PRODUCE

D2.1 Stakeholder Requirements for UDI in the Consumer Goods Products

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Abstract	The report presents the main findings of the iPRODUCE Task2.1 survey, aiming to capture insights about makerspaces' acceptance, main drivers, and barriers. The survey was conducted in the project's 6 CMDFs pilot countries, capturing main outcomes regarding general EU citizens', makers' and manufacturers' perceptions, needs and potential differences. The report is structured as follows: *Section 1* provides a short description of the context that motivated the project and introduces the main research questions that guided this study. *Section 2* presents a literature review regarding the main drivers, barriers, and challenges of makerspaces, in order to present the current state-of-the-art in the field of social manufacturing. *Section 3* includes all information related to the survey design and the implementation. In *Section 4*, we present some initial descriptive findings closely related to individual perceptions and levels of acceptance and highlight any significant variations between different EU areas. This section also includes the main statistical analysis of the dataset by including the outcomes of the factor analysis and logit model that we have built. Summary of key findings, conclusions and further discussion are presented in *Section 5*.

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Executive Summary

Exploring the current state-of-the-art of the collaborative production and makerspaces across Europe is essential for providing and developing an effective framework towards empowering the uptake of collaborative manufacturing ecosystems in the consumer goods sector. Lack of awareness and low social acceptance levels can greatly affect the course of these projects and can emerge as significant barriers for user-driven innovation (UDI). Especially in the case of collaborative production projects that require a complex multi-actor involvement, social acceptance can pose a serious threat to the successful implementation and sustainability of the project.

With the aim to gain insights into the main drivers boosting social acceptance of makerspaces and collaborative production projects, and in order to identify possible barriers and gaps limiting wider adoption of these initiatives, a survey was conducted, as part of the iPRODUCE project, targeting the project's 6 pilot countries. The focus was steered on identifying and analysing stakeholders' awareness levels, needs, drivers and barriers with regard to their engagement in social manufacturing, as well as capturing potential differences in perceptions between the project's pilot countries and stakeholder groups.

This report presents the survey's main findings. Building on the data collected, descriptive statistics and advanced inferential analytics (e.g. modelling, conjoint analysis, segmentation algorithms) were applied to explore relations, patterns, and potential groupings, producing meaningful intelligence that can feed the subsequent tasks of the project.

The key findings of the survey analysis, including the understanding and classification of stakeholders' perceptions and needs, reveal the main drivers and barriers as well as their support needs upon which iPRODUCE will better target and fine-tune the project's foreseen actions (i.e. establishment of cMDFs[1], collaborative tools, user innovation tools, blockchain technologies, incentives, etc.).

The report is structured as follows:

Section 1 provides a short description of the context that motivated the project and introduces the main research questions that guided this study.

Section 2 presents a literature review regarding the main drivers, barriers, and challenges of makerspaces, in order to present the current state-of-the-art in the field of social manufacturing.

Section 3 includes all information related to the survey design and implementation.

Section 4 is the most extensive section of the report and is structured to reflect the **outcomes** of survey analysis. We present some initial descriptive findings closely related to individual perceptions and levels of acceptance and highlight any significant variations between different EU areas. This section also includes the main statistical analysis of the dataset by including the outcomes of the factor analysis and logit model that we have built.

Section 5 presents a summary of key findings, conclusions, and further discussion.

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[1] Collaborative Manufacturing Demonstration Facilities (cMDFs): Local cMDF are at the heart of iPRODUCE and are expected to become the main stimulating drivers to launch, promote and realise the envisaged collaborative engineering and co-creation activities, while they will capitalise on novel consumer engagement approaches.

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1. Introduction

Over the last decade, an underlying cultural trend has been gaining attention and traction: collaborative production, social manufacturing, and the maker movement. The prosumer trend, the rapid expansion of makerspaces, the increased availability and affordability of digital fabrication tools such as 3D printers and laser cutters and the advance in digital collaborative technologies have led to the creation of a rapidly increasing number of Do-It-Yourself (DIY)[2] communities. Across the world, the maker movement is introduced as a driver for the new "industrial revolution". Collaborative production, however, like most newly emerging fields, still has many challenges to overcome before reaching its full potential.

The European Commission (EC) acknowledges that common collaborative production challenges include (i) the scaling up of manufacturing to a sufficiently large scale, (ii) the lack of viable business models and (iii) the tension between democratised manufacturing and existing market regulations (EC, 2015). The latter is also connected to issues of safety and quality of community manufactured goods. On top of these macro-level barriers, a series of subtler interconnected issues exist. Maker communities struggle between the sharing approach and the entrepreneurial one, often causing resistance to scaling efforts. Most importantly, in some cases, perceptions about makerspaces can significantly limit local support and participation.

The makers' community is calling for increased networking and network experience, sharing and adoption of best practices and a more holistic, culturally expansive, and community-centric role for makerspaces (ASEE, 2016). The EC invites policy makers to support collaborative production by encouraging shared physical and digital manufacturing infrastructure and networks. EC further calls for regulation that encourages and mainstreams democratised manufacturing (EC, 2015).

Scholars argue that in order to be able to tackle current barriers and inform effective policy and application around collaborative production, planners need to **first understand the stakeholders involved in the making communities; the general public, the makers as well as manufactures/industrial actors** (Komninos et al., 2019; Wolf-Powers et al, 2017; Angelidou and Psaltoglou, 2017). What is currently missing is a deeper understanding of the attitudes and needs as well as of the most predominant norms, stereotypes, and perceptions with regard to social manufacturing. There is a dire need to shed light not only on the demographics of makers and people who can potentially be makers (e.g. consumers turned into prosumers) but also examine their beliefs, incentives and goals so that better engagement strategies can be designed and established.

This is the very scope of the iPRODUCE Task 2.1. The task's actions aim at enabling a better understanding of the consumers, makers and industrial stakeholders in (i) the project's 6 pilot countries (*1st* round survey – D2.1) and (ii) across the EU (*2nd round* survey – D2.2), along with their perceptions, preferences and intentions as well as their level of understanding and behavioural aspects with respect to the collaborative manufacturing and the maker movement. To this end, a survey was launched, aiming at identifying whether factors that have been associated with or assumed as important in driving relevant perceptions are indeed important in shaping key aspects of the stakeholders' intentions to act.

This report (D2.1) captures the market research activities of the iPRODUCE Task 2.1 and, through a detailed analysis of the *1st round* survey, aims to shed light on the EU citizens', makers' and manufacturers' perceptions and potentially pinpoint meaningful heterogeneities among them.

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[2] Do-It-Yourself (DIY) is the method of building, modifying, or repairing things without the direct aid of experts or professionals.

2. Theoretical Background

It is common knowledge that the world is changing; population experiences a continuous increase, alongside lifestyles and trends that are constantly shifting. Within this context, technological advances and novel tools are transforming manufacturing production processes into more open, smarter, personalised production models where user innovation plays a significantly major role. In particular, modern technology allows makers to design and engineer their creations enabling mass-customisation on a large scale, while lowering the learning curve through community, such as social networks, video publishing sites, and online forums (Kwon and Lee, 2017).

Over the last decade, the maker economy has been attracting attention while an immense growth of communities engaged in DIY activities has been observed (Rosa et al., 2018, 2017). On this basis, much research has been done on the topic of maker movement and social manufacturing, highlighting cultures and approaches. However, there is still a lack of studies on the motivational factors behind the community participation and the "making behaviour" of makers. Aiming to shed light on this under-researched area, iPRODUCE is set out to study how the social manufacturing phenomenon is unfolding in the current manufacturing scene.

2.1. Social manufacturing, maker movement, makerspaces, makers

2.1.1. What is social manufacturing and maker movement?

The term "*social manufacturing*" is characterised with high level of utilising the power of communities in order to design and produce physical goods. It captures the phenomenon of shared participation between firms and/or individuals in the manufacturing process. However, there is no established definition of how exactly this sharing can take place (Hamalainen and Karjalainen, 2017). According to Jiang (2019), social manufacturing "*covers product life cycle activities that deal with organisational and interactive mechanisms under the context of socio-technical systems in the fields of industrial and production engineering*". It is an emerging technical and business paradigm of collaborative production, associated with the maker and DIY movement, that allows prosumers to build and co-create personalised products and individualised services with their partners through integrating inter-organisational manufacturing service processes (Jiang, Leng and Ding, 2016).

Similarly, the term "*maker movement*" is still a subject of discussion. Several scholars (Rosa et al., 2018, 2017; Bean et al., 2015; Wittemyer et al., 2014) have attempted to provide a definition of this trend, as an evolving branch of the DIY movement. It is often described as an innovative form of manufacturing production that combines cutting-edge technologies, such as 3D printing and laser cutting, with arts and crafts activities. It is a cultural trend that promotes learning, innovation as well as design thinking and places value on an individual's ability to be a creator as well as a consumer. In this context, "making" is characterised as the process of activities - such as designing, building, modifying, and/or repurposing material objects - oriented towards making a ''product'' that can be used, interacted with, or demonstrated (Martin, 2015).

2.1.2. Where is making taking place?

The physical representation of the maker movement would be the *makerspaces*. Makerspaces are

community-based initiatives, hosted in open spaces, that empower people to access technologies and cultivate skills for design and fabrication. Individuals are enabled to make things for themselves or with others in self-directed projects. Makerspaces are introducing design, prototyping and innovation to wider, non-professional participation (Davies, 2017). Participants in these spaces learn by doing and exchange knowledge and skills with one another.

A makerspace is usually equipped with small-scale versions of highly versatile, digitally-enabled design and fabrication tools, originally developed for rapid prototyping in industry, as well as providing more traditional hand tools associated with various crafts (Smith, 2017). Some makerspaces are self-defined as "hackerspaces", linked to a tradition of workshops that goes back to hacker communities in the 1990s (Maxigas, 2012). A more formalised network of initiatives adopts the label "Fablabs" - Fabrication laboratories (Gershenfeld, 2005). Other initiatives and workshops define themselves as makerspaces and remain member-based, though non-profit, and - like hackerspaces and many Fablabs - have "open day" events and a community-orientation. While differences are observed between existing makerspaces, there are also strong similarities. As Smith states (2017), all these makerspaces "*at heart share a common commitment to tools for people*" In this report "*makerspace*" is used as an umbrella term, covering all these common-nature initiatives and workshops.

The aim of these initiatives is to provide makers and their communities the infrastructures and technical equipment required to turn their ideas into actions and, eventually, products. Makerspaces serve as places of social engagement that strengthen the values of community and cooperation. They provide the opportunity for citizens to share views, express their creativity, freely experiment, and develop new skills in a collaborative structure. These spaces function as multidisciplinary learning environments that stimulate new ideas and concepts for products, accelerating invention and design cycles (Rosa et al., 2017).

While the diffusion of such spaces is impressive[3], it is far from being geographically homogeneous (Bean et al., 2015). Data collected from previous EU studies (Rosa et al., 2018) indicate that a higher number of makerspaces can be found in western European countries and among them, France, Germany and Italy are accounting for more than half of the makerspaces in EU. This could imply that there is a connection between the level of a community's economic development and the uptake of the maker movement. Nevertheless, nowadays makerspaces are present in all major EU cities, illustrating a significant spatial allocation of the maker movement across the EU; all major capital cities have at least one makerspace. It appears that makerspaces indeed flourish in large urban environments since the latter offer significant benefits, such as access to customers, early adopters, more socially conscious and environmentally aware citizens, etc (Schrock et al., 2016).

2.1.2.1. Digitisation of Makerspaces

The provisioning of digital technologies further supports social manufacturing, enhancing the opportunities and experience of co-creation and product life-cycle management. Leveraging digital features, embedded in the makerspaces' tools, opens the possibility for wider collaboration and communication between groups at a distance, by sharing and coordinating globally across tailor-made digital platforms or even social media platforms. For example, social media sites set the ground for discussing manufacturing practices whereas guiding steps and detailed design instructions are shared online over platforms like *Instructables*. Sharing the same tools and networking digitally means that, in

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[3] The *fabfoundation.org* website lists more than 1750 Fablabs in more than 100 countries.

principle, a prototype designed in one makerspace can be made, adapted and improved in any other makerspace anywhere (Smith, 2017). In this context, online dedicated fora and uploaded videos consist an important source of advice, instruction, and discussion in gaining design and making capabilities through a non-formal learning experience (Wood, Rust, & Horne, 2009). Individuals may attend their local makerspace and learn with participants at other makerspaces globally, through online courses and shared projects.

Makerspaces' digital tools, therefore, further boost collaborative production. Participants in makersapces collaborate freely in the conceptualisation, design and production of an inspiring variety of objects, "*from environmental monitoring equipment, to furniture; from human prosthetics to sports equipment; from bicycles to eco-houses; from wind turbines to beehives; and all sort of things in between*" (Kohtala, 2016; Smith, 2017). While a large share of participants is involved in the process for the personal fulfilment of making things, there is an increasing number of members that use makerspaces to pursue entrepreneurial activities, educational projects, and socially oriented innovation. By collaborating in such activities and documenting them openly - building upon the latest ICT (Information and Communications Technology) advances, such as cloud computing and big data technologies - a platform infrastructure for knowledge and skills is emerging which, in turn, enables the establishment of collaborative manufacturing networks (Firmansyah and Amer, 2013; Varela *et al.*, 2018).

2.1.3. Who are the makers?

Apart from the physical spaces, an essential element of the maker movement is, of course, the people who take part in it; the makers. Literature defines makers as individuals who create a range of products, from crafts and home improvements to self-service facilities, leveraging information technology (Collier & Wayment, 2018; Kwon and Lee, 2017). Notwithstanding the variety of existing terminology, makers are people who share a common passion around handcrafts, craftsmanship. grassroot innovations, and DIY projects.

The current knowledge about makers derives mostly from qualitative studies, according to which, makers range from hobbyists to traditional artisans to more advanced software developers, and could include craftsmen, designers, artists, musicians, cooks, students, welders, scientists, engineers and software developers (Kwon and Lee, 2017; Wittemyer, 2014). In this sense, "*we are all makers*" as Dougherty, the founder of MAKE Community[4] states, implying that everyone can, or at least has the potential to, engage in making activities (Masters, 2018).

2.1.3.1. Demographics of the makers

Over the last decade, scholars have observed a variety of demographic characteristics related to makers (Wittemyer, 2014; Make and Intel, 2012). Studies reveal that makerspaces appear to be a male-dominated landscape, with women representing only a 20% share of the total makerspaces participating population. Female makers are usually engaged in making via arts and crafts such as sewing while males are more attracted to physical sciences and engineering-related projects. The median age of female participants is 28 years old, while the median age of adult male makers is 34. With regard to employment, researchers highlight that over eight in ten (83%) makers are employed and nearly one-

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[4] *https://make.co/*

third of them have job titles or job descriptions in technical areas (Hartmann and Mietzner, 2017).

Research further confirms that makers consist a well-educated group, with 97% of the Makerspaces' participants having attended or graduated from college. A share of 80% has undertaken post-graduate education and more than 40% of the makers' population holds post-graduate degrees. Some of the most common degrees amongst makers include engineering, as well as computer and information science. Interestingly, it appears that male "makers" are mainly engaged in science and engineering, while women "makers" are mainly engaged in arts. Furthermore, participants of makerspaces report a high median household income and most of them are married.

The information presented above offers valuable insights around the maker's profile and calls for further inquiry. Making seems to be heavily dominated by men and especially those that are educated and wealthy. Among else, the low representation of women in the maker movement, the makers' young age, and their educational profile raise a series of questions that need to be further investigated:

- What are the specific participation challenges for women?

- Does the elderly find it difficult to take part in making activities? Why?

- Are people who do not have tertiary education involved in the maker movement? If not, why?

- Why do unemployed and economically disadvantaged people have lower participation rates?

- What type of training would empower vulnerable groups, such as uneducated, unemployed and people of low economic status, to be involved?

- How important is engineering, IT and technical knowledge and skills for participating in the maker movement?

Current studies analyse and compare various aspects that characterise participants of the maker movement. Nevertheless, only a few of them investigate whether specific social groups are underrepresented within makers' communities (Seo, 2019). Despite the movement's claims of universality, there is consistent reproduction of exclusion cases (Whelan, 2018). As reported in literature, most of the members of makerspaces are "*technically interested and well educated and, therefore, represent a particular fraction of society*" (Waldman-Brown et al., 2016). This indicates that, **while inclusiveness of making comes across as one of the key characteristics of the maker movement, whether the movement is inclusive for everyone, still remains in question**.

2.2. Drivers, barriers, attitudes, and challenges around social manufacturing

Apart from shedding light into the demographics of makers, there is a dire need to acquire a deeper understanding of the beliefs, perceptions, incentives and barriers of makers and people who could potentially be makers.

2.2.1. Drivers influencing engagement in making

Even though the maker movement is constantly growing, studies on the motivational factors that affect community participation in the making activities are still lacking (Kwon and Lee, 2017). Nevertheless,

current research offers some indications for aspects that can support the uptake of this social phenomenon. For instance, makers' prior DIY experience in terms of skills, as well as materials knowledge, positively influences their decision to participate in such projects. Moreover, the benefits derived from STEM (Science, Technology, Engineering, and Mathematics) education in terms of abilities and skills are one of the main factors that make makerspaces appealing, especially to children and youth (Hartmann and Mietzner, 2017). Literature indicates that the maker movement and STEM education are closely related, and makers are interested in how the STEM fields can help them expand their knowledge through making (Sang and Simpson, 2019). Also, together with an expressed interest in learning, the will to experiment is among the top motivations (Menichinelli et al., 2017).

Scholars also point out that motivations also include economic benefits and economic savings (Collier and Wayment, 2017; Wolf and McQuitty, 2011). The lack of available or affordable high-quality products, together with the need for more customised – tailored to personal needs - items, also motivates people. In addition, the growing anti-consumption ideology and sustainable lifestyle patterns seem to be among the key drivers for the engagement in makers communities. Along these lines, the use of recycled and reclaimed materials in the produced work and crafts significantly motivates people (Collier and Wayment, 2017). The existence of available urban spaces is also an important factor since it helps makers to build the knowledge and, especially, the relationships that will further enable them to be involved in making activities (Wolf-Powers, 2016). However, even though having a common co-working area where makers can share tools is important, what also motivates participation is the community spirit and the co-existence of a variety of different mindsets. As such, the opportunity to be in touch with people of different competencies and exchange knowledge, experiences and skills seems to be a significant driver towards community participation and collaborative co-creation.

Most makers indicate as important factors the desire to create, the craftsman identity (i.e. a type of social labelling), the feeling of creating something from start to finish, as well as the enjoyment of socialising and participating in a DIY community. The need for uniqueness and differentiation from other people, as well as the sense of empowerment, open-sharing and learning, creativity, accomplishment, self-improvement, fun and enjoyment that making activities offer, are also considered to be core motivational factors (Collier and Wayment, 2017; Wolf and McQuitty, 2011).

Overall, the motivation for participating in maker initiatives is mostly related to personal and generic objectives such as (i) learning about making, (ii) using making for education and (iii) developing personal projects. Other motivations such as developing collaborative solutions, improving business through making or improving policymaking, appear to be subordinate (MAKE-IT project, 2017).

2.2.2. Challenges in participating in the maker movement

General public individuals or existing makers, however, often have many challenges to overcome before they engage in makerspaces and making activities. Several authors indicate a variety of barriers that affect people's decision to participate in the maker movement. According to relevant studies, makers can be discouraged by the lack of income stemming from these initiatives, the insufficient available information, the lack of mentorship as well as the limited access to tools and materials (Bean et al., 2015; Wittemyer et al., 2014). Besides that, the fear of failure and criticism together with the fear of the unknown are supposed to be among the top challenges.

Moreover, the lack of technical skills seems to be a barrier since *"creating an object from scratch using a digital drawing means is not necessarily a straightforward process".* As such, this process makes it

difficult for anyone to walk into a makerspace and start creating immediately (Waldman-Brown et al., 2015). This is in line with another literature source which suggests that the competence of people to execute the necessary tasks will significantly affect their motivation and willingness to join; when a person is willing to actively join the maker movement, he or she should also feel indeed able to join (MAKE-IT, 2017). Some of the potential participants are also concerned about more general contextual aspects, since they perceive makerspaces to be too loud, dusty, and disorganised workspaces. It should also be noted that documented barriers also include the potential absence of clearly defined goals from the making process, as well as the limited awareness of what makerspaces are and what benefits they can provide (Lewis, 2015).

Apart from these general factors identified in literature, previous research has reported additional specific challenges faced by underrepresented social groups. Even though maker initiatives take place mostly at a local or regional scale, they often lack an approach for being more inclusive towards various types of makers (MAKE-IT, 2017). The maker movement gathers rather homogeneous audiences while it appears difficult to attract low socioeconomic or minority groups.

In relation to gender, potentially existing gender gaps (*as also reported in Section 3.1.3.1 – Demographics of the makers*) might arise mostly due to existing norms related to gender imbalances, stereotypes, and biases (Maric, 2018; Bean et al., 2015; Lewis, 2015; Wittemyer et al., 2014). Overall, it seems that makerspaces are a male-dominated environment in which women face difficulties in finding a role. Thus, makerspaces appear to be an environment where female makers participation requires a higher amount of engagement effort. Researchers observe that women underrepresentation within the maker movement is also related to the overriding feeling and/or misconception that women are less interested in technical activities and related careers closely related to STEM (Bean et al., 2015). Further to the above obstacles, female makers struggle to find free time to join makerspaces due to family obligations and lack of child-care (Maric, 2018; Bean et al., 2015).

Gender disparities are not the only issue affecting individuals' involvement in the maker movement. Scholars also report the challenges that people with disabilities face regarding their participation in making activities (Seo, 2019; Stamos et al., 2019). It is highlighted that accessibility problems drive the underrepresentation of this social group which has been generally marginalised in the maker movement. Common issues that people with disabilities, and especially blind makers, could face are inaccessible and undocumented instructions for maker toolkits, less tangible design of the making board, and lack of multi-sensory modules.

Finally, as also previously mentioned (*Section 2.1.3.1*), participation challenges are also faced by the elderly, people of lower educational level, people with a lack of technical (STEM) skills, unemployed, and people of lower economic status. Researchers further indicate that underrepresented racial and ethnic minorities seem to be less engaged in making activities. However, the reasons for this exclusion have not yet been addressed.

2.2.3. Attitudes towards the maker movement

Regardless of the various barriers towards individuals' inclusion in making activities, the share of people involved in the maker movement has been increased over the last decade (Kwon and Lee, 2017). Makers' insights and perspectives, however, range. Recent reports demonstrate that participation in makerspaces is mostly seen as a free-time activity that offers resourcefulness and empowerment (Rosa et al., 2018; Make and Intel, 2012). As such, makers gather in such places to spend time together with

other people, share experiences, knowledge, and passion, and cultivate their hobbies. Furthermore, even though many of the participants see some opportunities for entrepreneurial development within makerspaces, there are only a few cases whereby employment and its related benefits consist real concerns or aspirations for the members of the maker communities.

It is observed that, among makers, there is limited knowledge on how their developed maker projects can create meaningful impact (MAKE-IT project, 2017). Finally, it also seems that there is a considerable share of makers with an aspiration to remain small-scale, holding no desire to grow or sell their businesses, since they connect fast growth with overtaking personal skills, resources, and values. They believe that growth will influence their attachment to a place, as well as their willingness to make a difference in local economies (Wolf-Powers et al., 2016).

Overall, providing skills training, access to digital tools as well as technical support, seem to be the main goals for individuals involved in a makerspace. On the other hand, research indicates that new employment opportunities, supporting of new creative tech start-ups or promotion of the maker technology are not perceived as the main purpose of the making initiatives (Rosa et al., 2018).

3. Methodological approach

This report presents the results of the 1st round survey of iPRODUCE T2.1, evaluating stakeholders' needs and perceptions around social manufacturing in the project's 6 pilot countries. A 2nd round survey is scheduled to take place later in the project, targeting the broader EU area, results of which will be delivered by M18 and will update the preliminary insights retrieved from this survey analysis.

3.1. Sample

The survey uses a quota sample including 862 responses from the general public, makers, and manufacturers in 6 EU countries (Denmark, France, Germany, Greece, Italy, and Spain). The survey was translated into the 6 pilot languages and was administered online through the GDPR compliant EU survey platform with an initial goal of capturing a total of 900 responses across all countries. Due to the Covid-19 implications, data collection period was extended and, eventually, lasted from March 2020 to August 2020 (*see section 3.1.1*). Responses were collected mostly through online means via the following channels:

a) **E-mailing** partners' network lists as well as targeted groups with an emphasis on (i) makerspaces and Fablab networks as well as (ii) networks of manufacturing, prototyping, fabrication and packaging start-ups and SMEs.

b) **Broadcasting through** the project's and partners' **social media accounts** (e.g. through the iPRODUCE Twitter and LinkedIn accounts, or partners' dedicated Facebook, LinkedIn, and Twitter accounts). It should be noted that the survey was also heavily promoted through social media groups that were active in producing face-shields and medical equipment for Covid-19.

c) **Specialised online fora** – the survey was promoted in dedicated online threads that are relevant to the project's main topics.

d) Survey dissemination through the **project's / partners' websites** (promotion through dedicated posts or newsletters).

3.1.1. Data collection period - eventual deviations and corrective actions

Only a few days after the survey's launch (March 6, 2020), the Covid-19 pandemic took hold over the EU and all iPRODUCE maker communities and Fablabs, the driving force of each pilot team and the main lever for collecting responses, shifted their focus in producing face shields and medical equipment accessories for a greater cause. They quickly mobilized and have been working selflessly to support the healthcare providers in the frontline. The exponential spread of the novel coronavirus further led to the implementation of work-from-home policies and lockdowns across the EU. These measures were, beyond doubt, vital for public health but arguably hindered the survey dissemination, prohibiting the participation in social events and practically making the circulation of hard-copy surveys not feasible. Indicatively, some of the pilots had already planned to distribute printed versions of the survey in events which were cancelled, making data collection even more difficult. Promoting the survey, under these extraordinary circumstances, turned into a much more challenging task than what was originally anticipated. Aiming to ensure that a statistically representative sample is acquired, a unanimous decision

was made to extend the survey's data collection period to August 2020, safeguarding the validity of the task's outcomes without impacting other project's activities.

3.2. Questionnaire structure

The survey's questions were clustered in 7 main sections, each of which corresponds to dedicated research question(s). Each section and its rationale are presented briefly below:

1. **Introduction to the topic**. This introductory, warm-up section, inquires participants about their knowledge on terms related to the maker movement.

2. **Perceptions**. This section inquires participants about their thoughts on makerspaces.

3. **Barriers**. The purpose of this section seeks to understand the main barriers hindering participation in makerspaces.

4. **Drivers**. This section complements the barriers section by exploring why people would participate in a makerspace. In this section, a set of different questions were prepared to separately address (a) makers/consumers and (b) manufacturers.

5. **Features of a Digital Platform for Social Manufacturing.** This section collects feedback on the most popular and fit-for-purpose features that a digital platform for social manufacturing, aiming to connect makers, manufacturing SMEs and consumers, should have.

6. **Willingness to join, openness and values**. This section inquires participants about their willingness to be involved or join in social manufacturing activities.

7. **General information.** This section includes basic demographic information such as sex, age, country, place, or residence (e.g. urban or rural area), educational background, occupational status, and others.

All demographic information was collected in compliance with the general data protection regulation (GDPR) of the European Union and was used solely for research and statistical reasons. No natural person can be identified through their demographic information. In addition, to take part in the survey, all research subjects had to agree to the terms and conditions set out to a dedicated consent form that was included in the online survey session. Finally, the management of datasets including such information adheres to the project's data management plan.

The detailed T2.1 survey is presented in *Annex I*, whereas references to specific questions within the report are cited as "QXX_Y", where "XX_Y" corresponds to the respective question's number.

4. Survey Outcomes

4.1. Descriptive analysis

4.1.1. Demographics and main variables

This section presents the main findings regarding the descriptive characteristics of the sample and the responses that were collected throughout the large-scale survey.

4.1.1.1. Spatial sample distribution

Starting from the spatial distribution of responses, *Figure 1* presented the 6 iPRODUCE pilot countries that took part in the survey. The total number of responses per country (Q25_1) is given in Table 1.

Figure 1. iPRODUCE pilot counties

Table 1. Sample distribution by country

County	Responses	Percentage
Total	862	100.00%
Denmark	51	5.92%
France	111	12.88%
Germany	222	25.75%
Greece	170	19.72%
Italy	140	16.24%
Spain	142	16.47%
Other	26	3.02%

Source: Authors' calculations

4.1.1.2. Sample distribution by individual characteristics

Table 2 presents the breakdown of responses based on demographic characteristics (Q23 – Q28). We can see that our sample follows an almost normal distribution considering age and educational level. With regard to gender, it is clear that we have a much larger share of male (69.26%) compared to the female (28.77%) survey population. Persons between 20-29 years old are highly present in the sample (34.22%), together with individuals with tertiary education (86.08% - including all three tertiary education levels: Bachelor's degree, MSc, PhD).

Table 2. Sample distribution by individual characteristics (gender, age, education, and occupational status)

Gender	Responses	Percentage
Total	862	100.00%
Male	597	69.26%
Female	248	28.77%
Other	17	1.97%
Age	**Responses**	**Percentage**
Total	862	100.00%
> 20 years	10	1.16%
20-29 years	295	34.22%
30-39 years	163	18.91%
40-49 years	147	17.05%
50-59 years	160	18.56%
60 + years	87	10.09%
Education	**Responses**	**Percentage**
Total	862	100.00%
Less than a High School Diploma	7	0.81%
High School Diploma	113	13.11%
Bachelor's Degree	254	29.47%
Master's Degree	385	44.66%
Doctorate	103	11.95%
Occupational status	**Responses**	**Percentage**
Total	862	100.00%
Employed	443	51.39%
Self-employed / entrepreneur	165	19.14%
Unemployed	29	3.36%
Student	180	20.88%
Household activity	3	0.35%
Retired	15	1.74%
Other	27	3.13%

Source: Authors' calculations

4.1.1.3. Sample distribution by spatial typology

Table 3 presents the pilot countries distribution in relation to the sample decomposition in three typologies, including urban, semi-urban and rural areas (Q30).

PRODUCE

Table 3. Sample distribution (%) by typology

	Urban	Semi-urban *	Rural	Total
Total sample	**49.65%**	**38.05%**	**12.30%**	**100.00%**
Denmark	62.75%	35.29%	1.96%	100.00%
France	40.54%	36.94%	22.52%	100.00%
Germany	54.50%	32.88%	12.61%	100.00%
Greece	62.94%	29.41%	7.65%	100.00%
Italy	23.57%	59.29%	17.14%	100.00%
Spain	51.41%	40.14%	8.45%	100.00%
Other	65.38%	23.08%	11.54%	100.00%

Note: Semi-Urban areas include persons living in suburbs and towns.
Source: Authors' calculations

In the cases of Denmark, Greece, and Germany, more than 50% of participants are located within an urban context. In the cases of France and Spain, it appears that a big share of participants stays in semi-urban regions. France, specifically, has the largest share of people residing in rural areas compared to the rest of the pilot countries. Furthermore, in Italy, the share of participants living in semi-urban settings is larger than the equivalent share of the urban population.

4.1.1.4. Sample distribution by stakeholder group

The following plot (*Figure 2*) presents the share of stakeholder groups, captured per pilot country (Q7). Out of the total registered sample (n=862), consumers (general public) represent a 57.8% share (n=498), whereas makers (n=157) and manufacturers (n=207) consist a 18.2% and 24% share of the total survey population respectively.
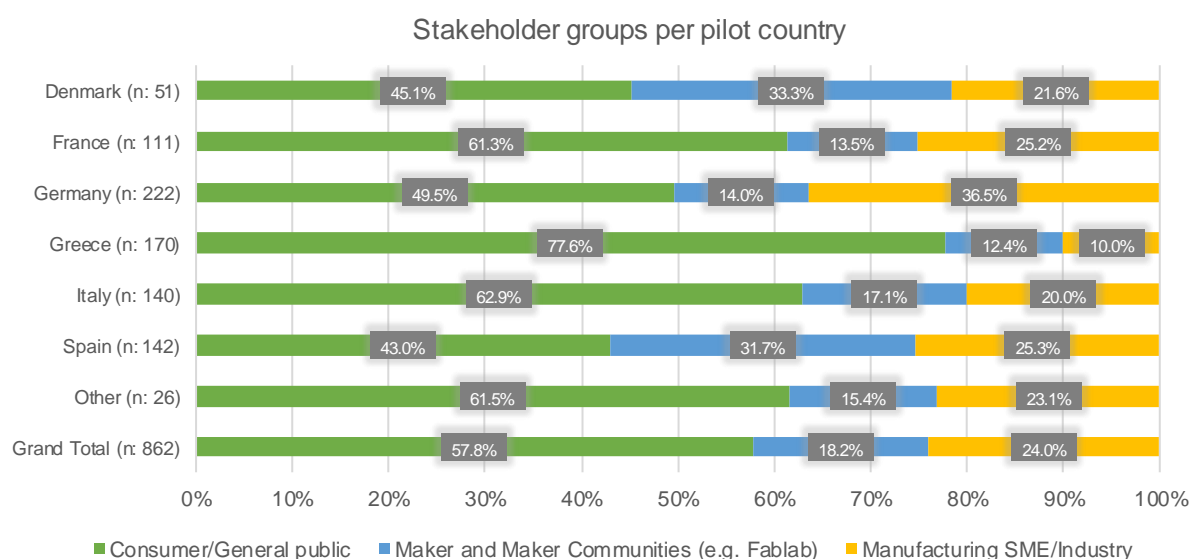
Figure 2. Share of stakeholder groups per pilot country

4.1.2. Familiarity with terms by spatial and individual characteristics

Regarding the familiarity of survey participants with the terms "*DIY manufacturing*", "*makerspace*", "*Fablab*", "*manufacturing facility*", "*co-creation*", and "*social manufacturing*" (Q1_1 – Q1_6), results indicate that many respondents are acquainted with some of the provided terminology, as shown in *Figure 3*. The most well-known term is "*DIY manufacturing*", as a significant share of our sample (53.13%) appears to be very familiar with it. The terms "*makerspace*", "*Fablab*" and "*co-creation*" seem to be slightly less known among participants, as decreased shares of good familiarity (31.67%, 29.12% and 28.07% respectively) are observed. A 23.9% share of our sample is very familiar with "*manufacturing facility*" whereas the term "*social manufacturing*" scores the lowest familiarity levels amongst survey participants (13.81%).
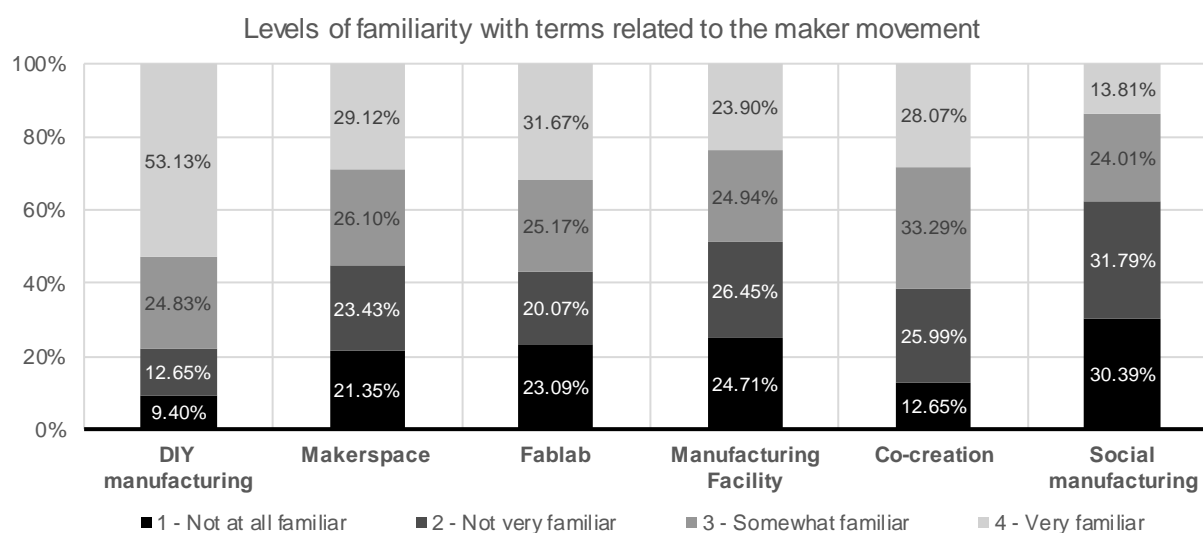
Figure 3. Levels of familiarity with terms related to the maker movement

Overall, it appears that more than 50% of our respondents' sample is relatively familiar with the concept of makerspace This share, when asked to specify the type of a potential existing relationship with a makerspace or a Fablab (Q3_2), indicated, as depicted in *Figure 4,* that they either have heard of these spaces (28.6%), used a makerspace/Fablab to develop a project (26.6%) or participated in a making activity (21.6%). Having a friend/acquaintance who is a maker or has participated in a maker activity constitutes an additional aspect for previous experience.
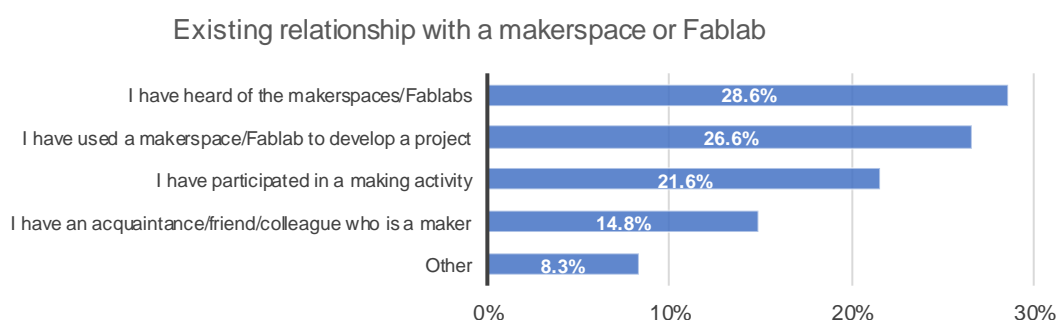
Figure 4. Type of existing relationship with a makerspace or Fablab

A detailed presentation of these results is given in *Table 4*, illustrating the mean familiarity by individual characteristics' and country clusters breakdown. As we can see, there are several differences between the six terms under investigation. As expected, mean familiarity reaches a peak in all cases when referring to "*DIY manufacturing*", whereas the lowest scores are observed in the case of the "*social manufacturing*" term.

It seems that the term "*Fablab*" is not as popular in Greece as in the case of the other pilot countries. The 30-49 years old group is more acquainted with all terms based on mean familiarity comparisons to younger and older age groups. At the same time, there are no significant gender gaps in the under-investigation terms, as mean familiarity levels are similar between males and females. Similarly, it seems that the level of education does not significantly affect familiarity shares with the aforementioned terms. With regard to occupational status, it is clear that housekeeper participants are significantly less familiar with all terms. We should, however, note that the overall sampling in this category was remarkably low and therefore these insights are not statistically representative. In the case of the terms "*DIY manufacturing*" and "*co-creation*", there seems to be a common understanding between the different employment categories. Within this group, employed and self-employed persons are the ones that have higher levels of familiarity with the examined terms.

Table 4. Mean familiarity of key terms by spatial and individual characteristics (gender, age, education, and occupational status)

	DIY manufacturing	makerspace	Fablab	manufacturing facility	co-creation	social manufacturing
Countries						
Denmark	3.76	3.20	3.20	2.82	3.10	2.18
France	3.20	2.51	3.16	2.77	2.94	2.06
Germany	2.97	2.46	2.46	2.36	2.48	1.82
Greece	3.14	2.46	1.99	2.08	2.76	2.52
Italy	3.27	2.66	2.91	2.69	2.79	2.25
Spain	3.38	2.90	2.89	2.54	2.94	2.51
Other	3.65	2.92	2.65	2.73	2.88	2.35
Gender						
Male	3.23	2.67	2.70	2.59	2.73	2.18
Female	3.18	2.51	2.52	2.19	2.83	2.25
Other	3.53	2.93	2.93	3.07	3.40	2.93
Age						
< 20 years	3.30	2.20	2.10	1.60	2.60	1.50
20-29 years	3.34	2.48	2.44	2.36	2.80	2.20
30-39 years	3.44	2.91	2.98	2.62	2.89	2.43
40-49 years	3.16	2.95	3.01	2.65	2.97	2.33
50-59 years	3.01	2.48	2.58	2.58	2.63	2.11
60 + years	2.85	2.38	2.38	2.29	2.38	1.90
Education						
Less than a High School Diploma	3.57	2.57	2.86	2.29	2.57	2.57
High School Diploma	3.26	2.47	2.36	2.22	2.35	2.01
Bachelor's Degree	3.31	2.63	2.56	2.33	2.78	2.31
Master's Degree	3.14	2.66	2.79	2.64	2.86	2.22
Doctorate	3.20	2.68	2.70	2.57	2.85	2.17

	DIY manufacturing	makerspace	Fablab	manufacturing facility	co-creation	social manufacturing
Occupational Status						
Employed	3.22	2.71	2.78	2.57	2.86	2.27
Self-employed / entrepreneur	3.19	2.72	2.71	2.62	2.72	2.20
Unemployed	3.14	2.59	2.66	2.00	2.59	2.14
Student	3.34	2.43	2.39	2.26	2.73	2.13
Household activity	2.33	2.00	1.33	1.00	1.00	1.00
Retired	2.80	2.13	2.20	2.13	2.40	2.07
Other	3.00	2.56	2.44	2.44	2.48	2.15

Source: Authors' calculations

4.1.3. Previous experience by spatial and individual characteristics

Participants were also asked (Q6) to indicate whether they have had previous experience in a collaborative project, involving makers and manufacturing SMEs. Results indicate that only a small share (27.96%) of the respondents has had previous experience with the maker movement (*Figure 5*). This share seems to vary between different demographic groups.

Do you have previous experience with an activity involving makers and manufacturing SMEs in a collaborative project?

27.96%

■ No
■ Yes

72.04%
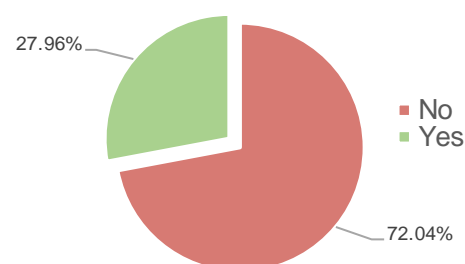
Figure 5. Previous experience in a collaborative project

As depicted in *Table 5*, it appears that the share of male participants with previous experience in a collaborative project is remarkably higher (31.66%) than the respective share of female respondents (18.95%). With regard to age groups, persons between 30-39 years old indicate the highest share of experience (40.49%). Our sample analysis further indicates that more than 40% of people being unemployed or not having attended higher education have indeed acquired a relevant experience around hands-on working on collaborative projects. Interestingly, unemployed people appear to be quite more experienced (44.83%) with the maker movement - alongside self-employed persons (36.97%) - compared to the relevant shares of the rest of the occupational categories (e.g. employed, retired). Similarly, people of a primary education appear to be more experienced (42.86%) around collaborative/making projects, compared to the respective shares of the rest of the educational level groups.

Table 5. Previous experience shares (%) by spatial and individual characteristics

	No	Yes	Total
Countries			
Denmark	64.71%	35.29%	100.00%
France	73.87%	26.13%	100.00%
Germany	79.28%	20.72%	100.00%
Greece	82.35%	17.65%	100.00%
Italy	69.29%	30.71%	100.00%
Spain	54.23%	45.77%	100.00%
Other	61.54%	38.46%	100.00%

	No	Yes	Total
Gender			
Male	68.34%	31.66%	100.00%
Female	81.05%	18.95%	100.00%
Other	73.33%	26.67%	100.00%
Age			
< 20 years	90.00%	10.00%	100.00%
20-29 years	80.34%	19.66%	100.00%
30-39 years	59.51%	40.49%	100.00%
40-49 years	64.63%	35.37%	100.00%
50-59 years	70.63%	29.38%	100.00%
60 + years	80.46%	19.54%	100.00%
Education			
Less than a High School Diploma	57.14%	42.86%	100.00%
High School Diploma	76.11%	23.89%	100.00%
Bachelor's Degree	74.02%	25.98%	100.00%
Master's Degree	71.43%	28.57%	100.00%
Doctorate	66.02%	33.98%	100.00%
Occupational Status			
Employed	71.11%	28.89%	100.00%
Self-employed / entrepreneur	63.03%	36.97%	100.00%
Unemployed	55.17%	44.83%	100.00%
Student	85.56%	14.44%	100.00%
Household activity	100.00%	0.00%	100.00%
Retired	80.00%	20.00%	100.00%
Other	62.96%	37.04%	100.00%

Source: Authors' calculations

Our analysis further investigated the relationship between educational level (Q26) and previous experience with maker movement (Q6). *Figure 6* presents the distribution of the previous experience shares between the different educational levels investigated. It becomes evident that **persons reporting previous experience around making/collaborative projects either indicate primary (or no education), or tertiary education**.
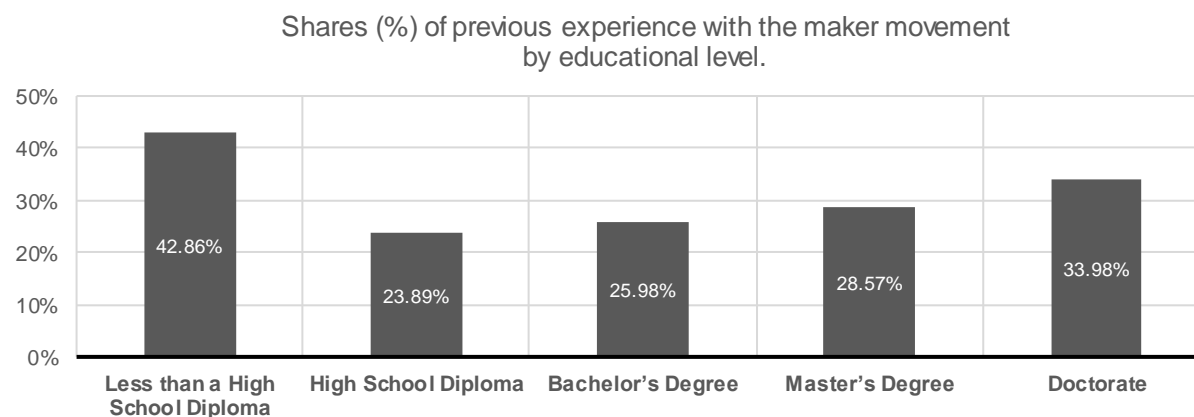
Figure 6. Shares (%) of previous experience with the maker movement by educational level

4.1.4. Preferred types of activities and respondents' fields of experience

In order to better understand the main type of activities that would attract the respondents' interest, through their potential participation in a makerspace or a Fablab, we analysed the answers received from question Q4_1: *"What type of activities would you be interested in, in relation to makerspaces and Fablabs?".* As showcased in *Table 6*, the **most popular activities related to makerspaces include digital fabrication tools (laser cutting, CNC milling and 3D printing), agile methods (ideation, paper prototyping, design thinking), woodworking, metalworking, hardware and machining**. It appears that activities related to more professionally oriented perspectives are on the top of the preferences list, reflecting the citizens' potential expectations when visiting a makerspace.

Table 6. Types of activities that survey respondents would wish to implement through their potential participation in makerspaces or Fablabs (Q4_1). Total sample and pilot countries

	Total sample	Denmark	France	Germany	Greece	Italy	Spain
Digital fabrication tools	17.37%	16.73%	18.25%	17.70%	15.79%	16.91%	19.11%
Agile methods	11.66%	7.57%	13.00%	14.34%	9.41%	10.31%	11.95%
Woodworking	10.40%	13.94%	10.25%	9.69%	7.34%	9.07%	13.99%
Metalworking	9.87%	11.16%	9.00%	11.37%	6.54%	9.90%	11.60%
Hardware, machining	9.84%	11.95%	8.25%	9.69%	10.53%	9.90%	9.56%
Electronics prototyping	9.66%	10.76%	9.75%	9.43%	9.09%	12.58%	8.36%
Software programming	8.36%	7.97%	8.50%	8.66%	10.05%	10.72%	4.27%
Photography, cinematography	7.87%	5.98%	9.75%	5.68%	11.16%	5.98%	7.85%
Information technologies	7.78%	5.18%	6.00%	8.53%	11.64%	8.66%	4.44%
Handcrafting	6.29%	7.17%	6.25%	3.75%	8.13%	4.54%	8.53%
Other	0.89%	1.59%	1.00%	1.16%	0.32%	1.44%	0.34%
Total Sample	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Authors' calculations

Aiming to further shed light on makerspaces' potential participants profiles and inclinations around collaborative manufacturing activities and processes, we further examined two additional survey questions. First, we investigated the survey participants' fields of expertise, as recorded in Q8_1. Analysed answers, presented in *Table 7,* indicate that the **sectors better aligned to the respondents' background include the fields of electronics, prototyping, mechanics, arts and furniture making.**

We then examined the participants' preferences with regard to how they like "working with their hands" during their free time (Q2). Analysed responses, depicted in *Table 8*, indicate that at least 1 out of 4 participants shares a passion for fixing things using hands. Crafting or fixing furniture, making toys or clothes, designing, and drawing as well as playing with electronics and 3D printers were among the top preferred options in this list.

Table 7. Sectors relevant to the survey participants' field of expertise (Q8_1)

	Total sample	Denmark	France	Germany	Greece	Italy	Spain
Electronics	15.01%	13.13%	10.18%	16.19%	18.27%	19.83%	10.96%
Prototyping	14.64%	17.50%	13.09%	15.71%	9.37%	16.80%	16.21%
Mechanics	11.05%	9.38%	15.64%	9.94%	13.58%	11.85%	7.99%
Arts	7.93%	10.63%	7.64%	3.69%	11.48%	3.58%	12.33%
Furniture	6.54%	10.00%	5.45%	3.53%	4.22%	2.75%	15.98%
Other	6.37%	10.00%	8.00%	8.33%	3.75%	7.44%	3.20%
Microelectronics/ nanoelectronics	6.33%	5.00%	3.27%	8.17%	5.39%	10.47%	3.65%
Automotive	5.82%	5.00%	10.55%	6.09%	3.04%	7.99%	3.20%
Accessories	5.23%	5.00%	5.82%	0.96%	8.20%	4.13%	8.45%
Mobility	4.68%	1.88%	5.82%	8.17%	1.64%	4.13%	3.65%
Medicine/Health	4.51%	1.88%	5.82%	7.53%	2.81%	4.13%	2.05%
Wearables	4.30%	4.38%	2.55%	4.65%	7.03%	3.86%	2.05%
Clothing, textiles	4.18%	4.38%	5.09%	2.88%	7.03%	2.75%	3.88%
Packaging	3.42%	1.88%	1.09%	4.17%	4.22%	0.28%	6.39%
Total Sample	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Authors' calculations

Table 8. Preferred free time activities - "working with hands" (Q2)

	Total sample	Denmark	France	Germany	Greece	Italy	Spain
Fix things around the house (e.g. car, bike)	25.56%	20.74%	27.57%	26.39%	26.92%	24.74%	24.94%
Hobbies (e.g. building models, furniture, toys/clothes)	17.67%	18.09%	22.06%	19.83%	12.26%	15.82%	19.02%
Other related activity that involves working with hands	15.65%	17.02%	12.87%	15.97%	17.79%	14.80%	13.88%
Design/draw/paint	15.35%	18.09%	13.97%	11.60%	14.18%	14.80%	22.11%
Play with electronics, 3D printers	13.51%	15.96%	13.60%	12.44%	14.18%	13.27%	14.40%
Code (produce software)	9.35%	9.04%	6.62%	8.07%	12.26%	14.80%	4.63%
I do not like to work with my hands	2.92%	1.06%	3.31%	5.71%	2.40%	1.79%	1.03%
Total Sample	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Authors' calculations

Overall, results indicate that **it is of crucial importance to investigate the local community's preferences before establishing a makerspace or, in the case of iPRODUCE, a cMDF as it is essential to provide a solid orientation of the main activities that can be achieved through them**. At the same time, it is important to invest in the dissemination and communication of the offered activities so that citizens are better-informed about the potential of such facilities and exploit the provided capacities in a beneficial way both at the individual and community level. Detailed results on preferred activities, cluster by pilot country, are presented in *Section 4.1.10*

4.1.5. Perceptions towards participation in makerspaces

Apart from understanding the main activities that citizens and stakeholders wish to see included in a makerspace or cMDF, it is also important to investigate their attitudes and perceptions towards their potential participation in these facilities. In this regard, *Figure 7* presents the descriptive analysis' outcomes of selected likert-scale questions[5], related to ways in which citizens understand the role of makerspaces. Participants' perceptions are further investigated in the statistical analysis chapter (*section 4.3*).

In *Figure 7*, we can see that **almost 80%** (38.05% agree – 41.30% strongly agree) of the survey participants express a **positive attitude towards welcoming a makerspace** in their region and finds that the collaboration between makers, consumers and SMEs is constructive (Q11_1 and Q11_2 respectively). Approximately a 70% share believes, or strongly believes, that makerspaces should contribute locally and that **individuals' participation in makerspaces or Fablabs can indeed bring a positive impact at a regional level** (Q12_4). 80 % of our total sample agrees (47.45%) or strongly agrees (32.05%) that their **participation in makerspaces would open up new professional opportunities** (Q12_3). The vast majority of our sample expressed a **desire that makerspaces should function as training centres for disruptive technologies** (Q13_4). Interestingly, however, 1 out of 3 respondents believes that consumers are not necessarily lacking the knowledge to be part of a manufacturing process (Q15_2). That further links to the increased share of survey respondents (45.13% agree – 27.26% strongly agree) that states that consumers should have an active role in the design of a product (Q15_1). Finally, many participants (58.93%) consider that further steps should be taken so that makerspaces **involve groups which are underrepresented in the maker movement**, such as women, elderly, people with disabilities, low socioeconomic status groups (Q13_1).

Q11_1: My overall perception about makerspaces and Fablabs is positive

Q11_2: My overall perception about the collaboration between makers, consumers and SMEs is positive

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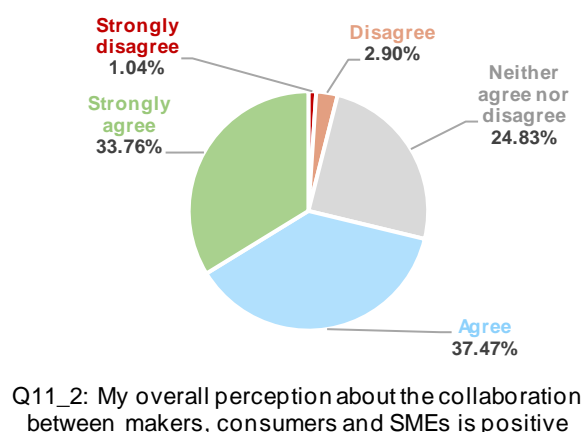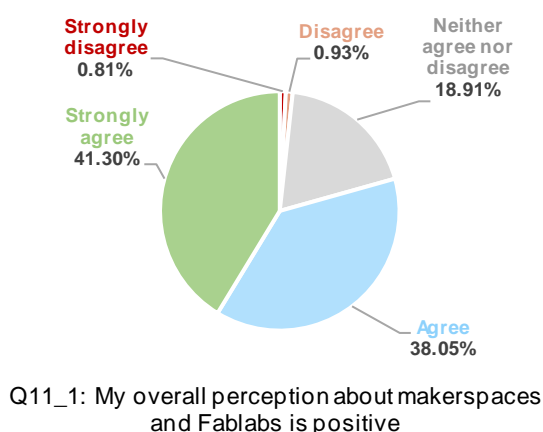
[5] A "likert scale" is a question which contains 5 or 7 response options (in our case that would 5 options). The choices range from *Strongly Agree* to *Strongly Disagree* so the survey maker can get a holistic view of people's opinions and their level of agreement.
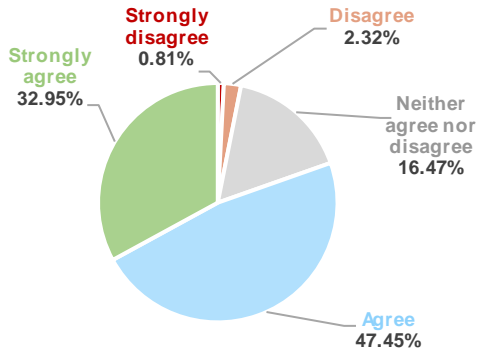
Q12_3: Participation in makerspaces and Fablabs opens up new professional opportunities
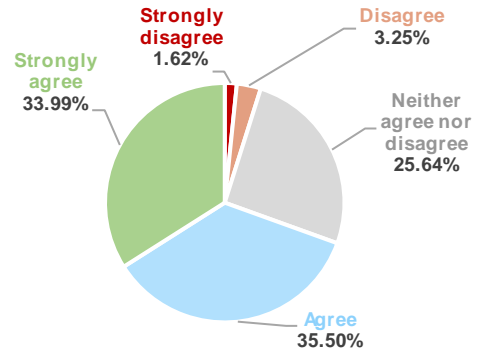
Q12_4: Participation in makerspaces and Fablabs will have a positive impact on my local area
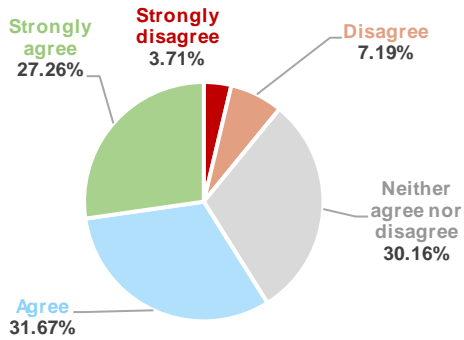
Q13_1: Makerspaces should involve groups which are underrepresented in the maker movement
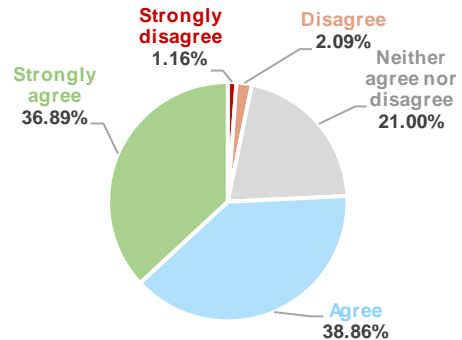
Q13_4: Makerspaces should function as training centres for disruptive technologies
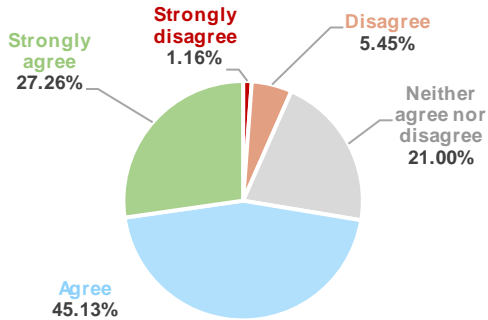
Q15_1: Consumers should have an active role in the design of a product
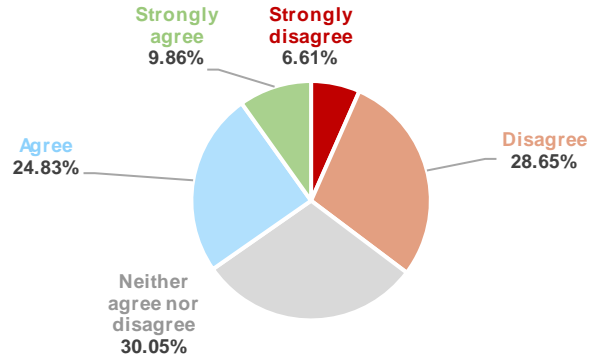
Q15_2: Consumers are lacking the knowledge to be part of a manufacturing process

Figure 7. Results regarding perceptions for participating in makerspaces (selected questions: Q11-Q16)

Detailed results of all questions related to participants' perceptions towards participating in a makerspace or a Fablab (Q11 – Q16) are presented in *Annex II - Table 24*.

4.1.6. Barriers and concerns around involvement in makerspaces

Our survey further investigated potential barriers that can hinder citizens' and stakeholders' participation in makerspaces or cMDFs. In this regard, *Figure 8* presents the descriptive analysis' outcomes of selected questions related to issues that can raise concerns with regard to consumers', makers' or manufacturers' participation in social manufacturing projects. Participants' barriers and concerns are further investigated int the statistical analysis chapter (*section 4.3*).

In *Figure 8,* we can see that the vast majority of the survey respondents agree (40.14%) or strongly agree (27.03%) that, up until today, there is a **lack of information with regard to the exact makerspaces' scope and actions** (Q17_3). On the other hand, interestingly enough, more than half of our sample believes that they do not lack the necessary skills to be involved in makerspaces' activities. This statement is well-aligned with the perception expressed by more than 30% of our sample (Q15_2 – *see previous section*) that, in practice, consumers do not lack the necessary knowledge to be part of a manufacturing process. We further observe that a 58% share of the survey respondents is indeed **concerned about potentially limited funding opportunities, expressing that this could discourage them from taking part in a makerspace** (D17_9). A 40% share of our sample has no specific opinion on whether there is already a sufficient number of makers or existing makerspaces (Q17_1). Not supporting a particular opinion in this case might be linked to the limited awareness of what (and where) makerspaces are and what benefits they can provide. **1 out of 3 respondents believes that a potential issue hindering participation in social manufacturing would be the lack of suitable digital technologies, such as platforms and tools,** while there is an equal share that does not recognise this as an issue. Finally, a 36.54% share of respondents expressed **concerns about sharing sensitive information** (e.g. technical features of a product, invention/idea, the design of a product) within collaborative manufacturing communities.
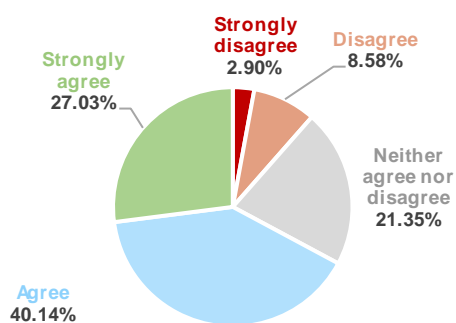
Q17_3: Lack of information about makerspaces and their actions
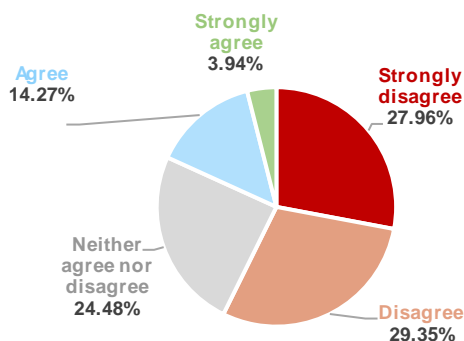
Q17_4: I lack the necessary skills to be involved in such activities
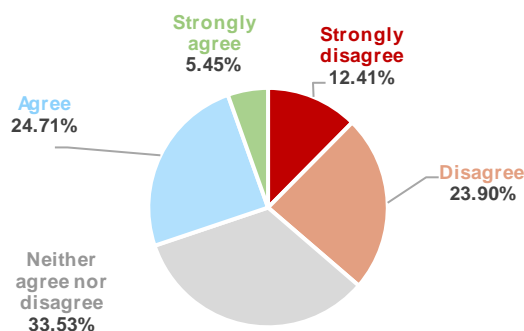
Q17_5: Lack of suitable technologies (e.g. platforms, tools, etc.)

Q17_9: Funding opportunities

Q17_1: Not enough makers/makerspaces/Fablabs

Q17_6: Concerns about sharing sensitive information (e.g. technical features of a product, invention/idea, the design of a product)
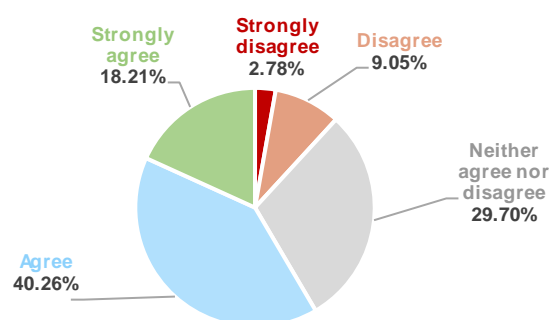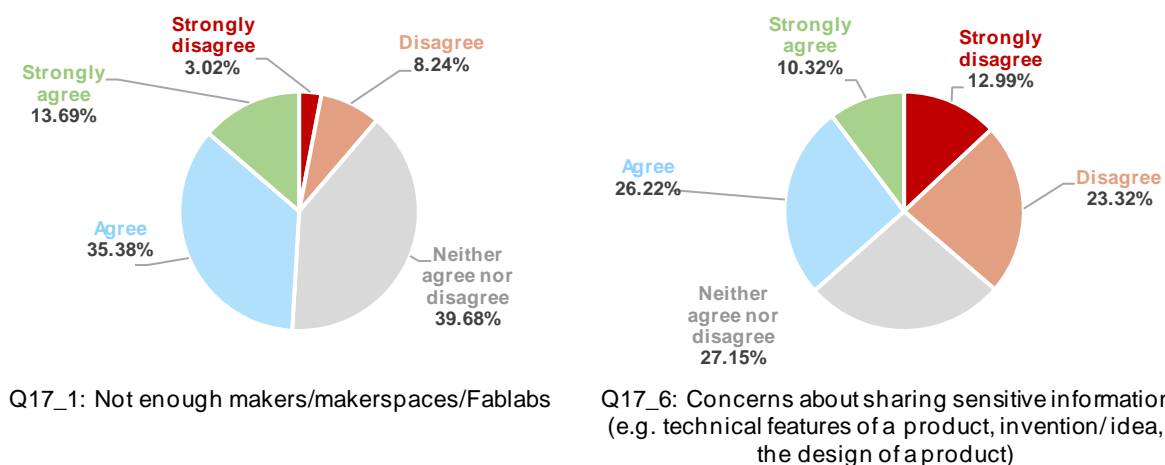
Figure 8. Results regarding barriers around involvement in makerspaces (selected questions: Q17)

Detailed results of all questions related to participants' barriers and concerns around involvement in makerspaces (Q17_1 Q17_11) are presented in *Annex II - Table 25.*

4.1.7. Drivers for participation in social manufacturing

This section explores drivers that could potentially incentivize stakeholders' participation in makerspaces or cMDFs. We separately examined drivers for (i) consumers and makers (Q18) as well as for (ii) manufacturing SMEs/Industry (Q19), as depicted in *Figure 9* and *Figure 10* respectively.

In the case of general public and makers' audiences (n=655), it appears that (i) meeting people with common interests, (ii) acquiring new technical skills, (iii) exchanging knowledge and (iv) extending network consist important drivers towards participating in a social manufacturing project. Interestingly, the prospects of earning money or peer recognition are not popular among the proposed potential drivers in this sample. A 20% share disagrees or strongly disagrees with being involved in the maker movement to gain financial rewards (*Figure 9*).
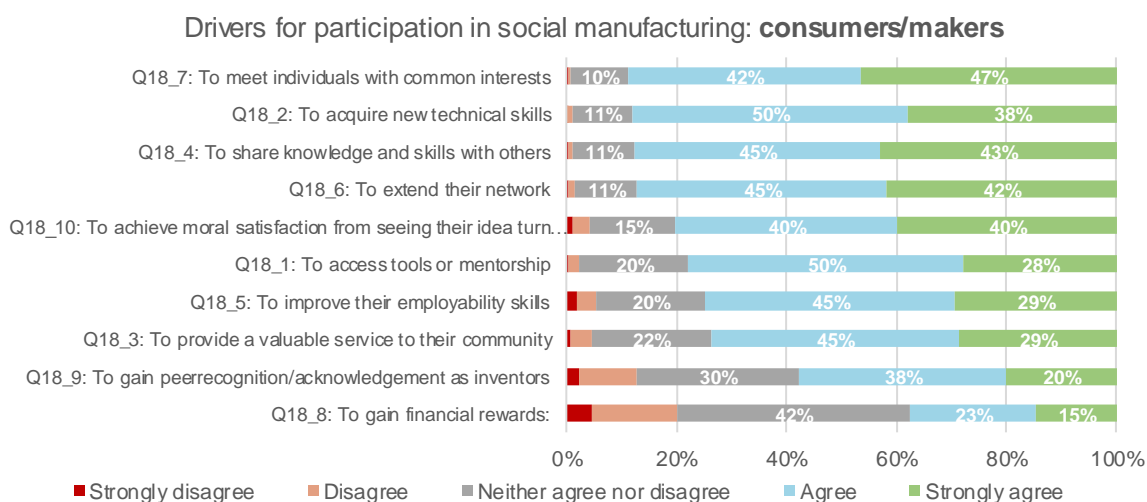
Figure 9. Drivers for participation in social manufacturing – consumers/makers

In the case of the manufacturing SMEs audience (n= 207), it appears that (i) testing new product designs and evaluating products before reaching the market, (ii) developing products that better reflect personal needs, (iii) identifying new commercial opportunities and (iv) better sharing visions with customers consist essential drivers towards participating in a social manufacturing project. Interestingly, the prospects of reducing the cost of developing products and services or becoming more self-aware on sustainability issues did not consist popular drivers among this group (*Figure 10*). Survey participants' drivers are further investigated in the statistical analysis chapter (*section 4.3*).
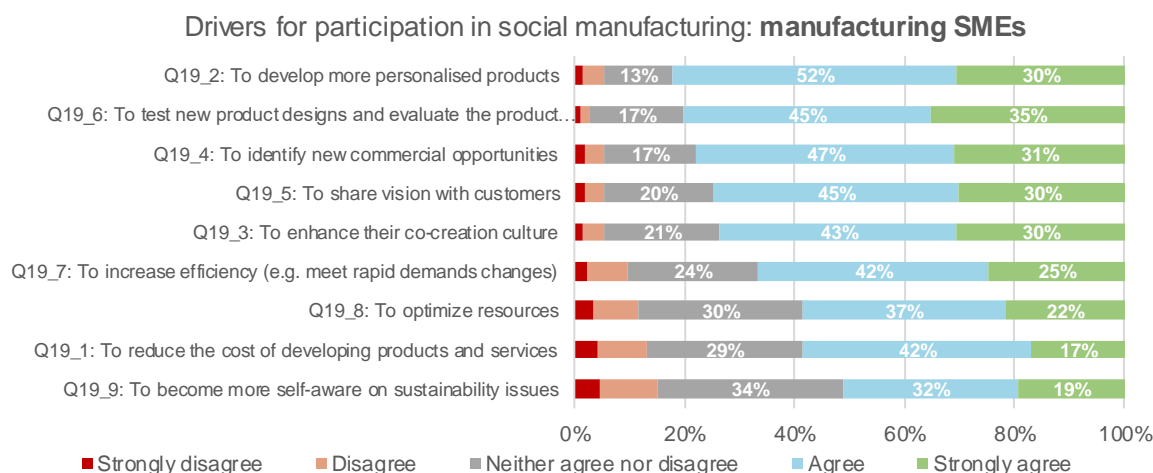
Figure 10. Drivers for participation in social manufacturing - manufacturing SMEs

4.1.8. Willingness to join a makerspace

The participants' overall positive perspective with regard to taking part in a social manufacturing project is further reflected in the descriptive analysis' outcomes of question Q22 that directly examines survey respondents' willingness to join a makerspace/Fablab. As depicted in *Figure 11,* **the vast majority of the total population sample is willing to join a social manufacturing workshop mostly aiming to gain access to training, digital tools, exchange ideas and to participate in workshops and projects for digital modelling and fabrication.**
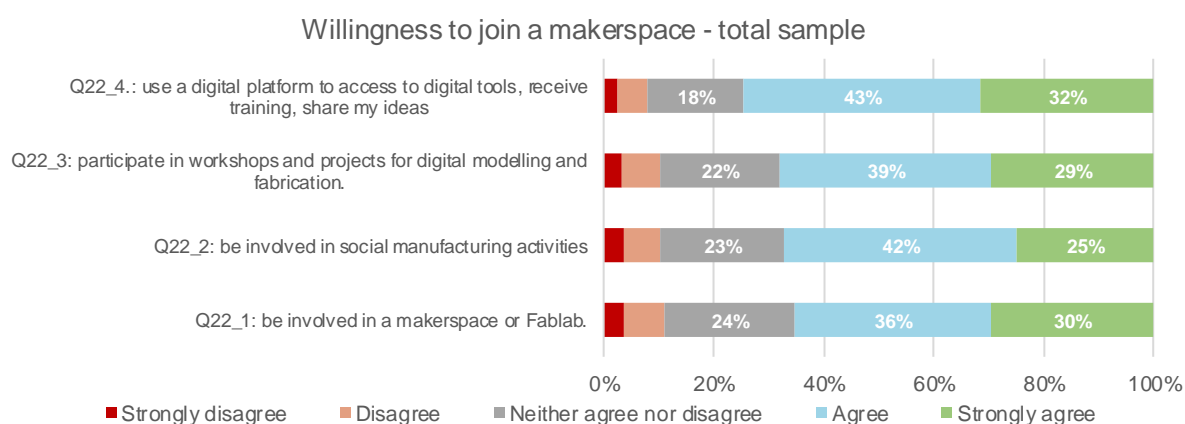
Figure 11. Willingness to join a makerspace: total survey sample

Table 9 highlights the differences between the varying stakeholder groups' beliefs.

Table 9. Willingness to join a makerspace – stakeholder groups

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Grand total
Q22_1: be involved in a makerspace or Fablab						
Total Sample	**3.83%**	**7.19%**	**23.78%**	**35.50%**	**29.70%**	**100.00%**
Consumers/General public	5.22%	8.03%	29.92%	36.35%	20.48%	100.00%
Makers and Maker communities	1.91%	0.64%	5.10%	29.94%	62.42%	100.00%
Manufacturing SMEs/Industry	1.93%	10.14%	23.19%	37.68%	27.05%	100.00%
Q22_2: be involved in social manufacturing activities						
Total Sample	**3.60%**	**6.61%**	**22.74%**	**42.00%**	**25.06%**	**100.00%**
Consumers/General public	4.42%	6.83%	24.50%	45.38%	18.88%	100.00%
Makers and Maker communities	2.55%	1.91%	13.38%	33.12%	49.04%	100.00%
Manufacturing SMEs/Industry	2.42%	9.66%	25.60%	40.58%	21.74%	100.00%
Q22_3: participate in workshops and projects for digital modelling and fabrication						
Total Sample	**3.48%**	**6.73%**	**21.81%**	**38.52%**	**29.47%**	**100.00%**
Consumers/General public	4.22%	8.23%	23.69%	40.76%	23.09%	100.00%
Makers and Maker communities	2.55%	2.55%	9.55%	32.48%	52.87%	100.00%
Manufacturing SMEs/Industry	2.42%	6.28%	26.57%	37.68%	27.05%	100.00%
Q22_4.: use a digital platform to access to digital tools, receive training, share my ideas						
Total Sample	**2.55%**	**5.45%**	**17.52%**	**42.92%**	**31.55%**	**100.00%**
Consumers/General public	2.81%	6.63%	19.48%	44.58%	26.51%	100.00%
Makers and Maker communities	1.91%	0.00%	8.92%	36.94%	52.23%	100.00%
Manufacturing SMEs/Industry	2.42%	6.76%	19.32%	43.48%	28.02%	100.00%

Source: Authors' calculations
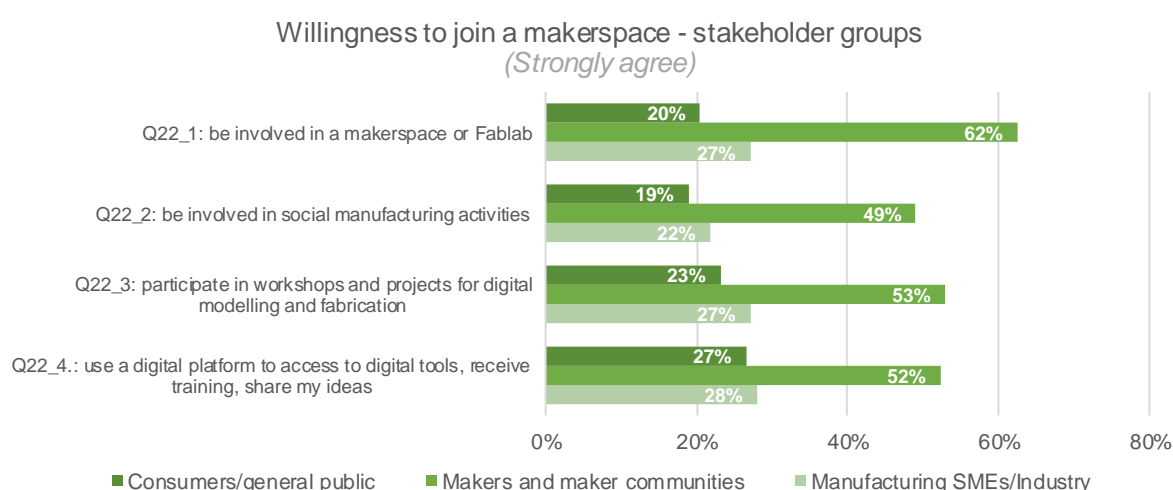
Figure 12. Willingness to join a makerspace: stakeholder groups (displayed option: Strongly agree)

Figure 12 further indicates that, **among the project's 3 main stakeholder groups, makers, as expected, appear to be more enthusiastic about joining a makerspace.** The figure above confirms that the share of stakeholders that strongly agrees with the given statements (Q22_1 – Q22_4) and

feels eager to join a social manufacturing project is remarkably higher for makers and members of existing maker communities. Variations per pilot country are introduced in the dedicated section *4.1.10*, whereas detailed results are also depicted in *Annex II - Table 28*.

Apart from examining the stakeholders' willingness to be involved in a social manufacturing project, makers and manufacturers were also asked (Q9 and Q10 respectively) to indicate the maturity stage (e.g. idea stage, design stage, fabrication stage) of their potentially existing or upcoming project/service, during which they would be willing to join a makerspace, utterly aiming to collaboratively reach (develop) a final outcome. Results, as shown in *Figure 13*, indicate that **1 out of 3 makers is interested in joining a makerspace at the design stage of a product. A 30% share is interested in co-manufacturing a product - joining, therefore, a makerspace during the fabrication stage of an existing project/system/application.** Industrial actors expressed similar preferences. **A 37% share of the manufacturers' population would join a makerspace over the design stage of a product whereas a 29% share chose fabrication as the preferred product maturity stage for entering a makerspace.**

makers (Q9): at which stage is your current product/system/application that you would be interested to develop through a makerspace/Fablab?

- An existing product that needs added functionalities
- Design stage
- Fabrication stage
- Idea stage
- Other
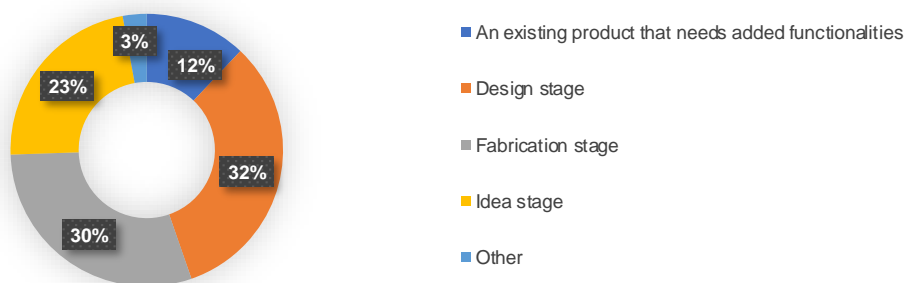
manufacturing SMEs (Q10): at which stage is your current product/system/application that you would be interested to develop through a makerspace/Fablab?

- An existing product that needs added functionalities
- Design stage
- Fabrication stage
- Idea stage
- Other
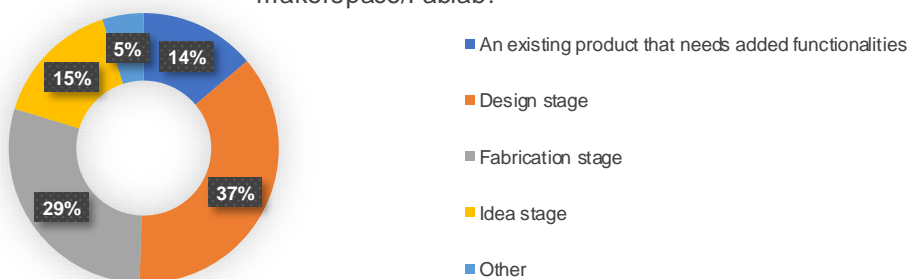
Figure 13. Maturity stage of a product while entering a makerspace

4.1.9. Preferred features in a Digital Platform for Social Manufacturing

One of the core tasks in iPRODUCE is the establishment of a new Digital Platform for Social Manufacturing that will connect makers, manufacturing SMEs, and consumers. Aiming to develop a platform that would better respond to the preferences of the project's stakeholders, we seized the opportunity and included a relevant survey question (Q20), addressing respondents' potential needs. Survey participants were specifically asked to prioritize their needs by indicating how essential a series of suggested features would be in a digital platform for social manufacturing (Q20: *"Which of the following features do you consider necessary in a Digital Platform (Web) for Social Manufacturing? [choose to what extent each feature is crucial, 1=Not at all, 5=Extremely crucial]"*).

As depicted in *Figure 14*, **(i) a detailed mapping/list of makerspaces/Fablabs' manufacturing equipment** (Q20_2), **(ii) offering training activities** (Q20_5) to enhance skills on how to use Fablabs' tools and machinery **and providing easy-to-use digital tools** (Q20_1), such as design thinking tools and AR / VR modelling **are considered among the most important digital features in a web platform for social manufacturing.**
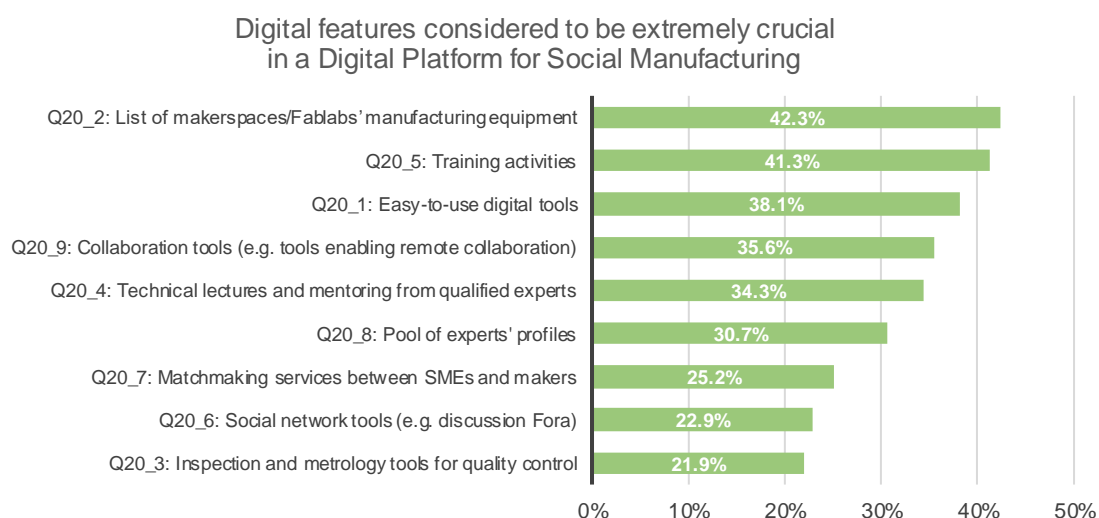
Figure 14. Features considered to be extremely crucial in a Digital Platform for Social Manufacturing

4.1.9.1. Sample distribution by stakeholder group

Figures 15, 16 and *17* further showcase the evaluation (prioritisation based on importance) of digital features for a social manufacturing platform, expressed per stakeholder category. Minor preference differences are observed between the varying groups. General public respondents clearly express their need for a web platform that offers training activities whereas makers find the list of makerspaces' manufacturing equipment and the provision of collaboration tools (e.g. tools enabling remote collaboration) extremely crucial. Manufacturers find that the easy-to-use digital tools (e.g. design thinking tools, AR / VR modelling etc.) would be essential in such a platform. Variations per pilot country are introduced in the dedicated *Section 4.1.10,* whereas detailed results are further presented in *Annex II - Table 29.*

Evaluation of suggested features in a Digital Platform for Social Manufacturing
Consumers/general public
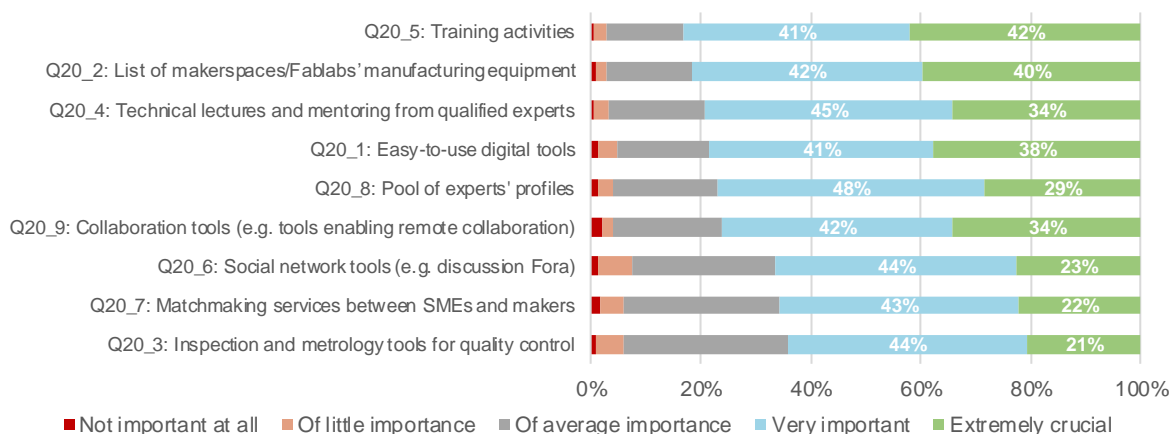
Figure 15. Evaluation of suggested features in a Digital Platform for Social Manufacturing: consumers

Evaluation of suggested features in a Digital Platform for Social Manufacturing
makers and maker communities
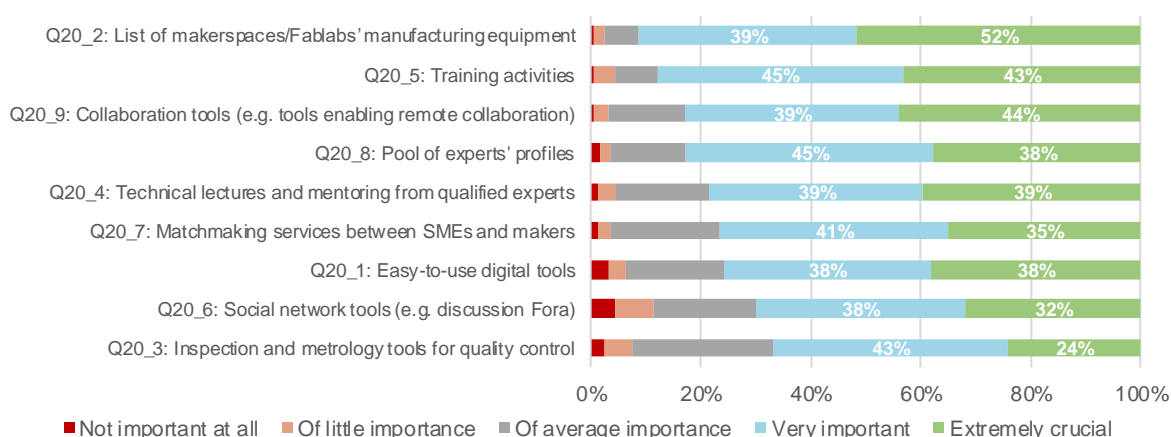
Figure 16. Evaluation of suggested features in a Digital Platform for Social Manufacturing: makers

Evaluation of suggested features in a Digital Platform for Social Manufacturing
Manufacturing SMEs/Industry
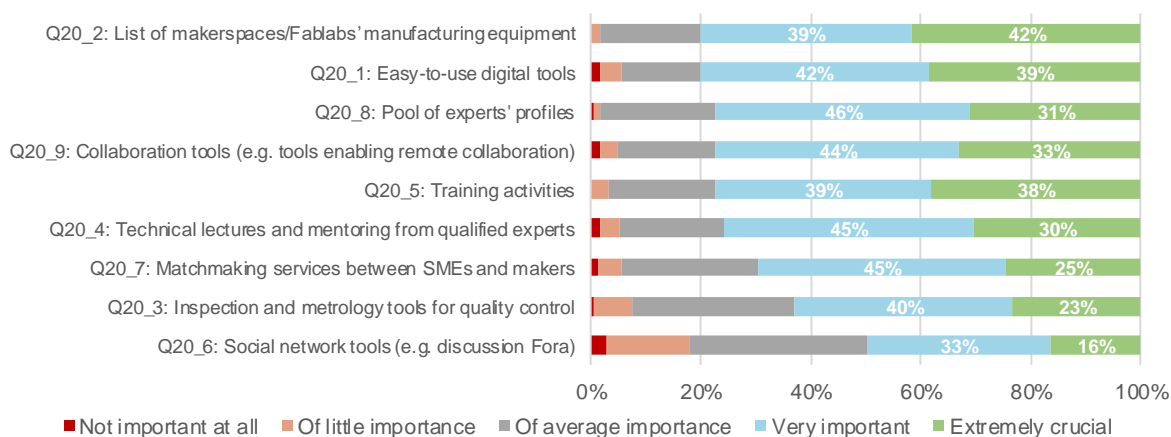
Figure 17. Evaluation of suggested features in a Digital Platform for Social Manufacturing: Manufacturing SMEs

4.1.9.2. Management of Intellectual Property Rights (IPR)

While investigating which digital features are considered to be essential, we further asked survey participants whether management of Intellectual Property Rights (IPR) should be addressed in a web platform for social manufacturing. *Table 10* presents analysed results clustered by stakeholder groups, pilot countries, gender, and level of education.

It is observed that, among the three main stakeholder groups, representatives of manufacturing SMEs are the ones who most eagerly support the option of including this service for safeguarding their projects. With regard to education, people of a higher education – as expected – have expressed a higher preference towards including such a feature. Finally, it appears that participants from Germany and Greece are especially interested in being able to manage IPR through a social manufacturing online platform. In most cases, 1 out of 3 survey participants does not have an opinion.

Table 10. Management of Intellectual Property Rights (IPR) in a Digital Platform for Social Manufacturing

	Yes	No	Do not know / No opinion	Grand total
Q21_1: Do you believe that the Management of Intellectual Property Rights (IPR) should be addressed in a Digital Platform (Web) for Social Manufacturing?				
Total	**58.87%**	**10.31%**	**30.82%**	**100.00%**
Stakeholder groups				
Consumers/General public	55.19%	9.74%	35.06%	100.00%
Makers and Maker communities	59.72%	12.50%	27.78%	100.00%
Manufacturing SMEs/Industry	67.20%	10.05%	22.75%	100.00%
Countries				
Denmark	37.50%	12.50%	50.00%	100.00%
France	56.19%	8.57%	35.24%	100.00%
Germany	63.78%	11.22%	25.00%	100.00%
Greece	75.00%	3.05%	21.95%	100.00%
Italy	44.80%	18.40%	36.80%	100.00%
Spain	53.38%	10.53%	36.09%	100.00%
Gender				
Male	58.64%	11.40%	29.96%	100.00%
Female	59.57%	8.51%	31.91%	100.00%
Other	57.14%	0.00%	42.86%	100.00%
Education				
Less than a High School Diploma	42.86%	0.00%	57.14%	100.00%
High School Diploma	42.00%	15.00%	43.00%	100.00%
Bachelor's Degree	58.16%	6.28%	35.56%	100.00%
Master's Degree	62.82%	11.83%	25.35%	100.00%
Doctorate	64.89%	10.64%	24.47%	100.00%

Source: Authors' calculations

Participants interested in accessing an IPR management service within a digital platform for social manufacturing were further asked to define which IPR type would better reflect their individual needs for safeguarding a project. As depicted in *Figure 18*, it appears that patent and copyright options

are considered to be equally popular. A share of 17.5% expressed that smart contracts would better reflect their needs whereas only a 7.7% share chose trademark as the preferred IPR type.
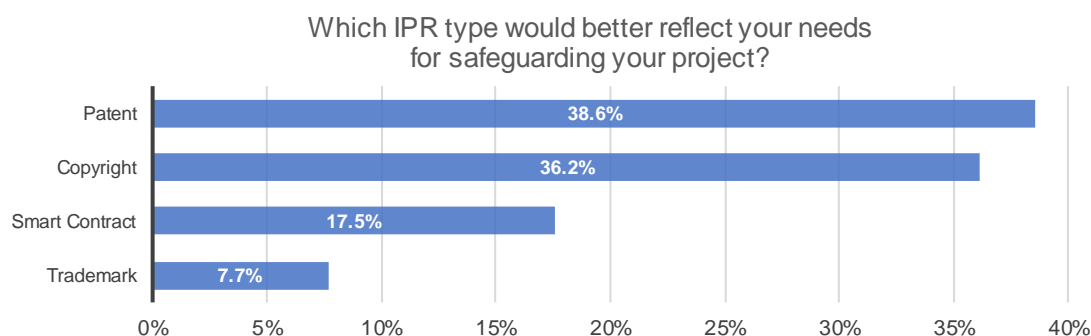
Figure 18. Preferred IPR type in a Digital Platform for Social Manufacturing

4.1.10.   Pilot countries analysis

A more detailed analysis, shedding light in the specificities of our pilot cases and pinpointing potential heterogeneities among them, is presented in this section. We provide results for each pilot country separately, so it can be seen in more detail how each case is potentially diversified in terms of people's perceptions for participating in makerspaces, as well as the main activities that they wish to perform through them.

Each country section follows a similar structure. We start by presenting the main demographic distribution of each pilot sample, alongside with shares referring to familiarity with relevant terms and previous experiences around the maker movement and social manufacturing. We further show pilot results towards respondents' willingness to join a makerspace together with the most popular makerspace activities that participants would like to be enrolled to. In each pilot case, we investigated the survey participants' main fields of expertise, aiming to further provide insights on the popular domains of activities that potentially prevail at a regional level and could be linked to potential stakeholders' expectations from the local iPRODUCE cMDFs. We, finally, highlight how different pilot cases prioritise and evaluate the importance of varying digital features in a web platform for social manufacturing.

We keep the analysis at a descriptive level, as more qualitative information at a local level needs to be collected in order to accurately capture regional needs. However, our findings can indeed feed into the project's foreseen activities and can serve as a valuable input for future workshops and discussion sessions that will be implemented in the pilot cases.

Apart from the detailed analysis, provided below, a consolidated table with all main descriptive statistics for all pilot countries is presented in *Annex II - Table 31.*

4.1.10.1.   Denmark

Table 11. Sample distribution by individual characteristics, familiarity, and previous experience - Denmark

	Denmark (n=51)
Stakeholder groups	
Consumers/General public	45.10%
Makers and Maker communities	33.33%
Manufacturing SMEs/Industry	21.57%
Total	100.00%
Gender	
Male	76.47%
Female	19.61%
Other	3.92%
Total	100.00%
Age	
< 20 years	1.96%
20-29 years	35.29%
30-39 years	25.49%
40-49 years	19.61%
50-59 years	7.84%
60 + years	9.80%
Total	100.00%
Education	
Less than a High School Diploma	3.92%
High School Diploma	17.65%
Bachelor's Degree	35.29%
Master's Degree	35.29%
Doctorate	7.84%
Total	100.00%
Occupational Status	
Employed	47.06%
Self-employed / entrepreneur	29.41%
Unemployed	5.88%
Student	17.65%
Household activity	0.00%
Retired	0.00%
Other	0.00%
Total	100.00%
Familiarity with terms (mean)	
DIY manufacturing	3.76
Makerspace	3.2
Fablab	3.2
Manufacturing facility	2.82
Co-creation	3.1
Social manufacturing	2.18
Previous experience in a collaborative project	
No	64.71%
Yes	35.29%
Total	100.00%

Source: Authors' calculations

The sample collected in Denmark includes 51 observations. Due to the Covid-19 implications, the Danish pilot team did not have the opportunity to broadcast the project in time to get more people engaged in project activities, such as questionnaires and online meetings. As work and schools' activities continued remotely, there was an overflow of media communication. The result was that the Danish partners experienced that a mix of adaptation period and lack of direct contact significantly affected the number of captured survey responses, even though both betaFACTORY and CBS posted innumerous invites to fill out the online questionnaire. As a 2nd round survey (T2.1 – D2.2) will be sent out later in the project, a (statistically) more representative sample will be captured, the results of which will update the indicative insights currently retrieved from this descriptive analysis.

As presented in *Table 11*, most of the participants among the Danish sample are men, 20-39 years old, employed or self-employed with a higher education. It appears that 1 out of 3 persons is a maker whereas consumers consist a 45% share of the total Danish population. With regards to familiarity with relevant terms, high scores have been achieved in the case of the *"DIY manufacturing", "Makerspace"* and *"Fablab" terms*. In practice, the Danish survey participants appear to be much more acquainted with the given terminology, compared to the rest of the pilot countries.

Most of the respondents (64.71%) do not have previous experience with an activity involving makers and manufacturing SMEs whereas a 35.29% share already has an existing relationship with a makerspace or Fablab, mostly claiming experience in using their facilities to develop a project (*Figure 19*). In the case of willingness towards joining social manufacturing activities, *Figure 20* further confirms that a large share of the Danish population has a positive perception and would indeed be willing to be involved in a makerspace or Fablab (27% agree – 55% strongly agree).
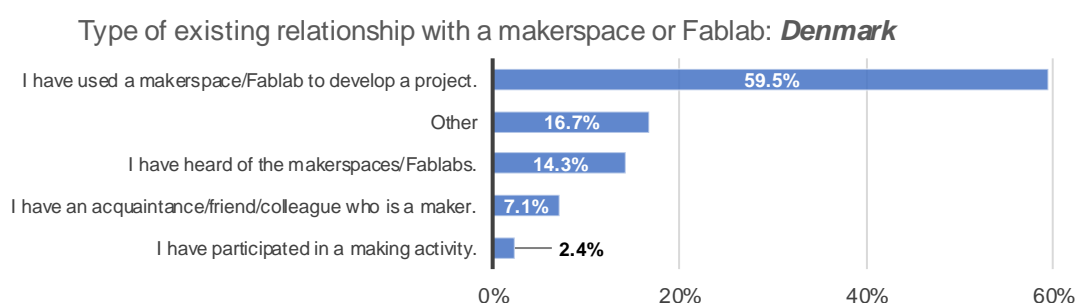
Figure 19. Type of existing relationship with a makerspace or Fablab - Denmark
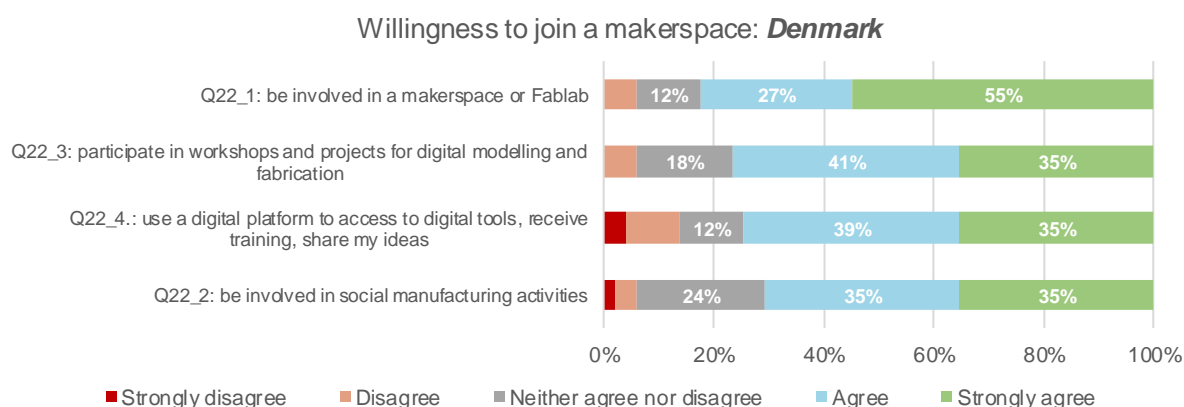
Figure 20. Willingness to join a makerspace - Denmark

Our results further shed light on the main types of activities that Danish participants would wish to be enrolled to through their potential participation in makerspaces (*Figure 21*). We can see that the first places on the list are mostly covered by manufacturing-related activities. More specifically, the top three activities include: (i) digital fabrication tools (laser cutting, CNC milling and 3D printing), (ii) woodworking and (iii) hardware or machining. We also investigated the Danish respondents' fields of experience and, as shown in *Figure 22*, it appears that the main domains relevant to the participants' sector of expertise include: (i) prototyping, (ii) electronics and (iii) arts.

Types of activities that survey respondents would wish to implement through their potential participation in a makerspace or Fablab : *Denmark*

Activity	Percentage
Digital fabrication tools (Laser Cutting, 3D Printing)	16.7%
Woodworking	13.9%
Hardware, machining	12.0%
Metalworking	11.2%
Electronics prototyping	10.8%
Software programming	8.0%
Agile methods (ideation, paper prototyping, design thinking)	7.6%
Handcraft (e.g. bags, jewellery, knitting, sewing)	7.2%
Photography, cinematography, photo editing	6.0%
Information technologies	5.2%
Other	1.6%

Figure 21. Types of activities that survey respondents would wish to implement through their potential participation in makerspaces or Fablabs - Denmark

Sectors relevant to the survey participants' field of expertise: *Denmark*

Sector	Percentage
Prototyping	17.5%
Electronics	13.1%
Art	10.6%
Other	10.0%
Furniture	10.0%
Mechanics	9.4%
Accessories	5.0%
Automotive	5.0%
Microelectronics / nanoelectronics	5.0%
Clothing, textiles	4.4%
Wearables	4.4%
Packaging	1.9%
Medicine/Health	1.9%
Mobility	1.9%

Figure 22. Sectors relevant to the survey participants' field of expertise - Denmark

With regard to the evaluation of digital features for a social manufacturing platform *(Figure 23),* the Danish sample expressed a preference towards (i) the provision of a detailed list of

makerspaces/Fablabs' manufacturing equipment, (ii) the establishment of a catalogue with experts' profiles so that makers/SMEs can seek for assistance and (iii) gaining access to training activities to enhance skills on how to use Fablabs' tools and machinery.

Figure 23. Evaluation of suggested features in a Digital Platform for Social Manufacturing - Denmark

4.1.10.2.   France

Table 12. Sample distribution by individual characteristics, familiarity, and previous experience - France

	France (n=111)
Stakeholder groups	
Consumers/General public	61.26%
Makers and Maker communities	13.51%
Manufacturing SMEs/Industry	25.23%
Total	100.00%
Gender	
Male	70.27%
Female	29.73%
Other	0.00%
Total	100.00%
Age	
< 20 years	1.80%
20-29 years	44.14%
30-39 years	18.02%
40-49 years	15.32%
50-59 years	17.12%
60 + years	3.60%
Total	100.00%
Education	

	France (n=111)
Less than a High School Diploma	0.00%
High School Diploma	6.31%
Bachelor's Degree	22.52%
Master's Degree	55.86%
Doctorate	15.32%
Total	100.00%
Occupational Status	
Employed	62.16%
Self-employed / entrepreneur	12.61%
Unemployed	2.70%
Student	17.12%
Household activity	0.00%
Retired	1.80%
Other	3.60%
Total	100.00%
Familiarity with terms (mean)	
DIY manufacturing	3.2
Makerspace	2.51
Fablab	3.16
Manufacturing facility	2.77
Co-creation	2.94
Social manufacturing	2.06
Previous experience in a collaborative project	
No	73.87%
Yes	26.13%
Total	100.00%

Source: Authors' calculations

The French sample includes 111 observations (Table 12). Most of the participants are men (70.27%) of a relatively young age, 20-29 years old. Approximately a 75% share of the French sample is employed or self-employed whereas there is a 17.12% share of student respondents. 45% of the French survey participants are consumers whereas 1 out of 4 participants is a manufacturer. With regards to familiarity with relevant terms, high scores have been achieved related to the *"DIY manufacturing"* and *"Fablab" terms*.

Most of the respondents (73.87%) do not have previous experience with the maker movement. Among the ones considering themselves familiar with the concept of makerspaces or Fablabs, a 32.3% share claims that they have previously used such a space to develop a project. Moreover, having heard about the maker movement or having a friend/acquaintance who is a maker or has participated in a maker activity constitute additional aspects for previous experience (*Figure 24*).

In the case of willingness towards joining social manufacturing activities, *Figure 25* indicates that the majority of French respondents are indeed willing to join a makerspace, mostly aiming to be involved in social manufacturing processes, gain access to training, digital tools, exchange ideas and to participate in projects for fabrication.

Type of existing relationship with a makerspace or Fablab: *France*

Figure 24. Type of existing relationship with a makerspace or Fablab - France

Willingness to join a makerspace: *France*
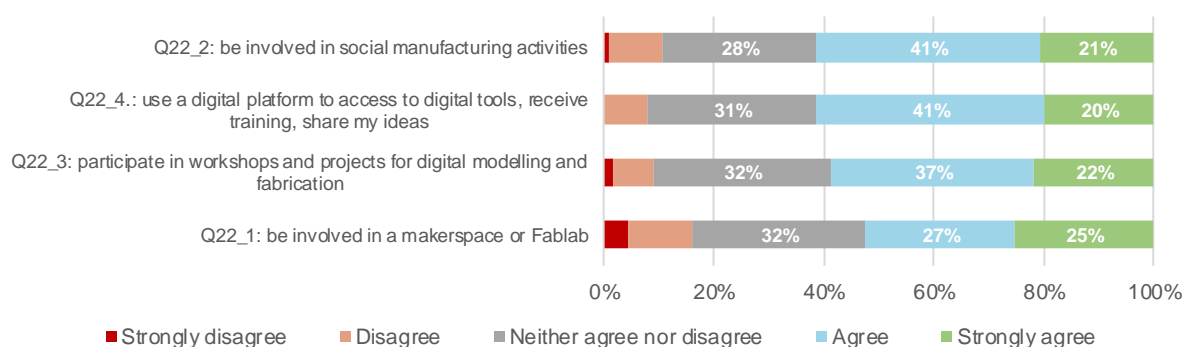
Figure 25. Willingness to join a makerspace - France

We further explored the main types of activities that survey participants from France would wish to be enrolled to through their participation in makerspaces (*Figure 26*). The top three activities include: (i) digital fabrication tools (laser cutting, CNC milling and 3D printing), (ii) agile methods (ideation, paper prototyping, design thinking) and (iii) woodworking. With regard to the French respondents' fields of experience, as shown in *Figure 27*, it appears that the top three domains most relevant to the participants' sector of expertise include: (i) mechanics, (ii) prototyping and (iii) automotive activities.

Types of activities that survey respondents would wish to implement through their potential participation in a makerspace or Fablab : *France*
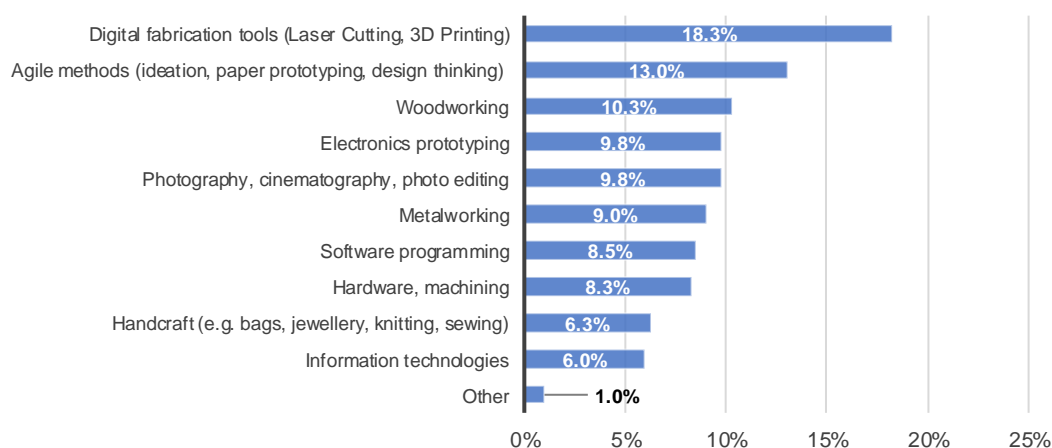
Figure 26. Types of activities that survey respondents would wish to implement through their potential participation in makerspaces or Fablabs - France

Sectors relevant to the survey participants' field of expertise: *France*
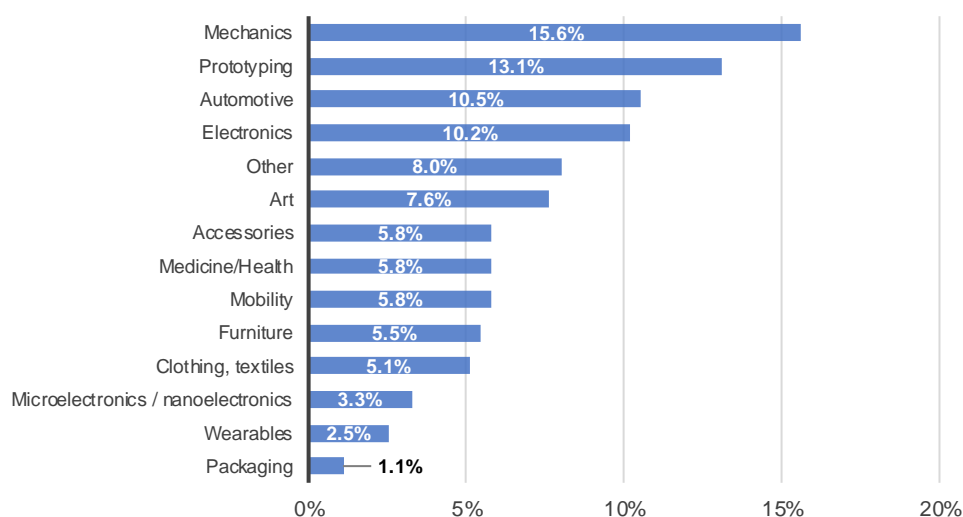
Figure 27. Sectors relevant to the survey participants' field of expertise - France

Figure 28, presents the preference list of the digital features that French respondents considered to be essential in a web platform for social manufacturing. Among the provided options, it appears that (i) the provision of online training activities, (ii) a detailed list of makerspaces/Fablabs' manufacturing equipment, and (iii) gaining access to tools that would enable remote collaboration are considered to be the most important ones.

Figure 28. Evaluation of suggested features in a Digital Platform for Social Manufacturing - France

4.1.10.3. Germany

Table 13. Sample distribution by individual characteristics, familiarity, and previous experience - Germany

	Germany (n=222)
Stakeholder groups	
Consumers/General public	49.55%
Makers and Maker communities	13.96%
Manufacturing SMEs/Industry	36.49%
Total	100.00%
Gender	
Male	76.58%
Female	22.97%
Other	0.45%
Total	100.00%
Age	
< 20 years	0.00%
20-29 years	5.41%
30-39 years	17.12%
40-49 years	18.02%
50-59 years	31.98%
60 + years	27.48%
Total	100.00%
Education	
Less than a High School Diploma	0.00%
High School Diploma	2.25%
Bachelor's Degree	11.26%
Master's Degree	62.61%
Doctorate	23.87%
Total	100.00%
Occupational Status	
Employed	68.92%
Self-employed / entrepreneur	23.42%
Unemployed	0.00%
Student	1.35%
Household activity	0.45%
Retired	2.70%
Other	3.15%
Total	100.00%
Familiarity with terms (mean)	
DIY manufacturing	2.97
Makerspace	2.46
Fablab	2.46
Manufacturing facility	2.36
Co-creation	2.48
Social manufacturing	1.82
Previous experience in a collaborative project	
No	79.28%
Yes	20.72%
Total	100.00%

Source: Authors' calculations

In Germany, 222 responses have been registered, making this the largest collected sample. Compared to the rest of the pilot countries, **this sample has the highest share of manufacturers (36.49%), and is the oldest in terms of age** (approx. 50% over 50 years old) and most highly educated (62.61% and 23.87% hold a master's and PhD degree respectively). As presented in *Table 13,* half of the German sample population are consumers and only a 13.96% share is represented by makers. Women consist a 22.97% share of the total German sample. It should also be noted that more than 90% of respondents are employed (68.92%) or self-employed (23.42%) with a moderate familiarity with the provided terminology around *"DIY manufacturing", "Makerspace", "Fablab", "Manufacturing facility",* and *"Co-creation".* A low score has been observed regarding the "*social manufacturing*" term.

A 20.27% share of German respondents appears to have previous experience in a collaborative project. Among the ones considering themselves familiar with the concept of makerspaces or Fablabs, a 33% share, as depicted in *Figure 29*, claimed that they have heard of the concept before whereas a 24.5% share has already participated in a making activity. Having used a makerspace to develop a project (17%) or having a friend/acquaintance who is a maker or has participated in a maker activity (16%) constitute additional aspects for previous experience.

In the case of willingness towards joining social manufacturing activities, *Figure 30* confirms that the vast majority of the German sample would indeed like to be involved in a makerspace, mostly aiming to use digital tools through a social manufacturing platform, receive training and exchange ideas.

Type of existing relationship with a makerspace or Fablab: *Germany*
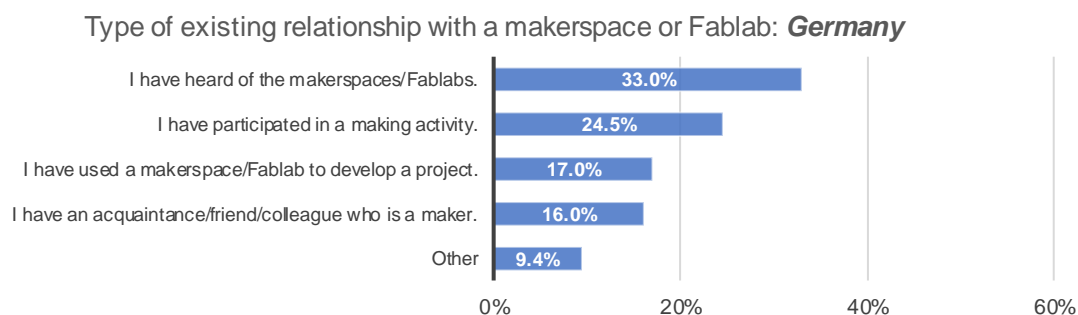
Figure 29. Type of existing relationship with a makerspace or Fablab - Germany

Willingness to join a makerspace: *Germany*
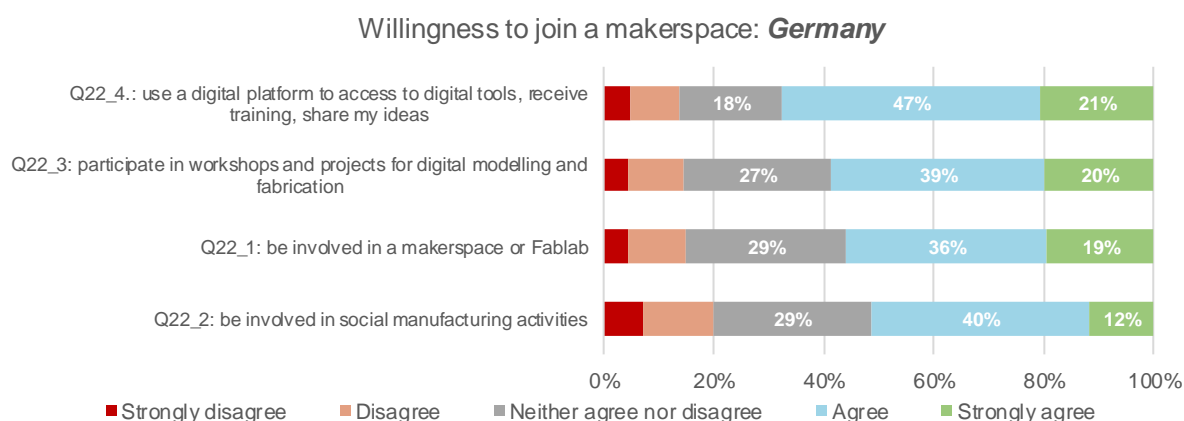
Figure 30. Willingness to join a makerspace - Germany

With regard to the preferred types of activities that participants from Germany would wish to be enrolled to in makerspaces (*Figure 31*), we can see that the top three activities include: (i) digital fabrication tools (laser cutting, CNC milling and 3D printing), (ii) agile methods (ideation, paper prototyping, design thinking) and (iii) woodworking. Once again, the first places on this list are mostly covered by manufacturing-related activities, as in most of the pilot cases. When examining the German respondents' fields of experience, as depicted in *Figure 32*, we see that the sectors most relevant to the participants' domains of expertise include: (i) electronics, (ii) prototyping and (iii) mechanics.

Types of activities that survey respondents would wish to implement through their potential participation in a makerspace or Fablab: *Germany*

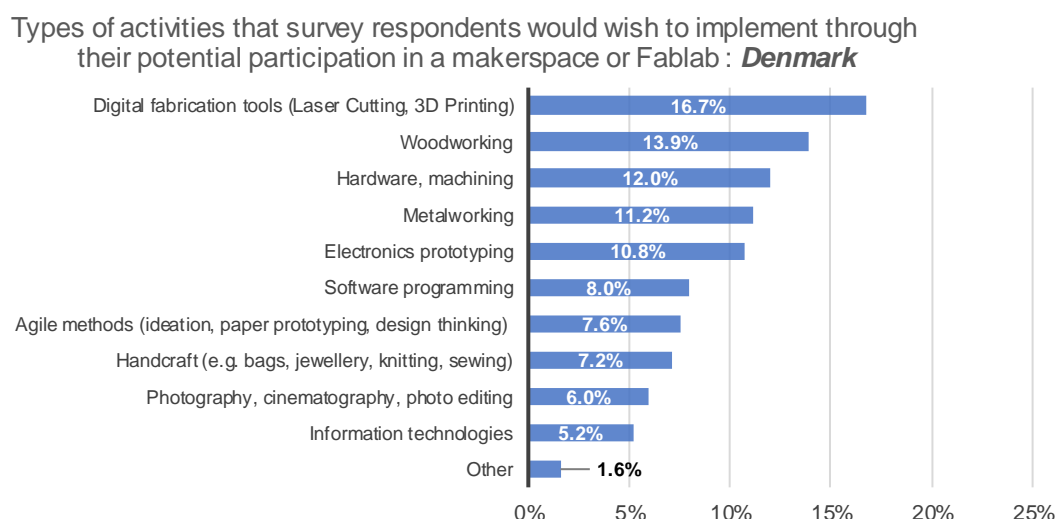| Activity	%
Digital fabrication tools (Laser Cutting, 3D Printing)	17.7%
Agile methods (ideation, paper prototyping, design thinking)	14.3%
Metalworking	11.4%
Woodworking	9.7%
Hardware, machining	9.7%
Electronics prototyping	9.4%
Software programming	8.7%
Information technologies	8.5%
Photography, cinematography, photo editing	5.7%
Handcraft (e.g. bags, jewellery, knitting, sewing)	3.7%
Other	1.2%

Figure 31. Types of activities that survey respondents would wish to implement through their potential participation in makerspaces or Fablabs - Germany
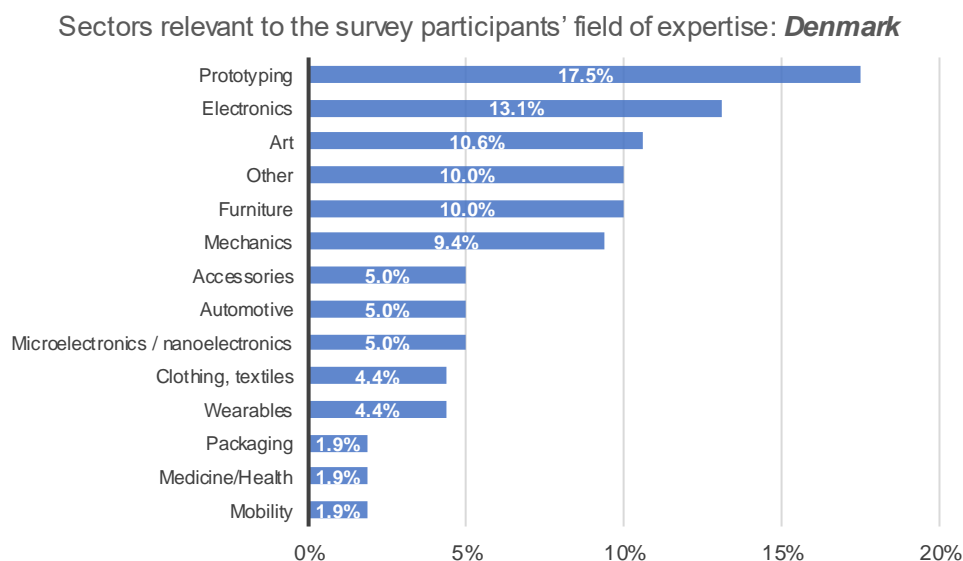
Sectors relevant to the survey participants' field of expertise: *Germany*

Sector	%
Electronics	16.2%
Prototyping	15.7%
Mechanics	9.9%
Other	8.3%
Mobility	8.2%
Microelectronics / nanoelectronics	8.2%
Medicine/Health	7.5%
Automotive	6.1%
Wearables	4.6%
Packaging	4.2%
Art	3.7%
Furniture	3.5%
Clothing, textiles	2.9%
Accessories	1.0%
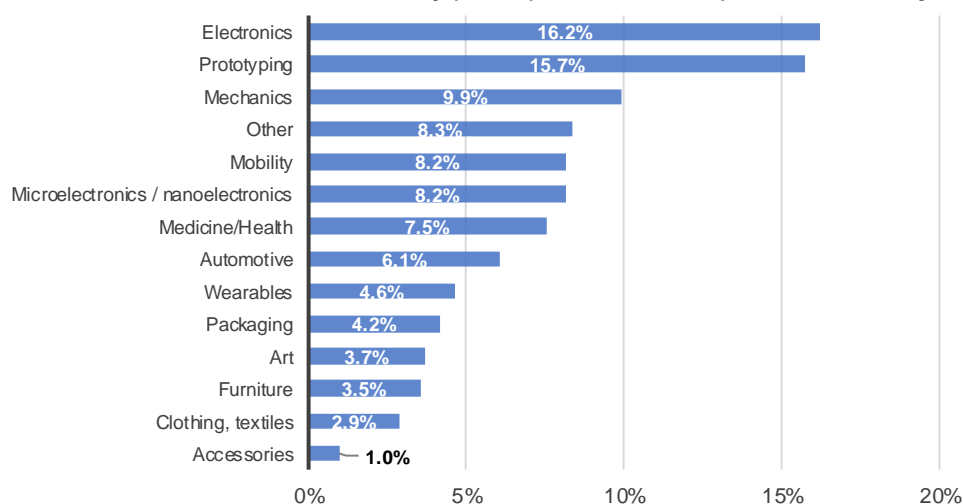
Figure 32. Sectors relevant to the survey participants' field of expertise - Germany

Figure 33, presents the evaluation of digital features that German respondents considered to be important in a web platform for social manufacturing. (i) The provision of easy-to-use digital tools, such as design thinking tools and AR / VR modelling, (ii) having a list of makerspaces/Fablabs' manufacturing equipment and (iii) gaining access to training activities to enhance skills on how to use Fablabs' tools and machinery are considered among the most essential ones.

Evaluation of suggested features in a Digital Platform for Social Manufacturing
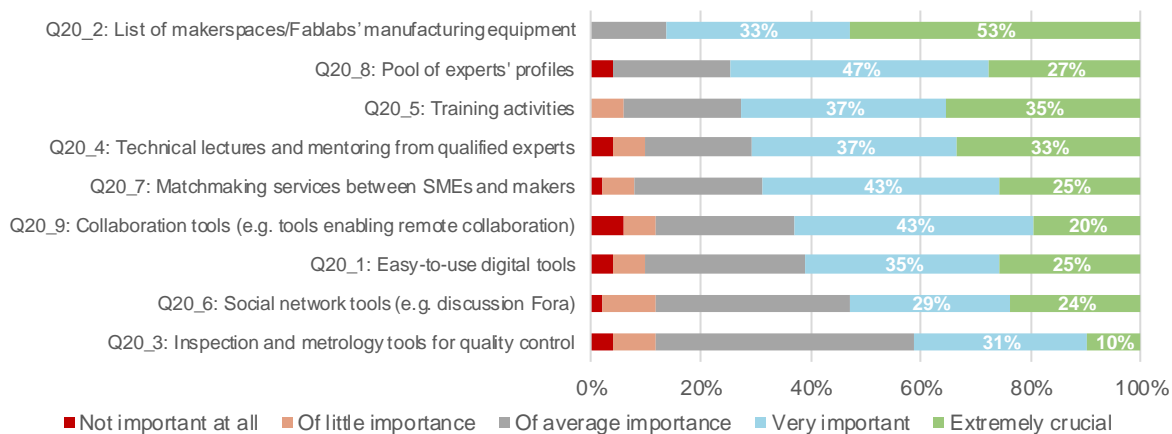*Germany*
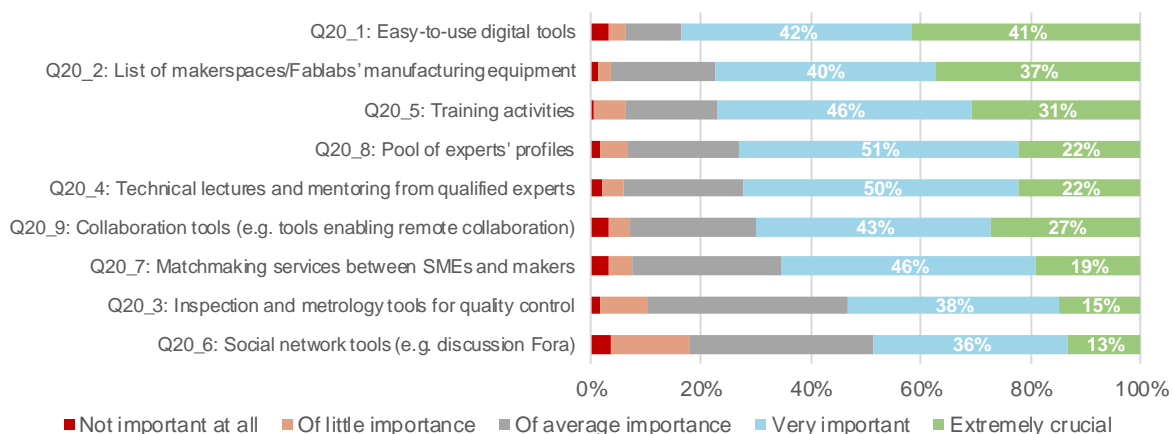
Figure 33. Evaluation of suggested features in a Digital Platform for Social Manufacturing - Germany

4.1.10.4. Greece

Table 14. Sample distribution by individual characteristics, familiarity, and previous experience - Greece

	Greece (n=170)
Stakeholder groups	
Consumers/General public	77.65%
Makers and Maker communities	12.35%
Manufacturing SMEs/Industry	10.00%
Total	100.00%
Gender	
Male	50.00%
Female	47.06%
Other	2.94%
Total	100.00%
Age	
< 20 years	1.18%
20-29 years	58.24%
30-39 years	15.88%
40-49 years	8.82%
50-59 years	12.35%
60 + years	3.53%
Total	100.00%
Education	
Less than a High School Diploma	0.59%
High School Diploma	11.76%
Bachelor's Degree	44.71%
Master's Degree	34.71%
Doctorate	8.24%
Total	100.00%

	Greece (n=170)
Occupational Status	
Employed	39.41%
Self-employed / entrepreneur	15.88%
Unemployed	2.94%
Student	34.71%
Household activity	0.00%
Retired	2.94%
Other	4.12%
Total	100.00%
Familiarity with terms (mean)	
DIY manufacturing	3.14
Makerspace	2.46
Fablab	1.99
Manufacturing facility	2.08
Co-creation	2.76
Social manufacturing	2.52
Previous experience in a collaborative project	
No	82.35%
Yes	17.65%
Total	100.00%

Source: Authors' calculations

In the case of Greece, the sample includes 170 observations. *Table 14* shows that most of the survey participants are consumers (77.65% - the highest share among pilot cases), mostly aged 20-29 years old. There is a high share of students (34.71%) being represented in this sample, whereas more than half of the Greek respondents are employed or self-employed with higher education. **The Greek sample has the highest share of female participants (47.06%), compared to the rest of the pilot countries**, while the male population share is 50%. Participants from Greece indicate lower levels of familiarity with regard to the "*Fablab*" and "*Manufacturing facility*" terms, and a moderate familiarity with terminology around "*DIY*" and "*social manufacturing*".

Only a 17.65% has had previous experiences with the maker movement, which is the lowest share compared to other pilot countries. Among the ones considering themselves familiar with the concept of makerspaces, 1 out of 3 persons, as depicted in *Figure 34*, has heard of the concept before whereas a 26% share has already participated in a making activity. Using a makerspace to develop a project or having a friend/acquaintance who is a maker or has participated in a maker activity or constitute additional aspects for previous experience.

In the case of willingness towards joining social manufacturing activities, *Figure 35* confirms, like in all pilot cases, that the vast majority of the Greek sample would indeed like to be involved in a makerspace, mostly aiming to use digital tools through a social manufacturing platform, receive training and exchange ideas. This picture is well-aligned with results retrieved from the total survey sample.

With regard to the main types of activities that survey participants from Greece would like to be enrolled to through their potential participation in makerspaces, we see that the first places on the list are, in this case, not solely covered by manufacturing-related activities, as in most pilot cases (*Figure 36*). More specifically, the top three activities in this case include: (i) digital fabrication tools (laser cutting, CNC milling and 3D printing), (ii) information technologies and (iii) photography, cinematography, and photo

editing. We further investigated the Greek respondents' fields of experience and, as shown in *Figure 37*, the sectors most relevant to the participants' expertise include: (i) electronics, (ii) mechanics and (iii) arts.

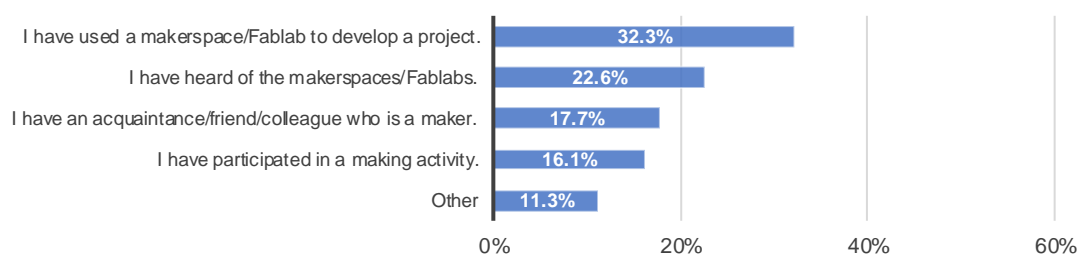Type of existing relationship with a makerspace or Fablab: *Greece*
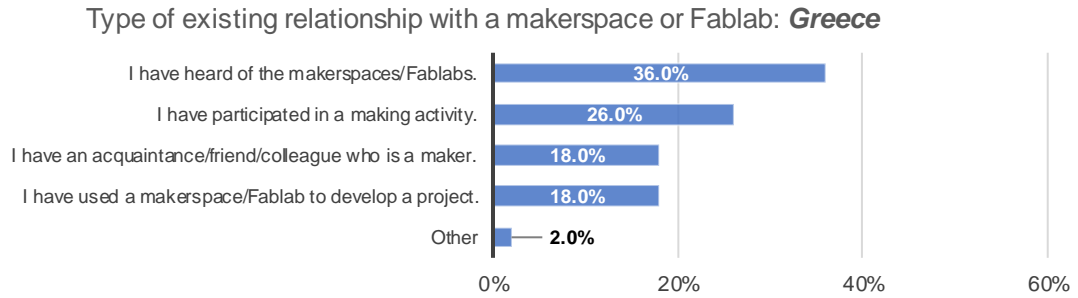
Figure 34. Type of existing relationship with a makerspace or Fablab - Greece

Willingness to join a makerspace: *Greece*
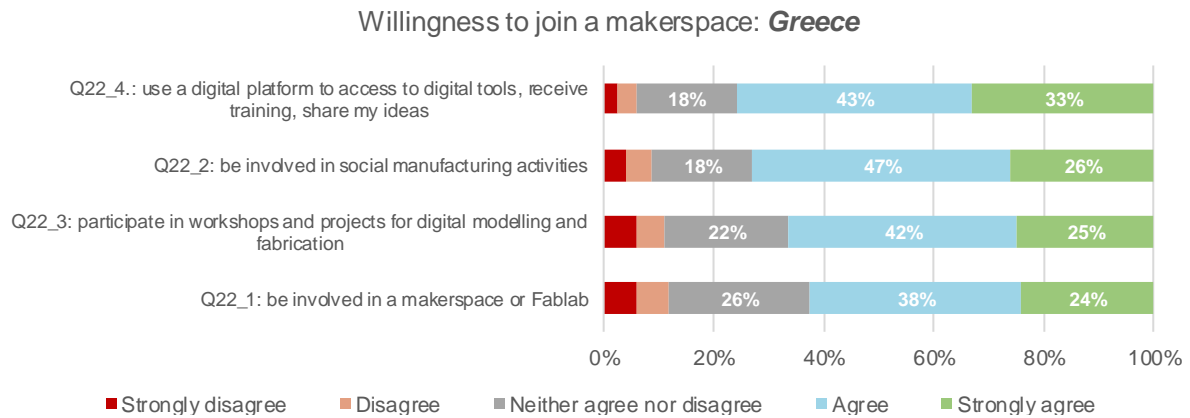
Figure 35. Willingness to join a makerspace - Greece

Types of activities that survey respondents would wish to implement through their potential participation in a makerspace or Fablab: *Greece*
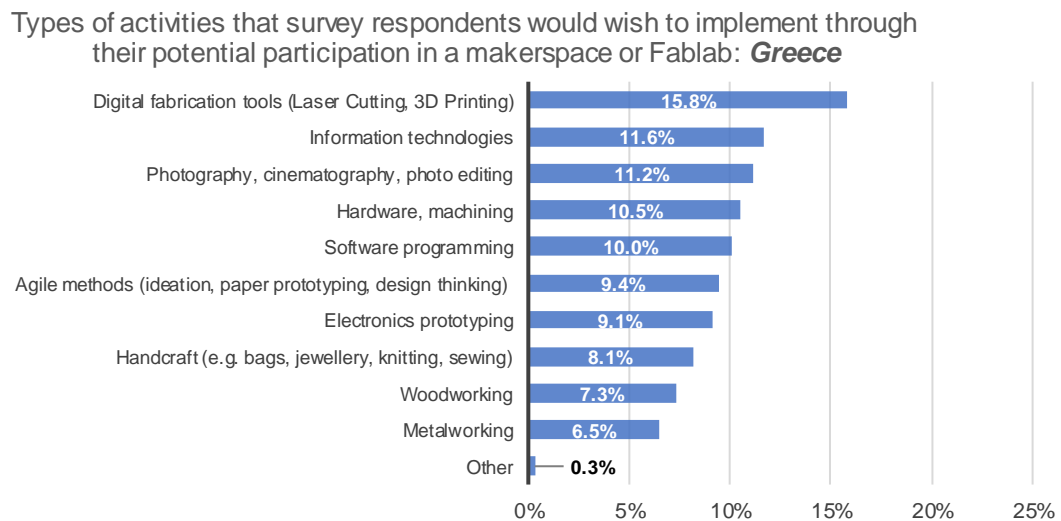
Figure 36. Types of activities that survey respondents would wish to implement through their potential participation in makerspaces or Fablabs – Greece

Sectors relevant to the survey participants' field of expertise: *Greece*

Sector	Percentage
Electronics	18.3%
Mechanics	13.6%
Art	11.5%
Prototyping	9.4%
Accessories	8.2%
Wearables	7.0%
Clothing, textiles	7.0%
Microelectronics / nanoelectronics	5.4%
Packaging	4.2%
Furniture	4.2%
Other	3.7%
Automotive	3.0%
Medicine/Health	2.8%
Mobility	1.6%
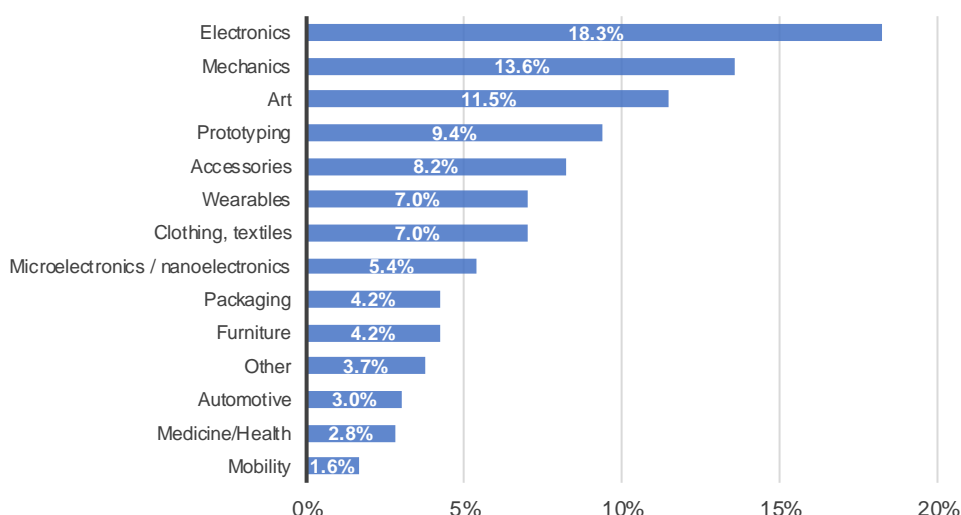
Figure 37. Sectors relevant to the survey participants' field of expertise - Greece

Figure 38, presents the preference list of the digital features that Greek respondents considered to be essential in a web platform for social manufacturing. Among the provided options, Greeks find that having access to online technical lectures and mentoring from qualified experts is the most essential one. Along with this, the provision of collaboration tools (e.g. tools enabling remote collaboration), the organisation of training activities and the detailed catalogues with the makerspaces/Fablabs' equipment seem equally significant.

Evaluation of suggested features in a Digital Platform for Social Manufacturing
Greece

Feature	Very important	Extremely crucial
Q20_4: Technical lectures and mentoring from qualified experts	45%	46%
Q20_9: Collaboration tools (e.g. tools enabling remote collaboration)	44%	41%
Q20_2: List of makerspaces/Fablabs' manufacturing equipment	43%	42%
Q20_5: Training activities	42%	41%
Q20_6: Social network tools (e.g. discussion Fora)	52%	31%
Q20_3: Inspection and metrology tools for quality control	48%	34%
Q20_1: Easy-to-use digital tools	44%	39%
Q20_8: Pool of experts' profiles	46%	35%
Q20_7: Matchmaking services between SMEs and makers	42%	21%

Legend: ■ Not important at all ■ Of little importance ■ Of average importance ■ Very important ■ Extremely crucial

Figure 38. Evaluation of suggested features in a Digital Platform for Social Manufacturing - Greece

4.1.10.5. Italy

Table 15. Sample distribution by individual characteristics, familiarity, and previous experience - Italy

	Italy (n=140)
Stakeholder groups	
Consumers/General public	62.86%
Makers and Maker communities	17.14%
Manufacturing SMEs/Industry	20.00%
Total	100.00%
Gender	
Male	81.43%
Female	16.43%
Other	2.14%
Total	100.00%
Age	
< 20 years	0.00%
20-29 years	48.57%
30-39 years	22.86%
40-49 years	15.71%
50-59 years	10.71%
60 + years	2.14%
Total	100.00%
Education	
Less than a High School Diploma	0.00%
High School Diploma	27.14%
Bachelor's Degree	24.29%
Master's Degree	42.14%
Doctorate	6.43%
Total	100.00%
Occupational Status	
Employed	30.00%
Self-employed / entrepreneur	25.00%
Unemployed	2.86%
Student	37.86%
Household activity	0.71%
Retired	0.71%
Other	2.86%
Total	100.00%
Familiarity with terms (mean)	
DIY manufacturing	3.27
Makerspace	2.66
Fablab	2.91
Manufacturing facility	2.69
Co-creation	2.79
Social manufacturing	2.25
Previous experience in a collaborative project	
No	69.29%
Yes	30.71%
Total	100.00%

Source: Authors' calculations

As presented in *Table 15*, the Italian sample contains 140 observations that mostly include 20-39 years old male participants (the highest share of male participants among all pilot cases – 81.43%). 55% of the Italian respondents are employed or self-employed whereas the sample population also includes a 37.68% share of students (the highest students' share among pilot cases). With regard to level of education, a 27% share holds a high school diploma, with the remaining share representing respondents of a tertiary education. Italians appear to be moderately familiar with most of the provided terminology around social manufacturing.

Approximately 1 out of 3 participants already has a previous experience in a collaborative project (30.71%). Among the ones familiar with the concept, a 35% share, as depicted in *Figure 39*, has heard of makerspaces before whereas a 18.8% share has used makerspace facilities to develop a project. Having a friend/acquaintance who is a maker or has participated in a maker activity (17.5%) or having already participated in a making activity (15%) constitute an additional aspect for previous experience.

In the case of willingness towards joining social manufacturing activities, *Figure 40* confirms that the vast majority of the Italian sample would indeed wish to be involved in a makerspace mostly, as in all pilot cases, aiming to gain access to digital tools, receive training and exchange ideas.

Type of existing relationship with a makerspace or Fablab: *Italy*
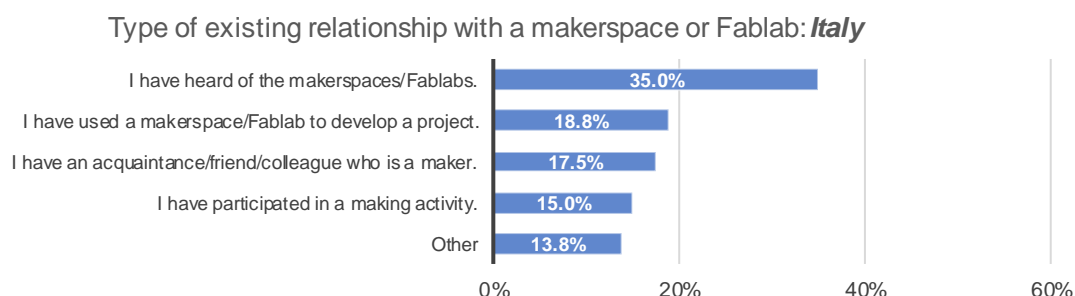
Figure 39. Type of existing relationship with a makerspace or Fablab - Italy

Willingness to join a makerspace: *Italy*
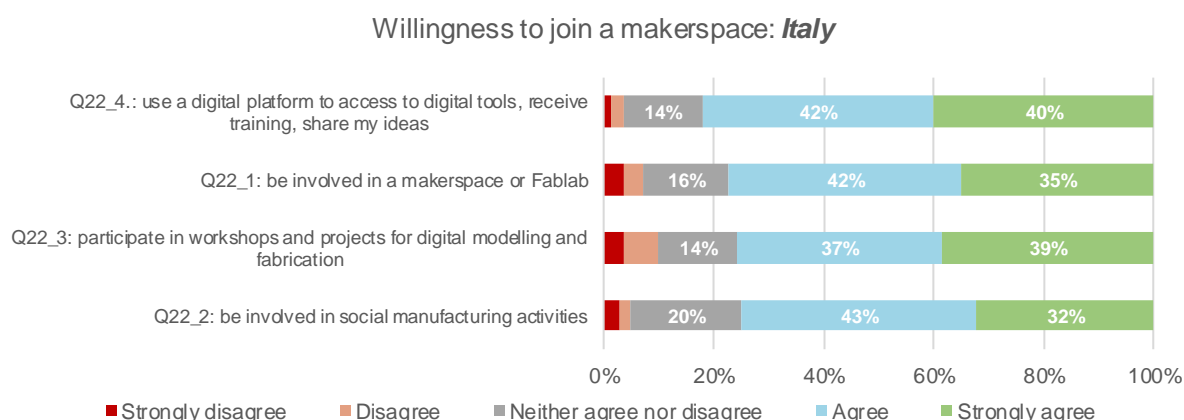
Figure 40. Willingness to join a makerspace - Italy

As shown in *Figure 41,* the most preferred types of activities that survey participants from Italy would wish to be enrolled to, through their potential participation in makerspaces, include: (i) digital fabrication tools (laser cutting, CNC milling and 3D printing), (ii) electronics prototyping and (iii) software

programming. With regard to the Italian respondents' main domains of experience, as shown in *Figure 42*, it appears that the main sectors relevant to the participants' expertise include: (i) electronics, (ii) prototyping and (iii) mechanics.

Types of activities that survey respondents would wish to implement through their potential participation in a makerspace or Fablab : *Italy*
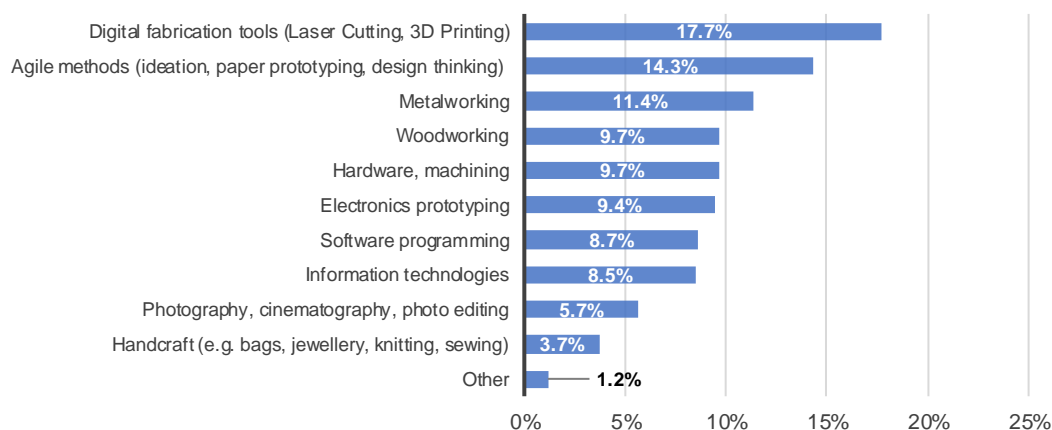
Activity	%
Digital fabrication tools (Laser Cutting, 3D Printing)	16.9%
Electronics prototyping	12.6%
Software programming	10.7%
Agile methods (ideation, paper prototyping, design thinking)	10.3%
Hardware, machining	9.9%
Metalworking	9.9%
Woodworking	9.1%
Information technologies	8.7%
Photography, cinematography, photo editing	6.0%
Handcraft (e.g. bags, jewellery, knitting, sewing)	4.5%
Other	1.4%
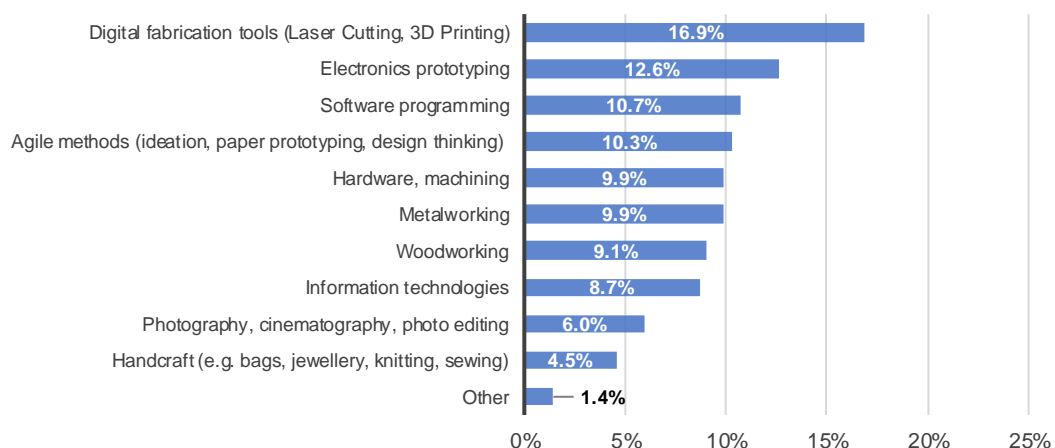
Figure 41. Types of activities that survey respondents would wish to implement through their potential participation in makerspaces or Fablabs - Italy

Sectors relevant to the survey participants' field of expertise: *Italy*

Sector	%
Electronics	19.8%
Prototyping	16.8%
Mechanics	11.8%
Microelectronics / nanoelectronics	10.5%
Automotive	8.0%
Other	7.4%
Accessories	4.1%
Medicine/Health	4.1%
Mobility	4.1%
Wearables	3.9%
Art	3.6%
Clothing, textiles	2.8%
Furniture	2.8%
Packaging	0.3%
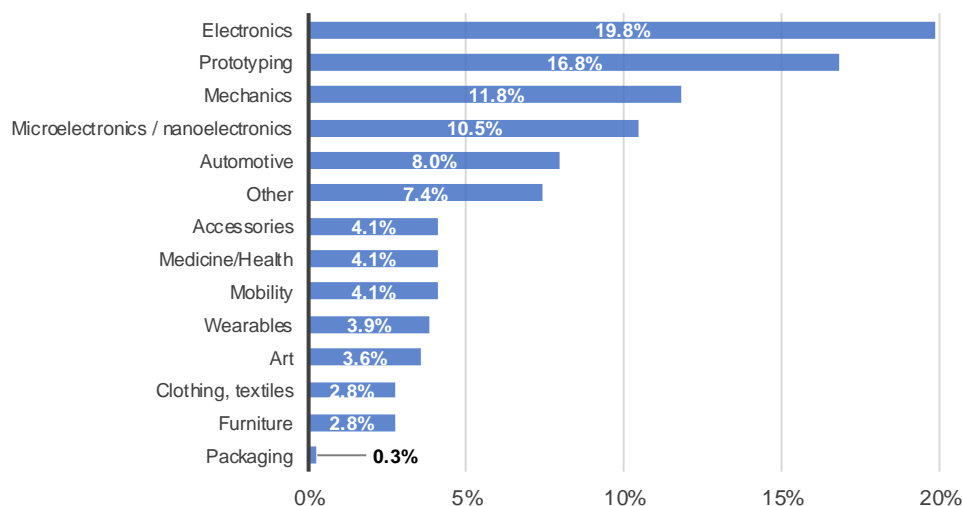
Figure 42. Sectors relevant to the survey participants' field of expertise - Italy

Figure 43 presents the digital features that Italian respondents considered to be essential in a web platform for social manufacturing. Preferred features here are consistent with the options considered to be most important in the rest of the pilot cases. More specifically, (i) the provision of a detailed list of makerspaces/Fablabs' manufacturing equipment, (ii) gaining access to training activities and (iii) having online technical lectures ad mentoring from qualified experts, consist the most popular options among the Italian sample.

Evaluation of suggested features in a Digital Platform for Social Manufacturing
Italy
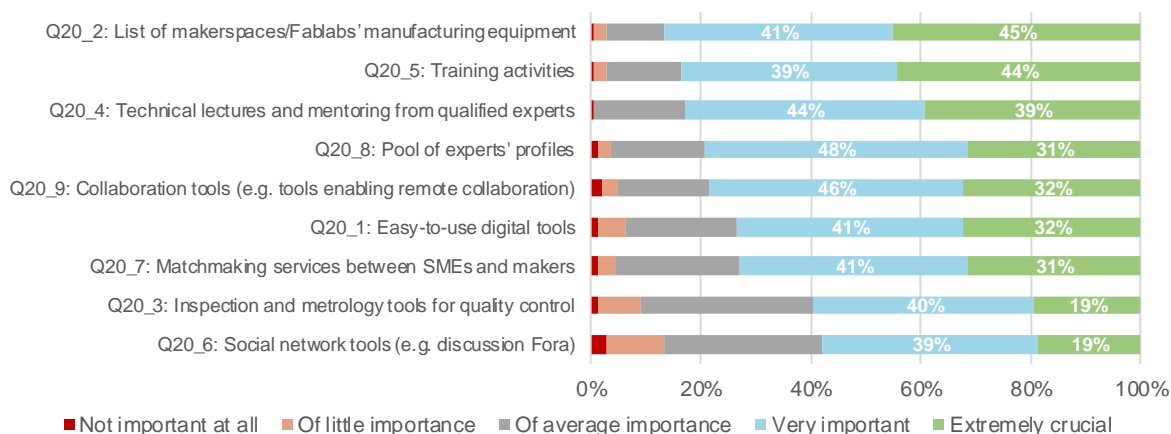
Figure 43. Evaluation of suggested features in a Digital Platform for Social Manufacturing - Italy

4.1.10.6.   Spain

Table 16. Sample distribution by individual characteristics, familiarity, and previous experience - Spain

	Spain (n=142)
Stakeholder groups	
Consumers/General public	42.96%
Makers and Maker communities	31.69%
Manufacturing SMEs/Industry	25.35%
Total	100.00%
Gender	
Male	68.31%
Female	28.87%
Other	2.82%
Total	100.00%
Age	
< 20 years	3.52%
20-29 years	27.46%
30-39 years	19.72%
40-49 years	26.06%
50-59 years	19.72%
60 + years	3.52%
Total	100.00%
Education	
Less than a High School Diploma	2.82%
High School Diploma	23.94%
Bachelor's Degree	49.30%
Master's Degree	21.83%
Doctorate	2.11%
Total	100.00%

	Spain (n=142)
Occupational Status	
Employed	50.00%
Self-employed / entrepreneur	12.68%
Unemployed	9.15%
Student	23.94%
Household activity	0.70%
Retired	0.70%
Other	2.82%
Total	100.00%
Familiarity with terms (mean)	
DIY manufacturing	3.38
Makerspace	2.9
Fablab	2.89
Manufacturing facility	2.54
Co-creation	2.94
Social manufacturing	2.51
Previous experience in a collaborative project	
No	54.23%
Yes	45.77%
Total	100.00%

Source: Authors' calculations

Finally, the Spanish sample, as presented in Table 16, contains 142 observations. **Compared to the rest of the pilot countries, this sample has the highest share of makers and representatives from maker communities** (31.69%) and shows the largest dispersion with regard to the participants' age, covering a share of representatives from all age groups. More than 70% of the Spanish participants population has higher education and students represent a fair amount of 24%. 62.68%. of respondents are employed or self-employed whereas unemployed respondents represent 9% of the total sample (a share remarkably higher compared to the rest of the pilot cases). The Spanish population appears to be moderately familiar with most of the provided terminology around social manufacturing.

Interestingly, 45% of the respondents' sample has a previous experience in a collaborative project. This is by far the largest share compared to the rest of the pilot countries, justified due to the increased penetration of makers in the examined population. Among the ones familiar with the concept of makerspaces and Fablabs, a 31.4% share, as depicted in *Figure 44*, has used a makerspace to develop a project, whereas a 30.4% share has already participated in a making activity.

Type of existing relationship with a makerspace or Fablab: *Spain*

I have used a makerspace/Fablab to develop a project.	31.4%
I have participated in a making activity.	30.4%
I have heard of the makerspaces/Fablabs.	25.5%
I have an acquaintance/friend/colleague who is a maker.	10.8%
Other	2.0%
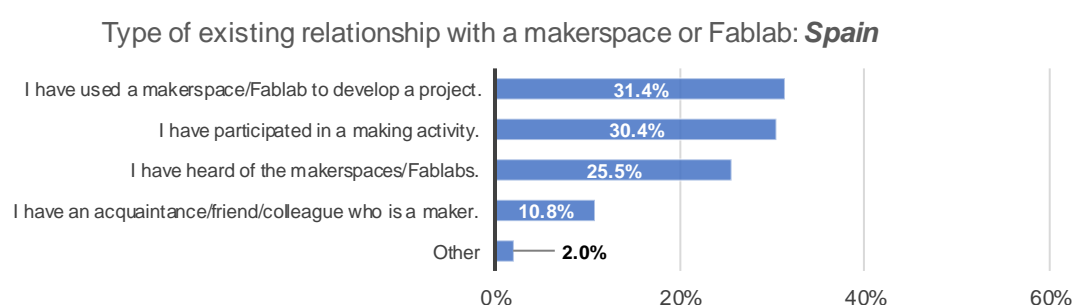
Figure 44. Type of existing relationship with a makerspace or Fablab – Spain

In the case of willingness towards joining social manufacturing activities, *Figure 45* indicates that Spain, compared to the rest of the pilot counties, has the lowest shares of respondents *not* willing to join a makerspace. In practice, an almost 90% share of participants appears to be eager to be involved, aiming mostly to gain access to digital tools and training. Once again, this eagerness could be linked to the increased share of makers in the Spanish survey sample.

Willingness to join a makerspace: *Spain*
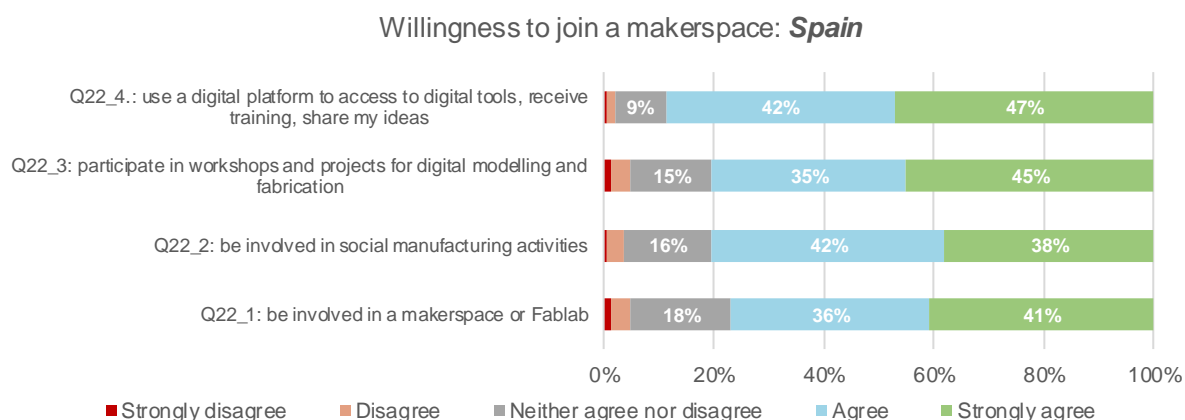
Figure 45. Willingness to join a makerspace - Spain

In *Figure 46*, we see that most desired activities include: (i) digital fabrication tools (laser cutting, CNC milling and 3D printing), (ii) woodworking and (iii) agile methods (ideation, paper prototyping, design thinking). As seen in previous cases, these are indeed the most popular options for the total survey sample, including all pilot countries (see *Table 6*). We further investigated the Spanish respondents' fields of experience and, as shown in *Figure 47*, the sectors most relevant to the participants' expertise include (i) prototyping, (ii) furniture and (iii) arts.

Types of activities that survey respondents would wish to implement through their potential participation in a makerspace or Fablab : *Spain*
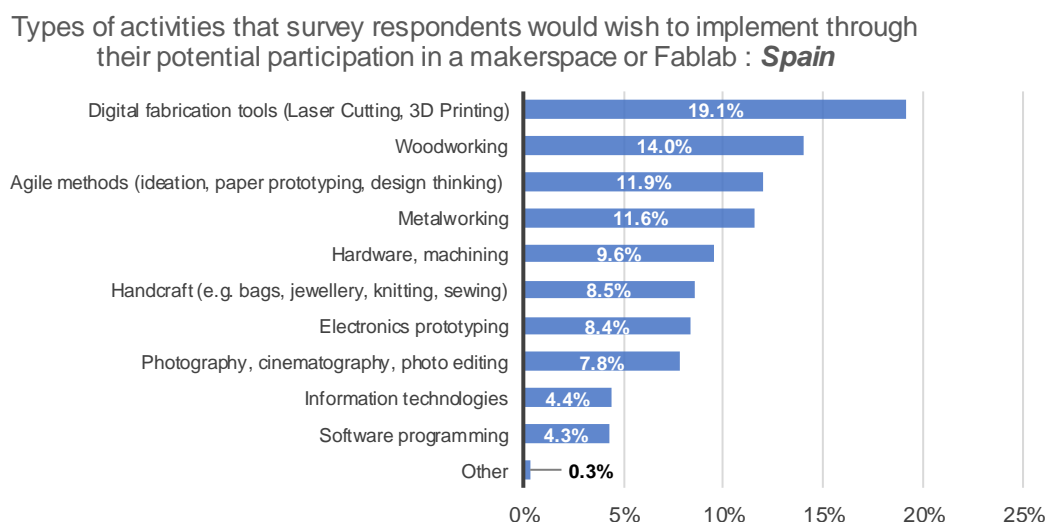
Figure 46. Types of activities that survey respondents would wish to implement through their potential participation in makerspaces or Fablabs - Spain

Sectors relevant to the survey participants' field of expertise: **Spain**

Sector	Percentage
Prototyping	16.2%
Furniture	16.0%
Art	12.3%
Electronics	11.0%
Accessories	8.4%
Mechanics	8.0%
Packaging	6.4%
Clothing, textiles	3.9%
Microelectronics / nanoelectronics	3.7%
Mobility	3.7%
Automotive	3.2%
Other	3.2%
Medicine/Health	2.1%
Wearables	2.1%
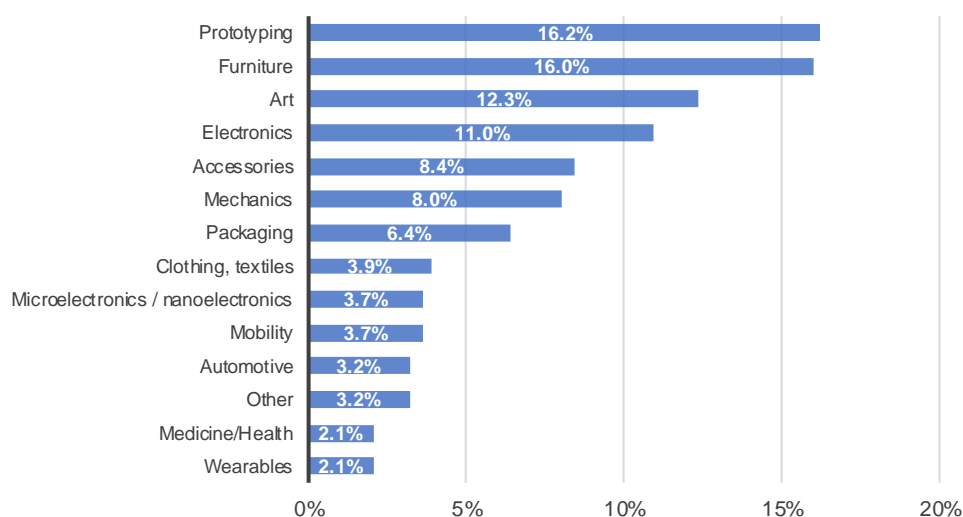
Figure 47. Sectors relevant to the survey participants' field of expertise - Spain

Finally, *Figure 48* presents the list of the features that Spanish respondents considered to be essential in a web platform for social manufacturing. Results here are consistent with the insights retrieved from all pilot cases. Specifically, (i) the offering of training activities to enhance skills on how to use Fablabs' tools and machinery, (ii) the provision of online tools enabling remote collaboration and (iii) a detailed mapping of makerspaces/Fablabs' manufacturing equipment, are considered among the most important features.

Evaluation of suggested features in a Digital Platform for Social Manufacturing
Spain

Feature	Very important	Extremely crucial
Q20_5: Training activities	38%	54%
Q20_9: Collaboration tools (e.g. tools enabling remote collaboration)	37%	49%
Q20_2: List of makerspaces/Fablabs' manufacturing equipment	42%	44%
Q20_8: Pool of experts' profiles	42%	42%
Q20_1: Easy-to-use digital tools	36%	46%
Q20_4: Technical lectures and mentoring from qualified experts	40%	40%
Q20_7: Matchmaking services between SMEs and makers	42%	37%
Q20_6: Social network tools (e.g. discussion Fora)	40%	32%
Q20_3: Inspection and metrology tools for quality control	44%	26%

■ Not important at all ■ Of little importance ■ Of average importance ■ Very important ■ Extremely crucial

Figure 48. Evaluation of suggested features in a Digital Platform for Social Manufacturing - Spain

iPRODUCE

4.2. Factor analysis

The next two sections include a detailed presentation of the methods that have been used for further exploring the survey-collected data, in order to get through insights for factors affecting perceptions and willingness to participate in the maker movement. We, specifically, used a two-step approach that includes first, a factor analysis in order to identify the most essential factors that result by combining the different items for a specific set of questions, and second, an ordered logit model that reveals the main factors affecting general public perceptions and willingness to join a makerspace.

Factor analysis is a variable reduction process that aims at revealing relationships between several variables within a dataset. Its main goal is to identify clusters of variables that can be jointly used to proxy specific dimensions of the analysis. In our case, we have structured the iPRODUCE T2.1 survey in a way so that each dimension that we want to thoroughly explore consists of a set of related items that attempt to capture different parts of this dimension. *Table 17* indicates the questions and their individual items that have been used for factor analysis in order to calculate dimensions to be considered within our statistical analysis in the following step. Each of the following questions refers to a specific dimension.

Table 17. Structure of questions and their relevant items that have been used for factor analysis

Question	Items
Q17 - Regarding my participation in social manufacturing, I am concerned about the following aspects:	Not enough makers/makerspaces/Fablabs
	I belong to a sociodemographic group that is underrepresented in makerspaces
	Lack of information about makerspaces and their actions
	I lack the necessary skills to be involved in such activities
	Lack of suitable technologies (e.g. platforms, tools, etc.)
	Concerns about sharing sensitive information (e.g. technical features of a product, invention/idea, the design of a product)
	Operational and management problems (e.g. standardization of procedures, potential logistics issues)
	Different philosophy and motives (e.g. economic, social, cultural) among the involved parties (individual makers in contrast to SMEs)
	Funding opportunities
	Lack of health and safety regulations and clarity about responsibility in case of an accident
	Lack of basic sustainability principles regarding the environment
Q18 - The participation of makers/consumers in social manufacturing would allow them:	To access tools or mentorship
	To acquire new technical skills
	To provide a valuable service to their community
	To share knowledge and skills with others
	To improve their employability skills
	To extend their network
	To meet individuals with common interests
	To gain financial rewards
	To gain peer-recognition/acknowledgement as inventors
	To achieve moral satisfaction from seeing their idea turn into product

Question	Items
Q19 - The participation of manufacturing SMEs in social manufacturing would allow them:	To reduce the cost of developing products and services
	To develop more personalised products
	To enhance their co-creation culture
	To identify new commercial opportunities
	To share vision with customers
	To test new product designs and evaluate the product before reaching the market
	To increase efficiency (e.g. meet rapid demands changes)
	To optimize resources
	To become more self-aware on sustainability issues
Q20 - Which features do you consider necessary in a Digital Platform (Web) for Social Manufacturing?	Easy-to-use digital tools (e.g. design thinking tools, generative design platform, Augmented Reality (AR)/ Virtual Reality (VR) modelling)
	List of makerspaces/Fablabs' manufacturing equipment
	Inspection and metrology tools for quality control
	Technical lectures and mentoring from qualified experts
	Training activities (e.g. to enhance the skills of DIY on how to use Fablabs' tools and machinery)
	Social network tools (e.g. discussion Fora)
	Communication and matchmaking services between SMEs and makers based on skills, experience and needs
	Contact points for experts (experts' pool with profiles so that other makers/SMEs can seek assistance)
	Collaboration tools (e.g. tools enabling remote collaboration)

Source: iPRODUCE project questionnaire

We performed a factor analysis for each of the aforementioned questions to build our composite variables, referring to different dimensions that might co-exist within each case. Results are presented below (*Tables 18 - 21*) and have been calculated based data from all survey participants (*N*=862), who answered the indicated likert-scale questions. For each of the identified questions, as further explained below, we present the main values that have been used to derive the factors that belong to the corresponding dimension.

Starting with Q17, this question refers to the identification of the main barriers for participation to makerspaces and Fablabs. This is indeed one of the core questions included in the survey, providing significant inputs that may feed into the project's foreseen tasks. As we can see, the factor analysis results (*Table 18*) indicate that the items included in this question can be clustered to four factors. These refer to concerns regarding:

(i)   *security, operation, and motives – factor 1*: This factor includes items trying to capture concerns about sharing sensitive information, operational and management problems that might arise during operation, as well as different philosophy aspects and motives between participants;

(ii)   *health, safety, and environmental sustainability – factor 2*: The second factor refers to the barriers that relate to lack of health and safety regulations and responsibility in case of an

accident, as well as lack of basic sustainability principles regarding the environmental impact of a makerspace;

(iii)   *social inclusion, skills' matching and technologies – factor 3*: The third factor encompasses all aspects related to social barriers, such as belonging to a sociodemographic group that is underrepresented in makerspaces, lack of relevant skills to be involved in such activities, and lack of suitable technologies;

(iv)   *adequate number of makerspaces, information and funding opportunities – factor 4*: The final factor related to barriers towards boosting makerspaces refers to potential concerns about the number of makerspaces, informational inadequacies about makerspaces and their actions, as well as lack of funding opportunities.

Table 18. Rotated component loading for barriers (Q17) incl. 11 items

Q17 – Items	Factor 1	Factor 2	Factor 3	Factor 4
	(Barrier_F1)	*(Barrier_F2)*	*(Barrier_F3)*	*(Barrier_F4)*
Not enough makers/makerspaces/Fablabs	-0.067	0.008	-0.027	0.785
I belong to a sociodemographic group that is underrepresented in makerspaces	-0.115	0.172	0.535	0.329
Lack of information about makerspaces and their actions	0.084	-0.049	0.402	0.575
I lack the necessary skills to be involved in such activities	0.060	0.060	0.789	-0.159
Lack of suitable technologies	0.174	-0.026	0.689	0.142
Concerns about sharing sensitive information	0.602	0.226	0.251	-0.093
Operational and management problems	0.751	0.183	0.144	0.001
Different philosophy and motives	0.758	0.073	-0.062	0.141
Funding opportunities	0.341	0.228	-0.130	0.620
Lack of health and safety regulations and clarity about responsibility in case of an accident	0.132	0.862	0.009	0.004
Lack of basic sustainability principles regarding the environment	0.105	0.865	0.058	0.073
Eigenvalues	2.60	1.53	1.33	1.09
Variance	1.70	1.67	1.65	1.52
Number of test items included	3	2	3	3

Source: Authors' calculations

Alongside the barriers' component presented above, Q18 and Q19 attempt to shed light on the main drivers that affect overall perceptions and willingness to join makerspaces and Fablabs, both in the case of individuals (consumers and makers), as well as manufacturing SMEs and industry (Q18 and Q19 respectively). In the case of consumers and makers (Q18), using factor analysis, we can identify two main types of drivers related to:

(i)   *individual and community-related aspects – factor 1*: This factor includes aspects of mentorship, technical skills' development, community services, knowledge sharing, network formation and common interest grouping;

(ii)   *product development and market-oriented drivers – factor 2*: The second identified factor encompasses business-oriented drivers, such as employability, financial rewards, peer-recognition and acknowledgement and product development.

The items shaping the two factors that act as drivers in the case of makers and consumers are presented in *Table 19*, alongside their eigenvalues and variance in each case that justify their selection. At the same time, in the case of identifying the drivers for manufacturing SMEs and industry, all items included in Q19 can form a single factor, as it shown in *Table 20*.

Table 19. Rotated component loading for drivers in the case of makers and consumers (Q18) incl. 10 items

Q18 – Items	Factor 1	Factor 2
	(Driver_F1)	(Driver_F2)
To access tools or mentorship	0.755	0.114
To acquire new technical skills	0.833	0.142
To provide a valuable service to their community	0.615	0.482
To share knowledge and skills with others	0.810	0.197
To improve their employability skills	0.501	0.589
To extend their network	0.729	0.282
To meet individuals with common interests	0.768	0.185
To gain financial rewards	0.033	0.874
To gain peer-recognition/acknowledgement as inventors	0.242	0.793
To achieve moral satisfaction from seeing their idea turn into product	0.509	0.515
Eigenvalues	5.16	1.26
Variance	3.99	2.42
Number of test items included	6	4

Source: Authors' calculations

Table 20. Rotated component loading for drivers in the case of Manufacturing SMEs/Industry (Q19) incl. 9 items

Q19 – Items	Factor 1
To reduce the cost of developing products and services	0.626
To develop more personalised products	0.783
To enhance their co-creation culture	0.735
To identify new commercial opportunities	0.770
To share vision with customers	0.767
To test new product designs and evaluate the product before reaching the market	0.722
To increase efficiency (e.g. meet rapid demands changes)	0.751
To optimize resources	0.736
To become more self-aware on sustainability issues	0.673
Eigenvalues	4.81
Variance	4.81
Number of test items included	9

Source: Authors' calculations

Finally, in order to understand whether there are variations on how different types of digital features of a social manufacturing platform may affect overall perception and willingness to join makerspaces, we performed a factor analysis in Q20. Results presented in *Table 21* indicate that all items included in this question can be grouped into a single factor, indicating that there are no significant differences regarding the participants' perceptions about the role of digital features in boosting their participation in makerspaces.

Table 21. Rotated component loading for digital features (Q20) incl. 9 items

Q20 – Items	Factor 1
Easy-to-use digital tools (e.g. design thinking tools, generative design platform, Augmented Reality (AR)/ Virtual Reality (VR) modelling)	0.547
List of makerspaces/Fablabs' manufacturing equipment	0.643
Inspection and metrology tools for quality control	0.594
Technical lectures and mentoring from qualified experts	0.729
Training activities	0.693
Social network tools	0.648
Communication and matchmaking services between SMEs and makers	0.718
Contact points for experts	0.752
Collaboration tools (e.g. tools enabling remote collaboration	0.717
Eigenvalues	4.09
Variance	4.09
Number of test items included	9

Source: Authors' calculations

All factors derived from this section's analysis constitute the baseline upon which we built our ordered logit model, as presented in the next step.

4.3. Statistical analysis

This section includes the statistical analysis of the T2.1 survey-collected data. To estimate the effects of selected parameters on general public perceptions and willingness to participate in makerspaces and Fablabs, measured in a 5-point likert scale, we have developed and estimated an ordered logic model. Following Long and Freese (2006), the ordinal regression model is commonly presented as a latent variable model. In this context, we define y^* as a latent variable ranging from $-\infty$ to $+\infty$, and thus, the structural model is given in eq. (1).

$$y_i^* = \boldsymbol{x}_i^T \beta + \varepsilon_i \ \ (1)$$

Where y_i^* is the exact but unobserved dependent variable for observation i; $\boldsymbol{x}$ is the vector of independent variables; ε_i is the error term, and β is the vector of regression coefficients which we target on estimating. In the case of ordered logit models, we cannot observe y_i^*, but instead we have only observations for the categories of response. In our case, the measurement model for ordinal outcomes is expanded to divide y_i^* into 5 ordinal categories:

$$y_i = m \ \text{ if } \ \tau_{m-1} \leq y_i^* \leq \tau_m \ \text{ for } m = 1 \text{ to } 5$$

where the thresholds τ_1 through τ_5 are estimated. The probability of an observed outcome for a given set of values of the independent variables of $\boldsymbol{x}_i^T$ corresponds to the area of the distribution where y_i^* falls between τ_{m-1} and τ_m as given below:

$$Pr(y = m|\boldsymbol{x}) = Pr(\tau_{m-1} \le y_i^* \le \tau_m|\boldsymbol{x})$$

In our case, we choose to use a set of two dependent variables including aspects of perceptions related to the maker movement and willingness to join makerspaces. It is important to notice that we have used the factor analysis results, presented in the previous section, as **explanatory variables (IVs)** in our models. Below, in *Table 22*, we present the list of variables that have been used for our analysis.

Table 22. List of variables used for the survey statistical analysis

IVs	Short description	Related question
Familiarity with terms	Overall familiarity with terms related to makerspaces and Fablabs	**Q1_1 – Q1_6**
Previous experience	Dummy indicating previous experience with an activity involving makers and manufacturing SMEs in a collaborative project	**Q6**
Unfulfilled needs	Existing products in the market often do not fulfil needs/preferences	**Q14_1**
Promote inclusion	Makerspaces should involve groups which are underrepresented in the maker movement	**Q13_1**
Contribute locally	Makerspaces should contribute locally	**Q13_2**
Scale-up production	Makerspaces should scale up their production	**Q13_3**
Act as training centres	Makerspaces should function as training centres for disruptive technologies	**Q13_4**
Empower consumers	Empower consumers to be vocal about their needs and preferences	**Q16_1**
Makers lose their identity	Cause makers to lose their identity and purpose of making	**Q16_2**
Enhance innovation	Enhance manufacturers' innovation capacity	**Q16_3**
Higher quality services	Create circumstances for delivering higher quality services and products	**Q16_4**
Barriers_F1	Security // Operation // Motives	
Barriers_F2	Health // Environmental sustainability	**Q17**
Barriers_F3	Inclusion // Skills // Technologies	
Barriers_F4	Small number // Lack of information // Funding	
Digital features	Digital features necessary for social manufacturing	**Q20**
Drivers_F1	Personal improvement and community networking	**Q18**
Drivers_F2	Product and market-oriented drivers	
Drivers for SMEs and industry	Drivers for manufacturing SMEs and industry	**Q19**
Maker	Dummy for makers	**Q7**
Gender	Dummy for females	**Q23**
Age	Age	**Q24**
Education	Educational level in year of schooling	**Q26**
Background	Experience in the fields of engineering or computer and information science (either academic or professional)	**Q27**
Income	Variable indicating income level	**Q29**
Area	Variable indicating population density	**Q30**

The results of the analysis for the 8 models that we run for the overall sample and specific sub-samples are presented in *Table 23 (2 two dependent variables * 4 groups: total sample; consumers; makers and manufacturers)*. As it is shown, most of the identified variables included in our model have been found to be statistically significant when related to the overall perceptions and willingness to join makerspaces and Fablabs, which we use as our dependent variables.

By taking a closer look at the results, we can see that familiarity with terms related to makerspaces and Fablabs, as well as previous experience, constitute significant parameters positively affecting both our dependent variables. In the first case, overall familiarity with terms (Q1_1 – Q1_6 – "*To what extent are you familiar with the following terms?*") has been found statistically significant in all cases when referring to both makerspace perceptions and willingness to join a makerspace or a Fablab. Secondly, previous experience referring to Q6 ("*Do you have previous experience with an activity involving makers and manufacturing SMEs in a collaborative project?*") captures real experience related to makerspaces and collaborative production. Our results indicate that this parameter is statistically significant both for perception and willingness to join when we consider our total sample (including both general public and manufacturers) and the general public sample, meaning that **higher levels of previous experience result in positive perceptions and willingness to join**.

When we move on to Q14 ("*I believe/feel that existing products in the market often do not fulfil my needs/preferences*") we can see that this variable indicates a positive impact on perception and willingness to join in almost all cases. This means that **people who believe that there is a lack of products out in the market, well-aligned to their needs, are more open to approaches such as makerspaces and Fablabs to achieve higher levels of variety**.

Perceptions related to potential positive roles of makerspaces and Fablabs, including them serving as means for promoting inclusion (Q13_1), increasing local contribution (13_2), scaling-up of production (Q13_3) and training centres (Q13_4), have also been investigated in this analysis. More specifically, results in *Table 23* indicate that **promoting functionalities/roles of makerspaces related to inclusion and the training character of makerspaces could be an effective way to increase positive perceptions and willingness to join them**.

At the same time, we were able to further investigate variables focusing on specific effects of makerspaces, such as variables related to consumer empowerment (Q16_1), innovation enhancement (Q16_3) and higher quality services (Q16_4). These have also been found to be significant in some, but not all cases. In the case of the manufacturing/industry sample, **consumer empowerment and higher quality services have a positive impact on willingness to join and perceptions related to makerspaces respectively** (models 5 and 6), whereas innovation enhancement positively affects perceptions in the case of our total sample (model 1).

Moving on to aspects closely related to barriers (Q17) included in our models, the results point out that most of them play a significant role in the levels of perceptions and willingness to join makerspaces and Fablabs. More specifically, factors related to health and environmental sustainability (Barriers_F2), as well as lack of makerspaces, information, and funding opportunities (Barrier_F4) negatively affect almost all models included in the analysis. At the same time, **barriers related to security, operational aspects and potential motives around makerspaces (Barriers_F1) are also a key element for increased positive perceptions and willingness to join**, whilst **barriers referring to lack of inclusion, skills and technologies (Barriers_F3) have been found significant only when examining the manufacturing SMEs/Industry sample** (model 6).

Another interesting finding presented in *Table 23*, refers to the alignment of perceptions related to accessing a series of digital features in web platform for social manufacturing (Q20). We can see that the digital features variable is strongly statistically significant in all cases, indicating that people who are strongly in favour of introducing digital aspects as facilitators to the promotion of makerspaces and Fablabs, indicate, also, an increased positive perception and willingness to join these places, in spite being consumers, makers or manufacturers.

The drivers related to consumers (Q18), as identified in our survey, and based on the factor analysis presented in the previous section, also have a significant effect on the formation of our dependent variables. **Personal improvement and community networking aspects** (Drivers_F1) **constitute the main drivers for boosting consumers' and makers' perceptions and willingness to join makerspaces and Fablabs**. On the other hand, it appears that **drivers related to product and market-oriented aspects** (Drivers_F2) **can only boost consumers' willingness to join in a social manufacturing project.** Moreover, the drivers that we have included in our survey related to manufacturers, do not seem to indicate any statically significant effects (Q19).

Finally, when it comes to demographic characteristics, we can see that **age and education are the factors most affecting perceptions and willingness to join**, with gender being significant in only two cases (models 2 and 4). When we look at the overall results, it is interesting to notice that **younger persons are more positive towards makerspaces** and more willing to join them, and at the same time, **people with lower education have a similar attitude**. Education plays a key role in the case of manufacturers, whereas age is considered significant in the case of consumers. Being a woman negatively affects willingness to join makerspaces in the case of consumers (general public). **Lower income is found to be related to higher levels of positive perceptions and willingness to join**, whereas population density has not been statistically significant in our analysis (Q30).

Table 23. Ordered logit model results for consumers, makers, and manufacturing SMEs

IVs	Total sample		Consumers		Makers		Manufacturers	
	Perception	Willingness to join	Perception	Willingness to join	Perception	Willingness to join	Perception	Willingness to join
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Familiarity with terms	0.103 ***	0.073 ***	0.094 ***	0.035 *	0.089 **	0.118 ***	0.112 ***	0.067 **
Previous experience	0.161	0.453 ***	0.282	0.618 ***	0.538	0.252	-0.468	-0.259
Unfulfilled needs	-0.021	0.265 ***	-0.032	0.366 ***	0.004	0.133	-0.024	0.023
Promote inclusion	0.208 ***	0.075	0.136	-0.105	0.195	0.350 **	0.091	0.106
Contribute locally	0.075	-0.099	0.042	0.065	0.120	-0.643 ***	0.199	-0.102
Scale-up production	-0.012	0.084	-0.050	-0.104	0.001	0.308	-0.071	0.073
Act as training centres	0.350 ***	0.145 *	0.340 ***	0.174	0.197	-0.057	0.484 **	0.171
Empower consumers	0.145	0.122	0.151	0.060	0.050	-0.091	-0.020	0.466 **
Makers lose their identity	0.007	-0.013	-0.067	-0.057	0.306 *	0.095	-0.055	0.145
Enhance innovation	0.240 **	0.127	0.031	-0.100	0.464 *	0.402	0.245	0.313
Higher quality services	0.137	-0.065	0.087	-0.142	-0.275	-0.394	0.403 **	-0.029
Barriers_F1	0.339 ***	0.540 ***	0.040	0.419 ***	0.122	0.184	0.365	0.292
Barriers_F2	-0.371 ***	-0.353 ***	-0.237 *	-0.196	-0.192	-0.200	-0.430 **	-0.279
Barriers_F3	-0.086	0.055	-0.181 **	0.008	0.232	0.058	0.048	0.396 ***
Barriers_F4	-0.274 ***	-0.191 ***	-0.181 *	-0.110	-0.200	-0.056	-0.483 ***	-0.422 ***
Digital features	0.744 ***	1.401 ***	0.350 *	1.143 ***	0.539	1.534 ***	0.914 ***	1.140 ***
Drivers_F1			1.183 ***	0.716 ***	1.004 **	1.437 ***		
Drivers_F2			0.107	0.305 *	0.142	0.547		
Drivers for SMEs and industry							0.260	0.403
Gender	0.126	-0.290 **	-0.132	-0.405 **	0.222	0.175	0.521	0.308
Age	-0.105 **	-0.166 ***	-0.040	-0.160 **	-0.086	0.005	-0.043	-0.127
Education	-0.233 ***	-0.188 **	-0.082	0.072	-0.280	-0.314	-0.320 **	-0.544 ***
Background	0.107	0.283 *	0.096	0.283	0.115	0.999 **	0.231	-0.023
Income	-0.080	-0.304 **	-0.270	-0.500 ***	0.408	0.117	0.144	-0.065
Area	0.082	0.039	0.005	-0.067	0.023	0.207	0.222	0.186
Observations	838	838	481	481	154	154	204	204
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo R2	0.135	0.110	0.141	0.103	0.159	0.193	0.192	0.140
Log Likelihood	-1211.44	-1787.65	-689.88	-1055.60	-181.91	-237.59	-279.31	-412.23

Level of statistical significance: ***p<0.01, **p<0.05, *p<0.1

Source: Authors' calculations

5. Summary of key findings

This section provides an overview of the key findings that the survey results have revealed. Insights around perceptions and willingness to join a social manufacturing project can help us understand the main drivers and barriers in this area, and what needs to be communicated in order to build awareness and increase people's interest around social manufacturing. The report's main findings bear a strong potential to foster participation in and uptake of the project's activities and will especially serve as a valuable input for future workshops and discussion sessions implemented, through the local iPRODUCE cMDFs, during the project's lifetime.

Familiarity and previous experience in a collaborative project

Results have shown that **higher levels of familiarity with terms related to social manufacturing, as well as previous experience in a collaborative project, constitute significant parameters positively affecting both overall perceptions and willingness to join the maker movement.** It is interesting to observe that most persons reporting previous experience around making/collaborative projects either indicate primary, or tertiary education. This finding provides evidence that activities related to the collaborative production cover a wide range of technical expertise, starting from simple activities, related to low-skilled persons; and moving on to more advanced activities, closely related to highly skilled persons.

Perceptions and willingness to join a makerspace

The vast majority of survey participants expresses a positive attitude towards being involved in collaborative production workshops, firmly believing that such an experience bears a strong potential of opening up new professional opportunities. By joining a makerspace or Fablab, stakeholders **mostly aim to gain access to digital tools, exchange ideas and participate in projects for digital modelling and fabrication**. Among the project's 3 main stakeholder groups, makers, as expected, appear to be more enthusiastic in getting involved in a social manufacturing experience. Our statistical analysis further indicates that **consumer empowerment, provision of higher quality services and the promotion of functionalities related to inclusion and the training character of makerspaces** consist key factors that can **effectively increase positive perceptions** and willingness to join a collaborative manufacturing project.

When it comes to demographic characteristics, we see that **the level of education and age are the factors most affecting stakeholders' attitudes**. In the case of age, we can see that younger persons tend to have more positive perceptions regarding makerspaces and are more willing to join them. It is interesting to notice that, at the same time, people of a lower education have a similar attitude. Another interesting observation is that lower income is related to higher levels of positive perceptions and willingness to join a social manufacturing project. With regard to gender, being a woman, in the case of consumers, negatively affects willingness to join makerspaces. Since, though, female participants are underrepresented in this survey, such an insight reflects a relatively small share of the examined population and, thus, should only be considered as preliminary indication. Finally, spatial characteristics referring to the type of the area where participants reside (urban, semi-urban, rural) have not been found significant in any of the examined cases.

Survey participants further indicated the maturity stage (e.g. idea stage, design stage, fabrication stage) of their potentially existing or upcoming project/service, during which they would be willing to join a makerspace. Our analysis indicates that **1 out of 3 makers would be interested in joining a makerspace at the design stage of their product, whereas a 30% share prefers to join in at the**

fabrication stage, ultimately aiming to co-develop the final outcome. Industrial actors expressed similar preferences. **A 37% share of the manufacturers' population would join in a makerspace over their product's design stage whereas a 29% share chose fabrication as the preferred product maturity stage for entering a makerspace.**

Drivers and barriers for participation in social manufacturing

Personal improvement and community networking aspects constitute the main **drivers** for boosting consumers' and makers' willingness to join makerspaces. On the other hand, drivers related to product and market-oriented aspects appear to only boost consumers' perceptions towards taking part in a social manufacturing project. **Barriers** related to health and environmental sustainability, as well as lack of makerspaces, information, and funding opportunities, affect almost all stakeholder groups' perceptions. Barriers related to security, operational aspects and potential motives around makerspaces also consist a key element for increased positive perceptions and willingness to join.

Preferred digital features in a social manufacturing web platform

Aiming to establish a new digital platform for social manufacturing that will better respond to the preferences of the project's stakeholders, we seized the opportunity and included a relevant survey question, addressing respondents' potential needs. In practice, it is observed that people who are strongly in favour of introducing digital aspects as facilitators to the promotion of makerspaces also indicate increased positive perception and willingness to join these facilities, in spite being consumers, makers or manufacturers. Having a **list of makerspaces/Fablabs' manufacturing equipment, offering training activities to enhance skills on how to use Fablabs' machinery and providing easy-to-use digital tools, such as design thinking tools or tools enabling remote collaboration** are considered among the most important digital features in a social manufacturing online platform. Among the project's three main stakeholder groups, representatives of **manufacturing SMEs are the ones who most eagerly support the option of including an IPR management service** within the iPRODUCE platform.

Pilot countries investigation and preferred types of social manufacturing activities

The survey analysis further offered the opportunity to separately investigate characteristics regarding each pilot case, as presented in detail in *Section 4.1.10*. In this regard, we have identified the main attitudes towards welcoming and using makerspace facilities in the project's 6 pilot countries. An **overall positive attitude towards aspects of potential citizen engagement was observed in all examined cases**. Our analysis provided additional information regarding the main maker activities that participants would wish to be enrolled to in each pilot case. It appears that **activities related to more professionally oriented perspectives, such as digital fabrication tools (laser cutting, CNC milling and 3D printing) and agile methods (ideation, paper prototyping, design thinking)**, are constantly on the top of the respondents' preferences list, reflecting the citizens' potential expectations when visiting a makerspace or cMDF. In general, no major variations and heterogeneities have been observed, with regard to pilots' perceptions and preferred activities, between the examined countries.

Next steps

A 2nd round survey is scheduled to take place - within the activities of the iPRODUCE T2.1 - that will, this time, target the broader EU area, therefore, not limited to the pilot cases. Through crowdsourcing means, a large sample of responses will be captured, better reflecting the needs, perceptions, and barriers of the project's stakeholders at the EU level. Results stemming from the 2nd round survey will update the preliminary insights retrieved from this survey analysis and will be documented in a dedicated report (D2.2) that will be delivered by M18 of the project.

6. References

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Annex I

Welcome note

Dear participant, welcome to our survey!

The survey lasts **about 10 minutes**. There are no right or wrong answers, this is about your views. All data is anonymised, and your privacy is guaranteed.

Thank you for helping us gather relevant information!

What is the iPRODUCE project?

iPRODUCE is an EU-funded Horizon 2020 project which aims to promote collaborative manufacturing between makers, consumers and manufacturing Small Medium Enterprises (SMEs).

The objectives of iPRODUCE are threefold:

(1) bring Manufacturers, Makers and Consumer communities (MMCs) closer at the local level;

(2) engage these communities into joint co-creation challenges for the manufacturing of new consumer products and the introduction of novel engineering and production (eco) systems;

(3) provide practices, methods, and tools that both makers and manufacturing companies (specifically SMEs) are employing.

With this survey we aim at collecting information regarding people's, makers' and manufacturers' perceptions, opinions and needs regarding the maker movement, collaborative manufacturing and co-creation schemes between individual makers, consumers, and manufacturing enterprises.

Introduction to the topic

Q1. To what extent are you familiar with the following terms? (1 - Not at all familiar; 2 – Not very familiar; 3 – Somewhat familiar; 4 – Very familiar)

	1	2	3	4
Q1_1. - DIY manufacturing Do it yourself" ("DIY") is the method of building, modifying, or repairing things without the direct aid of experts or professionals.				
Q1_2. - Makerspace The makerspace is a place in which people with shared interests can gather to work on projects while sharing ideas, equipment, and knowledge. These people are committed to creatively design and build material objects. For example, the construction of a table by designing and producing its components in 3D prototyping machine.				
Q1_3. - Fablab Fablabs are open high-tech workshops where individuals have the opportunity to develop and produce custom-made things which are not accessible by conventional industrial scale technologies.				
Q1_4. - Manufacturing Facility Technological infrastructure open to collaborations with manufacturing companies, especially SMEs, that provides rapid prototyping and technology transfer services to create prototypes and small series of products. It typically uses Additive Manufacturing (also metallic) as an enabling technology in synergy with more traditional production technologies. It is similar to a Fablab but with machines typical of industrial production.				
Q1_5. - Co-creation Co-creation is defined as any project/product/service emerging from a collaborative development with a group of different stakeholders (citizens, designers, companies, makers, etc.)				
Q1_6. - Social Manufacturing Social manufacturing is associated with the maker and DIY movement. It is characterized with high level of utilizing the power of communities to design and manufacture of goods.				

Q2. Do you like to work with your hands in your free time to (more than one option can be selected)**?**
- ☐ Fix things around the house, car, bike, etc.
- ☐ Work on your hobby (building models, furniture, gifts, toys/clothes for kids, etc.)
- ☐ Play with electronics/microcontrollers, 3d printers, other hardware
- ☐ Code (produce software)
- ☐ Design/draw/paint
- ☐ Other related activity that gets you personally engaged to work with your hands
- ☐ No, I do not like to work with my hands, I prefer to hire professionals

Q3_1. Do you consider yourself familiar with the concept of makerspaces and Fablabs?
[ ] Yes [ ] No

Q3_2. If Yes, please specify the type of relationship you have (please select one option):
- ☐ I have heard of the makerspaces/Fablabs
- ☐ I have an acquaintance/friend/colleague who is a maker
- ☐ I have participated in a making activity
- ☐ I have used a makerspace/Fablab to develop a project
- ☐ Other

Q3_3. (Other) Please specify: (max. 200 characters)

Q4_1. What type of activities would you be interested in, in relation to makerspaces and Fablabs?
(More than one option can be selected)**:**
- ☐ Digital fabrication tools (Laser Cutting, CNC Milling and 3D Printing)
- ☐ Hardware, machining, etc.
- ☐ Electronics prototyping
- ☐ Information technologies
- ☐ Software programming, etc.
- ☐ Photography, cinematography, photo editing etc.
- ☐ Woodworking, etc.
- ☐ Metalworking, etc.
- ☐ Handcraft (e.g. bags, jewellery, knitting, sewing)
- ☐ Agile methods (ideation, paper prototyping, design thinking, etc.)
- ☐ Other

Q4_2. (Other) Please specify: (max. 200 characters)

Q5_1. With which of the following online services do you consider yourself familiar? (more than one option can be selected):
- ☐ Social Media
- ☐ Specialized Fora
- ☐ Online Searching
- ☐ E-shopping
- ☐ Develop a project using platforms for 3D printing, electronics production (e.g. online resources like Shapeways, Ponoko, Upverter)
- ☐ Other

Q5_2. (Other) Please specify: (max. 200 characters)

Q6. Do you have previous experience with an activity involving makers and manufacturing SMEs in a collaborative project?
- ☐   [ ] Yes [ ] No

Q7. Please define your role/profession from the following list (please select one answer):
- ☐   Makers and Maker communities (e.g. Fablab)
- ☐   Manufacturing SME/Industry
- ☐   Consumer/ General public

Q8_1. Which of the following sectors is more relevant to your field of expertise?
- ☐ Electronics
- ☐ Microelectronics/ nanoelectronics
- ☐ Furniture
- ☐ Prototyping
- ☐ Automotive
- ☐ Packaging
- ☐ Medicine/Health
- ☐ Mobility
- ☐ Mechanics
- ☐ Wearables
- ☐ Accessories
- ☐ Clothing, textiles
- ☐ Art
- ☐ Other

Q8_2. (Other) Please specify: (max. 200 characters)

Q9_1. In case you are a maker, at which stage is your current product/system/application that you would be interested to develop through a makerspace/Fablab?
- ☐ Idea stage
- ☐ Design stage
- ☐ Fabrication stage
- ☐ An existing product that needs added functionalities
- ☐ Other

Q9_2. (Other) Please specify: (max. 200 characters)

Q10_1. In case you are entrepreneurs / manufacturing SME, at which stage of your project you would be interested to develop through a makerspace/Fablab?
- ☐ Idea stage
- ☐ Design stage
- ☐ Fabrication stage
- ☐ An existing product that needs added functionalities
- ☐ Other

Q10_2. (Other) Please specify: (max. 200 characters)

Perceptions

Please indicate your agreement with the following statement [1=Strongly disagree; 2=Disagree; 3=Neither agree nor disagree; 4=Agree; 5=Strongly agree]

	1	2	3	4	5
Q11. My overall perception about:					
Q11.1. - Makerspaces and Fablabs is positive.					
Q11.2. - the collaboration between makers, consumers and SMEs is positive.					
Q12. Participation in makerspaces and Fablabs:					
Q12.1. - does not provide any benefits.					
Q12.2. - is something that should be considered as a hobby.					
Q12.3. - opens up new professional opportunities.					
Q12.4. - will have a positive impact on my local area.					
Q13. Makerspaces should:					
Q13_1. - Involve groups which are underrepresented in the maker movement (e.g. women, elderly, people with disabilities, low Socioeconomic Status (SES) groups).					
Q13_2. - Contribute locally.					
Q13_3. - Scale up their production.					
Q13_4. - Function as training centres for disruptive technologies.					
Q14. I believe/feel that:					
Q14_1. - existing products in the market do often not fulfil my needs/preferences.					
Q15. Consumers:					
Q15_1. - should have an active role in the design of a product.					
Q15_2. are lacking the knowledge to be part of a manufacturing process.					
Q16. A social manufacturing ecosystem involving makers, consumers and manufacturers would:					
Q16_1. - empower consumers to be vocal about their needs and preferences					
Q16_2. - cause makers to lose their identity and purpose of making.					
Q16_3. - enhance manufacturers' innovation capacity.					
Q16_4. - Create circumstances for delivering higher quality services and products (higher competition in-between manufacturers).					

Barriers

Please indicate your agreement with the following statement (1=Strongly disagree; 2=Disagree; 3=Neither agree nor disagree; 4=Agree; 5=Strongly agree)

	1	2	3	4	5
Q17. Regarding my participation in social manufacturing, I am concerned about the following aspects:					
Q17_1. - Not enough makers/makerspaces/Fablabs.					
Q17_2. - I belong to a sociodemographic group that is underrepresented in makerspaces.					
Q17_3. - Lack of information about makerspaces and their actions.					
Q17_4. - I lack the necessary skills to be involved in such activities.					
Q17_5. - Lack of suitable technologies (e.g. platforms, tools, etc.)					
Q17_6. - Concerns about sharing sensitive information (e.g. technical features of a product, invention/ idea, the design of a product).					
Q17_7. - Operational and management problems (e.g. standardization of procedures, potential logistics issues).					
Q17_8. - Different philosophy and motives (e.g. economic, social, cultural) among the involved parties (individual makers in contrast to SMEs).					
Q17_9. - Funding opportunities					
Q17_10. - Lack of health and safety regulations and clarity about responsibility in case of an accident.					
Q17_11. - Lack of basic sustainability principles regarding the environment					
Q17_12. - Other					
Q17_13. (Other) Please specify: (max. 200 characters)					

Drivers (To be answered only by makers/consumers)

Please indicate your agreement with the following statement (1=Strongly disagree; 2=Disagree; 3=Neither agree nor disagree; 4=Agree; 5=Strongly agree)

	1	2	3	4	5
Q18. The participation of makers/consumers in social manufacturing would allow them:					
Q18_1. - To access tools or mentorship.					
Q18_2. - To acquire new technical skills.					
Q18_3. - To provide a valuable service to their community.					
Q18_4. - To share knowledge and skills with others.					
Q18_5. - To improve their employability skills.					
Q18_6. - To extend their network.					
Q18_7. - To meet individuals with common interests.					
Q18_8. - To gain financial rewards.					
Q18_9. - To gain peer-recognition/acknowledgement as inventors					
Q18_10. - To achieve moral satisfaction from seeing their idea turn into product.					
Q18_11. - Other					
Q18_12. (Other) Please specify: (max. 200 characters)					

Drivers (To be answered only by manufacturers)

Please indicate your agreement with the following statement (1=Strongly disagree; 2=Disagree; 3=Neither agree nor disagree; 4=Agree; 5=Strongly agree)

	1	2	3	4	5
Q19. The participation of manufacturing SMEs in social manufacturing would allow them:					
Q19_1. - To reduce the cost of developing products and services.					
Q19_2. - To develop more personalised products					
Q19_3. - To enhance their co-creation culture.					
Q19_4. - To identify new commercial opportunities.					
Q19_5. - To share vision with customers.					
Q19_6. - To test new product designs and evaluate the product before reaching the market.					
Q19_7. - To increase efficiency (e.g. meet rapid demands changes)					
Q19_8. - To optimize resources					

Q19_9. - To become more self-aware on sustainability issues					
Q19_10. - Other					
Q19_11. (Other) Please specify: (max. 200 characters)					

Features of a Digital Platform for Social Manufacturing

This is the last set of questions of the survey. We are now in the process of creating a new Digital Platform for Social Manufacturing that will aim to connect makers, manufacturing SMEs and consumers. Your feedback in the following statements, could significantly contribute to the development of a platform that would better respond to your preferences

	1	2	3	4	5
Q20. Which features do you consider necessary in a Digital Platform (Web) for Social Manufacturing? (choose to what extent each feature is crucial, 1=Not at all, 5=Extremely crucial)					
Q20_1. - Easy-to-use digital tools (e.g. design thinking tools, generative design platform, Augmented Reality (AR)/ Virtual Reality (VR) modelling)					
Q20_2. - List of makerspaces/Fablabs' manufacturing equipment					
Q20_3. - Inspection and metrology tools for quality control					
Q20_4. - Technical lectures and mentoring from qualified experts					
Q20_5. - Training activities (e.g. to enhance the skills of DIY on how to use Fablabs' tools and machinery)					
Q20_6. - Social network tools (e.g. discussion Fora)					
Q20_7. - Communication and matchmaking services between SMEs and makers based on skills, experience, and needs.					
Q20_8. - Contact points for experts (experts' pool with profiles so that other makers/SMEs can seek assistance)					
Q20_9. - Collaboration tools (e.g. tools enabling remote collaboration)					
Q20_10. - Other					
Q20_11. (Other) Please specify: (max. 200 characters)					

Q21_1. Do you believe that the Management of Intellectual Property Rights (IPR) should be addressed in a Digital Platform (Web) for Social Manufacturing?

[ ] Yes   [ ] No   [ ] Do not know/No opinion

Q21_2. If yes, which of the following IPR categories would better reflect your needs for safeguarding your project?

- ☐ Copyright
- ☐ Patent
- ☐ Trademark
- ☐ Smart Contract

Willingness to join

Please indicate your agreement with the following statement (1=Strongly disagree; 2=Disagree; 3=Neither agree nor disagree; 4=Agree; 5=Strongly agree)

Q22. I would:	1	2	3	4	5
Q22_1. – like to be involved in a makerspace or Fablab.					
Q22_2. - like to be involved in social manufacturing activities (either as a consumer, maker, or manufacturing SME)					
Q22_3. - be interested in participating in workshops, projects and training activities for digital modelling and fabrication.					
Q22_4. - be interested in using a digital platform which would allow me to have access to digital tools, receive training, get in touch, and share my ideas, etc.					

General Information

Q23. Gender:

- ☐ Female
- ☐ Male
- ☐ Transgender
- ☐ Gender variant/Non-conforming
- ☐ I prefer not to answer

Q24. What is your age?

- ☐ Under 20 years
- ☐ 20-29 years
- ☐ 30-39 years
- ☐ 40-49 years
- ☐ 50-59 years
- ☐ 60+ years

Q25_1. In which country do you live?

☐ Denmark

☐ France

☐ Germany

☐ Greece

☐ Italy

☐ Spain

☐ Other

Q25_2. (Other) Please specify: (max. 200 characters)

Q26. What is the highest level of education you have attended?

☐ Less than a High School Diploma

☐ High School Diploma

☐ Bachelor's Degree

☐ Master's Degree

☐ Doctorate

Q27. Do you have previous experience in the fields of engineering or computer and information science (either academic or professional experience)?

[ ] Yes [ ] No

Q28. What is your occupational status?

☐ Employed

☐ Unemployed

☐ Self-employed/entrepreneur

☐ Student

☐ Household activity

☐ Retired

☐ Other

Q29. How would you classify the net household income of your family? (*non-mandatory question*)

☐ Low income

☐ Medium income

☐ High income

Q30. Do you live in a?

☐ Densely populated area (urban)

☐ Intermediate area (semi-urban)

☐ Thinly populated area (rural)

Survey end

Thank you for taking part in this survey and contributing to our understanding of what people think about makerspaces and collaborative manufacturing between individual makers and manufacturer enterprises.

Your input will help us a great deal to identify key elements and perceptions that should be considered during the implementation of our project.

Do you have any questions or comments? You can contact us at *info@iproduce-project.eu*.

Feel free to follow the iPRODUCE social media accounts for more information**!**

Twitter account (*https://twitter.com/iPRODUCE_EU*)

LinkedIn group (*https://www.linkedin.com/groups/8876687/*)

Informed consent

This privacy policy details information collection practises related to your personal data and other related information and the limited manner in which the iPRODUCE project will use and disclose the information provided to us when you responded the survey.

By participating in the survey, you voluntarily consent to the collection and use of your information by iPRODUCE as set forth in this privacy policy. If you have any questions concerning this privacy policy or our data collection practises you may contact us at *info@iproduce-project.eu*. We reserve the right to change this privacy policy at any time and inform all participants about the updates.

In addition to your opinion, we are collecting some personal information such as age, country of residence and educational status for socio-demographic purposes. The collected data will be saved and used until the end of the research period of the iPRODUCE project. The data will be only used for the purpose of the iPRODUCE project, funded under the European Union Horizon 2020 program, aiming to promote makerspaces and the maker movement across Europe.

The lawfulness of the processing of personal data is determined pursuant to Article 6 of the EU's General Data Protection Regulation (GDPR). With respect to personal data, the processing of personal data is based on consent.

Annex II

Perceptions towards participation in makerspaces

Table 24. Perceptions towards participation in makerspaces – total sample

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Grand total
Q11. My overall perception about:						
Q11_1: makerspaces and Fablabs is positive	0.81%	0.93%	18.91%	38.05%	41.30%	100.00%
Q11_2: the collaboration between makers, consumers and SMEs is positive.	1.04%	2.90%	24.83%	37.47%	33.76%	100.00%
Q12. Participation in makerspaces and Fablabs:						
Q12_1: does not provide any benefits.	48.03%	22.16%	15.08%	9.63%	5.10%	100.00%
Q12_2: is something that should be considered as a hobby	19.61%	31.67%	35.50%	9.86%	3.36%	100.00%
Q12_3: opens up new professional opportunities.	0.81%	2.32%	16.47%	47.45%	32.95%	100.00%
Q12_4: will have a positive impact on my local area.	1.62%	3.25%	25.64%	35.50%	33.99%	100.00%
Q13. Makerspaces should:						
Q13_1: involve groups which are underrepresented in the maker movement (e.g. women, elderly, people with disabilities, low Socioeconomic Status (SES) groups).	3.71%	7.19%	30.16%	31.67%	27.26%	100.00%
Q13_2: contribute locally.	1.04%	2.78%	22.51%	40.95%	32.71%	100.00%
Q13_3: scale up their production	1.51%	8.93%	37.82%	30.05%	21.69%	100.00%
Q13_4: function as training centres for disruptive technologies	1.16%	2.09%	21.00%	38.86%	36.89%	100.00%
Q14. I believe/feel that:						
Q14_1: existing products in the market do often not fulfil my needs/preferences.	3.71%	15.31%	39.91%	29.70%	11.37%	3.71%
Q15. Consumers:						
Q15_1: should have an active role in the design of a product.	1.16%	5.45%	21.00%	45.13%	27.26%	100.00%
Q15_2: are lacking the knowledge to be part of a manufacturing process.	6.61%	28.65%	30.05%	24.83%	9.86%	100.00%
Q16. A social manufacturing ecosystem involving makers, consumers and manufacturers would:						
Q16_1. empower consumers to be vocal about their needs and preferences	0.81%	2.32%	16.24%	55.22%	25.41%	0.81%
Q16_2. cause makers to lose their identity and purpose of making.	19.61%	36.77%	29.70%	11.48%	2.44%	19.61%
Q16_3. enhance manufacturers' innovation capacity.	0.58%	2.44%	19.14%	52.44%	25.41%	0.58%
Q16_4. create circumstances for delivering higher quality services and products (higher competition in-between manufacturers).	0.53%	5.26%	15.79%	125.26%	206.84%	0.53%

Barriers and concerns around involvement in makerspaces

Table 25. Barriers and concerns around involvement in makerspaces

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Grand total
Q17. Regarding my participation in social manufacturing, I am concerned about the following aspects:						
Q17_1: Not enough makers/makerspaces/Fablabs.	3.02%	8.24%	39.68%	35.38%	13.69%	100.00%
Q17_2: I belong to a sociodemographic group that is underrepresented in makerspaces	23.78%	21.23%	35.85%	13.69%	5.45%	100.00%
Q17_3: Lack of information about makerspaces and their actions	2.90%	8.58%	21.35%	40.14%	27.03%	100.00%
Q17_4: I lack the necessary skills to be involved in such activities	27.96%	29.35%	24.48%	14.27%	3.94%	100.00%
Q17_5: Lack of suitable technologies (e.g. platforms, tools, etc.).	12.41%	23.90%	33.53%	24.71%	5.45%	100.00%
Q17_6: Concerns about sharing sensitive information (e.g. technical features of a product, invention/idea, the design of a product).	12.99%	23.32%	27.15%	26.22%	10.32%	100.00%
Q17_7: Operational and management problems (e.g. standardization of procedures, potential logistics issues).	5.92%	16.24%	41.65%	30.28%	5.92%	100.00%
Q17_8: Different philosophy and motives (e.g. economic, social, cultural) among the involved parties (individual makers in contrast to SMEs).	4.52%	11.25%	35.03%	37.82%	11.37%	100.00%
Q17_9: Funding opportunities	2.78%	9.05%	29.70%	40.26%	18.21%	100.00%
Q17_10: Lack of health and safety regulations and clarity about responsibility in case of an accident.	9.16%	20.19%	37.82%	23.32%	9.51%	100.00%
Q17_11: Lack of basic sustainability principles regarding the environment	8.93%	19.84%	41.76%	21.46%	8.00%	100.00%

Drivers for participation in social manufacturing

Table 26. Drivers for participation in social manufacturing – consumers/makers

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Grand total
Q18. The participation of makers/consumers in social manufacturing would allow them:						
Q18_1: To access tools or mentorship	0.31%	2.14%	19.85%	49.92%	27.79%	100.00%
Q18_2: To acquire new technical skills	0.15%	0.92%	10.99%	50.08%	37.86%	100.00%
Q18_3: To provide a valuable service to their community	0.92%	3.66%	21.68%	45.19%	28.55%	100.00%
Q18_4: To share knowledge and skills with others	0.46%	0.76%	11.15%	44.73%	42.90%	100.00%
Q18_5: To improve their employability skills	1.98%	3.36%	20.00%	45.34%	29.31%	100.00%
Q18_6: To extend their network	0.46%	1.22%	11.30%	45.34%	41.68%	100.00%
Q18_7: To meet individuals with common interests	0.31%	0.61%	10.38%	42.14%	46.56%	100.00%
Q18_8: To gain financial rewards:	4.73%	15.42%	42.29%	23.05%	14.50%	100.00%
Q18_9: To gain peer recognition / acknowledgement as inventors	2.14%	10.53%	29.77%	37.56%	20.00%	100.00%
Q18_10: To achieve moral satisfaction from seeing their idea turn into product	1.07%	3.36%	15.42%	40.46%	39.69%	100.00%

Table 27. Drivers for participation in social manufacturing - manufacturing SMEs

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Grand total
Q19. The participation of manufacturing SMEs in social manufacturing would allow them:						
Q19_1: To reduce the cost of developing products and services	4.35%	8.70%	28.50%	41.55%	16.91%	100.00%
Q19_2: To develop more personalised products	1.45%	3.86%	12.56%	51.69%	30.43%	100.00%
Q19_3: To enhance their co-creation culture	1.45%	3.86%	21.26%	43.00%	30.43%	100.00%
Q19_4: To identify new commercial opportunities	1.93%	3.38%	16.91%	46.86%	30.92%	100.00%
Q19_5: To share vision with customers	1.93%	3.38%	19.81%	44.93%	29.95%	100.00%
Q19_6: To test new product designs and evaluate the product before reaching the market	0.97%	1.93%	16.91%	44.93%	35.27%	100.00%
Q19_7: To increase efficiency (e.g. meet rapid demands changes)	2.42%	7.25%	23.67%	42.03%	24.64%	100.00%
Q19_8: To optimize resources	3.38%	8.21%	29.95%	36.71%	21.74%	100.00%
Q19_9: To become more self-aware on sustainability issues	4.83%	10.14%	33.82%	31.88%	19.32%	100.00%

Willingness to join a makerspace

Table 28. Willingness to join a makerspace – Pilot countries

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Grand total
Q20. I would:						
Q22_1: be involved in a makerspace or Fablab						
Total Sample	**3.83%**	**7.19%**	**23.78%**	**35.50%**	**29.70%**	**100.00%**
Denmark	0.00%	5.88%	11.76%	27.45%	54.90%	100.00%
France	4.50%	11.71%	31.53%	27.03%	25.23%	100.00%
Germany	4.50%	10.36%	29.28%	36.49%	19.37%	100.00%
Greece	5.88%	5.88%	25.88%	38.24%	24.12%	100.00%
Italy	3.57%	3.57%	15.71%	42.14%	35.00%	100.00%
Spain	1.41%	3.52%	18.31%	35.92%	40.85%	100.00%
Q22_2: be involved in social manufacturing activities						
Total Sample	**3.60%**	**6.61%**	**22.74%**	**42.00%**	**25.06%**	**100.00%**
Denmark	1.96%	3.92%	23.53%	35.29%	35.29%	100.00%
France	0.90%	9.91%	27.93%	40.54%	20.72%	100.00%
Germany	7.21%	12.61%	28.83%	39.64%	11.71%	100.00%
Greece	4.12%	4.71%	18.24%	47.06%	25.88%	100.00%
Italy	2.86%	2.14%	20.00%	42.86%	32.14%	100.00%
Spain	0.70%	2.82%	16.20%	42.25%	38.03%	100.00%
Q22_3: participate in workshops and projects for digital modelling and fabrication						
Total Sample	**3.48%**	**6.73%**	**21.81%**	**38.52%**	**29.47%**	**100.00%**
Denmark	0.00%	5.88%	17.65%	41.18%	35.29%	100.00%
France	1.80%	7.21%	32.43%	36.94%	21.62%	100.00%
Germany	4.50%	9.91%	27.03%	38.74%	19.82%	100.00%
Greece	5.88%	5.29%	22.35%	41.76%	24.71%	100.00%
Italy	3.57%	6.43%	14.29%	37.14%	38.57%	100.00%
Spain	1.41%	3.52%	14.79%	35.21%	45.07%	100.00%
Q22_4.: use a digital platform to access to digital tools, receive training, share my ideas						
Total Sample	**2.55%**	**5.45%**	**17.52%**	**42.92%**	**31.55%**	**100.00%**
Denmark	3.92%	9.80%	11.76%	39.22%	35.29%	100.00%
France	0.00%	8.11%	30.63%	41.44%	19.82%	100.00%
Germany	4.95%	9.01%	18.47%	46.85%	20.72%	100.00%
Greece	2.35%	3.53%	18.24%	42.94%	32.94%	100.00%
Italy	1.43%	2.14%	14.29%	42.14%	40.00%	100.00%
Spain	0.70%	1.41%	9.15%	41.55%	47.18%	100.00%

Source: Authors' calculations

Preferred features in a Digital Platform for Social Manufacturing

Table 29. Evaluation of suggested features in a Digital Platform for Social Manufacturing – Stakeholder groups

	Not important at all	Of little importance	Of average importance	Very important	Extremely crucial	Grand total
Q20. Which features do you consider necessary in a Digital Platform (Web) for Social Manufacturing?						
Q20_1: Easy-to-use digital tools (e.g. design thinking tools, AR / VR modelling etc.)						
Total Sample	**1.74%**	**3.60%**	**16.36%**	**40.26%**	**38.05%**	**100.00%**
Consumers/General public	1.20%	3.61%	16.87%	40.56%	37.75%	100.00%
Makers and Maker communities	3.18%	3.18%	17.83%	37.58%	38.22%	100.00%
Manufacturing SMEs/Industry	1.93%	3.86%	14.01%	41.55%	38.65%	100.00%
Q20_2: List of makerspaces/Fablabs' manufacturing equipment						
Total Sample	**0.58%**	**2.09%**	**14.27%**	**40.72%**	**42.34%**	**100.00%**
Consumers/General public	0.80%	2.21%	15.26%	41.97%	39.76%	100.00%
Makers and Maker communities	0.64%	1.91%	6.37%	39.49%	51.59%	100.00%
Manufacturing SMEs/Industry	0.00%	1.93%	17.87%	38.65%	41.55%	100.00%
Q20_3: Inspection and metrology tools for quality control						
Total Sample	**1.16%**	**5.57%**	**28.89%**	**42.46%**	**21.93%**	**100.00%**
Consumers/General public	1.00%	5.02%	29.72%	43.57%	20.68%	100.00%
Makers and Maker communities	2.55%	5.10%	25.48%	42.68%	24.20%	100.00%
Manufacturing SMEs/Industry	0.48%	7.25%	29.47%	39.61%	23.19%	100.00%
Q20_4: Technical lectures and mentoring from qualified experts						
Total Sample	**1.04%**	**2.90%**	**17.87%**	**43.85%**	**34.34%**	**100.00%**
Consumers/General public	0.60%	2.61%	17.67%	44.78%	34.34%	100.00%
Makers and Maker communities	1.27%	3.18%	17.20%	38.85%	39.49%	100.00%
Manufacturing SMEs/Industry	1.93%	3.38%	18.84%	45.41%	30.43%	100.00%
Q20_5: Training activities (enhance skills on how to use Fablabs' tools and machinery)						
Total Sample	**0.35%**	**3.02%**	**14.04%**	**41.30%**	**41.30%**	**100.00%**
Consumers/General public	0.40%	2.61%	13.86%	41.16%	41.97%	100.00%
Makers and Maker communities	0.64%	3.82%	7.64%	44.59%	43.31%	100.00%
Manufacturing SMEs/Industry	0.00%	3.38%	19.32%	39.13%	38.16%	100.00%
Q20_6: Social network tools (e.g. discussion Fora)						
Total Sample	**2.32%**	**8.35%**	**26.33%**	**40.14%**	**22.85%**	**100.00%**
Consumers/General public	1.41%	6.02%	26.31%	43.57%	22.69%	100.00%
Makers and Maker communities	4.46%	7.01%	18.47%	38.22%	31.85%	100.00%
Manufacturing SMEs/Industry	2.90%	14.98%	32.37%	33.33%	16.43%	100.00%
Q20_7: Communication and matchmaking services between SMEs and makers based on skills, experience, and needs.						
Total Sample	**1.51%**	**4.06%**	**25.87%**	**43.39%**	**25.17%**	**100.00%**
Consumers/General public	1.61%	4.42%	28.31%	43.37%	22.29%	100.00%
Makers and Maker communities	1.27%	2.55%	19.75%	41.40%	35.03%	100.00%
Manufacturing SMEs/Industry	1.45%	4.35%	24.64%	44.93%	24.64%	100.00%
Q20_8: Contact points for experts (experts' pool with profiles so that other makers/SMEs can seek assistance)						
Total Sample	**1.16%**	**2.44%**	**18.33%**	**47.33%**	**30.74%**	**100.00%**
Consumers/General public	1.20%	3.01%	18.88%	48.39%	28.51%	100.00%
Makers and Maker communities	1.91%	1.91%	13.38%	45.22%	37.58%	100.00%
Manufacturing SMEs/Industry	0.48%	1.45%	20.77%	46.38%	30.92%	100.00%

	Not important at all	Of little importance	Of average importance	Very important	Extremely crucial	Grand total
Q20. Which features do you consider necessary in a Digital Platform (Web) for Social Manufacturing?						
Q20_9: Collaboration tools (e.g. tools enabling remote collaboration)						
Total Sample	**1.74%**	**2.44%**	**18.10%**	**42.11%**	**35.61%**	**100.00%**
Consumers/General public	2.01%	2.21%	19.48%	42.17%	34.14%	100.00%
Makers and Maker communities	0.64%	2.55%	14.01%	38.85%	43.95%	100.00%
Manufacturing SMEs/Industry	1.93%	2.90%	17.87%	44.44%	32.85%	100.00%

Source: Authors' calculations

Table 30. Evaluation of suggested features in a Digital Platform for Social Manufacturing – Pilot countries

	Not important at all	Of little importance	Of average importance	Very important	Extremely crucial	Grand total
Q20. Which features do you consider necessary in a Digital Platform (Web) for Social Manufacturing?						
Q20_1: Easy-to-use digital tools (e.g. design thinking tools, AR / VR modelling etc.)						
Total Sample	**1.74%**	**3.60%**	**16.36%**	**40.26%**	**38.05%**	**100.00%**
Denmark	3.92%	5.88%	29.41%	35.29%	25.49%	100.00%
France	0.90%	2.70%	24.32%	39.64%	32.43%	100.00%
Germany	3.15%	3.15%	10.36%	41.89%	41.44%	100.00%
Greece	0.59%	1.76%	15.29%	43.53%	38.82%	100.00%
Italy	1.43%	5.00%	20.00%	41.43%	32.14%	100.00%
Spain	0.70%	5.63%	11.97%	35.92%	45.77%	100.00%
Q20_2: List of makerspaces/Fablabs' manufacturing equipment						
Total Sample	**0.58%**	**2.09%**	**14.27%**	**40.72%**	**42.34%**	**100.00%**
Denmark	0.00%	0.00%	13.73%	33.33%	52.94%	100.00%
France	0.00%	3.60%	16.22%	39.64%	40.54%	100.00%
Germany	1.35%	2.25%	18.92%	40.09%	37.39%	100.00%
Greece	0.00%	2.94%	12.35%	42.94%	41.76%	100.00%
Italy	0.71%	2.14%	10.71%	41.43%	45.00%	100.00%
Spain	0.00%	0.70%	12.68%	42.25%	44.37%	100.00%
Q20_3: Inspection and metrology tools for quality control						
Total Sample	**1.16%**	**5.57%**	**28.89%**	**42.46%**	**21.93%**	**100.00%**
Denmark	3.92%	7.84%	47.06%	31.37%	9.80%	100.00%
France	0.00%	8.11%	26.13%	46.85%	18.92%	100.00%
Germany	1.80%	8.56%	36.49%	38.29%	14.86%	100.00%
Greece	0.00%	0.59%	17.06%	48.24%	34.12%	100.00%
Italy	1.43%	7.86%	31.43%	40.00%	19.29%	100.00%
Spain	0.70%	2.82%	26.06%	44.37%	26.06%	100.00%
Q20_4: Technical lectures and mentoring from qualified experts						
Total Sample	**1.04%**	**2.90%**	**17.87%**	**43.85%**	**34.34%**	**100.00%**
Denmark	3.92%	5.88%	19.61%	37.25%	33.33%	100.00%
France	0.00%	5.41%	29.73%	38.74%	26.13%	100.00%
Germany	2.25%	3.60%	22.07%	50.00%	22.07%	100.00%
Greece	0.00%	1.76%	6.47%	45.29%	46.47%	100.00%
Italy	0.71%	0.00%	16.43%	43.57%	39.29%	100.00%
Spain	0.00%	2.82%	16.90%	40.14%	40.14%	100.00%

	Not important at all	Of little importance	Of average importance	Very important	Extremely crucial	Grand total
Q20. Which features do you consider necessary in a Digital Platform (Web) for Social Manufacturing?						
Q20_5: Training activities (enhance skills on how to use Fablabs' tools and machinery)						
Total Sample	**0.35%**	**3.02%**	**14.04%**	**41.30%**	**41.30%**	**100.00%**
Denmark	0.00%	5.88%	21.57%	37.25%	35.29%	100.00%
France	0.00%	2.70%	12.61%	38.74%	45.95%	100.00%
Germany	0.45%	5.86%	16.67%	46.40%	30.63%	100.00%
Greece	0.00%	1.18%	15.29%	42.35%	41.18%	100.00%
Italy	0.71%	2.14%	13.57%	39.29%	44.29%	100.00%
Spain	0.00%	1.41%	7.04%	38.03%	53.52%	100.00%
Q20_6: Social network tools (e.g. discussion Fora)						
Total Sample	**2.32%**	**8.35%**	**26.33%**	**40.14%**	**22.85%**	**100.00%**
Denmark	1.96%	9.80%	35.29%	29.41%	23.53%	100.00%
France	1.80%	4.50%	32.43%	36.94%	24.32%	100.00%
Germany	3.60%	14.41%	33.33%	35.59%	13.06%	100.00%
Greece	1.18%	1.18%	14.71%	52.35%	30.59%	100.00%
Italy	2.86%	10.71%	28.57%	39.29%	18.57%	100.00%
Spain	0.70%	6.34%	21.13%	40.14%	31.69%	100.00%
Q20_7: Communication and matchmaking services between SMEs and makers based on skills, experience, and needs.						
Total Sample	**1.51%**	**4.06%**	**25.87%**	**43.39%**	**25.17%**	**100.00%**
Denmark	1.96%	5.88%	23.53%	43.14%	25.49%	100.00%
France	0.90%	6.31%	29.73%	41.44%	21.62%	100.00%
Germany	3.15%	4.50%	27.03%	46.40%	18.92%	100.00%
Greece	0.59%	4.71%	31.18%	42.35%	21.18%	100.00%
Italy	1.43%	2.86%	22.86%	41.43%	31.43%	100.00%
Spain	0.00%	1.41%	19.72%	42.25%	36.62%	100.00%
Q20_8: Contact points for experts (experts' pool with profiles so that other makers/SMEs can seek assistance)						
Total Sample	**1.16%**	**2.44%**	**18.33%**	**47.33%**	**30.74%**	**100.00%**
Denmark	3.92%	0.00%	21.57%	47.06%	27.45%	100.00%
France	0.90%	1.80%	22.52%	46.85%	27.93%	100.00%
Germany	1.80%	4.95%	20.27%	50.90%	22.07%	100.00%
Greece	0.00%	0.59%	18.24%	45.88%	35.29%	100.00%
Italy	1.43%	2.14%	17.14%	47.86%	31.43%	100.00%
Spain	0.00%	2.11%	13.38%	42.25%	42.25%	100.00%
Q20_9: Collaboration tools (e.g. tools enabling remote collaboration)						
Total Sample	**1.74%**	**2.44%**	**18.10%**	**42.11%**	**35.61%**	**100.00%**
Denmark	5.88%	5.88%	25.49%	43.14%	19.61%	100.00%
France	0.00%	1.80%	23.42%	36.04%	38.74%	100.00%
Germany	3.15%	4.05%	22.97%	42.79%	27.03%	100.00%
Greece	0.59%	0.00%	14.71%	43.53%	41.18%	100.00%
Italy	2.14%	2.86%	16.43%	46.43%	32.14%	100.00%
Spain	0.00%	2.11%	11.27%	37.32%	49.30%	100.00%

Source: Authors' calculations

Pilot Countries analysis

Table 31. Sample distribution by individual characteristics, familiarity, and previous experience – Pilot countries

	DK	FR	DE	GR	IT	ES
Stakeholder groups						
Consumers/General public	45.10%	61.26%	49.55%	77.65%	62.86%	42.96%
Makers and Maker communities	33.33%	13.51%	13.96%	12.35%	17.14%	31.69%
Manufacturing SMEs/Industry	21.57%	25.23%	36.49%	10.00%	20.00%	25.35%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Gender						
Male	76.47%	70.27%	76.58%	50.00%	81.43%	68.31%
Female	19.61%	29.73%	22.97%	47.06%	16.43%	28.87%
Other	3.92%	0.00%	0.45%	2.94%	2.14%	2.82%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Age						
< 20 years	1.96%	1.80%	0.00%	1.18%	0.00%	3.52%
20-29 years	35.29%	44.14%	5.41%	58.24%	48.57%	27.46%
30-39 years	25.49%	18.02%	17.12%	15.88%	22.86%	19.72%
40-49 years	19.61%	15.32%	18.02%	8.82%	15.71%	26.06%
50-59 years	7.84%	17.12%	31.98%	12.35%	10.71%	19.72%
60 + years	9.80%	3.60%	27.48%	3.53%	2.14%	3.52%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Education						
Less than a High School Diploma	3.92%	0.00%	0.00%	0.59%	0.00%	2.82%
High School Diploma	17.65%	6.31%	2.25%	11.76%	27.14%	23.94%
Bachelor's Degree	35.29%	22.52%	11.26%	44.71%	24.29%	49.30%
Master's Degree	35.29%	55.86%	62.61%	34.71%	42.14%	21.83%
Doctorate	7.84%	15.32%	23.87%	8.24%	6.43%	2.11%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Occupational Status						
Employed	47.06%	62.16%	68.92%	39.41%	30.00%	50.00%
Self-employed / entrepreneur	29.41%	12.61%	23.42%	15.88%	25.00%	12.68%
Unemployed	5.88%	2.70%	0.00%	2.94%	2.86%	9.15%
Student	17.65%	17.12%	1.35%	34.71%	37.86%	23.94%
Household activity	0.00%	0.00%	0.45%	0.00%	0.71%	0.70%
Retired	0.00%	1.80%	2.70%	2.94%	0.71%	0.70%
Other	0.00%	3.60%	3.15%	4.12%	2.86%	2.82%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Familiarity with terms (mean)						
DIY manufacturing	3.76	3.2	2.97	3.14	3.27	3.38
Makerspace	3.2	2.51	2.46	2.46	2.66	2.9
Fablab	3.2	3.16	2.46	1.99	2.91	2.89
Manufacturing facility	2.82	2.77	2.36	2.08	2.69	2.54
Co-creation	3.1	2.94	2.48	2.76	2.79	2.94
Social manufacturing	2.18	2.06	1.82	2.52	2.25	2.51
Previous experience in a collaborative project						
No	64.71%	73.87%	79.28%	82.35%	69.29%	54.23%
Yes	35.29%	26.13%	20.72%	17.65%	30.71%	45.77%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Authors' calculations