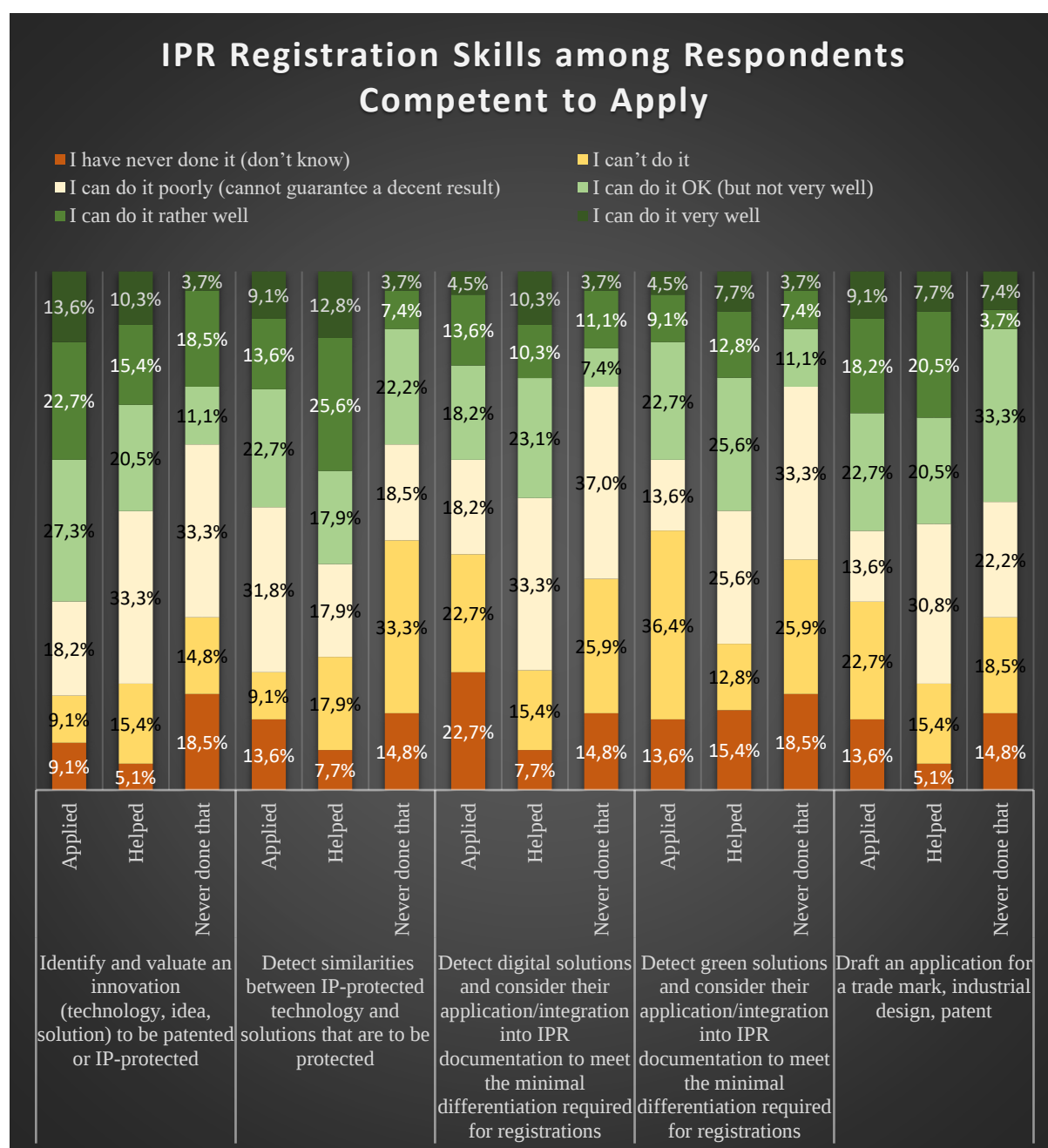


Figure 19: IPR Registration Skills Among Respondents Competent to Apply

The groups of respondents who applied for IPR, helped apply or realistically considered registering a technology (but did not) represent a small proportion of the surveyed sample (see Fig. 15 and 17). It is ill-advised to perform statistical analysis on these categories due to the “small number error”. Nevertheless, the data exhibit a distinctive pattern. The group that only considered registering IP showed the lowest scores among the three categories. This raises the question about the causality of this phenomenon: whether they didn’t pursue the application due to lacking skills or whether their decision to abandon the registration ended up becoming a missed opportunity to learn new skills.

The graph also indicates a significant difference between groups that applied and that were helping with IPR registration. Firstly, the identification of the “right” technology to register shows a high divide. Respondents who applied for IPR are very skilled in identifying and evaluating a technology to be IP-protected. However, they are visibly less competent in detecting technological (minimal) differences necessary for the registration, especially distinguishing and integrating digital and green content in the application. Although the results are not conclusive, the survey revealed an important direction for public-private cooperation. These differences can be an indication for the TTOs and business support groups to specialise in helping with suggestions for green and digital changes, offering consultation on the matter. Thus, the curricula could concentrate on raising awareness of the importance of green and digital innovation, as well as on indicating the stakeholders who might provide help.

Finally, drafting an Application Form has the highest homogeneity among the groups. This is an important finding, indicating that technical issues are more important than legislative and bureaucratic concerns. This reverberates with previous conclusions on the reasons for abandoning or disregarding IPR registration.

The discussion on application skills cannot ignore a situation when a company or inventor must defend their Intellectual Property. The data shows that not many respondents were in a situation to be engaged in a defence process. Only 3% of the surveyed had to defend their IPR, and 6% helped others do so (Fig. 20). These numbers indicate relatively low chances of facing an illegal problem with IPR. The majority of respondents did not own IPR, which explains the low number of infringement detection.

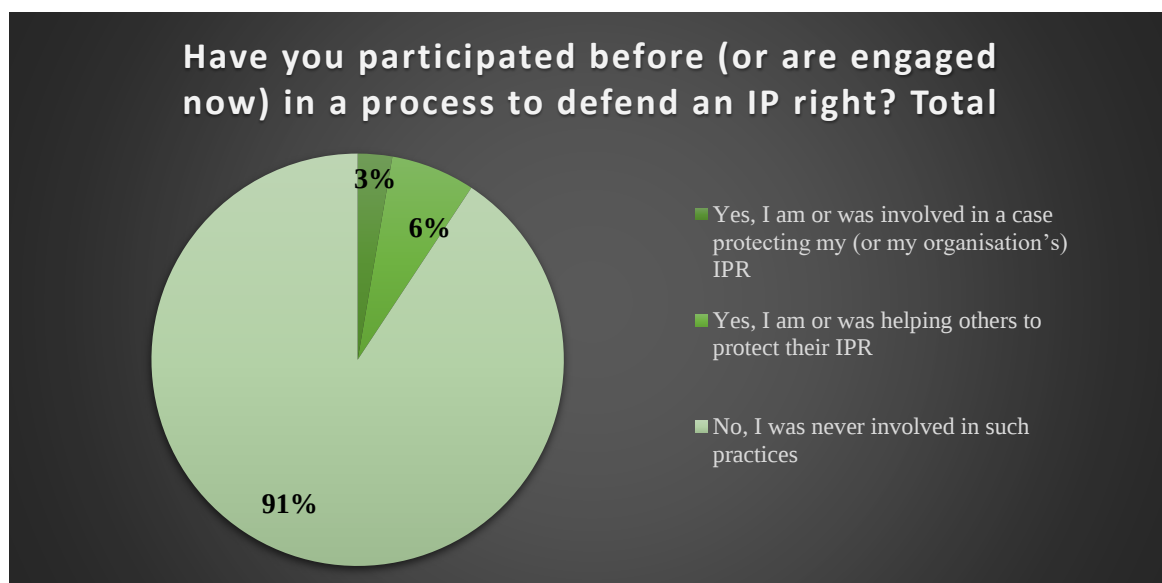


Figure 20: Experience in Defending IPR

The defence of IPR shows similar dynamics as the application skills (Fig. 21). Therefore, the same conclusions can be applied to this situation. The curricula could address the issue in a similar fashion, as to cover the IPR defence topics by indicating the possibilities of accessing professional help (especially from TTOs and business support organisations). This can act as a bridging topic, decreasing the notorious trust gap between public and private spheres.

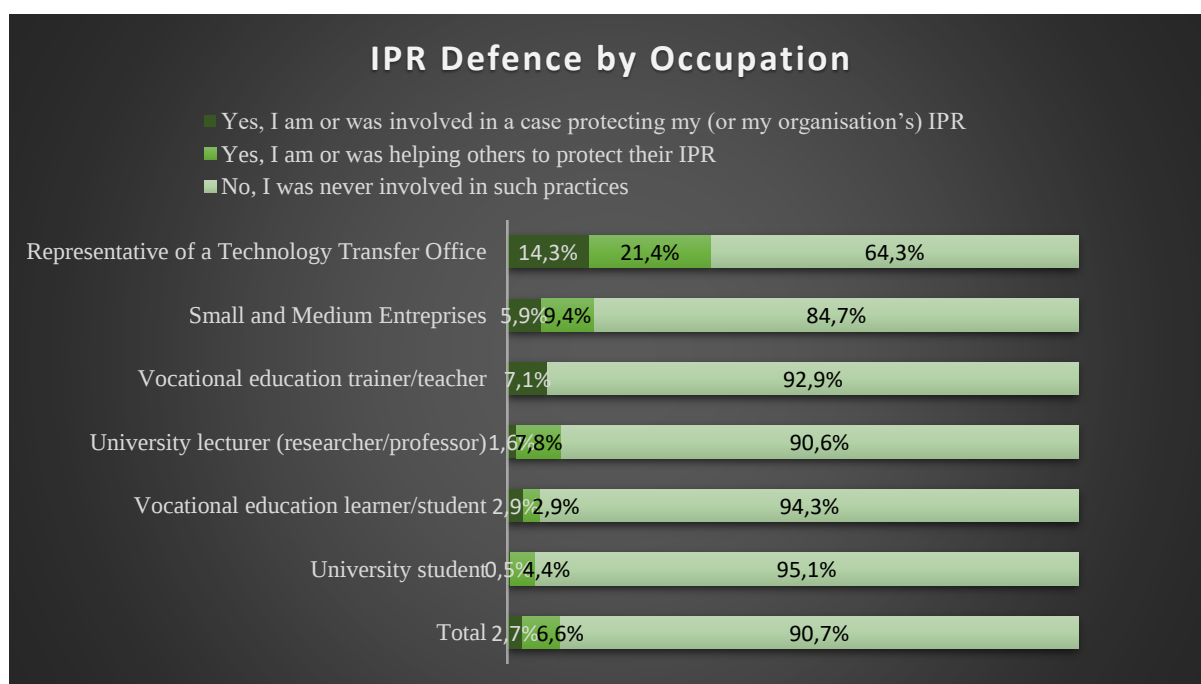


Figure 21: IPR Defence by Occupation

5.3 IPR and Innovation

The most important part of the report touches on the practical application of IPR in the innovation process, with a specific focus on integrating green and digital solutions. Among the surveyed population, only a third has ever considered IPR for innovation activities (Fig. 22). Cumulatively, 29,4% are considering IPR as innovation input, of which only 16% aim to utilise it in their working place or entrepreneurship activities.

The intents differ based on the level of IPR familiarity and North-South dichotomy (Fig. 23). Analysing the Knowledgeable category, it shows a high degree of thoughtfulness in the Business-Support group, followed by a significant proportion of respondents who consider using it in the industry at their current employment position. In the context of less familiar groups (Unfamiliar and Basic), the entrepreneurial intent is higher (as a ratio among positive answers), but the category indicating a lack of interest prevails. Such findings indicate once more that the IPR framework could benefit from public-private cooperation and training in raising awareness about business benefits.

Additionally, the data shows a greater IPR usage in Northern and Central Europe compared to Southern countries. The difference is most visible considering the intent to utilise IPR in entrepreneurial endeavours. In practice, this shows a higher need to teach Southern European Students and SMEs about the importance of IPR and the privileges it grants to existing businesses and start-ups. However, both macro-regions will benefit from the training, given their high rates of respondents who do not consider IPR as inputs in their innovation process.

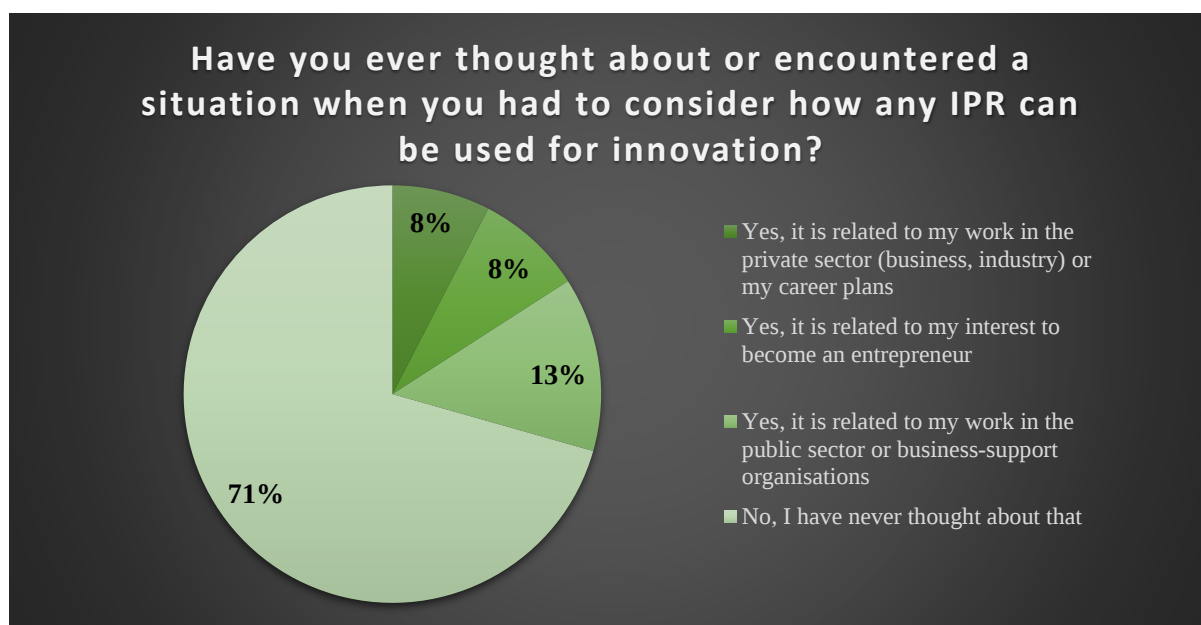


Figure 22: Respondents who Considered IPR for Innovation

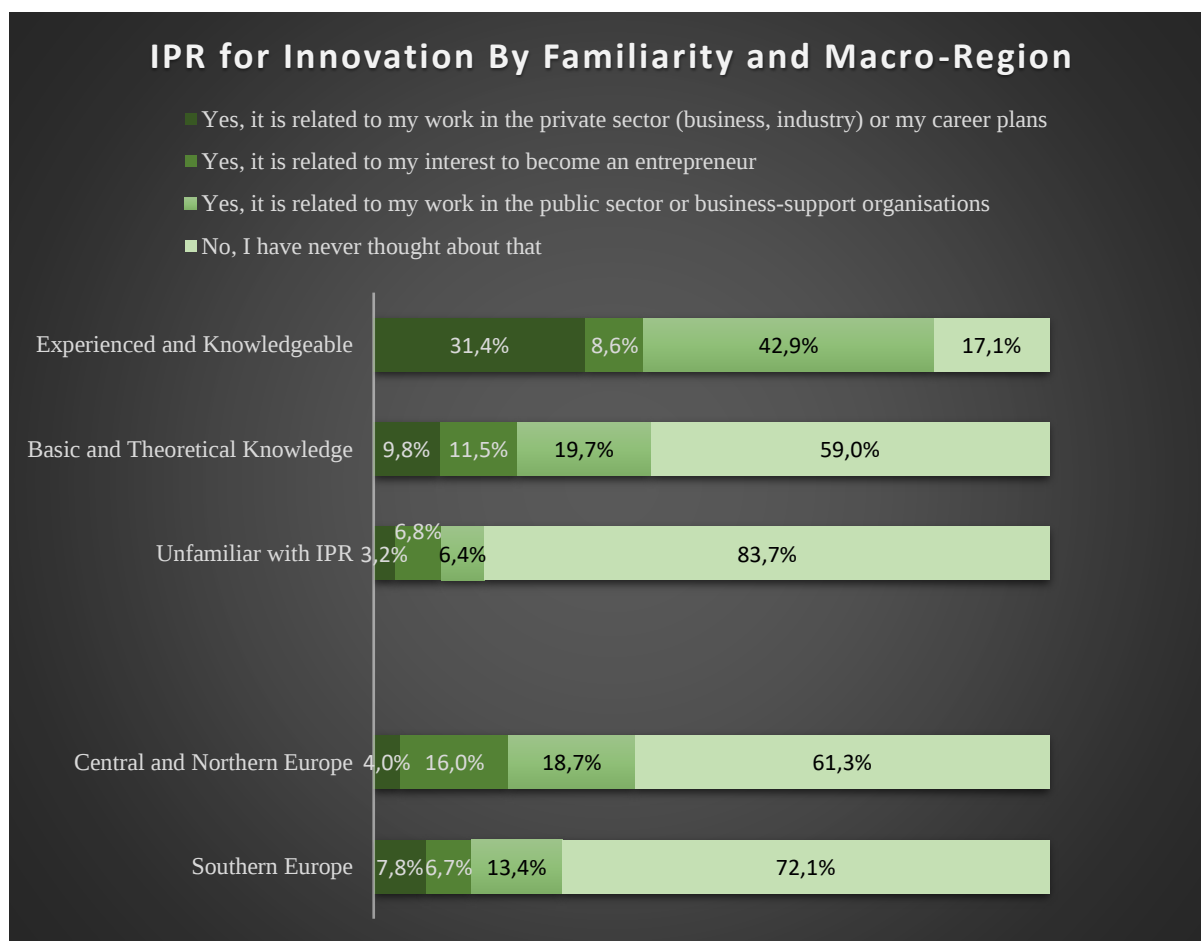


Figure 23: IPR for Innovation by Familiarity and Macro-Region

Deepening the analysis revealed that the Education/Implementation skill gap is very wide in the context of IPR utilisation (Fig. 24). Adopting IP-protected solutions in a company's hard (e.g., R&D) and soft (e.g., learning by doing) innovation practices presented the gravest gap. It is true that such a process requires deep knowledge of a company's internal organisation (of production, management, etc.), which might be a controlling factor in explaining the gap. Such practical knowledge can only be learned while working within the company's environment. Nevertheless, understanding the potential and the need to develop such skills can be one of the priorities for the IPR curricula and teaching materials for HEI and VET students. Focusing on IPR databases as a source of innovative knowledge and know-how (as yet another skill deficit) can be the relevant factor that will allow mediating this large competence disparity.

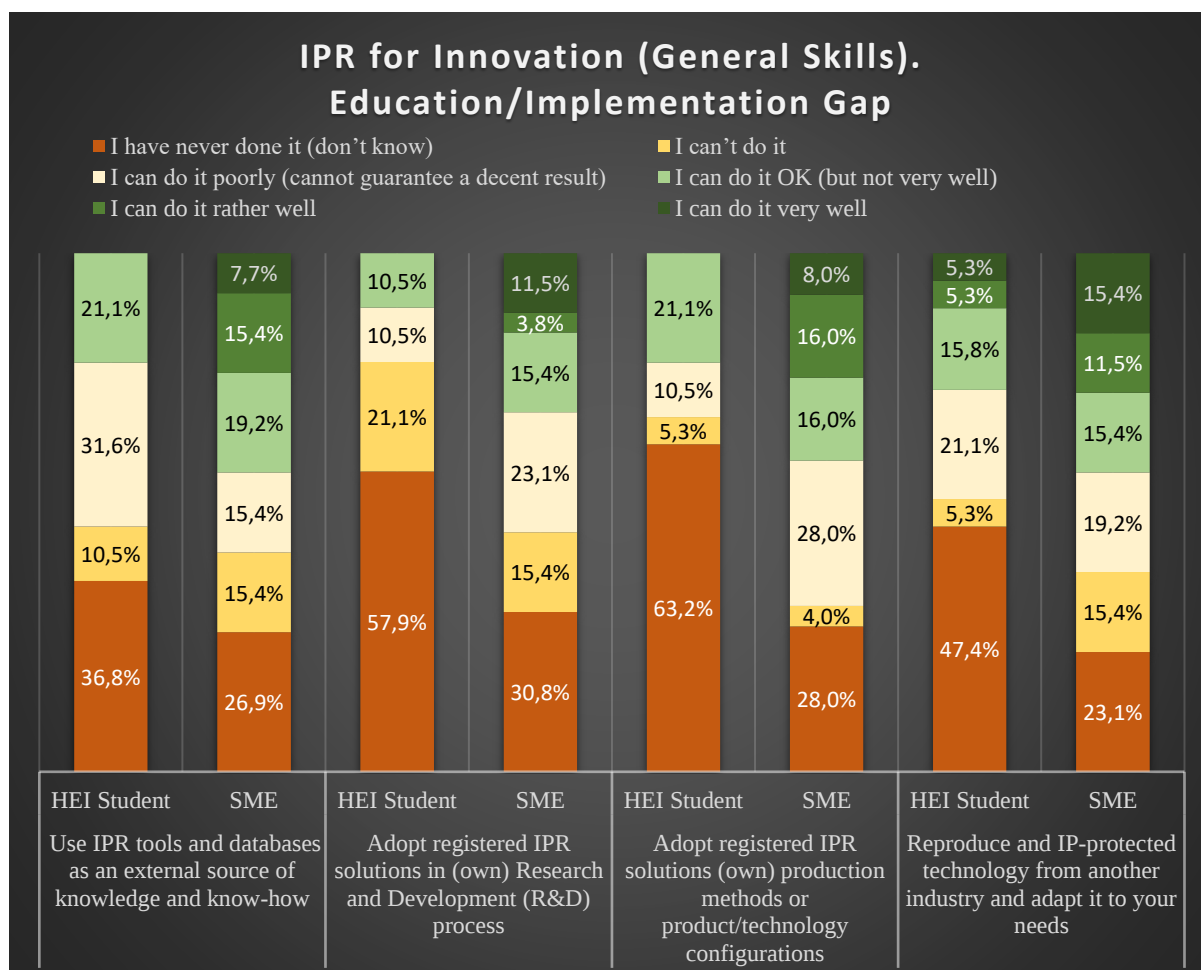


Figure 24: IPR for Innovation (General Skills). Education/Implementation Gap

A cross-tabulation analysis revealed that all adopting practices correlate with the skills of using IPR databases as a knowledge source. The relationship is strongest in the context of reproducing technology from other industries ($\chi^2 = 86,207$; Spearman $R = 0.601$). Using IPR to improve one's own R&D also shows a high correlation ($\chi^2 = 91,814$; Spearman $R = 0.542$). And the weakest (but still powerful) relationship is between IPR as a Knowledge Source and Improving Soft Innovation Skills ($\chi^2 = 79,167$; Spearman $R = 0.537$). However, it is unclear what is the causal relationship between these variables. For example, companies that rely on R&D and linear innovation often have resources and competencies to register/defend their IPR, thus seeing the benefits in widening their search range (i.e., including IPR-protected technologies into internal processes).

This small analysis strengthens our argument about the need for IPR education. Offering education on IPR and pursuing a better conceptualisation of its benefits and utilisation areas (especially among HEI and VET students) will offer new skills and opportunities for SMEs and start-ups to become innovative.

Based on the previous conclusion, we extended our analysis to include the view on support organisation's skills. Their competencies show a reverse pattern compared to SMEs' (Fig. 25). Their

understanding of the possibility of utilising IPR as an innovation knowledge source is significantly greater than that of private agents. Nevertheless, the conceptualisation of how to integrate and adopt IP-protected technology in the innovation process is inferior to that of SMEs. This represents an opportunity to incorporate relevant topics on IPR utilisation even among the Knowledgeable group, which is greatly represented by the TTO and public organisations.

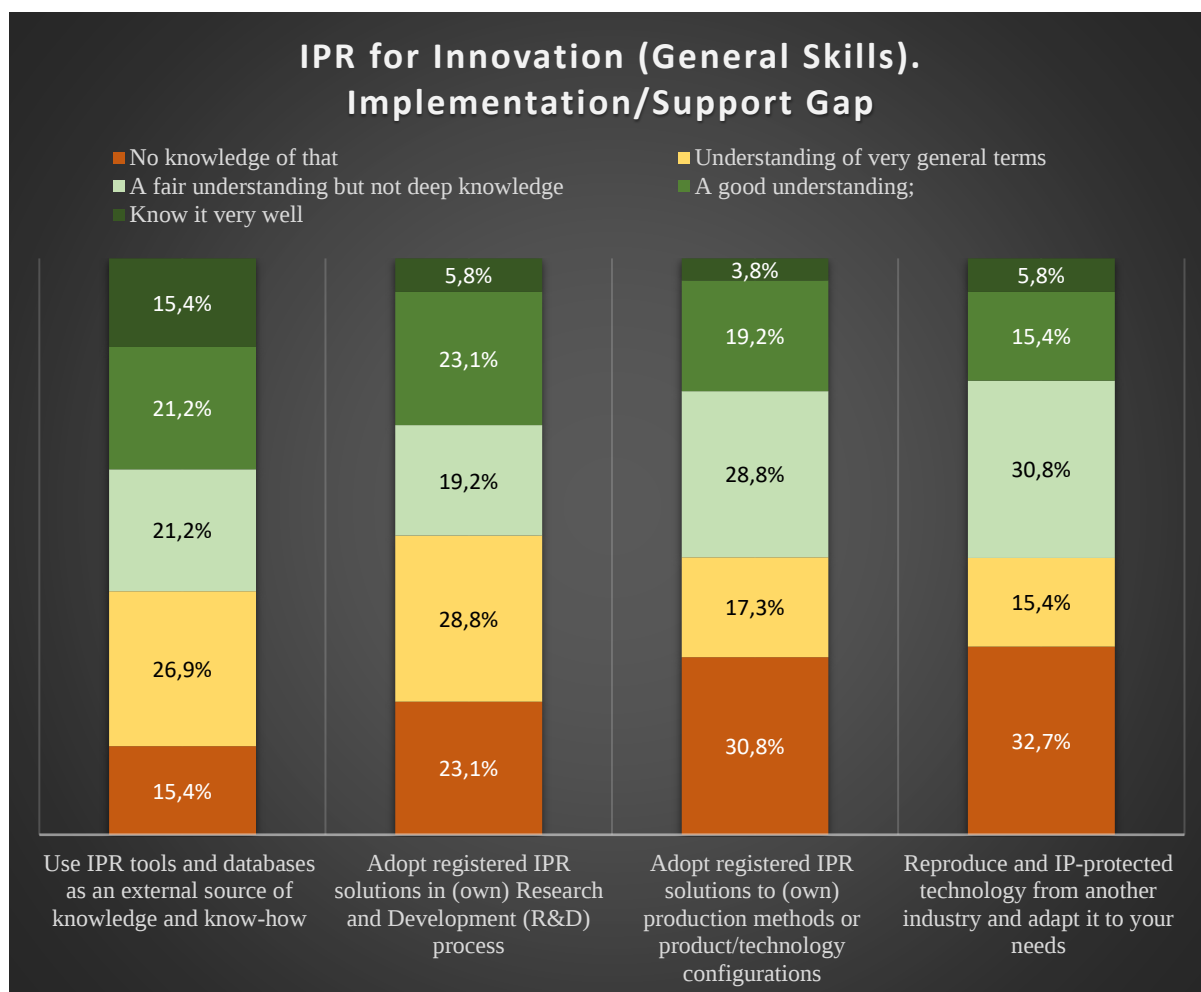


Figure 25: IPR for Innovation (General Skills). Implementation/Support Gap

The importance of IPR transcends the area of technological innovations. Buying external IPRs from other companies provides multiple opportunities to utilise their licences and protected technology to enhance a company's decision-making. Multiple solutions (such as industrial designs) can be used to strengthen market position and supply chain relationships. Nevertheless, data shows that knowledge on utilising IP in management and organisational spheres receives far less interest than technological innovations (Fig. 26, compared with Fig. 25). An absolute majority of respondents (for each item in Fig. 26) have limited perception of how to improve non-technological processes by using own or external IPR. It presents an opportunity to include examples and case studies as topics for training. Also, this is

an important topic to be discussed in policy debates. This shows that the European IPR framework suffers from a lack of awareness and a stereotypical technological mindset, both in the private and public sectors.

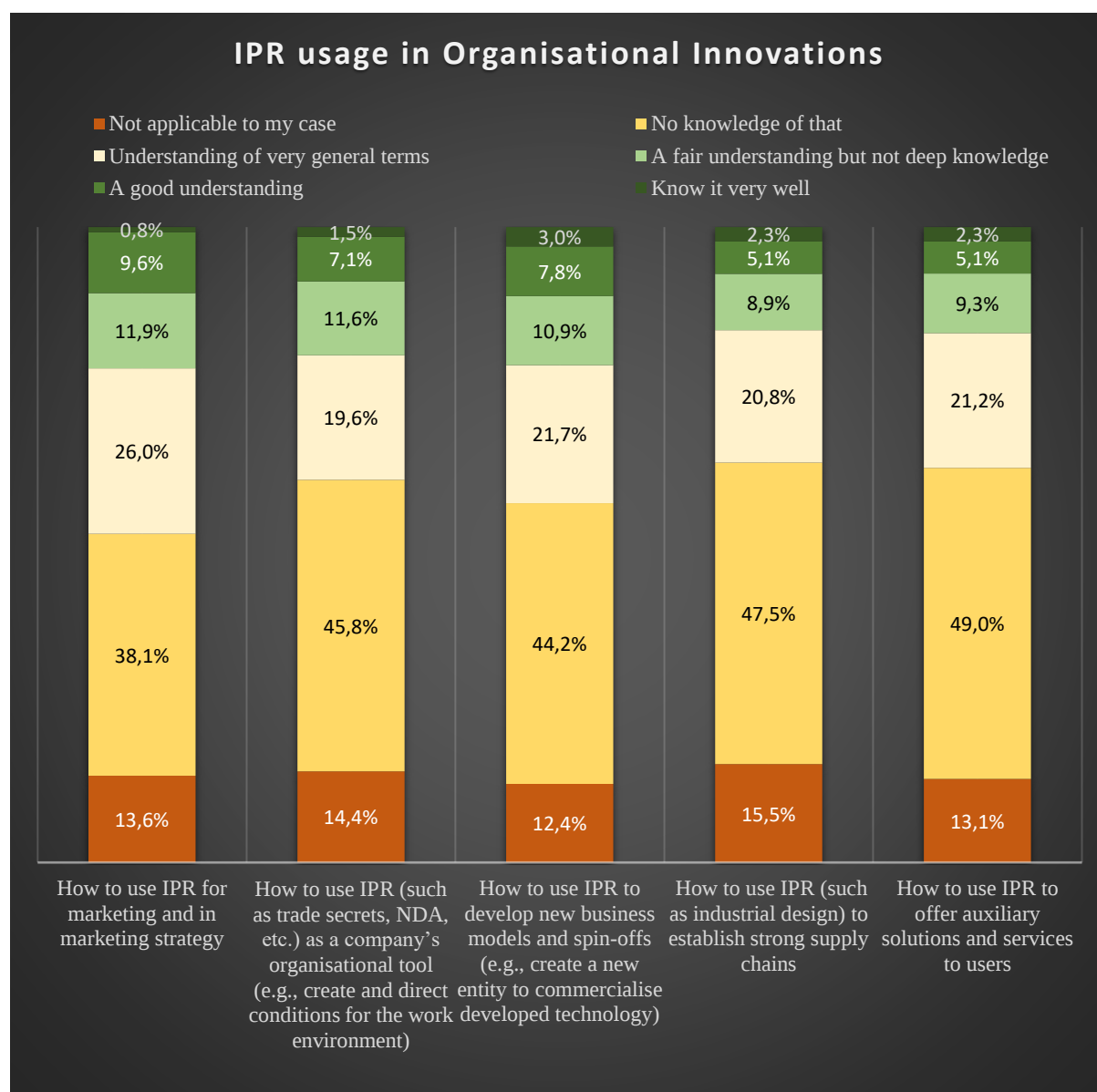


Figure 26: IPR usage in Organisational Innovations

The data shows a great disinterest in IPR utilisation for non-technological innovations for the whole survey sample. Nevertheless, it is more important to conclude that there are substantial differences between the education, public and private sectors (Fig. 27). Considering the Education/Implementation gap, the awareness of IPR utilisation among VET and HEI students is catastrophically low. But even so, the business sector is not very knowledgeable about the

opportunities offered by the IPR either. This is especially clear when comparing the competencies of TTO representatives with SMEs'. As a professional group, TTOs are far better qualified to consider IPR for different types of benefits, such as managerial improvements. However, their competencies fade when concerned with alternative practical utilisation (e.g., developing supply chains and promoting additional services). Given the limitations that come with the survey design and dissemination, these conclusions cannot be generalised. We strongly recommend pursuing additional research on the skill discrepancy between businesses and support organisations.

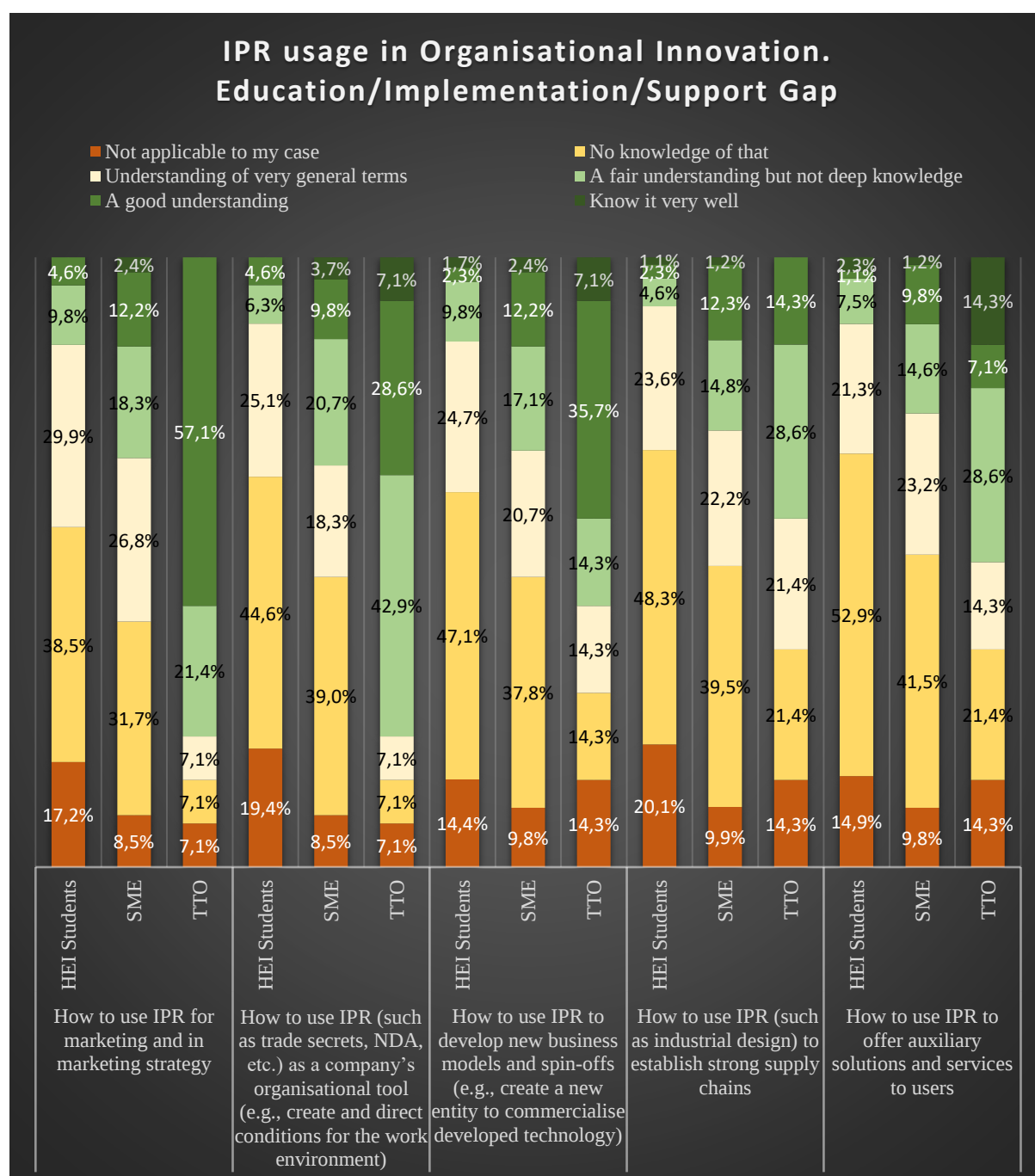




Figure 27: IPR usage in Organisational Innovation. Education/Implementation/Support Gap

The private sector's skills cover 25-30% of all variables in the graph (Fig. 27). This could mean that the experienced/Knowledgeable category of SMEs considers IPR in their organisational innovations. An alternative explanation is that the composition of the SME group comprises employees and managers. Therefore, the managerial staff is best suited to identify organisational opportunities. Yet, the ANOVA test of variance shows no statistical difference between managers and employees on all the items in the graph ($p > 0.05$). Therefore, the training can address both employees and employers equally in promoting the IPR benefits for management and organisational innovations.

5.4 Green and Digital Technology

The final and most important part of the report is related to the analysis of the utilisation and incorporation of green and digital technology in a company's daily routine and innovation process. The survey touches separately on these sets of skills to try and expand the understanding of the status quo. A general view (Fig. 28) shows that the aforementioned technologies perform worse than the application of IPR in technological innovations (for unspecified technology, Fig. 25) but shows a better level of knowledge of IPR utilisation compared to the managerial and organisational innovation (Fig. 26).

Nevertheless, the survey revealed an overall lack of knowledge of the practical impact of green and digital innovation and utilisation of IPR for their implementation. This is evident, as 66% to 78% of the respondents think this is not applicable to their business or at least have a vague understanding of how it can be done. Compared to other types of IPR usage, green and digital solutions display a lower degree of interest.

In this context, the knowledge of how to find and integrate green and digital solutions into one's own production or business model registered the lower scores. The data exhibits a slight preference for digital innovations. The T-test, a statistical analysis of means difference, shows that this is significant for the confidence level of 95% (t value= 2.298; $p=0.022$). Therefore, we can conclude that digital innovations present a greater interest in the EU market. This finding can be justified by the social trends of digitalisation of economic, financial, service and other sectors. Thus, digitalisation is perceived to have a greater market value than green technology (Fig. 29; Fig. 30).

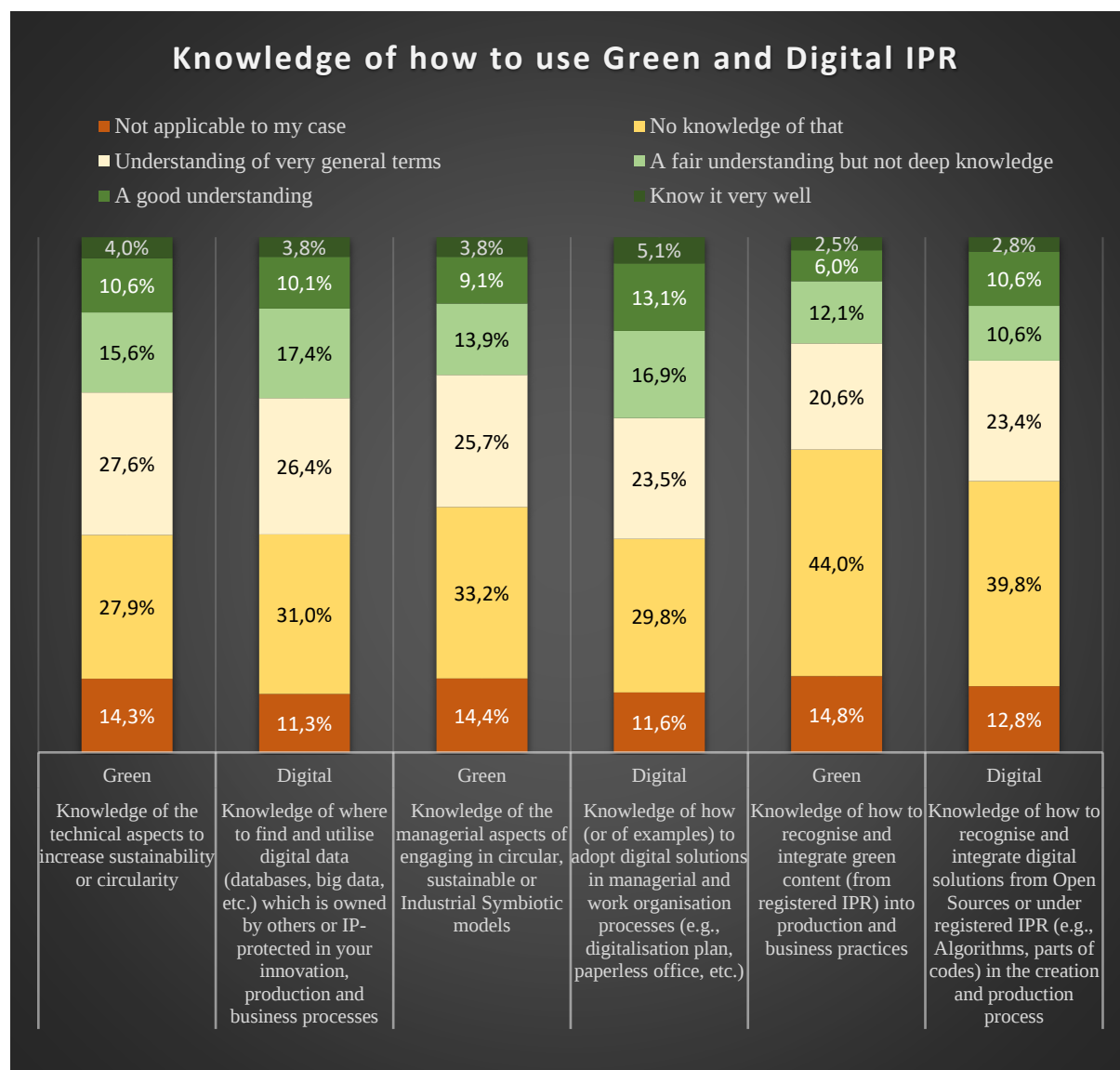


Figure 28: Knowledge of how to use Green and Digital IPR

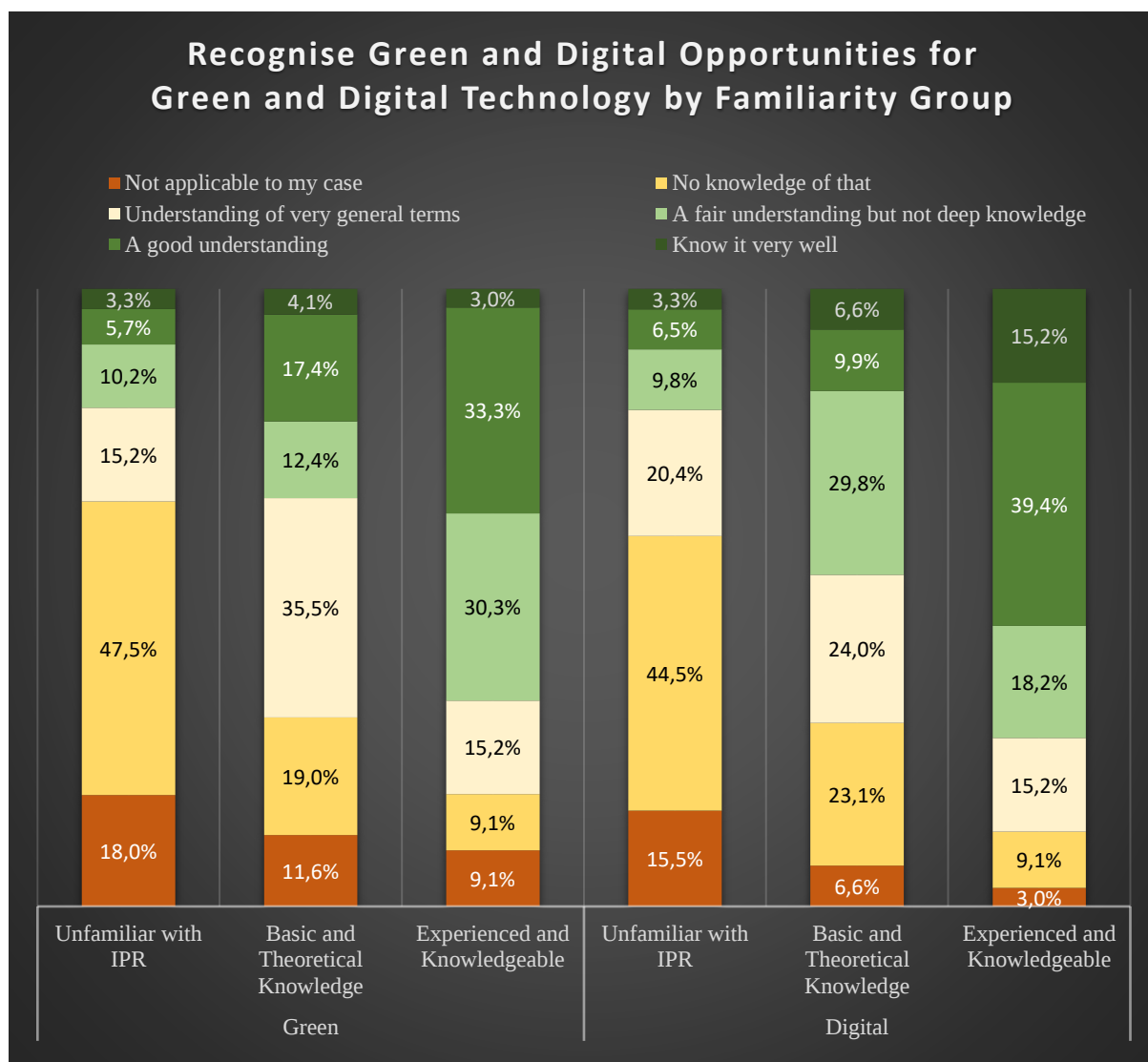


Figure 29: Recognise Green and Digital Opportunities by Familiarity Group

Disregarding the Unfamiliar group (who have similar troubles recognising green and digital opportunities), the Basic and Knowledgeable categories are better at recognising digital solutions (46% for Basic and 73% for Knowledgeable) compared to green ones (35% for Basic and 66% for Knowledgeable). The Basic group feels more confident in detecting green solutions and less for digital (based on “good understanding values”). For the Knowledgeable group, the difference is highlighted even more, as the answers indicating a “fair understanding” dropped by 12%. This dilemma raises interesting questions for future research.

On the basis of the last graph (Fig. 29), and given a strong affiliation between occupation and familiarity level, it can be safely concluded that market interest in digital technology is greater than for the green and sustainable business models. Therefore, we proceeded with analysing the answer patterns to see the Education/Implementation skill gap (Fig. 30).

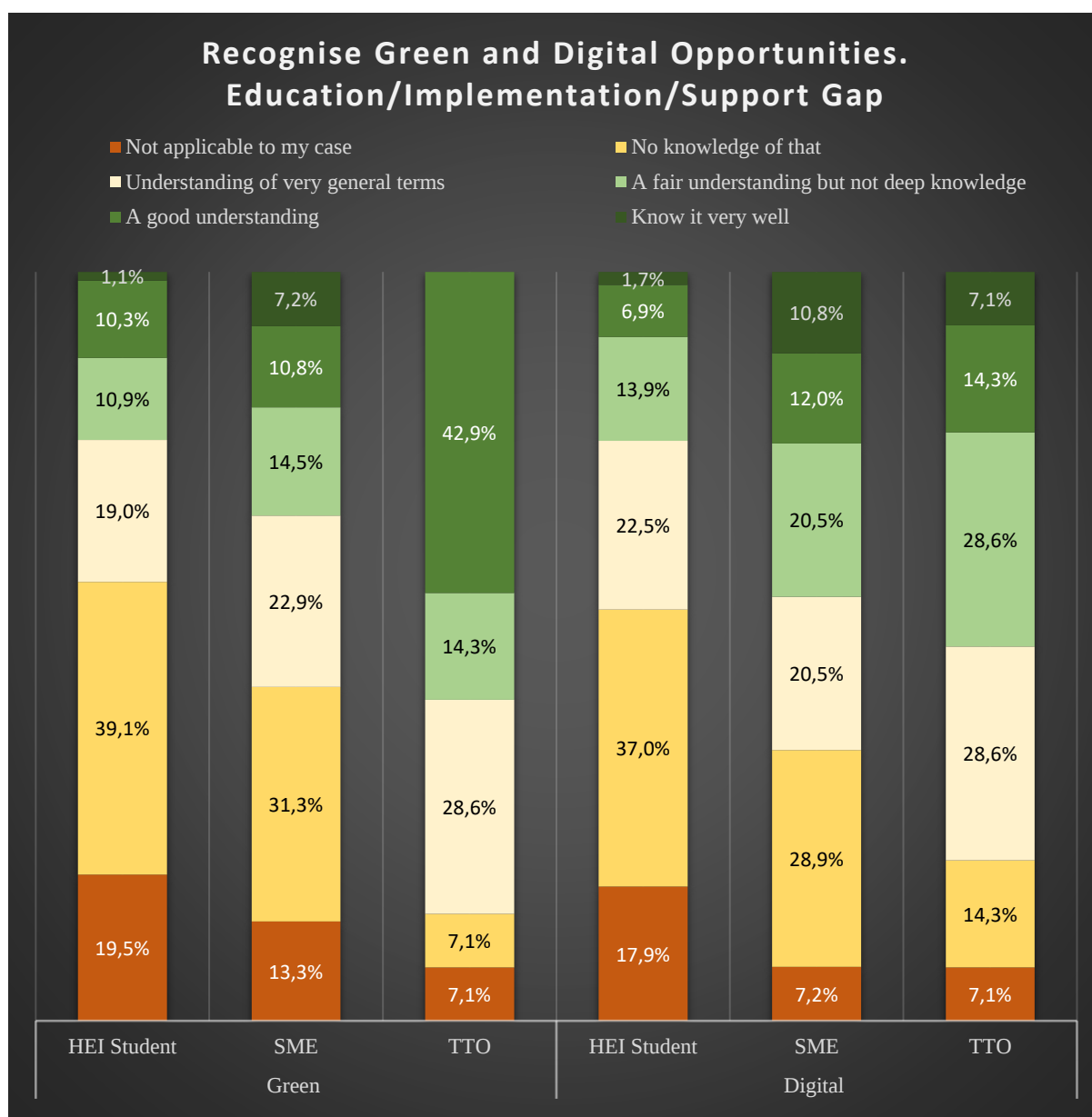


Figure 30: Recognise Green and Digital Opportunities. Education/Implementation/Support Gap

As such, SMEs have a better understanding of digital opportunities than of green solutions. More so, they perceive it as less discontinuous with their technology. Comparing the “not applicable” responses, only 7,2% consider that digitalisation is not suited for their business models, which contrasts with 13,3% affiliated with green and sustainable ones. This is why the Education/Implementation gap is not as big for green technology. However, this is not a positive conclusion, as the figures show a genuine lack of green opportunities recognition.

The reverse is true for the difference between businesses and support organisations. The knowledge of green technology is superior for TTO representatives. The mismatch between these groups calls for tighter public-private cooperation to boost the level of green technology use in the market. It is curious

that TTO representatives were reluctant to say that they have an excellent knowledge of green business opportunities (the answer rate for the “know it very well” category is 0%). But compared to digital, they are more confident in recognising important details (see the difference between “good knowledge” and “fair understating”).

Consequently, this is a premise to introduce more information about the benefits of green models, present good practices and suggest active help. To reduce the load and increase the benefit to the maximum, the training materials could concentrate on presenting the benefits of digital innovations as a premise to transition to green and circular models. In this context, it will address the skill gap on two levels at once.

5.5. Conclusions

A sad and important conclusion in this chapter is that IPR is poorly viewed as an asset for innovation and entrepreneurship among SMEs, students and education personnel. Business support organisations are most knowledgeable on how to analyse, apply and use IPR in innovation. A reasonable solution is to enhance public-private cooperation on IPR to boost the understanding of its benefits for general profit, strategic partnership and innovation activities among the SMEs. For the learners (HEI and VET students), this can be addressed by implementing an IPR-focused curriculum to reduce the competence gap.

Similar patterns are seen for the skills in registering and defending IPR. In this context, the SMEs and other stakeholders have concerns about the registration process and are not very proficient at registration (i.e., low knowledge of the application process). Some of the most impactful reasons to abandon IPR registration are related to fears that technology is already under someone’s protection, the timing involved and the high price (especially for SMEs). The leading cause, which has the higher demotivation rates (cumulatively), is the doubt whether an innovation is worth being protected. All the underlined problems might be coming from a low level of understanding of the benefits of IPR, mediocre intent to think of IPR as an innovative knowledge source and use it to upgrade technology with green and digital solutions. The situation can be mediated by providing teaching materials that will address IPR-searching skills, knowledge of the databases and tools, and help respondents perceive business opportunities in IPR utilisation. A good understanding of IPR benefits on multiple levels of a company’s activity (including production and management) might be the necessary motivational push. That is especially relevant given previous findings that institutional/company interest is the most potent catalyst for learning about IPR.

The gap between education and industry (skill-wise) exists. Despite the fact that not all SMEs are aware of and use IPR on a continuous basis, the discrepancy is significant. Therefore, the training materials can be tailored to mediate this problem. By presenting strategies to boost innovation potential through IPR (owned and external) and informing about the active assistance from experts on IPR and sustainability (e.g., TTOs, business support organisations, policy incentives offering help, etc.), the training will help narrow the skill gap and utilisation deficit. For a long-term impact, it will guarantee that students will have the knowledge to apply solutions involving IPR for their start-ups and careers, including adopting green and digital solutions.

Still, a big concern remains the divide between the public and private sectors in terms of perceiving the relevance of IPR for innovation. Many SMEs are unfamiliar with the possibilities and therefore show low proficiency in skills, competencies and knowledge of IPR. The support organisations' knowledge of the practical application is limited as well. Their understanding of how IPR can contribute to the development of new services, strengthening buyer-supply relationships, etc., are not as high as other skills and sometimes lower than that of the SME group. It calls for a campaign to raise awareness among the public bodies and private sector to boost cooperation and compensate for these shortcomings.

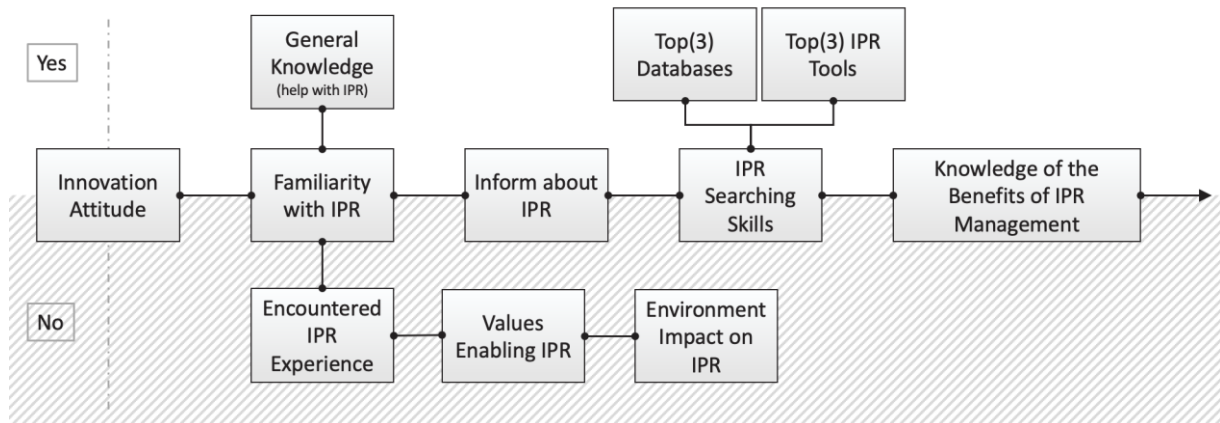
Finally, we observed a dire situation of green and digital skills among the surveyed stakeholders. Even if these technologies are better perceived than the utilisation of IPR in management, the proportion of respondents competent in recognising them as business opportunities is very limited. Between the two types of technology, digital trends showed a higher interest for SMEs. Nevertheless, a big part of the respondents encounters difficulties in comprehending the technological and managerial aspects of digitalisation. Even worse is the case of sustainable and circular transition, which displays lower scores of competencies and knowledge. However, green technology is better perceived by support groups (such as TTOs). That reinforces the conclusion on the need to strengthen public-private cooperation, which in this case, can have symbiotic effects, improving the skills of both sectors in the areas they lack the most.

Consequently, this reveals the urgent need to start including green and digital solutions in education concerning technological, managerial, and innovation fields. The training materials should address the most urgent issue, which is a lack of understanding of how to integrate green and digital solutions into the existing production and innovation practices. To "kill two birds with one stone," we might consider concentrating on presenting good practices of sustainable models and digitalisation as examples of successful IPR use.

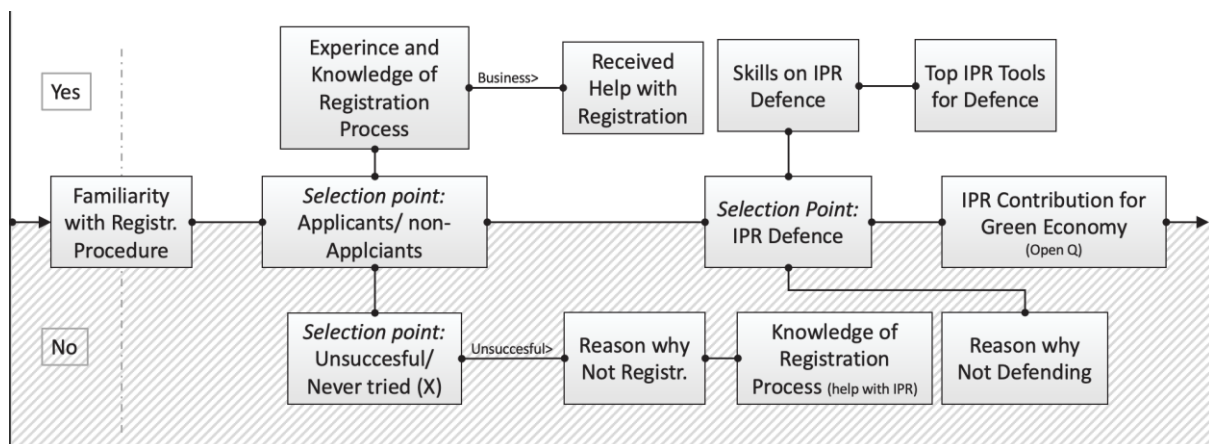
● Annex 1 – Survey: Graphical Representation

The graphical representation of the Survey is a result of two co-validation workshops conducted in June and September 2022. The goals of both workshops were to elaborate the Survey best fitting the state of the art of the field and best adjust it to the needs of the IPR4SC project.

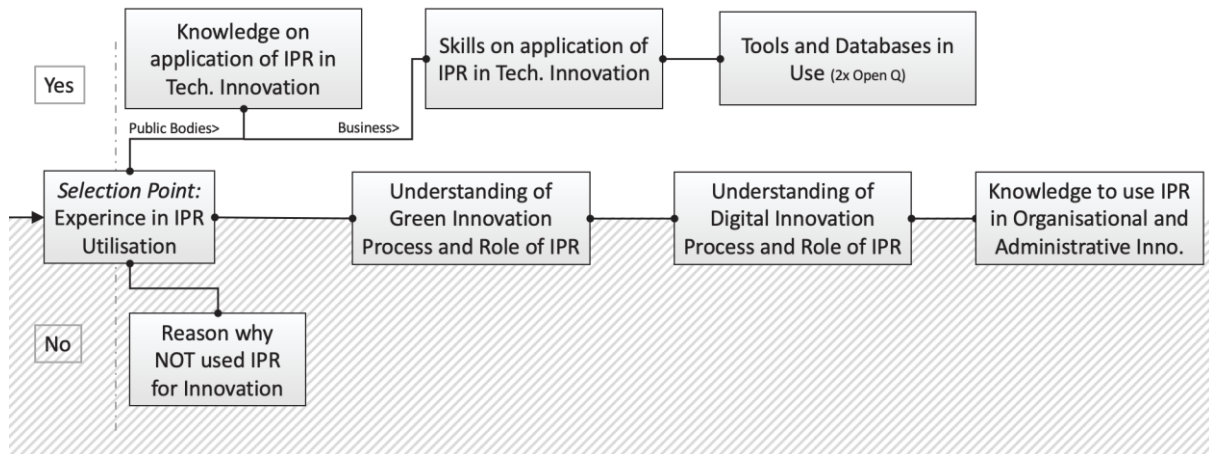
Part 1: Skills in the Promotion of IPR and Understanding of IPR utility



Part II: Skills in Reading, Analysing, Comparing, Drafting and Defending IPR applications;



Part III: Utilisation of IPR and IPR Management for Innovation (Knowledge and Technology- Creation, Adoption, Combination, and Commercialisation)



● Annex 2 – The Questionnaire

Introduction:

Hello,

This is the "Intellectual Property Rights for Sustainability and Circularity" (IPR4SC) team. We are implementing an Erasmus + Alliances for Innovation project on the importance of Intellectual Property Rights (IPR) for innovation and sustainable development. The Project's primary goal is to increase the IPR and Entrepreneurial skills of European inventors, SMEs and citizens, especially in implementing Digital and Green Innovations for a Sustainable and Circular Economy.

To achieve our goal, we need Your Help!

We want to determine the real needs of the Europeans in dealing with IPR and, therefore, have a targeted and concrete impact. We must keep a real-life perspective and assess the situation to suggest and implement the right Decisions.

Could you take this survey and answer a few questions for us?

It will not take too long, 15-20 min., we promise ;-)

GDPR:

Dear Respondent,

Before you proceed, we must inform you that the survey is collecting personal data, and therefore, the General Data Protection Regulation (GDPR) applies. So we need your permission to use your data for further analysis and publication of reports. However, we only collect and report information on your

Country of Residence, Current Occupation, Age, and Educational Background. So we keep your identity safe and will not publish responses identifying any individual.

As we collect the above-listed personal information along with your answers, we kindly ask you to agree to the collection of your personal information before completing the survey. Completing the survey and personal data is voluntary and a condition for your participation in our study. If you disagree, we cannot accept your responses. Details about collecting, storing and processing your information in this survey can be found [here](#). Privacy policy and general terms are available on this [link](#).

Please indicate whether you agree to collect your personal information:

- ☐ No, I do not agree with collecting my personal information
- ☐ Yes, I agree with collecting my personal information

Demographics:

1. Country - Could you tell us a bit about Yourself? Where are you from?

Country

2. Age - What is your age?

3. Occupation - What is your main occupation?

- University student
- Vocational education learner/student
- University lecturer (researcher/professor)
- Vocational education trainer/teacher
- Manager/owner of a micro-enterprise (1-9 employees)
- Employed in a micro-enterprise (1-9 employees)
- Manager/owner of a small or medium enterprise (10-49 employees)
- Employed in a small or medium enterprise (10-49 employees)
- Manager in a big company (50+ employees)
- Employed in a big company (50+ employees)
- Representative of a Technology Transfer Office

- Representative of a Patent Office or other type of IPR organisation
- Attorney
- Other:

3.A If you are employed in a company, can you tell us in what industry and what is your specialisation (e.g., in production, technological application, working in the R&D department, administration, HR, etc.)?

Industry (what company is doing?)	Work	Description (what are you doing?)
_____	_____	

4. What is your educational background or current field of study?

- Mathematical and computer sciences
- Physical sciences
- Chemical sciences
- Earth science
- Biological science
- Medical sciences
- Agricultural and veterinary sciences
- Civil engineering and architecture
- Industrial and information engineering
- Sciences of antiquity, philological-literary and historical-artistic
- Historical, philosophical, pedagogical and psychological sciences
- Legal sciences
- Economic and statistical sciences
- Political and social sciences
- Other:

Part I: Skills in Promotion of IPR and Understanding of IPR utility

Q1 - What is your attitude toward Innovation?

- ☐ I am not usually concerned about the development of new technology
- ☐ I am interested in new things as a consumer (exclusively). I like to buy new technology and solution when these are available in the market
- ☐ I am constantly monitoring the development of technology in a particular field of interest (motivated by personal or professional needs)
- ☐ I am more than interested. I am also searching for and applying solutions to improve some technology myself
- ☐ I am interested and trying to implement innovations. And more so, I try to follow the latest development trend – e.g., to reduce waste and carbon emission; to produce something from materials used before; to produce something from residuals and waste of other production methods; to improve recycling; etc.

Q2 -How Familiar are you with the concept of Intellectual Property Rights (IPR)

- ☐ I did not hear about this term before
- ☐ I know only in very general terms – e.g., that I have to pay for music, videos, and photos that are (copyrighted) owned by other people
- ☐ I have basic knowledge – e.g., I had a class that introduced IPR, I can differentiate between types of Intellectual Property (IP) and navigate the terminology
- ☐ I am knowledgeable or active in studying IPR on a theoretical level – I know and check relevant literature in the area; I can do a descriptive analysis; I can provide some introductory training; etc.
- ☐ I have (exploratory) experience working with IPR – e.g., reading a patent; identifying copyright; searching for a patent or technology; researching and analysis of trends; etc.
- ☐ I own or deal with IPR regularly – e.g., I have a patent, copyright, etc.; I license or use licenses; I check for infringements and defend IP rights; etc.

Q2.Unfamiliar.A - Intellectual Property (IP) refers to various solutions, creations and designs developed by someone. Usually, these are called creations of the mind- reflecting that they exist as artistic works, inventions, designs and symbols. The IPR, therefore, is related to exclusive rights given to the creator to use it as seen fit and limit the right of others to use the same IP. You could encounter such cases in your daily life. For example - You are required to pay for a song, buy a movie or a licence for software, etc. Or you might know about the existence of officially registered IPR, such as patents or trademarks, that give exclusive rights to its owners.

Have you ever bought artistic work, technology or solutions for personal or professional use?

☐ Yes

☐ No

Q2. Unfamiliar.B - Now that you might have a better understanding of IPR, could you share your opinions with us? Do you agree that:

	Strongly Disagree	Rather Disagree	Neither Agree nor Disagree	Rather Agree	Strongly Agree
Is it fair for someone to demand payment to use their technology or solutions developed or owned by them	☐	☐	☐	☐	☐
It is correct to have sanctions (appropriate legal punishment) for people that use someone's idea or property without paying, even if it is something minor	☐	☐	☐	☐	☐
I believe it is cheating to use someone's technology for free, even if it is only for personal use	☐	☐	☐	☐	☐
If I were the owner of a technology, idea or solution, I would like people to pay for using it	☐	☐	☐	☐	☐
If I were the owner of a technology, idea or solution, I would like to have legal means to protect my rights and keep others from using it without my consent	☐	☐	☐	☐	☐
In my environment, people use technology without respect for IPR	☐	☐	☐	☐	☐
It is OK to use someone's IPR (e.g., a pirated software) if people cannot afford to buy the original	☐	☐	☐	☐	☐
Even if someone (in my location) uses technology without paying for it, I am not sure there will be consequences for them (they will not get caught)	☐	☐	☐	☐	☐

Q2. Unfamiliar.C - What do you think is missing for you to deepen your knowledge? And if possible, give us an idea of what you think can be improved to raise your interest and knowledge about IPR.

	Utterly missing	Mostly missing	Exists but needs improvement	It is present and helping	How?
Personal interest and/or practical need	☐	☐	☐	☐	
Professional needs (e.g., incentives from job position, application of technology, etc.)	☐	☐	☐	☐	
Innovation needs – e.g., utilisation of external technology or licensing own technology	☐	☐	☐	☐	
A sense of practical use of IPR in the community I live	☐	☐	☐	☐	
Interest from your company, institution or organisation	☐	☐	☐	☐	
Educational materials – e.g., curricula, side topics, examples, literature and articles etc. in the Educational Institution I was or am frequenting	☐	☐	☐	☐	
Online sources that can help me at my level of understating of IPR	☐	☐	☐	☐	
An organisation (near me) that is focused on helping with IPR needs	☐	☐	☐	☐	
Specialists (e.g., attorneys, patent officers, etc.) in the field of IPR	☐	☐	☐	☐	
A well-developed Legal Background (requiring the implementation of IPR)	☐	☐	☐	☐	
Other:	☐	☐	☐	☐	

Q2.Familiar - It seems you are familiar with the concept. If someone asks you to help them with an IPR problem, how well can you:

	I have never done it (don't know)	I can't do it	I can do it poorly (cannot guarantee a decent result)	I can do it OK (but not very well)	I can do it rather well	I can do it very well

Differentiate between IPR typology, definitions and concepts	☐	☐	☐	☐	☐	☐
Suggest how better to protect intangible assets (e.g., art, ideas, knowledge, etc.)	☐	☐	☐	☐	☐	☐
Suggest how better to protect industrial assets (e.g., technology, designs, production methods, etc.)	☐	☐	☐	☐	☐	☐
Suggest where to learn more about IPR (e.g., literature, experts, sources)	☐	☐	☐	☐	☐	☐
Suggest where to find legal information, for example, on national regulations	☐	☐	☐	☐	☐	☐
Suggest where to find legal and active help (whom to address)	☐	☐	☐	☐	☐	☐
Help find information and reports on the latest IPR trends	☐	☐	☐	☐	☐	☐
Do research and identify certain technological or IPR trends	☐	☐	☐	☐	☐	☐
Suggest active policies and incentives that motivate IPR registration (e.g., tax reduction, reimbursement, etc.)	☐	☐	☐	☐	☐	☐

Q3 - Considering your knowledge, what would be your approach (where to ask) to find out more about the IPR and related topics?

	I did not know I can find information there	I would not ask there	Maybe, if my first sources are not enough	That would be (one of) the first choice(s)
Online sources (general search)	☐	☐	☐	☐
Online targeted search (visiting webpages, databases, blogs of IP experts or IP organisations)	☐	☐	☐	☐
Educational system – e.g., ask a professor, researcher, etc.	☐	☐	☐	☐
Organisations Specialised in IPR (NGOs, Patent Offices, TTOs etc.)	☐	☐	☐	☐

Consult speciality literature in the field	☐	☐	☐	☐
Other:	☐	☐	☐	☐

Q4 - If someone asks you to help them find any IPR (e.g., patents or design rights) that contains certain technology, how hard is it for you to do a targeted search?

	I have never done it (don't know)	It is hard to do it	I should put significant effort	Neither hard nor easy	I can do it (rather) easily	I am very proficient at that
Identify the correct databases where to search for IPR	☐	☐	☐	☐	☐	☐
Utilise special IPR tools or software	☐	☐	☐	☐	☐	☐
Consider the selection of filtering options to target the right technology	☐	☐	☐	☐	☐	☐
Utilise keywords and associated terminology to widen the search	☐	☐	☐	☐	☐	☐
Identify cases that are using the "green" (eco, sustainable, circular) IPR solutions applied in this technological field	☐	☐	☐	☐	☐	☐
Identify cases that are using digital IPR solutions applied in this technological field	☐	☐	☐	☐	☐	☐
Identify the area (e.g., country) where a technology is IP protected	☐	☐	☐	☐	☐	☐
Identify the duration of IP protection for the registered technology/solution and if it is still valid or not	☐	☐	☐	☐	☐	☐
Identify whether an IPR technology is being commercialised (and where)	☐	☐	☐	☐	☐	☐

Q4.Databases - If not troublesome, can you identify what databases you are using? If many, please name the top three that you consider most useful:

Database you are using or you consider to be the best choice

Second best choice

Third best choice



Q4.Tools - If not troublesome, can you identify what IPR you are using? If many, please name the top three that you consider most useful:

The IPR tool you are using or you consider to be the best choice

Second best choice

Third best choice

Q5 - Multiple examples show that innovation and utilisation of IP are tightly related. Developing IPR can sometimes be considered synonymous with innovation activities. In this regard, can you auto-evaluate your understanding of the following:

	No knowledge of that	Understanding of very general terms	A fair understanding but not deep knowledge	A good understanding	Know it very well
What are the benefits of owning and registering various IPR	☐	☐	☐	☐	☐
What are the risks, limitations and vulnerabilities of different IPR	☐	☐	☐	☐	☐
How to perform a Cost-Benefit analysis on the merits and worth of registering a solution as IPR	☐	☐	☐	☐	☐
How to combine various IPR practices and rights to gain maximum benefits	☐	☐	☐	☐	☐
How to capitalise on IPR to secure profits	☐	☐	☐	☐	☐
How to signal partners, users and competitors about the technology you are developing through registered or protected technology, solutions, designs, etc.	☐	☐	☐	☐	☐
How to use IPR to strengthen innovation portfolio and attract investors	☐	☐	☐	☐	☐
How to use IPR as partnership leverage, for example, in supply chains or co-creation activities	☐	☐	☐	☐	☐

How to use IPR to create new business models, spin-offs, or develop a new start-up	☐	☐	☐	☐	☐
How to raise awareness about the organisational or regional specialisation by using IPR and registering technology (e.g., green solutions, technological know-how) in a specific field.	☐	☐	☐	☐	☐
How to use IPR as motivation and reward for innovation performance	☐	☐	☐	☐	☐
How to use IPR to engage in a circular business model	☐	☐	☐	☐	☐

Part II: Skills in Reading, Analysing, Comparing, Drafting and Defending IPR applications

Q6- How familiar are you with the procedural and legal aspects related to IPR registration? Can you evaluate your

	No knowledge of that	Understanding of very general terms	A fair understanding but not deep knowledge	A good understanding	Know it very well
Knowledge of the national legal IPR framework	☐	☐	☐	☐	☐
Knowledge of the international IPR rights and standards	☐	☐	☐	☐	☐
Knowledge of the application process (e.g., documentation needed, steps to follow, timing, etc.)	☐	☐	☐	☐	☐

Knowledge of the registration and approval process (including its risks: opposition, limitation, revocation)	☐	☐	☐	☐	☐
Knowledge of the creative and business assets that are protected automatically (without the need to apply)	☐	☐	☐	☐	☐
Knowledge of the process to formulate and enforce a Non-Disclosure Agreement (NDA)	☐	☐	☐	☐	☐
Knowledge of the contractual possibilities of how to safeguard trade secrets	☐	☐	☐	☐	☐
Knowledge of the possible contractual agreements between an organisation and an employee on the ownership of the IPR	☐	☐	☐	☐	☐

Q7 - Have you participated before (or are engaged now) in an IPR application or registration process?

- ☐ Yes, I am trying to (or already did) apply for an IPR
- ☐ Yes, I helped (or am helping) someone with IPR registration
- ☐ No, I have never done that

Q7.Applied.A - Can you auto-evaluate your skills and competencies related to the technical and legal aspects necessary for the registration process?

	I have never done it (don't know)	I can't do it	I can do it poorly (can't guarantee a decent result)	I can do it OK (but not very well)	I can do it rather well	I can do it very well
Identify and value an innovation (technology, idea, solution) to be patented or IP-protected	☐	☐	☐	☐	☐	☐
Read and critically analyse registered IPR (e.g., read a patent, critically analyse copyright for technological identification and comparison)	☐	☐	☐	☐	☐	☐

Detect similarities between IP-protected technology and solutions that are to be protected	☐	☐	☐	☐	☐	☐
Detect digital solutions and consider their application/integration into IPR documentation to meet the minimal differentiation required for registrations	☐	☐	☐	☐	☐	☐
Detect green solutions and consider their application/integration into IPR documentation to meet the minimal differentiation required for registrations	☐	☐	☐	☐	☐	☐
Draft an application for a trade mark, industrial design, patent	☐	☐	☐	☐	☐	☐
Draw the necessary technological schematics for an application	☐	☐	☐	☐	☐	☐
Assess a technology's Novelty, Inventiveness and Industrial Applicability	☐	☐	☐	☐	☐	☐

Q7.Applied.B Did someone help you in the registration process? If yes, can you tell us what their involvement was?

	I did it	I mostly did it	Both equally involved	They mostly did it	They did it
Consider the Importance and Value of the innovation (technology, idea, solution) or work to be patented and/or IP-protected	☐	☐	☐	☐	☐
Checking and following local and national legal frameworks on IPR	☐	☐	☐	☐	☐
Searching (in specialised databases) for patents, trademarks, copyrights and industrial designs that are in the same field and similar	☐	☐	☐	☐	☐
Checking within other patents, trademarks, copyrights and industrial designs on the similarity of the idea and deciding whether the changes fit the necessary (minimal) degree of variation	☐	☐	☐	☐	☐

Drafting the text and preparing a trademark, industrial design or patent application form	☐	☐	☐	☐	☐
Identifying additional value of the patent, trademark or industrial design- e.g., the possibility to utilise technology in a circular, green and sustainable economy; suggesting strategies for IPR commercialisation, etc.	☐	☐	☐	☐	☐
Is there another aspect that we have missed?	☐	☐	☐	☐	☐

Q7.Helped - Can you auto-evaluate your skills and competencies related to the technical and legal aspects necessary for the registration process?

	I have never done it (don't know)	I can't do it	I can do it poorly (cannot guarantee a decent result)	I can do it OK (but not very well)	I can do it rather well	I can do it very well
Identify and value an innovation (technology, idea, solution) to be patented or IP-protected	☐	☐	☐	☐	☐	☐
Read and critically analyse registered IPR (e.g., read a patent, critically analyse copyright for technological identification and comparison)	☐	☐	☐	☐	☐	☐
Detect similarities between IP-protected technology and solutions that are to be protected	☐	☐	☐	☐	☐	☐
Determine the (minimal) degree of differentiation between IP-protected technology and solutions that are to be protected	☐	☐	☐	☐	☐	☐
Detect digital solutions and consider their application/integration into IPR documentation	☐	☐	☐	☐	☐	☐

to meet the minimal differentiation required for registrations						
Detect green solutions and consider their application/integration into IPR documentation to meet the minimal differentiation required for registrations	☐	☐	☐	☐	☐	☐
Draft an application form	☐	☐	☐	☐	☐	☐
Draw the necessary technological schematics for an application	☐	☐	☐	☐	☐	☐
Assess a technology's Novelty, Inventiveness and Industrial Applicability	☐	☐	☐	☐	☐	☐

Q7.NotApplied.A - Did you ever consider applying or registering for an IPR?

☐ Yes, I did consider applying for IPR

☐ No, I have never considered it

Q7.NotApplied.B - What made you abandon your intention to register IPR?

	Not applicable	Not important reason	Not critical, but I considered it	Important Issue, but not critical	Critical reason	(one of) The main reason(s)
Personal disinterest/ No practical need to apply (e.g., I did not develop any innovation, idea or solution to protect it)	☐	☐	☐	☐	☐	☐
I plan to or already did make my invention public – e.g., publishing a paper, posting for free use, etc. I do not want to limit its use	☐	☐	☐	☐	☐	☐
I found an easier solution that does not require registration (other types of IPR)	☐	☐	☐	☐	☐	☐
I am not sure if the technology/solution I have is worth being patented or IP-protected	☐	☐	☐	☐	☐	☐

I have found that the technology I would like to patent (or work that I can copyright) is illegal in my area	☐	☐	☐	☐	☐	☐
I struggle to understand the legal framework. IPR regulation is too complicated for me	☐	☐	☐	☐	☐	☐
I struggle to understand the registration process	☐	☐	☐	☐	☐	☐
I think the technology I want to patent already exists, but I do not know how to find it/check for it	☐	☐	☐	☐	☐	☐
The technology is already under someone (else's) IPR	☐	☐	☐	☐	☐	☐
It will be detrimental for me – e.g., I will reveal my secrets to the competition	☐	☐	☐	☐	☐	☐
It takes too long to be registered	☐	☐	☐	☐	☐	☐
It is too expensive to register and then protect IPR	☐	☐	☐	☐	☐	☐
I am unsure whether the enforcement of IPR law is correct – even if someone steals my IP, they will not be punished	☐	☐	☐	☐	☐	☐
Other:	☐	☐	☐	☐	☐	☐

Q7.NotApplied.C - We understand your motivations. Nevertheless, if someone asks you for guidance to register an IPR, how well can you help with:

	I have never done it (don't know)	I can't do it	I can do it poorly (cannot guarantee a decent result)	I can do it OK (but not very well)	I can do it rather well	I can do it very well
Identify and value an innovation (technology, idea, solution) to be patented or IP-protected	☐	☐	☐	☐	☐	☐

Read and critically analyse registered IPR (e.g., read a patent, critically analyse copyright for technological identification and comparison)	☐	☐	☐	☐	☐	☐
Detect similarities between IP-protected technology and solutions that are to be protected	☐	☐	☐	☐	☐	☐
Determine the (minimal)degree of differentiation between IP-protected technology and solutions that are to be protected	☐	☐	☐	☐	☐	☐
Detect digital solutions and consider their application/integration into IPR documentation to meet the minimal differentiation required for registrations	☐	☐	☐	☐	☐	☐
Detect green solutions and consider their application/integration into IPR documentation to meet the minimal differentiation required for registrations	☐	☐	☐	☐	☐	☐
Draft an application form	☐	☐	☐	☐	☐	☐
Draw the necessary technological schematics for an application	☐	☐	☐	☐	☐	☐
Assess a technology's Novelty, Inventiveness and Industrial Applicability	☐	☐	☐	☐	☐	☐

Q8 - Have you participated before (or are engaged now) in a process to defend an IP right?

- ☐ Yes, I am or was involved in a case protecting my (or my organisation's) IPR
- ☐ Yes, I am or was helping others to protect their IPR
- ☐ No, I was never involved in such practices

Q8.Defended - Can you auto-evaluate your skills and competencies necessary for the IPR defence?

	I have never done it (don't know)	I can't do it	I can do it poorly (cannot guarantee a decent result)	I can do it OK (but not very well)	I can do it rather well	I can do it very well
Search and identify infringements (e.g., find parties using IP-protected technology)	☐	☐	☐	☐	☐	☐
Utilise specialised tools that help with infringement detection	☐	☐	☐	☐	☐	☐
Evaluate and estimate potential damage from infringement	☐	☐	☐	☐	☐	☐
Follow the IPR protection process (e.g., prepare documentation, follow the correct steps, etc.)	☐	☐	☐	☐	☐	☐
Apply adequate protection strategy based on the type of IPR and (potential) damage caused	☐	☐	☐	☐	☐	☐
Mediate an IPR dispute (e.g., help parties find a compromise and avoid a costly lawsuit)	☐	☐	☐	☐	☐	☐

Q8.Defended.A - If not troublesome, can you identify what IPR tool you are using to find infringements and fight IPR cases? If many, please name the top three that you consider most useful:

The IPT tool that you are using or is the
best choice

Third best choice

Q8.NoDefend - Have you ever been in a situation to protect your IPR but refused to do so?

Multiple answers are possible

☐ Yes, I refused because it was too costly

☐ Yes, I refused because of the legal complexity

- ☐ Yes, I refused because of the weak legal framework (e.g., there are no adequate sanctions, corrupted legal system, etc.)
- ☐ Yes, I refused because we mediated the situation without the need to imply legal sanctions
- ☐ No, I never detected any infringements - No need
- ☐ No, I don't own any IPR to protect in the first place
- ☐ Other:

Q9 - We have observed that there are not many IPRs registered in the field of the green and circular economy. Maybe you can share your opinion on how green, circular and sustainable technology can benefit from IPR protection:

- ☐ No, I don't think it is correct. There are enough Green IPR
- ☐ No, I don't know how it can benefit
- ☐ No, I am not sure what is Green, Sustainable and Circular technology and how it works
- ☐ Yes,

Part III: Utilisation of IPR and IPR management for innovation (knowledge and technology creation, adoption, combination, and commercialisation)

Q10 - Have you ever thought about or encountered a situation when you had to consider how any IPR can be used for innovation?

- ☐ Yes, it is related to my work in the private sector (business, industry) or my career plans
- ☐ Yes, it is related to my interest to become an entrepreneur
- ☐ Yes, it is related to my work in the public sector or business-support organisations
- ☐ No, I have never thought about that

Q10.No - Is there a particular reason why IPR does not interest you as a source of innovation input?

Multiple answers are possible

- ☐ I have never had the need or was put in a situation to consider it
- ☐ The business model does not require to introduce any innovations
- ☐ The innovation process does not require additional steps that include IPR
- ☐ The technology level and production means are unique (or other explanations) and do not allow the adoption of new solutions
- ☐ I don't trust technology that was not developed by another organisation
- ☐ I don't understand the regulation on IPR and am afraid to use it

Q10.Yes.Business+Entrepreneur - Can you evaluate your skills in the application of IPR in technological innovations? How well can you:

	I have never done it (don't know)	I can't do it	I can do it poorly (I cannot guarantee a decent result)	I can do it OK (but not very well)	I can do it rather well	I can do it very well
Use IPR tools and databases as an external source of knowledge and know-how	☐	☐	☐	☐	☐	☐
Adopt registered IPR solutions in (own) Research and Development (R&D) process	☐	☐	☐	☐	☐	☐
Adopt registered IPR solutions (own) production methods or product/technology configurations	☐	☐	☐	☐	☐	☐
Correctly consider the degree of adoption (how much external knowledge) to incorporate into internal processes	☐	☐	☐	☐	☐	☐
Consider necessary changes and additional improvements for the external knowledge (e.g., correct the technology to your needs and further improve it)	☐	☐	☐	☐	☐	☐
Reproduce and IP-protected technology from another industry and adapt it to your needs	☐	☐	☐	☐	☐	☐

Adopt IPR solutions for solving internal technological problems or shortcomings	☐	☐	☐	☐	☐	☐
Collect information from users, suppliers, buyers, competitors, etc., to improve innovation performance or internal IP (e.g., licensed software, product functionality)	☐	☐	☐	☐	☐	☐
Use IPR as data for the analysis of technological trends	☐	☐	☐	☐	☐	☐

Q10.Yes.Business+Entrepreneur.A - Can you tell us what IPR databases and tools you are using as knowledge and technology sources?

Databases

Tools

Q10.Public+Support - Considering your experience, can you evaluate your knowledge of how IPR can be applied to technological innovation? For example, could you explain to someone (or give life examples) how to:

	No knowledge of that	Understanding of very general terms	A fair understanding but not deep knowledge	A good understanding;	Know it very well
Use IPR tools and databases as an external source of knowledge and know-how	☐	☐	☐	☐	☐
Adopt registered IPR solutions in (own) Research and Development (R&D) process	☐	☐	☐	☐	☐
Adopt registered IPR solutions to (own) production methods or product/technology configurations	☐	☐	☐	☐	☐
Correctly consider the degree of adoption (how much external knowledge) to incorporate into internal processes	☐	☐	☐	☐	☐

Build upon external knowledge during/after implementation process (e.g., apply your solution to a technology to further improve it)	☐	☐	☐	☐	☐
Reproduce and IP-protected technology from another industry and adapt it to your needs	☐	☐	☐	☐	☐
Adopt IPR solutions for solving internal technological problems or shortcomings	☐	☐	☐	☐	☐
Collect information from users, suppliers, buyers, competitors, etc., to improve innovation performance or internal IP (e.g., licensed software, product functionality)	☐	☐	☐	☐	☐
Use IPR as data for the analysis of technological trends	☐	☐	☐	☐	☐

Q11- The latest trends in the industry clearly indicate the adoption of green, circular, sustainable and digital technology in many European sectors and companies.

Can you evaluate your level of understanding of green, circular and sustainable trends and processes?

	Not applicable to my case	No knowledge of that	Understanding of very general terms	A fair understanding but not deep knowledge	A good understanding	Know it very well
Knowledge of the technical aspects to increase sustainability or circularity	☐	☐	☐	☐	☐	☐
Knowledge of the managerial aspects of engaging in circular, sustainable or Industrial Symbiotic models	☐	☐	☐	☐	☐	☐
Knowledge of how to recognise and integrate green content (from registered IPR) into production and business practices	☐	☐	☐	☐	☐	☐
Knowledge of how to search for partners to engage in a circular model	☐	☐	☐	☐	☐	☐

Knowledge of how to use IPR or IPR tools to search and engage with partners to go circular	☐	☐	☐	☐	☐	☐
Knowledge of how to transition to a green business model (e.g., process steps, what needs changing, etc.)	☐	☐	☐	☐	☐	☐
Recognise (business) opportunities related to the utilisation of green technology and models	☐	☐	☐	☐	☐	☐
Any other trends and practices that we missed and you are knowledgeable about?	☐	☐	☐	☐	☐	☐

Q12 - Can you evaluate your level of understanding of digital trends and processes?

	Not applicable to my case	No knowledge of that	Understanding of very general terms	A fair understanding but not deep knowledge	A good understanding	Know it very well
Knowledge of where to find and utilise digital data (databases, big data, etc.) which is owned by others or IP-protected in your innovation, production and business processes	☐	☐	☐	☐	☐	☐
Knowledge of how (or of examples) to adopt digital solutions in managerial and work organisation processes (e.g., digitalisation plan, paperless office, etc.)	☐	☐	☐	☐	☐	☐
Knowledge of how to recognise and integrate digital solutions from Open Sources or under registered IPR (e.g., Algorithms, parts of codes) in the creation and production process	☐	☐	☐	☐	☐	☐
Knowledge of how to increase a business or organisation's security levels using digital solutions and IP-protected technology	☐	☐	☐	☐	☐	☐

Recognise (business) opportunities related to the utilisation of digital technology and models	☐	☐	☐	☐	☐	☐
Any other trends and practices that we missed and you are knowledgeable about?	☐	☐	☐	☐	☐	☐

Q13 - We understand that not all innovations are related to technology. Could you evaluate your knowledge of how IPR can be used for Organisational and Administrative improvements?

	Not applicable to my case	No knowledge of that	Understanding of very general terms	A fair understanding but not deep knowledge	A good understanding	Know it very well
How to use IPR for marketing and in marketing strategy	☐	☐	☐	☐	☐	☐
How to use IPR to secure Exclusive Sales to compensate for R&D expenses and ensure Return on Investment (RoI)	☐	☐	☐	☐	☐	☐
How to use IPR (such as trade secrets, NDA, etc.) as a company's organisational tool (e.g., create and direct conditions for the work environment)	☐	☐	☐	☐	☐	☐
How to use IPR to develop new business models and spin-offs (e.g., create a new entity to commercialise developed technology)	☐	☐	☐	☐	☐	☐
How to use IPR (such as industrial design) to establish strong supply chains	☐	☐	☐	☐	☐	☐
How to use IPR to offer auxiliary solutions and services to users	☐	☐	☐	☐	☐	☐
How to use (external) IPR solutions to reduce load and increase the efficiency of management tasks	☐	☐	☐	☐	☐	☐
Acquire, sell or manage IPR to secure merging, assimilation or other forms of business transformation	☐	☐	☐	☐	☐	☐

Further Contact:

Email - If you are interested in the topic of IPR and agree to participate in further research organised by our team, please leave your email so that we can contact you.

Newsletter - Would you like to receive Newsletters from our Project and be informed about the latest activities and achievements of IPR4SC project?

☐ Yes, I would like to receive the latest news

☐ No, I am not interested in it