

ΠΑΝΤΕΙΟΝ ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΟΙΝΩΝΙΚΩΝ ΚΑΙ ΠΟΛΙΤΙΚΩΝ ΕΠΙΣΤΗΜΩΝ

PANTEION UNIVERSITY OF SOCIAL AND POLITICAL SCIENCES



Σχολή Επιστημών Οικονομίας και Δημόσιας Διοίκησης
Τμήμα Οικονομικής και Περιφερειακής Ανάπτυξης

Developing impact assessment methodologies for Collaborative Workspaces in rural and peripheral areas

ΔΙΔΑΚΤΟΡΙΚΗ ΔΙΑΤΡΙΒΗ

Lorenzo Marmo

Αθήνα, 2025

This PhD is a part of CORAL-ITN, a Marie Skłodowska Curie Innovative Training Network (2021-2024) which aims to unpack the latent dynamics and impacts of collaborative workspaces in rural and peripheral areas and integrate them as development tools in local and regional policies to open up new potentials for socio-economic development.



This project has received funding from the European Union's Horizon 2020 research and innovation program under the Marie Skłodowska-Curie grant agreement No 955907.

Μελής Επιτροπή

Βασίλειος Αυδίκος, Αναπληρωτής Καθηγητής Παντείου Πανεπιστημίου (Επιβλέπουσα)

Αντώνης Ροβολής, Καθηγητής Παντείου Πανεπιστημίου και Αναπληρωτής Πρόεδρος Τμήματος

Άγγελος Μιμής, Αναπληρωτής Καθηγητής Παντείου Πανεπιστημίου



Copyright © Lorenzo Marmo, 2025

All rights reserved. Με επιφύλαξη παντός δικαιώματος.

Απαγορεύεται η αντιγραφή, αποθήκευση και διανομή της παρούσας διδακτορικής διατριβής εξ ολοκλήρου ή τμήματος αυτής, για εμπορικό σκοπό. Επιτρέπεται η ανατύπωση, αποθήκευση και διανομή για σκοπό μη κερδοσκοπικό, εκπαιδευτικής ή ερευνητικής φύσης, υπό την προϋπόθεση να αναφέρεται η πηγή προέλευσης και να διατηρείται το παρόν μήνυμα. Ερωτήματα που αφορούν τη χρήση της διδακτορικής διατριβής για κερδοσκοπικό σκοπό πρέπει να απευθύνονται προς τον συγγραφέα.

Η έγκριση της διδακτορικής διατριβής από το Πάντειο Πανεπιστήμιο Κοινωνικών και Πολιτικών Επιστημών δεν δηλώνει αποδοχή των γνώμων του συγγραφέα.

Acknowledgements

I would like to express my sincere gratitude to Vasilis and Antonis for their guidance and constant support during this academic journey.

My sincere thanks to all the researchers of the MSCA CORAL-ITN project for being like a second family and for giving me precious advice and helping me throughout these three and a half years.

A special mention to the Athenian team for being more than just colleagues, sharing the joys and sorrows of the PhD process.

Many thanks to the team of European Creative Hubs Network for their support both in the office and during the inspiring meetups in Brussels, Porto, and Timișoara that allowed me to discover the work, ideas, and dreams of many amazing people working in the cultural and creative sector from all over Europe.

A special thanks to all members of the COST Action CA 18214 - The Geography of New Working Spaces and the Impact on the Periphery, especially to the ones that shared their national datasets of collaborative workspaces.

Finally, I would like to thank my family and all my closest friends for having always supported me and for being a continuous source of inspiration.

Table of Content

List of tables	6
List of figures	9
Abstract	10
1. Introduction	12
2. Impact assessment methodology	19
2.1. Framework & Literature review	23
2.1.1. Input	26
2.1.2. Output & outcome to measure impact	29
2.2. Research questions	64
2.3. Survey implementation	66
2.4. Econometric analysis	68
3. Geography of Collaborative Workspaces	70
3.1. National concentration of CWS in Europe	70
3.2. NUTS classification	71
3.3. Urbanity-rurality & remoteness dimensions	72
3.4. CWS in urban, intermediate, and rural regions	73
4. Demographics of Collaborative Workspaces	76
4.1. Year of opening of the CWS	78
4.2. Self definition of the CWS	79
4.3. Size of CWS	81
4.4. Income streams	81
4.5. Paid and volunteering labour in CWS	84
4.6. Ownership status	87
4.7. Capacity, users and occupancy rates	89
4.8. Hard infrastructure	90
4.9. Social curation	91
5. Social and environmental impacts	93
5.1. Networking opportunities	96
5.1.1. Dependent variables	97
5.1.2. Models and results	110
5.2. Social inclusion	128
5.2.1. Dependent variables	128
5.2.2. Models and results	132
5.3. Local cultural value	137
5.3.1. Dependent variables	138
5.3.2. Models and results	140
5.4. Environmental impact	146
5.4.1. Dependent variables	147
5.4.2. Models and results	150
5.5. Discussion	154
5.6. Limitations, challenges and future research	166
6. Conclusions	170
Reference	175
Annex	191
A1: List of proposed output and outcome indicators	191
A2: Sources for each country	194
A3: National Profiles	194

Austria	195
Belgium.....	196
France.....	198
Germany	200
Italy.....	204
Netherlands	207
Portugal	209
Spain.....	211
Sweden	212
Switzerland	213
A4: Top 40 NUTS3 regions ranked according to the location quotient	214
A5: Tests for multicollinearity with the Variance Inflation Factor (VIF) technique	216
A6: Tests for heteroscedasticity with Breusch-Pagan test	220
A7: Tests for the assumption of normality of the distribution of residuals.....	224

List of tables

Table 1 : Input indicators: enabling social factors.....	27
Table 2 : Input indicators: enabling physical factors.....	28
Table 3 : Proposed output and outcome indicators for the measurement of economic impact...	43
Table 4 : Proposed output and outcome indicators for the measurement of social impact.	57
Table 5 : Proposed output and outcome indicators for the measurement of environmental impact.....	63
Table 6 : Number of CWS in European countries and their national concentration.....	71
Table 7 : Shares of CWS in urban (1), intermediate (2) and rural (3) NUTS3 regions, as well as share of CWS located in remote NUTS3 regions. Following the Eurostat definition, the % of remote regions is a separate category of regions and is not added up to the urban, intermediate, rural regions sums.	73
Table 8 : Types of CWS according to managers' definitions in cities, outside cities, and in total (multiple answers).....	80
Table 9 : Small, medium, and large CWS in cities and outside cities.....	81
Table 10 : CWS's main sources of income (multiple answers).....	82
Table 11 : CWS's primary, secondary, and tertiary income streams.....	83
Table 12 : CWS's Full-time and Part-time staff, and volunteers.	84
Table 13 : Weekly working hours per volunteer in cities, outside cities, and according to the size of the CWS.	85
Table 14 : Share of full-time employees, part-time employees, and volunteers compared to the total of the CWS staff, with geographic and CWS size differences.....	86
Table 15 : Total weekly working hours in CWS for full-time employees, part-time employees, and volunteers (given by the multiplication between the number of employees or volunteers and the average working hours per week for the specific category of employee or volunteer).	86
Table 16 : Percentage of paid labour in total and according to CWS's main income streams (Market streams, personal funds and external subsidies, or a mix of the both), in cities, outside cities, and according to the CWS' size.....	87
Table 17 : CWS's types of ownership or lease.	88
Table 18 : CWS which are owned, rented, or given for free from public institutions, with geographical and size differences.	88
Table 19 : Maximum number of users that can be accommodated in the working areas.	89
Table 20 : Number of daily CWS users.	90
Table 21 : Occupancy rate (given by the ratio between users of the space present on a daily basis and maximum number of individuals that can be accommodated in the working areas), and percentage of users that are not residents in the municipality of the space.....	90
Table 22 : CWS's hard infrastructure in cities, outside cities, and in total (multiple answers).....	91
Table 23 : The share of labour devoted to curating the CWS from a social perspective working in cities, outside cities, and according to the size of the CWS.	92
Table 24 : Descriptive statistics of the independent and control variables.	94
Table 25 : Descriptive statistics of the dependent variables accounting for the role of CWS as providers of network opportunities.	97
Table 26 : CWS openness to non members in cities, outside cities, and in total.	98
Table 27 : Descriptive statistics on different typologies of Sociocultural activities using a Likert scale (1-5).....	99
Table 28 : CWS's typologies of social activities in cities, outside cities, and in total.....	100
Table 29 : CWS's typologies of social activities in small, medium, and large CWS.....	101
Table 30 : CWS's typologies of social activities in CWS that rely mainly on income streams from the market, from personal funds or external subsidies, or a mix of the two.....	102
Table 31 : Descriptive statistics on Training and mentoring programs in CWS using a Likert scale (1-5).	103
Table 32 : Offering Training and mentoring programs according to location, size, income streams, and in total.....	104
Table 33 : Descriptive statistics on networking events in CWS using a Likert scale (1-5).....	105

Table 34 : Offering events to stimulate networking according to location, size, income streams, and in total.....	105
Table 35 : Wider networks of CWS according to location, size, income streams, and in total. ...	106
Table 36 : Types of interaction with medium and large firms in CWS according to location, size, income streams, and in total. Respondents could select multiple options.	107
Table 37 : Degrees of relevance of the activities performed in CWS with regard to locally rooted industries according to location, size, income streams, and in total.....	108
Table 38 : CWS' interaction with organisations from the third sector according to location, size, income streams, and in total. Respondents could select multiple options.	109
Table 39 : Results of the ordered probit models for CWS' openness to non-members, organisation of Sociocultural events, Training and mentoring programs, and results of the simple probit model for the organisation of networking events.	113
Table 40 : Marginal effects for the regression model on networking events.	116
Table 41 : Results of the multinomial probit model regarding regional, national, and international networks of CWS.....	118
Table 42 : Results of the simple probit models for the CWS' interactions with medium and large firms, NGOs, and community organisations, and results of the ordered probit model for the CWS' interaction with locally rooted industries.....	119
Table 43 : Marginal effects for the regression model on the interaction with medium and large firms.	121
Table 44 : Marginal effects for the regression model on the interaction with NGOs.	122
Table 45 : Marginal effects for the regression model on the interaction with community organisations.....	123
Table 46 : Results of the simple probit models for the CWS' interactions with social enterprises, charities, neighbourhood groups, and labour associations.	124
Table 47 : Marginal effects for the regression model on the interaction with social enterprises.....	125
Table 48 : Marginal effects for the regression model on the interaction with charities.	126
Table 49 : Marginal effects for the regression model on the interaction with neighbourhood groups.....	127
Table 50 : Marginal effects for the regression model on the interaction with labour associations.....	127
Table 51 : Descriptive statistics of the dependent variables accounting for the role of CWS in fostering social inclusion.....	128
Table 52 : Benefits to disadvantaged groups according to location, size, income streams, and in total.	129
Table 53 : Presence in CWS of at least one employee coming from disadvantaged groups according to location, size, income streams, and in total.....	130
Table 54 : Benefits to disadvantaged groups according to location, size, income streams, and in total.	131
Table 55 : Results of the simple probit models regarding the offer to disadvantaged groups of free or discounted membership, free use of the space, and training and workshops, as well as concerning the presence of employees working in the CWS coming from disadvantaged groups.....	133
Table 56 : Marginal effects for the regression model on the offering of training and workshops to disadvantaged groups in CWS.....	134
Table 57 : Marginal effects for the regression model on the employment of individuals from disadvantaged groups.....	135
Table 58 : Results of the simple probit models regarding the offer of training and workshops to long-term unemployed, NEETs, economic migrants and refugees, disabled people, and women.....	136
Table 59 : Descriptive statistics of the dependent variables accounting for the role of CWS in supporting local culture.....	137
Table 60 : Relationship between CWS and artists according to location, size, income streams, and in total.	139
Table 61 : Number of monthly visitors of cultural events in CWS and density of monthly visitors of the CWS, in cities, outside cities, and in total.	140

Table 62 : Results of the simple probit models on the support of CWS to local culture.	142
Table 63 : Marginal effects for the regression models on the relationship between CWS and artists, on the participation in residency programs, and on the organisation of artistic exhibitions and events.....	144
Table 64 : Results of the simple probit models on the logarithmic value of the number of monthly visitors per square meter.....	146
Table 65 : Descriptive statistics of the dependent variables regarding the environmental impact of CWS.	147
Table 66 : share of CWS located in formerly vacant buildings according to location, size, income streams, and in total.....	148
Table 67 : share of CWS that rely on self-produced energy from renewable sources according to location, size, income streams, and in total.....	148
Table 68 : average annual electricity consumption (kWh/user) in CWS in 2022 according to location, size, income streams, and in total.....	149
Table 69 : Results of the regression models for the environmental impact of CWS.....	152
Table 70 : Marginal effects for the regression model on the reuse of vacant buildings.	153
Table 71 : Summary of all the regression models. The ones that are not statistically significant are written in red. All statistically significant correlations between dependent variables (rows) and independent variables (columns) are highlighted in green when positive and red when negative.	155
Table 72 : Proposed output and outcome indicators for the measurement of economic, social, and environmental impact.....	191
Table 73 : List of sources for each country.	194
Table 74 : Distribution of CWS in Austrian NUTS3 regions.	195
Table 75 : Distribution of CWS in Belgian NUTS3 regions.....	197
Table 76 : Distribution of CWS in French NUTS3 regions.	199
Table 77 : Distribution of CWS in German NUTS3 regions.	203
Table 78 : Distribution of CWS in Italian NUTS3 regions.	206
Table 79 : Distribution of CWS in Dutch NUTS3 regions.....	208
Table 80 : Distribution of CWS in Portuguese NUTS3 regions.	210
Table 81 : Distribution of CWS in Spanish NUTS3 regions.....	211
Table 82 : Distribution of CWS in Swedish NUTS3 regions.	213
Table 83 : Distribution of CWS in Swiss NUTS3 regions.....	214
Table 84 : Top 40 NUTS3 regions ranked according to the location quotient.	214

List of figures

Figure 1 : Elements of the framework: Input, Output & outcome, Impact.	25
Figure 2 : The different dimensions of impact.	31
Figure 3 : Three dimensions of networking opportunities of CWS.	46
Figure 4 : Respondents from 273 CWS located in the following 34 European countries.	77
Figure 5 : Year of opening of the 273 European CWS part of the dataset from the survey from 2023, divided according to their location.	79
Figure 6 : Provision of Sociocultural events and activities in CWS using a Likert scale (1-5).	99
Figure 7 : Offering training to members on soft skills, on hard skills, to non-members, and networking events in CWS using a Likert scale (1-5).	103
Figure 8 : Location quotient (LQ) in Austria.	195
Figure 9 : Location quotient (LQ) in Belgium.	196
Figure 10 : Location quotient (LQ) in North France.	198
Figure 11 : Location quotient (LQ) in South France.	198
Figure 12 : Location quotient (LQ) in North Germany.	200
Figure 13 : Location quotient (LQ) in Germany Baden-Württemberg.	200
Figure 14 : Location quotient (LQ) in Germany Nordrhein-Westfalen.	201
Figure 15 : Location quotient (LQ) in South-West Germany.	201
Figure 16 : Location quotient (LQ) in East Germany.	202
Figure 17 : Location quotient (LQ) in Germany Bayern.	202
Figure 18 : Location quotient (LQ) in North Italy.	204
Figure 19 : Location quotient (LQ) in South Italy.	205
Figure 20 : Location quotient (LQ) in the Netherlands.	207
Figure 21 : Location quotient (LQ) in Portugal.	209
Figure 22 : Location quotient (LQ) in Spain.	211
Figure 23 : Location quotient (LQ) in Sweden.	212
Figure 24 : Location quotient (LQ) in Switzerland.	213

Abstract

This research aims at providing an impact assessment methodology to understand the potential impacts of Collaborative Workspaces (CWS) on their users and wider communities. Particularly, following the definition of urbanity and rurality provided by Eurostat, this research highlights the differences between CWS located in urban areas and the ones located in more peripheral and rural areas. The impact assessment framework is based on two common impact assessment methodologies: the Theory of Change and the Multidimensional Approach. It proposes several input, output, and outcome indicators meant to take account of the resources available to CWS (input) and subsequently capture the changes and effects of CWS (output-outcome). Additionally, this research presents the geography of CWS in Europe by providing the amount and distribution of CWS in 23 European countries. Furthermore, the research examines the proposed impact assessment methodology by using part of the indicators to measure the social and environmental impacts of CWS in the European context. The former focuses on the role of CWS in enabling networking opportunities and promoting social inclusivity among the actors and the communities around them, as well as enhancing the local cultural value of their territories. The latter dimension focuses on the role of CWS in revitalising underused or abandoned buildings and in producing renewable energy, as well as examining CWS' electricity consumption patterns. The methodology applies an econometric approach using cross-sectional data collected through a survey carried out from March to August 2023 directed to managers of CWS, counting a total of 273 respondents from 34 European countries. The econometric analysis applies binary and ordered multinomial probit estimation

models, as well as multiple log-linear estimation models. All regression models use the same set of independent variables, including CWS' location, CWS' size, quality of professional infrastructure, financial support strategy, ownership status, labour force, and social curation of the space. Results suggest that CWS located in cities are more likely to be part of international networks of CWS, to interact with medium and large firms and NGOs, and to host artists, particularly by offering them space for their artistic exhibitions and cultural events. Whereas CWS located outside cities have a greater probability of participating in regional and national networks of CWS to partially respond to the lack of resources and economic opportunities that characterise rural and peripheral areas. Future research should consider the perspective of users and wider communities rather than just focusing on CWS' managers. Additionally, it should attempt to collect more answers from CWS located in intermediate and rural areas so as to provide a more nuanced analysis of the geographical differences, including three levels (cities, towns and suburbs, and rural areas), rather than the dichotomised analysis provided in this research. Moreover, it could try to collect panel data with the same set of respondents to better capture the impacts of CWS on their users and wider communities.

Keywords: Collaborative Workspace; Impact Assessment; Networking Opportunities; Social Inclusion; Local Cultural Value; Environmental Impact.

1. Introduction

The identification of the effects and changes related to the implementation of a specific policy, program, or intervention is a challenging assignment. Policymakers and researchers implementing social programs, policy reforms, or other typologies of interventions need, in parallel, to develop impact assessment methodologies able to grasp whether such programs, policies, or interventions are generating the expected effects and benefits. In addition, impact assessment methodologies should be capable of identifying whether the measured changes are attributable to that specific program or intervention and lay the foundations for subsequent impact assessments of analogous programs or interventions (Khandker et al., 2009).

Literature offers several proposed impact assessment methodologies concerning the collaborative and sharing economy (Wigboldus & Brouwers, 2011; Vogel, 2012; Mayne, 2015; Barska et al., 2020; Douthwaite et al., 2020; Rice et al., 2020; Wang et al., 2020; Caprioli et al., 2021; Bompard et al., 2022). Nonetheless, it would be impractical to design a unique methodology capable of capturing the effects of all typologies of interventions and programs having to do with the collaborative and sharing economy (Sanna and Michelini, 2021). However, the presence of existing impact assessment methodologies can facilitate the design of a specific methodology suitable for a particular typology of program or intervention. In this regard, the main aim of this thesis is to provide an impact assessment methodology specifically designed for the evaluation of changes and effects attributable to the presence and related actions of Collaborative Workspaces (CWS) on their users, as well as on the local and regional contexts where they are located, which is still lacking in the

literature. This methodology is constructed on two specific strains of impact assessment methodologies: the Theory of Change and the Multidimensional Approach. Furthermore, the main challenges pertaining to more peripheral and rural areas are of particular interest for this research. In this regard, CWS can be considered as policy or intervention tools that can benefit peripheral and rural contexts and help them address systemic issues such as depopulation, brain drain, and many more.

In recent years, CWS are exponentially emerging as part of a more complex shift in labour dynamics and practices. Following the development of digital technologies and the resulting interconnectedness among actors in the knowledge economy, more highly skilled and knowledge workers are able to work remotely (Jamal, 2018). As a consequence, the rise of remote working led to an increasing number of workers with a higher degree of flexibility who do not necessarily have to operate from the premises of their company or organisation. Instead, they are free to choose where to perform their jobs. Consequently, many workers choose to operate from their homes, which can also result in greater levels of social and professional isolation, reduction of networking and collaboration opportunities, and greater difficulty in creating relationships of trust with others (Spinuzzi, 2012).

In this scenario, CWS, and especially coworking spaces, emerged as an alternative to home working by providing a space where professionals able to work remotely can share resources and knowledge with the rest of the community (Capdevila, 2013). Furthermore, these spaces are managed by community hosts who aim at *“facilitating encounters, interaction, collaboration, and mutual trust among the coworkers”* (Merkel, 2015, p. 128).

The establishment in 2005 of *Spiral Muse* in San Francisco is indicated by many as the starting point of the coworking movement, which spread quickly and in only six years counted more than 700 coworking spaces worldwide (Spinuzzi, 2012). Other studies identify the hackerspace *C-Base*, founded in 1995 in Berlin, as the earliest approach to a community orientated shared workspace concept, which would eventually lead a decade later to the establishment of different typologies of CWS worldwide (Orel et al., 2022; Hölzel & Vogl, 2023).

The definition of CWS includes a wide array of spaces, such as coworking spaces, makerspaces, hackerspaces, incubators and startup accelerators, cultural and creative hubs, and many more. They can function as middlegrounds supporting their economic and sociocultural ecosystems, having the potential to favour social engagement, innovation, and overall foster local economic development through the provision of hard infrastructure, facilitating knowledge sharing and community creation, and offering networking opportunities from the local to the global level (Schmidt et al., 2014; Hicks and Faulk, 2018; Nakano et al., 2020).

In 2007 only 75 CWS were present globally (Brown, 2017; Foertsch, 2017). According to *Statista*, in 2020 there were roughly 26,000 CWS globally, with 2.6 million users (Vogl & Akhavan, 2022). Moreover, in 2021, more than 5 million users are estimated to be hosted in 50,000 CWS worldwide (Avdikos & Pettas, 2021). Starting as an urban phenomenon, in the last decade CWS have spread also outside cities in more peripheral and rural areas (Tomaz et al., 2022). Nowadays, in many small and medium-sized towns and even villages in the EU and beyond, we find CWS that offer a variety of services to remote workers, digital nomads, small local businesses, etc.

As a result of such phenomena, there has been an increasing interest in understanding what type of long-term changes and effects these spaces generate, in urban but also in rural contexts, as highlighted before. To better understand what the potential impacts of CWS are on their users and, in general, on the local context where they operate, it is helpful to outline the common challenges that peripheral and rural places face.

Depopulation and brain drain are among the main challenges that rural areas and peripheral contexts have to address, causing ageing and demographic decline patterns. These can be partially counteracted through the establishment of CWS conceived as bottom-up civic initiatives aimed at meeting community necessities, providing new social and professional networks, and overall enhancing the appeal of remaining in such contexts (Ubels et al., 2022; Vogl & Akhavan, 2022).

Rural and peripheral contexts are generally characterised by low-qualified work, high rates of unemployment, and an overall weak economy, especially due to the low presence of creative workers and innovative industries. Thus, it is crucial for local and regional public institutions to promote initiatives that can attract and retain creative workers and contribute to the dynamisation of the local socio-economic context. In this regard, CWS - usually characterised by great professional diversity among their users - seem to have the potential to retain or attract highly skilled workers and creative individuals (Moriset, 2013; Chuah, 2016; Tomaz et al., 2022). Moreover, CWS can attract new businesses and venture capital, fostering employment and promoting local economic development (Jamal, 2018; Tomaz et al., 2022; Vogl & Akhavan, 2022). Despite a higher presence of CWS in major cities due to the greater location attractiveness, more and more CWS are opened in rural areas, assisting rural

entrepreneurship (Bouncken et al., 2020). As a result, enhanced entrepreneurial vitality and greater innovative potential can entice research and development companies to engage in more peripheral contexts (Mariotti et al., 2023).

Furthermore, as pointed out by Mariotti et al. (2023), rural and peripheral contexts are characterised by a lack of key hard infrastructures, discouraging CWS from locating in such areas. Nonetheless, if supported by tailor-made policies, CWS can facilitate the creation of hard infrastructures in remote areas (Mariotti et al., 2021). Additionally, they can facilitate socio-economic interactions, providing a pool of material and immaterial resources and creating new networking opportunities, acting as socio-material and labour infrastructures (Merkel, 2015; Avdikos & Pettas, 2021).

Finally, CWS can play a key role in addressing societal challenges that are not just related to rural and peripheral contexts, such as social inequalities and low inclusiveness, as well as environmental issues related to climate change and overuse of natural resources. In this regard, some CWS propose an alternative narrative to the traditional model of economic development based on unceasing economic growth, which is negatively affecting our environment and exacerbating social inequalities. Instead, they advance a community-based approach aiming at reducing socio-economic inequalities and where negative externalities on the environment are prioritised (Jamal, 2018; Gandini & Cossu, 2019).

Several studies provide quantitative insights on the role of CWS, but they only address the impacts of CWS on the economic level (Clifton et al., 2019; Hicks and Faulk, 2018), their respondents are only CWS' users (Bueno et al., 2018; Bouncken et al., 2020; Rese et al., 2020), or the CWS part of their dataset are located in a specific restricted

geographic area on the regional or national level (Durante and Turvani, 2018; Mariotti et al., 2021; Coll-Martínez & Méndez-Ortega, 2023; Mariotti et al., 2023).

Despite the presence of some studies addressing the social impacts of CWS (Fiorentino, 2019; Hölzel & de Vries, 2021; Mariotti et al., 2021) and others dealing with the environmental impacts (Ge et al., 2018; Ohnmacht et al., 2020; Vaddadi et al., 2020), literature on CWS is missing more thorough quantitative research on both social and environmental impacts. But even more importantly, literature on CWS is missing a systematic impact assessment methodology addressing CWS, which would be able to provide an overall understanding of the potentialities of CWS, as well as to guide future impact evaluations concerning similar spaces. Hence, this study aims at providing a systematic impact assessment methodology capable of identifying and measuring the potential changes and effects drawing from data gathered from managers of CWS, with a specific focus on the CWS located in more peripheral and rural contexts. Additionally, it presents the results from the econometric analysis regarding the social and environmental impacts of CWS on their users and wider communities.

The dissertation is structured as follows. Chapter 2 describes the methodology applied throughout the development of the impact assessment strategy for CWS, explaining the applied framework, the research questions, the survey implementation process, and the econometric analysis while using the literature that has been developed around the concept of CWS in the last 15 years. Chapter 3 examines the geography of CWS in Europe resulting from thorough desk-based research and based on the NUTS classifications from EUROSTAT. Chapter 4 delineates all the proposed indicators for the impact assessment for the economic, social, and environmental dimensions of

CWS. Chapter 5 outlines the results from a quantitative analysis on the networking opportunities originating from CWS, on the role of CWS in promoting social inclusion and in creating cultural value on the local level, as well as the results from a quantitative analysis on the environmental impacts of CWS. Furthermore, it points out the challenges and limits of the research process and proposes suggestions for future research. Finally, Chapter 6 draws conclusions on the above.

2. Impact assessment methodology

Individual actors and stakeholders involved in organisations from both the private and public spheres realised the impelling necessity to shed light on the consequences of their decisions and actions on the surrounding local context, as well as on society as a whole (Alomoto et al., 2022). Thus, in the last decades, several methodologies have been developed in response to such a strong societal demand for the measurement and evaluation of impacts in different fields. Impact evaluation methodologies are thus applied to understand whether - and to what extent - the implementation of a certain project or program is generating the intended changes and effects (Khandker et al., 2009).

When it comes to the assessment of impacts, a standard procedure has not been developed yet. Nonetheless, several studies propose different models to assess such social impacts and can be summarised considering seven elements (Grieco et al., 2015). The first one is the type of indicators, which can be qualitative, quantitative, or a mix of the two. The second element is the type of actors developing the impact assessment, which can vary from universities and research centers to public institutions and private organisations (or meta-organisations), both for-profit and non-for-profit. They all differ in the kind of goals to attain, as well as having different backgrounds, values, and an overall diverse orientation towards research strategies. The third element to consider is the type of impact to measure, which can be holistic or specific, focusing, for instance, on the economic, social, or environmental impacts. The fourth element focuses on the objective of the impact assessment, typically aimed at verifying whether the goals of the project or interventions are achieved.

Alternatively, the assessment may seek to provide precise measures of the generated impact, to provide crucial information for the management of an organisation, to report to specific stakeholders, or to obtain external recognition. The fifth element is the complexity of the impact assessment, depending on the number of indicators and categories of indicators. The sixth element is the sector, with certain impact assessments which are sector-specific and others that are cross-sectoral. Finally, the last element is the time frame, which can be prospective, retrospective, or ongoing. The *Organisation for Economic Cooperation and Development* (OECD) makes a distinction between *ex ante* impact analysis and *ex post* impact assessment. The former attempts to measure the potential future impacts of an intervention, policy, or program that is about to be implemented, while the latter aims to analyse the effects of a certain intervention, policy, or program, usually selecting a limited and well-defined set of impacts based on a specific theory or chain of causality (OECD, 2014).

As Sanna and Michelini (2021) highlight in their analysis of the impact assessment methodologies regarding the collaborative and sharing economy, a single methodology of impact assessment able to thoroughly capture all long-term changes and effects of an intervention cannot exist. Therefore, it is necessary to combine different tools and techniques to propose a functional *ad-hoc* methodology to measure the impacts of CWS, which can be considered as entities operating in the collaborative and sharing economy. More specifically, two strains of impact assessment methodologies are present in literature, sometimes overlapping in certain characteristics: the Theory of Change and the Multidimensional Approach.

The Theory of Change is among the most common impact assessment methodologies proposed to evaluate the impacts and changes coming from an intervention. Many studies applying the Theory of Change as a framework for their methodology of ex-post impact assessment share some key elements (Wigboldus & Brouwers, 2011; Vogel, 2012; Mayne, 2015; Douthwaite et al., 2020; Rice et al., 2020). Firstly, it is crucial to identify the main beneficiaries of the intervention. Secondly, the desired long-term effects and changes need to be defined, often including some intermediate effects and changes deriving from the intervention. Thirdly, it is important to define the context where the intervention is placed, including the current socio-economic conditions, the actors and stakeholders involved in the context, the political and institutional landscape, and the potential opportunities rising from the intervention. Subsequently, it is necessary to formulate assumptions on how change will unfold and to identify the fundamental actions leading to such long-term changes, possibly presenting cause-effect links. Finally, it is key to develop indicators able to measure such actions which lead to long-term changes and effects, namely the impacts of the intervention. For instance, the Food and Agriculture Organization of the United Nations applies the Theory of Change as a framework to assess the impacts of their Global Action program on *“One Country One Priority Product.”* Through this framework, they first identify the main challenges affecting global agrifood systems. Secondly, they define how to address such challenges and barriers to progress. Thirdly, they delineate the action to undertake to remove these barriers, developing several outputs to account for the desired impacts¹.

¹ [https://www.fao.org/one-country-one-priority-product/about/results-framework/theory-of-change-\(toc\)/en](https://www.fao.org/one-country-one-priority-product/about/results-framework/theory-of-change-(toc)/en)

Another common methodology applied for the impact assessment of an intervention is the Multidimensional Approach. This approach clusters the potential impacts of an intervention in thematic areas or dimensions of impact. Usually these dimensions are economic, social, environmental, and political and tend to make use of quantitative data (Sanna and Michelini, 2021). Nonetheless, in many studies the Multidimensional Approach can focus on more specific topics, for instance, breaking down the concept of sustainable development (Barska et al., 2020; Bompard et al., 2022), applying it to measure the development of renewable energies (Wang et al., 2020), or measuring the development of urban ecosystem services (Caprioli et al., 2021). Thus, what unites all these studies is the capacity of the Multidimensional Approach to deconstruct a wider field or domain into several dimensions which are easier to frame, favouring the construction of indicators that can function as a proxy for the measurement of the long-term changes and effects deriving from the specific implementation. In this regard, the Organisation for Economic Co-operation and Development developed a Multidimensional Approach to measure well-being and quality of life not exclusively from an economic perspective but also by including additional social and environmental dimensions².

For the purpose of developing a robust impact assessment methodology to measure the impacts of CWS, this work will rely on a mixed methodology of the Theory of Change and of the Multidimensional Approach, attempting to combine the features of these two methods which are more suitable to the analysis of the specific intervention, namely the presence and actions of CWS.

² <https://www.oecd.org/en/about/programs/kep.html>

In this regard, this chapter outlines the quantitative impact assessment methods applied for the purpose of identifying and measuring the impacts of the presence of CWS in both urban and rural or peripheral areas. More specifically, it presents a framework originating from the Theory of Change methodology, which is designed to describe the interconnections along the causal chain from the intervention (the presence of a CWS in a specific geographical context) to the effects and long-term changes supposedly resulting from such intervention (Van Leeuwen et al., 2005; Rice et al., 2020). It is therefore crucial to outline the causal assumptions that allow us to understand the impact pathways of a certain intervention (Mayne, 2015).

In addition, these effects and long-term changes are broken down into several dimensions of impact, following the proposed Multidimensional Approach to the methodology of impact assessment.

2.1. Framework & Literature Review

Several studies provide different attempts to measure the impacts of CWS. The majority are focusing on the economic impacts, such as employment and job quality (Hicks and Faulk, 2018), innovation and economic growth (Jamal, 2018; Clifton et al., 2019), business creation and entrepreneurship growth (Mariotti et al., 2021), and CWS' economic viability (Durante and Turvani, 2018). Some others are focusing on the location determinants of CWS (Coll-Martínez & Méndez-Ortega, 2023; Mariotti et al., 2023). Moreover, some studies attempt to measure the social impacts of CWS on productivity (Bueno et al., 2018), users' work satisfaction (Bouncken et al., 2020), collaboration and knowledge sharing (Rese et al., 2020), users' well-being and impact on the local communities (Mariotti et al., 2021). Additionally, many studies focus on

the measurement of environmental impacts related to commuting patterns and urban traffic congestion (Yu et al., 2021; Hölzel & de Vries, 2021; Mariotti et al., 2021), as well as on carbon emissions (Ge et al., 2018) and carbon footprint patterns (Vaddadi et al., 2020). Despite the presence of many studies addressing the impacts of CWS, broader research on more dimensions of impact on the European level is still missing. Thus, this research attempts to develop a novel methodology for the assessment of the impacts of CWS on their users and the local communities. This is constructed on the basis of a framework which is applied in all impact assessment studies applying the Theory of Change as the main methodology, as well as other impact assessment analyses (see Sokolowski, 2014; Sivesind et al., 2014). The application of this type of framework is appropriate when attempting to shed light on the impacts of CWS, given that it is not exclusively designed and constructed for programs and projects. In fact, it includes any causal model that firstly attempts to identify the existing change processes related to the presence of specific actors in a certain context. Moreover, it has to be based on specific assumptions made on how the process of change is expected and through which steps change will happen (Vogel, 2012; Douthwaite et al., 2020).

It is, thus, an extremely practical and flexible tool to describe a sequence of events and activities that are expected to generate intended results and impacts in particular contexts. Thus, as Wigboldus and Brouwers (2011) present in their reflection paper, it should not be perceived as a rigid methodological instrument but rather as an adaptable, context-specific tool that, based on predetermined assumptions, can assist the unpacking of latent dynamics and processes of change.

As shown in Figure 1, the applied framework is composed of the following three elements: *Input, Output & outcome, Impact* (Pearsons et al., 2013; OECD, 2010; INTRAC, 2017).

Each of the first two dimensions (input, output & outcome) has several indicators needed to measure and evaluate either the presence of essential elements in the CWS (input) or the economic, social, and environmental impacts of such spaces on local development and on the CWS users (output & outcome). Local development is intended as the development of the communities around the CWS from a geographic perspective, but it also includes professional and personal development of the individuals participating on different levels in the CWS' context. Output and outcome indicators are not exclusively connected to one dimension of impact but can potentially be connected to multiple impacts. Thus, this framework is characterised by non-linearity and multiplicity of relationships between outputs and outcomes and impacts (for instance, an output or outcome indicator could influence both social and economic impacts).

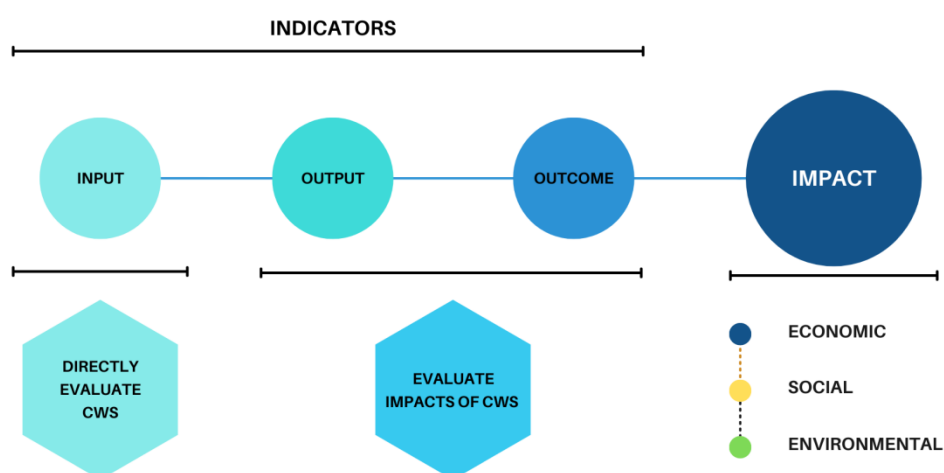


Figure 1: Elements of the framework: Input, Output & outcome, Impact.
Source: author.

2.1.1. Input

Input indicators are meant to monitor the availability and design of essential resources and factors that can facilitate the coworking environment. In fact, the presence of these resources and factors influences businesses' and coworkers' performance as well as potential impacts of CWS on local and regional development.

Moreover, these indicators can be used to directly evaluate the CWS.

The input indicators are divided into two categories. The first category considers the enabling social factors (Table 1), which include the social expenses of the CWS and the social curation. The first input indicator aims to measure the intended budget for social activities for the users, which is meant to strengthen informal networks and weak ties. In fact, as theorised by Granovetter (1973), weak ties provide crucial information for workers and facilitate the diffusion of innovation. In this regard, CWS that focus on their role as capacity-builders for informal networks and that invest in a collaborative environment are paramount to achieving social and economic impacts (Cabral & Winden, 2016; Clifton et al., 2019).

The second input indicator measures the efforts of CWS managers and hosts in curating the space from a social perspective, with community-building activities and other social events. The curation role provided by managers and hosts seems to be fundamental to stimulating a connective and collaborative environment, which hardly would form itself (Brown, 2017; Morgan, 2020; Mariotti et al., 2023).

Given the fact that both indicators similarly attempt to measure the curation role provided by managers and hosts, in the survey only *social curation* was included to account for the enabling social factor.

Table 1: Input indicators: enabling social factors.

Enabling social factors			
Indicator	Type of data	Metric	Source
Social expenses	Continuous	How much of the budget is spent on social activities for the users?	Manager
Social curation	Continuous	What percentage of labour is devoted to curating the space from a social perspective (community building, activities, events, etc.)?	Manager

The second category of inputs considers the hard infrastructure of CWS, as well as the facilitative and physical elements. It is complex to define specific indicators for this category given the diversity of CWS, differing in types of facilities, scale, scope, funding models, and so on. Following Brooke et al. (2014) - who in their report provide an analysis of the key workspace-related factors based on their case studies in London - this category includes eight indicators (Table 2).

The first indicator measures the number of individuals that can be accommodated in the working areas, while the second one investigates the size of CWS. The third one estimates the number of people part of the staff, which can be either employees (both part-time and full-time) or volunteers. The fourth indicator assesses the presence of hard infrastructures, such as meeting rooms, a social area (cafe, kitchen, break room), hot desks, event and activity rooms, private offices, outdoor space, a gym or workout area, and other social infrastructures. The fifth indicator measures the number of different membership options, while the sixth one evaluates the monthly cost for new startups or freelancers to join the CWS. For CWS *“the flexibility of occupancy terms, such as short-term commitments, combined with relatively low cost or no upfront cost to join the space, acts as a key draw for a start-up business”* (Brooke et al., 2014, p.36).

The proposed last two indicators are questions directed to the users of CWS, given the impracticability of measuring in a standardised manner the multifunctionality and layout adaptability of CWS. Concerning the former one, the multifunctionality of CWS facilitates dynamicity, offering formal and informal working spots, and it is connected to the increasingly widespread phenomenon of multi-local working (Di Marino & Lapintie, 2018). Whereas for the latter, the adaptability of the layout allows for different uses of the space, enabling different events and activities, which often contribute to the diversification of income streams (Brooke et al., 2014; Schmidt, 2019).

While the first four indicators (*capacity, size, staff, hard infrastructure*) are analysed in Chapter 4 - which deals with the demographics of the survey - the last four indicators are not further elaborated in this text. This is due to the fact that *flexibility of occupancy term* and *membership fee* were not included in the final survey directed to managers to keep the completion time of the survey within a reasonable time frame, whereas *multifunctionality* and *layout adaptability* were included in the survey directed to users, but the responses from that survey were too scant to allow for analysis.

Table 2: Input indicators: enabling physical factors.

Enabling physical factors			
Indicator	Type of data	Metric	Source
Capacity	Continuous	How many people can be accommodated in the working areas?	Manager
Size	Continuous	How many square meters is the indoor space?	Manager
Staff	Continuous	How many individuals are part of your staff (employees and volunteers)?	Manager
Hard infrastructure	Binary	Which of the following are present in the CWS (Meeting Room; Social Area, such as cafe, kitchen, or break room; Hot Desk; Event &	Manager

		Activity Room; Private Office; Outdoor Space; Gym, workout area, other social infrastructures).	
Flexibility of occupancy term	Continuous	How many different membership options are offered?	Manager
Membership fee	Continuous	How much does it cost (per month) for new startups or freelancers to join the CWS?	Manager
Multifunctionality	Ordered categorical	Do you think the CWS offers an adequate range of areas for different workspace-related activities?	User
Layout adaptability	Ordered categorical	Does the layout of the CWS allow for different uses and activities at different times?	User

2.1.2. Output & outcome to measure impact

Output indicators include all tangible and intangible products and services created, offered, or facilitated by CWS - such as social and cultural activities, events, training programs, projects, initiatives, etc. - directed both to CWS users and local communities. Moreover, it includes activities carried out by users that are, directly or indirectly, influenced by the CWS in which they operate (formal and informal collaborations and knowledge sharing, community interaction and support, etc.).

Outcome indicators include all short- and medium-term effects and changes derived from the presence of CWS. These can be differentiated from impacts due to their measurability. Outcome indicators can be both quantitative (how many...?) and qualitative (subjective perceptions).

Each output and outcome indicator can be intended as a proxy to measure impact. Impacts are long-term results and changes that can affect social, economic, and environmental factors related to the local territory and its actors. Output and outcome indicators allow the evaluation and measurement of such impacts, therefore being extremely useful for future policy recommendations regarding the roles of CWS on local and rural development.

The next paragraphs present the three areas of impact - economic, social, and environmental - together with the proposed output and outcome indicators, which are instruments to measure long-term changes and effects of CWS on their users and local communities. The full list of output and outcome indicators can be found in Annex A1. As mentioned before, the methodology applied follows the multidimensional approach. Thus, the impacts are divided into different dimensions: three dimensions related to the economic impact, three dimensions related to the social impact, and one dimension connected to the environmental impact. These dimensions were created following the present literature on the impacts of CWS, which is outlined in the next paragraphs.

The economic indicators are meant to measure economic growth, employment, and innovation. The social indicators aim at assessing the networking opportunities offered by CWS, as well as their role in promoting social inclusion and the development of local cultural value. Finally, the environmental indicators aim at determining the environmental impacts of CWS (Figure 2).

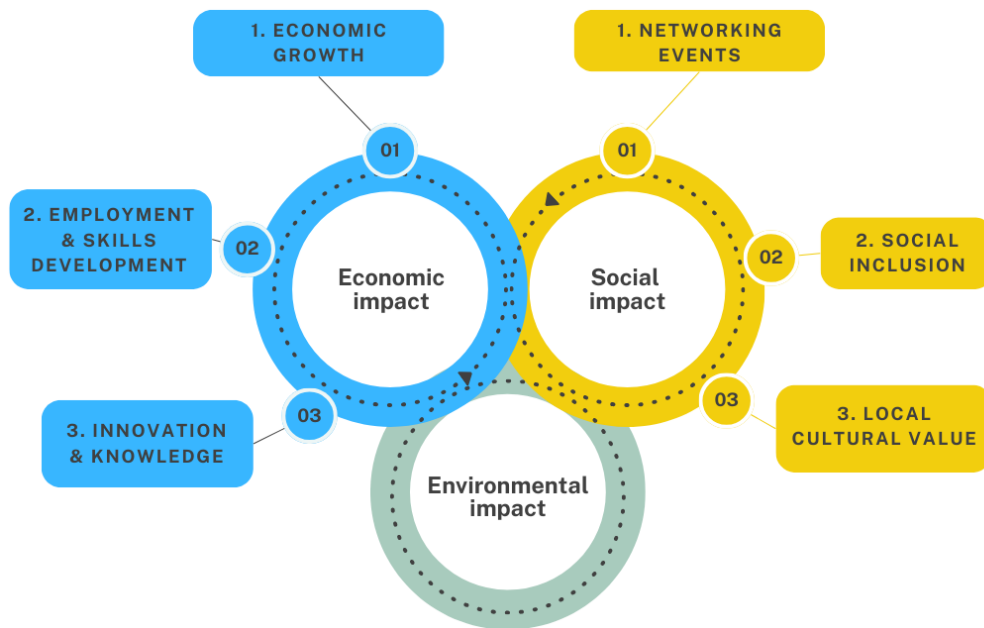


Figure 2: The different dimensions of impact.
Source: author.

2.1.3.1. Economic impact and potential indicators

The economic impact of CWS on local context and users is analysed across three dimensions: *Economic growth, Employment and skills development, Innovation and knowledge.*

Economic growth

The first dimension aims at evaluating the impact of CWS on the economic growth of individuals and businesses operating within the CWS, as well as at the local and regional levels. Economic growth is considered one of the key potential long-term changes and effects given by the presence of a CWS in a specific context. Their presence has the regenerative potential to attract knowledge workers in rural and peripheral areas and, in turn, foster local economic development (Brooke et al., 2014;

Jamal, 2018; Clifton et al., 2019; Nakano et al., 2020; Coll-Martínez & Méndez-Ortega, 2023). In the attempt to measure such impact, Roberts (2016) asked the respondents to indicate the percentage change in their income compared to the previous year. The results of the survey show that the majority of users have increased their income since they started working in the CWS. Thus, a potential indicator to consider to measure economic growth is the change in earnings on the user level (businesses, startups, freelancers, etc.) or any other indicators able to capture the “internal” perspective of the CWS.

Whereas when considering how CWS can facilitate economic growth outside the CWS, it is important to consider the role of CWS as social infrastructures. Through enhanced social interaction, not only do CWS facilitate the creation of new partnerships and collaborations among firms, startups, and freelancers within the CWS, but they also facilitate frequent interactions with external parties at the local level, such as local communities and local organisations. This, in turn, incentivises the creation of new networks and connections on their territory (Avdikos & Pettas, 2021; Vogl & Akhavan, 2022). Thus, CWS act as platforms which contribute to the creation of new partnerships, alliances, organisations and business agreements and that, if successful, will eventually expand and move out, favouring economic growth (Waters-Lynch & Potts, 2017; Clifton et al., 2019).

In addition, local businesses are also influenced by the opening of a CWS around them. CWS can stimulate local production and the provision of local services, promoting local economic development (Brooke et al., 2014; Jamal, 2018; Akhavan et al., 2019; Nakano et al., 2020). A study from Holzel and de Vries (2021) found out that the presence of a CWS is supposed to increase the revenues of the local businesses and

retailers located in close proximity, especially in the case of little towns and villages. While the increase in revenues is a direct impact, there could also be indirect ones; for instance, some CWS get involved in collaborations with external activities and service providers in their surroundings, such as a cafeteria or a bookshop (Kojo & Nenonen, 2016). These collaborations are deemed to support the socio-economic regeneration of local contexts (Akhavan et al., 2019).

In their study, Mariotti et al. (2021) describe the indirect impacts of CWS on the urban environment, highlighting the positive effect on the neighbourhood level of establishing agreements with local services.

Another factor that should be considered when measuring the role of CWS in favouring economic growth on the local level is to what extent CWS are able to retain businesses and professionals in the local area (Roberts, 2016; Jamal, 2018). Especially in rural and peripheral contexts, it is extremely challenging to retain a skilled workforce, which is crucial to create a dynamic and vibrant environment. CWS are moving towards this direction, offering a location to a diversity of skilled professionals (Tomaz et al., 2022). Moreover, their presence can provide a knowledge-intensive network through which new young professionals can start their businesses and potentially remain in their regional area (Vogl & Akhavan, 2022).

Finally, CWS can facilitate the start of new businesses. One of the most common features of CWS is accessibility to affordable and flexible occupancy terms for their users. Such characteristics are extremely attractive for businesses in their early phases of development. Low membership costs and short-term commitments - combined with access to a business community with shared resources and knowledge, the possibility of formal and informal collaboration, and networking events - make CWS

very supportive and suitable for early-stage businesses (Brooke et al., 2014; Nakano et al., 2020). Moreover, they provide users with tailor-made business support services concerning accountability and marketing strategies, as well as assisting them in accessing capital (Hicks and Faulk, 2018). Because of all the above-mentioned features, CWS can contribute to the local economic development by facilitating young professionals and entrepreneurs in accessing the labour market (Jamal, 2018). In the IPPR's report, Roberts (2016) found that two out of three survey respondents stated the crucial role of having access to their CWS in order to start their business. This result highlights the importance of such spaces for young freelancers and enterprises in their early professional career stages.

Employment and skills development

The second economic dimension attempts to evaluate the economic impact of CWS regarding employment creation. The capacity of CWS to increase productivity and to diminish costs of production for firms operating within can potentially result in more rapid employment growth (Hicks and Faulk, 2018). Furthermore, given their organisational structure, CWS can offer resilient strategies to secure users' income and employment (Schmidt, 2019; Gandini & Cossu, 2019).

Many studies highlight the importance of training and programs intended to develop the entrepreneurial capacities and skills of coworkers (Merkel, 2015; Kojo & Nekonen, 2016; Jamal, 2018; Nakano et al., 2020). These training and programs are provided more and more in CWS, mainly offered to CWS members but in some cases also directed to individuals not operating in the CWS (Bouncken & Reuschl, 2018).

Providing such activities is key to attracting and retaining creative individuals in peripheral areas. Especially in rural areas, where levels of unemployment are generally higher and where craftsmanship is one of the most prominent economic sectors, the provision of training opportunities on traditional craft techniques (also in combination with digital ones) by CWS could generate a positive impact on the local employment rate (Moriset, 2013; Bähr et al., 2019).

In their report, Brooke et al. (2014) present two case studies of CWS that, through the organisation of community outreach programs managed to provide skills to the local community, contributing to the creation of cultural and economic value.

Another aspect to consider when attempting to measure the role of CWS regarding employment is their capacity to favour job creation. In literature there is a knowledge gap regarding whether CWS have a positive impact on job creation. Despite being frequently identified in public policies as capable of generating job opportunities, only a few qualitative studies confirmed this feature, while the few quantitative researches did not find any evidence in this regard (Nakano et al., 2020).

In support of the above-mentioned causal relationship, Fisher (2014) describes how multifunctional hybrid spaces are shaped by the interaction between public and private spheres. One of the outcomes resulting from such interaction is that such spaces, among which are CWS, can help stimulate job creation. Another study found that through enhanced networking, CWS can generate new job opportunities (Durante & Turvani, 2018). Moreover, CWS can be seen as microclusters (Capdevila, 2013). From this perspective, they benefit from features typical of agglomeration economies, such as the share of intermediate inputs and knowledge. As a consequence, firms located in CWS have lower production costs and enhanced

productivity, which in turn facilitate employment growth, job creation, and overall stimulate regional economies (Hicks and Faulk, 2018). Despite such arguments, Hicks and Faulk's study does not find any statistically significant effect of the impact of business incubators and makerspaces on total employment. More evidence is thus needed to shed light on the relation between CWS and job creation.

The effects of CWS on employment can also be observed from a geographical perspective. Such spaces, especially in rural and peripheral contexts, have the potential to retain local people by offering them job opportunities or giving them the chance to start their personal business. This is reflected by their organisational structure, which makes them more suitable to host workers and entrepreneurs who operate in precarious conditions and volatile labour environments (IPRR, 2016; Schmidt, 2019). In their study, Nakano et al. (2020) found that in mid-size cities, CWS may be able to revitalise such geographical contexts by creating local jobs. Moreover, Vogl & Akhavan (2022) reviewed three studies (Buksh and Mouat, 2015; Katonane et al., 2017; Gazetov, 2018) that found a rise in local employment. According to their review, the presence of knowledge workers would result in the necessity of three to five additional workers carrying out service jobs in the same area in which they operate. Thus, this result highlights the regenerative potential of CWS in rural and peripheral contexts.

Finally, CWS, especially those with a social orientation, are committed to favouring access to employment for local people or disadvantaged groups and directly engage with issues related to labour precariousness, operating within the social economy (Gandini & Cossu, 2019; Roberts, 2016). In fact, as we will see further on when discussing the dimension of social impact on networking opportunities, CWS can be

deemed as “*a social economy solution to an information coordination problem in an entrepreneurial knowledge economy*” (Waters-Lynch & Potts, 2017, p.418).

Thus, another important aspect to consider when trying to measure the impact of CWS on employment is the commitment of such spaces to providing social support to marginalised individuals. As stated by Gandini and Cossu (2019), many CWS engage in programs and activities with the purpose of mitigating social matters also with regard to employment. Some CWS, especially the ones involved with organisations operating in the third sector, are dedicated to favouring access to employment for marginalised groups and to promoting a more inclusive economy (Sivesind et al., 2014; Roberts, 2016).

Innovation and knowledge

The third economic dimension attempts to evaluate the economic impact of CWS regarding its role as a facilitator in the process of business innovation. The combination of enhanced social interaction and knowledge spillovers, together with the provision of proper infrastructures, services, and resources in CWS can potentially increase formal collaboration, creativity, entrepreneurship, and innovation (Spinuzzi, 2012; Yu et al., 2019, Clifton et al., 2019, Hicks & Faulk, 2018).

Many studies attempting to quantitatively measure innovation have as an indicator the number of new products or processes (Janssen et al., 2011; Rammer et al., 2016; Tidd & Bessant, 2014). Therefore, it is a widespread indicator to assess the innovative potentials on the company and business unit level (ter Haar, 2018). Even though the majority of previous studies measured the number of new products on the output

level, it is also possible to measure it on the outcome level. In fact, the Regional Innovation Scoreboard (2021) includes one of the indicators included to measure the innovative potential on the regional level, which measures the turnover originating from new or significantly improved products. Such an indicator includes both products that are new to the market and the ones which are new to the firm (thus capturing the diffusion of innovative products).

Complementarily, more social indicators could be able to capture certain dynamics of innovation. In fact, CWS can facilitate the process of innovation through the provision of key elements such as open physical space, materials, and social characteristics. CWS users can benefit from such a platform, having the opportunity to increase their visibility and get to know different realities, as well as identify potential future collaborators or customers, which can result in the creation of new businesses and partnerships (Brown, 2017). Moreover, CWS adapt well to the new dynamics of markets, characterised by an ever-increasing tendency towards project-based partnerships, which result in an ongoing necessity for workers to seek new partners (Capdevila, 2013).

More specifically, these types of flexible workplaces encourage knowledge sharing, cross-functional cooperation, and inter-organisational involvement (Yu et al., 2019). Therefore, such a flexible working model can potentially enhance inter-organisational and cross-disciplinary business collaboration if compared to a traditional office environment or home working. This can ultimately reflect enhanced innovation (Spinuzzi, 2012; Yu et al., 2019). Similarly, Stumpf (2013) highlights the crucial role of enhanced exchange of ideas within CWS in boosting collaboration and thus innovation, creativity, and entrepreneurship. Another study conducted by Jamal (2018) in Ontario

states that, because of their ability to facilitate collaborations and partnerships, CWS are considered fundamental for the reactivation and development of urban economies in mid-sized cities.

Hicks & Faulk (2018) suggest that one of the major agglomeration effects in CWS is the one that results from knowledge spillovers, which they describe as benefits resulting from shared knowledge among coworkers. According to them, these spillovers can lead to increased experimentation and collaborations, which in turn can potentially enhance innovation and productivity. Innovation is intended to be collaborative, given that CWS mainly provide the conditions through which actors with diverse knowledge and backgrounds can meet, discuss, and eventually come up with novel creative solutions (Hartley et al., 2013; Buonocore et al., 2020). Conversely, Clifton et al. (2019) found out that among the main outputs included in their study, collaboration is not considered extremely important in facilitating impacts such as innovation and economic growth, given the rarity of formal collaborations within CWS. Whereas knowledge sharing, informal interactions, and a sense of community are highly significant.

Capdevila (2013) argues that collaborations within CWS are temporary, goal-oriented, and project-based. These collaborations, blending complementary skills and knowledge, can result in innovative outcomes. Another important element of this study is the risk resulting from frequent interactions within the same CWS that can create rigidity in the long term, eventually leading to interdependence and the so-called 'lock-in effect'.

The IPPR's report by Roberts (2016) stresses the importance not only of formal collaboration among coworkers but also of informal collaboration and knowledge

exchange. Communal areas within CWS are supposedly facilitating serendipitous encounters, with the potential of generating network opportunities, conceiving new ideas, and creating the conditions for collaboration. More frequent interactions and enhanced trust among coworkers can enable innovation, especially when managers and hosts of CWS are attentive to the development of a sense of community. CWS are thus creating a network that encourages the sharing of information and can offer advice and support within the space (Roberts, 2016).

Moreover, in their study, Clifton et al. (2019) claim that informal interactions and knowledge sharing, also defined as the exchange of tacit knowledge, strongly influence impacts such as innovation, productivity, and income. Following from Storper (1995), informal social elements such as “being in the right networks, getting the right internships, knowing the right people” (Clifton et al., 2019, p.13), are extremely important. Hence, it is relevant to explore the role of CWS as creator and facilitator of informal networks, “weak ties” and social capital within the space itself and beyond. Furthermore, Capdevila (2013) states that diversification and collaboration are fundamental for the process of innovation to unfold. And these two elements are provided by the share of knowledge resulting from the informal interaction among coworkers.

In addition to peer-to-peer skill exchange programs and events, many CWS organise training sessions, mentoring programs, workshops, seminars, lectures, courses, and business tutoring directed to the users. Such activities can empower professionals and enhance the survivability of startups, new companies, and young entrepreneurs and create a fertile ground for processes of innovation to unfold (Merkel, 2015; Kojo & Nekonen, 2016; Jamal, 2018; Nakano et al., 2020). Including formal training sessions

in the portfolio of activities of CWS has the potential to increase productivity, as well as the sense of community (Rese et al., 2020).

Nevertheless, the role of such activities offered by CWS remains unclear. Thus, potential effects and consequences of mentoring and training program availability on entrepreneurial success and new product development should be further investigated (Bouncken & Reuschl, 2018).

As previously mentioned, both the exchange of tacit knowledge and formal collaborations blend complementary skills and knowledge and facilitate innovative outcomes. To encourage such types of exchange practices among coworkers, it is crucial to have the role of 'curators' of CW managers and community hosts, which act as mediators (Brown, 2017). Coworkers - which generally are willing to share their knowledge with their peers - are encouraged by the community hosts to share their skills and know-how also through, for example, self-led workshops (Brown, 2017). For instance, in London, Camden Collective monthly carries out a two-hour skill exchange program. All members necessarily have to partake in this event and assist the other members, especially the ones with short business experience or economic resources (Brooke et al., 2014). Moreover, as stated by Merkel (2015), key activities which could encourage exchange practices are peer-to-peer learning groups. Thus, skill exchange programs and events are deemed to stimulate such exchange practices.

Dynamics of innovation are strongly dependent on investments and new businesses accessing funds. CWS can facilitate such necessity by acting as an intermediary between freelancers and businesses within the space and other external parties, such as funders, potential customers, and business partners (Brown, 2017; Cabral & van

Winden, 2016). Gandini and Cossu (2019) highlight the importance of CWS as connectors between local investors and innovative ideas, initiatives, and companies. In their study, Clifton et al. (2019) include high levels of funding and business opportunities as key outcomes of individuals and businesses operating in CWS. This is partly explained by the fact that some large companies support CWS because of their innovative potential. CWS are often well connected to local entrepreneurial environments, and, by getting involved with CWS users, big companies enhance their chances of finding and later on marketing successful ideas and projects developed outside their research and development facilities (Malecki, 2011; Moriset, 2013). Based on this, the presence of entrepreneurial initiatives in CWS located in rural areas have the potential to attract venture capital investors and contribute to innovation, business creation, and local economic growth (Vogl & Akhavan, 2022).

Finally, the contribution of CWS to trigger processes of innovation is strongly dependent on their ability to facilitate the development of broader networks. They provide a socio-material infrastructure composed of individuals, places, finances, and further components, which enable the formation of local, regional, and global networks, contributing to the development of entrepreneurial ecosystems and of platforms for new socio-political and economic action (Merkel, 2019; Schmidt, 2019; Avdikos & Pettas, 2021). Durante and Turvani (2018) state that such spaces triggered the replacement of traditional industrial clusters with “new networks of microbusinesses”, which use the CWS as functional physical platforms for their business operations.

Based on these perspectives, CWS are able to connect their users with strategic partners through global networks, allowing them to interact with distant actors and

access new information and knowledge that otherwise would not be accessible exclusively through local connections. CWS act as global pipeline connectors, favouring innovation and enhancing local competitiveness (Nakano et al., 2020; Mariotti et al., 2021). Furthermore, not only do global pipelines provide knowledge and know-how from sources that are exogenous to the local context, but they also function as disseminators of knowledge that is generated at the local level, enhancing the visibility of specific local contexts - or production cluster - worldwide (Capdevila, 2013).

Proposed indicators to measure economic impacts

Table 3 presents the proposed output and outcome indicators to measure the economic impacts of CWS, where each indicator is connected to one dimension of economic impact. In addition, a potential question is proposed for each indicator, and it can be directed to either CWS managers or CWS users.

Table 3: Proposed output and outcome indicators for the measurement of economic impact.

Impact	Indicator	Source	Question
Economic growth	Revenues	User	Indicate in percentage how much your earnings have increased / decreased since you started working in this CWS.
	Agreement with local services	User	Have you benefited from discounts and agreements with local services (restaurants, laundries, other businesses) offered by the CWS?
	Business retained in local area	Manager	What is the percentage of businesses that used the space in the last year that went on to leave the neighborhood / village / town?
	New business start	User	Did you (your company) start operating in the last year?
Employment & skills development	Skills development	Manager	How often do you organise training programs for individuals not working in the CWS?
	Job creation	Manager	How many additional jobs have been created in

			the last year?
	Local employment	Manager	How many coworkers have been hired from the local community in the last year? How many local startups have you hosted in the last year?
	Recruitment of unemployed	User	Were you unemployed before joining the CWS?
Innovation & knowledge	Sales of innovative products	User	What percentage of your turnover originated from new or significantly improved products?
	Collaboration	User	With how many CWS members have you had formal collaborations? (e.g. worked on a project together, started a project / business / partnership together, hired another member)
	Peer-to-peer support	User	With how many CWS members are you comfortable asking for professional advice about your work?
	Training and mentoring programs	Manager	How often do you organise training programs and events for members on SOFT SKILLS ³ ? How often do you organise training programs and events for members on HARD SKILLS ⁴ ?
	Networking events	Manager	How often do you organise events to stimulate NETWORKING (among members, organisations, funders, etc.)?
	Global pipeline	User	Did you increase your knowledge (know-how, market dynamics, etc.) by interacting with professionals not working in your CWS but that you met through the CWS? If yes, on which geographical level (local, regional, national, global)?

2.1.3.2. Social impact and potential indicators

The social impact of CWS on local context and users is evaluated considering three dimensions: *Networking opportunities*, *Social inclusion*, *Local cultural value*.

Networking opportunities

This research applies a broad understanding of the networking dynamics in CWS, which are not exclusively centered around the economic impact, but they can also be observed from a more social perspective. In this regard, the networking opportunities

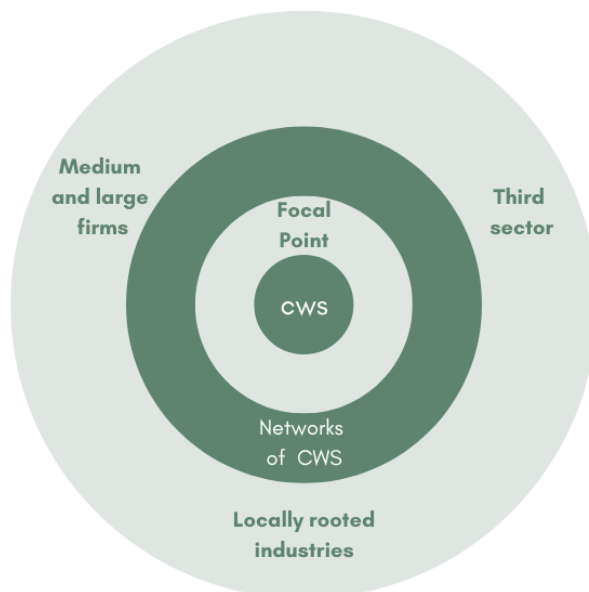
³ Communication, marketing, management, transversal and transferable skills.

⁴ Technical and professional-specific skills.

offered by CWS can be interpreted as key elements leading to the development of support networks alternative to the neoliberal vision of labour as individualised, precarious, and unequal, and that can favour the creation of “*mutual support structures for child care, training, sick pay, secure work and income, and so on*” (Sandoval, 2016, p.16). In this regard, some CWS engage in social innovation processes, offering opportunities to develop meaningful relationships, both from a personal and professional perspective, through the provision of physical space, networks, knowledge, and materials, empowering individuals and stimulating them to fulfil their desires, as well as encouraging them to develop collective subjectivities (Stockdale and Avdikos, 2024). By facilitating networking opportunities within the space, CWS can induce the development of an environment capable of generating inclusive innovation to occur (Dias and Smith, 2018). As explained in the previous paragraph, the innovative potential of CWS can indeed result in the development of new products and processes, but more commonly, CWS encourage the development of innovative social solutions through the use of local knowledge, promoting alternative values, and following unconventional practices (Liodaki, 2024). This is the case especially for the ones located in more peripheral and rural areas, which are not characterised by agglomeration economies, lacking high levels of entrepreneurship and the presence of talents typical of urban areas (Avdikos and Merkel, 2020).

According to Durante and Turvani (2018), CWS are assuming the role of traditional industrial clusters by providing a physical platform where a diverse array of actors can offer and encounter resources and support. The networking opportunities resulting from this role of CWS can be framed on three levels stemming from the current literature on CWS. Firstly, networking opportunities resulting from the interactions

among users of the CWS. Secondly, among networks of CWS, as well as accounting for the role of CWS as global pipeline connectors. Thirdly, partnerships and broader connections with external actors, such as with locally rooted industries, medium and large firms, and organisations from the third sector. The three levels of networking opportunities are presented in Figure 3.



*Figure 3: Three dimensions of networking opportunities of CWS.
Source: author.*

Starting from the first level, CWS provide a physical space where the dissemination of formal and informal exchange of ideas, information, knowledge, and skills is facilitated. They function as many authors define as “focal point”, “reference point”, or “shelling point”, namely points of reference where several actors can search, meet, and interact with others, and where informal exchange and casual encounters can potentially result in profitable networking opportunities, similarly, but on a micro-scale, to what is observed in clusters’ dynamics (Nakano et al., 2020; Capdevila, 2013; Waters-Lynch & Potts, 2017; Yu et al., 2019; Clifton et al., 2019; Schmidt, 2019; Brown, 2017). The role of CWS as focal points can be found both in CWS located in cities and outside

cities. In both cases, CWS aim at involving their local residents and community groups through the organisation of social and cultural events and activities, functioning as a semi-public space, and potentially involving different typologies of businesses (Capdevila, 2013; Brown, 2017; Avdikos & Merkel, 2020; Bosworth et al., 2023).

Moreover, as mentioned before with regard to the dimension of impact on innovation, elements such as collaboration, peer-to-peer support, training and mentoring programs, skill exchange programs and events, and networking events can all contribute to capturing the social impact concerning the networking opportunities present in CWS. In this regard, collaboration within CWS can reduce social isolation and promote a sense of community among coworkers, as well as create broader networks outside CWS. For instance, in Italy some CWS start collaborating with Social Streets, participatory and collective meeting points created by residents to develop an active social network in the neighbourhood they live in. Such types of collaborations create virtuous circles of further network opportunities, reciprocity, and trust (Akhavan et al., 2019). Accordingly, relationships of collaboration within CWS can generate sociocultural networks that have the potential to develop new types of collaborations, knowledge sharing, and creation dynamics (Bueno et al., 2018). Similarly, informal interactions resulting from sharing the same facilities through participation in training, workshops, mentoring and skills exchange programs, and sociocultural events increase the likelihood of conceiving new ideas, facilitating the creation of new networks, or just simply providing a space where individuals can offer advice and support to each other (Roberts, 2016). Therefore, CWS facilitate the creation of such informal networks or “weak ties”, which in turn provide their users

with useful and relevant information and knowledge that contribute to the valorisation of the social capital inside as well as outside the CWS (Clifton et al., 2019). A crucial element that facilitates the creation of networking opportunities is social trust, which can be understood as the expectation that arises within a community of regular, honest, cooperative behaviour, based on commonly shared norms, on the part of other members of that community (Anheier & Toepler, 2009). Trust is key among CWS' users to stimulate the production and exchange of tacit knowledge (Moriset, 2013). The creation of trust among users often needs the facilitation of CWS managers and hosts, who encourage formal and informal collaborations to create an environment of trust and counteract social isolation, as well as favour a sense of community and cooperation (Mariotti et al., 2021). Dynamics of trust creation and cooperation are also favoured by community activities in the CWS (coffee breaks, lunch breaks, drinks, etc.), leading to the sharing of ideas, trends, and information that, without relations of trust, would be harder to happen (Waters-Lynch and Potts, 2017). Moreover, the level of trust and community of a CWS replaces the hierarchical system typical of traditional firms, often characterised by competitive and opportunistic behaviour. Greater levels of trust and community can have positive effects on learning from other members, as well as enhancing self-efficiency and overall well-being (Bouncken and Reuschl, 2018). Finally, enhanced social trust among citizens is key to producing processes of social innovation and empowerment of marginalised groups (García et al., 2015).

The second level focuses on the networking opportunities resulting from the interactions with wider CWS networks. The connection with other CWS can play a key role in creating knowledge flows among peers operating in different CWS, enabling

more efficient knowledge-sharing dynamics (Nakano et al., 2020). In this regard, CWS, especially if participating in networks with other CWS, can function as industrial clusters on a micro level, with freelancers, entrepreneurs, and startups as the main actors within the microclusters (Capdevila, 2013). These wider CWS networks can be present on different geographical scales, from the local and regional ones to networks that connect different CWS on a national or global scale. These latter ones can act as global pipeline connectors, allowing the exchange of ideas, know-how, and technologies and speeding up the adoption of innovative practices (Nakano et al., 2020; Mariotti et al., 2021). The function of CWS as “global pipelines” allows different individuals, companies, or organisations physically distant from each other to interact, improve and develop new skills, and introduce new technologies and practices, overall enhancing their competitiveness (Nakano et al., 2020; Capdevila, 2013; Tumen and Zeydanli, 2016).

CWS part of wider CWS networks, are more likely to enhance the formal and informal collaborations among members and the exchange of new material and ideas, facilitating social and open innovation, regardless of the physical distance among different CWS (Avdikos and Pettas, 2021). Participating in such networks is crucial for CWS located in non-agglomerative economic areas (rural, remote, or peripheral areas) to assist their users in connecting with agglomeration economies, professionally interacting with key actors globally, and helping them access funding opportunities or simply exchanging knowledge and experience (Richardson, 2017; Avdikos & Merkel, 2020).

The third level regarding the networking opportunities resulting from the presence of CWS focuses on the relationships with external actors, which can be categorised in three typologies of external actors.

Firstly, CWS commonly interact with medium and large firms. Following the definition from the European Union⁵, these can be defined as companies having at least 50 employees and with a minimum turnover of 10 million euros. CWS' interactions with medium and large firms happen for different reasons. These firms tend to interact with CWS to connect with local entrepreneurial ecosystems, which are nested in CWS, favouring innovation processes outside the company, as well as to tap into pools of talented, highly skilled labour. Alternatively, medium and large firms wish to observe all creative initiatives coming from freelancers, startups, or small firms operating in the CWS (Coll-Martínez & Méndez-Ortega, 2023). Hence, medium and large firms perceive CWS as innovative places to acquire and develop new ideas and initiatives, in addition to the classic research and development facilities within the company. Thus, not only do they connect to, support, and fund existing CWS, but they often directly establish them, entrusting the creative process to freelancers and small enterprises rather than relying exclusively on their employees (Moriset, 2013). Many market-driven CWS mainly rely on venture capital from large firms to sustain their existence (Avdikos and Pettas, 2021). CWS defined as business incubators or start-up accelerators, are often funded by large firms and multinationals (Fiorentino, 2019). As a result, in rural areas it is increasingly common to establish CWS to attract venture capital in the region (Vogl & Akhavan, 2022).

⁵ EU recommendation 2003/361.

Secondly, CWS can interact with traditional local industries, which include local artisans, craftsmen, agri-food businesses, and many more. CWS can facilitate the modernisation of artisans', craftsmen's, or farmers' practices by providing resources, services, and support tailored to their needs. Moreover, CWS can provide them access to new markets, integrate new technologies in their processes of production, and facilitate collaborations with other members of the CWS, thus creating new configurations for locally rooted industries to evolve and modernise. The partnership between traditional local industries and CWS is mutually beneficial, providing members of the CWS with the expertise, know-how, and traditional knowledge of artisans and craftsmen. Whereas these latter may integrate new perspectives stemming from new technologies and market developments, ultimately leading to the creation of new economic opportunities for industries in recession (Capdevila, 2013; Bähr et al., 2019).

Thirdly, CWS can interact with organisations from the third or volunteer sector, such as NGOs, social enterprises, community organisations, charities, neighbourhood groups, and labour associations. CWS which are closely connected to local communities, aim at supporting well-being and promoting welfare through collective labour practices as community organisations (Roberts, 2016; Gandini and Cossu, 2019). CWS, thus, can function as a reference point for volunteers and paid workers of organisations from the third sector. These organisations aim to socially innovate by responding to social challenges - usually not addressed by the existing private and public institutions - through the creation of new forms of collaboration and economic, social, and political organisation, as well as keeping into consideration social and environmental externalities (Sivesind et al., 2014).

As pointed out by Merkel et al. (2023), interactions between CWS and organisations from the third sector are often found in urban contexts. Whereas CWS directly managed by organisations from the third sector are usually located in peripheral or remote areas, given the absence of public sector offerings (Merrell et al., 2022).

By providing space for free to such organisations, offering volunteer work, or directly organising and facilitating charity events, CWS can positively impact the area where they are located, addressing societal issues, bringing enhanced community cohesion, and promoting humanitarian non-profit purposes (Brooke et al., 2014; Roberts, 2016; Tremblay & Scailerez, 2020; Akhavan et al., 2021).

Social inclusion

The second social dimension considers CWS' involvement in social affairs and its care about social matters such as precariousness, disadvantaged social groups, and discrimination. Therefore, the aim is to assess the involvement of CWS regarding social inclusion in terms of mitigation of social issues through the provision of resources and services, as well as addressing systemic dynamics of social exclusion, promoting inclusion, and facilitating the empowerment of disadvantaged and marginalised groups (Garcia et al., 2015). Furthermore, this dimension of impact aims at unpacking the effects of CWS on the creation of social cohesion and the contribution to social sustainability of cities, municipalities, or neighbourhoods - enhancing the level of social capital or tackling social issues with projects that directly involve local communities (Gandini & Cossu, 2019).

Inclusivity and openness to diversity are among the core values shared by many CWS. In fact, promoting diversity not only is considered a key societal goal but can also encourage opportunities for the exchange of new ideas, perspective, and experiences that would not take place otherwise (Berbegal-Mirabent, 2021). In this regard a diversified working environment with regard to the social background and knowledge of the members is beneficial to foster value co-creation processes, as long as there is a common understanding of basic principles and labour dynamics (Goermer et al., 2021). Moreover, the openness to a wide array of activities and economic practices within a CWS enables some of the users to experiment with alternative ideas and practices that would not be accepted in other labour environments, while at the same time sharing the space with users who do not oppose the traditional economic practices (Vidaillet and Bousalham, 2020).

Many CWS are offering economic benefits to disadvantaged groups, such as free or discounted membership, free or discounted use of the space for events and gatherings, training and workshops, and other specific events. Such benefits can be focused on specific disadvantaged groups, for instance, by facilitating women-led businesses accessing specific skills and networks or by helping the social and economic inclusion of people with physical or mental disabilities, as well as refugees or economic migrants. Other CWS could focus on offering training and workshops to NEETs (Not in Education, Employment or Training), and the long-term unemployed to facilitate their (re)introduction into the labour market.

Among the social initiatives promoted by managers of CWS, there could be the employment of more vulnerable individuals coming from disadvantaged groups, such as refugees or economic migrants, long-term unemployed, NEETs, or individuals with

physical and mental disabilities. Such initiatives can directly counteract social issues such as unemployment, precarious employment, or social and economic exclusion (Gandini and Cossu, 2019; Berbegal-Mirabent, 2021).

As mentioned before, the organisation of training and workshops is among the benefits offered by CWS to disadvantaged groups to address unemployment and precarious employment (Gandini and Cossu, 2019). More specifically, CWS can provide them with learning facilities, as well as offer them services and activities to develop work skills and, at the same time, enhance their confidence (Roberts, 2016). In this regard, CWS can provide opportunities for training and professional development to the individuals that are trapped in dynamics of precarious labour (often informal), with no securities and benefits, scarce income, and no consideration for illnesses and mental or physical disabilities (Sandoval, 2016).

Similarly, training or workshops in CWS can be directed to NEETs to enhance their skills and work experience, as well as to increase their professional networks, for instance, by promoting partnerships between them and local businesses (Brooke et al., 2014). Therefore, the provision of training and workshops from CWS can focus on soft skills, focusing, for example, on communication, marketing, management, and, in general, on transversal and transferable skills. Otherwise, they can be directed to the development of hard skills, which are more technical and professional-specific skills. Finally, CWS can organise events to connect individuals from disadvantaged groups with wider professional networks.

Furthermore, the innovative organisational structures of CWS can provide more resilient strategies that facilitate higher rates of employment (Schmidt, 2019). In some cases, tackling unemployment is among the objectives of CWS, which, by offering

tailored programs and specific services, aims at supporting the unemployed and underemployed in their communities. This is the case especially in mid-sized towns, which are characterised by high rates of unemployment (Jamal, 2018). The presence of CWS in such peripheral contexts attracts diversified and highly skilled workers and facilitates the dynamisation of the local economies, nurturing local employment (Tomaz et al., 2022). At the same time, companies in CWS tend to employ more individuals compared to the ones outside CWS due to the lower costs and higher productivity of operating in the CWS (Hicks and Faulk, 2018).

Local cultural value

The third dimension - *Local cultural value* - takes into account CWS involvement with local cultural development and empowerment of the local community (for instance, by offering them social and physical space). It covers cultural, political, and social aspects of local revitalisation and regeneration.

CWS are considered effective tools for regional development and the stimulation and reactivation of local communities through the retention and attraction of knowledge workers (Bähr et al., 2019; Jamal, 2018). Furthermore, CWS are capable of strengthening linkages among CWS users, local communities, and existing local businesses and commercial activities (Brown, 2017; Akhavan et al., 2019; Brooke et al., 2014). In addition to the socio-economic impact of local development and revitalisation of peripheral areas, CWS can create cultural value and potentially generate (a)political collective identities (Brooke et al., 2014; Gandini & Cossu, 2019).

CWS have the potential to support and promote local cultural value through the organisation of cultural events, by hosting artists as part of artist residency programs, or by offering them space as permanent studios (Mariotti et al., 2021). Cultural and artistic events in the CWS are crucial resources to strengthen the local cultural value, which can incentivise youth engagement, facilitate social cohesion, and create a sense of belonging to the local context. The establishment of a resilient local cultural value can incentivise collective initiatives and bottom-up strategies to address economic and social issues, propose cultural regeneration practices, and promote alternative models of governance originating from active citizens (Garcia et al., 2015). In this regard, CWS can provide a physical and institutionalised space for bottom-up strategies to develop, enabling grassroots initiatives and citizens who would not be able to influence the top-down agenda from the local institutions to participate and share their values and experiences with their local community (Garcia et al., 2015; Gandini & Cossu, 2019). In addition, CWS could assist local communities in developing processes of common management, as well as integrate their demands and needs into the public agenda for socio-economic development (Avdikos & Pettas, 2021; Schmidt, 2019; Chuah, 2016).

Cultural value creation can be facilitated by CWS through the organisation of cultural programs and events open to the wider community, as well as incorporating in the CWS also other typologies of spaces, for instance a cafeteria, a theatre, an open workshop, a radio station, and many more (Brooke et al., 2014). Furthermore, the organisation of cultural events for the wider audience not only facilitates the exchange of ideas and enhances the likelihood of beneficial unexpected encounters, but it also paves the way for deeper connections between CWS and their users and their local

communities (Brown, 2017). According to the study of Mariotti et al. (2021), CWS have a key role in the establishment of microclusters in the creative and cultural sector. Moreover, they encourage the development of voluntary gathering of citizens in their neighbourhoods, as well as enabling the consolidation of community ties (Roberts, 2016).

When it comes to peripheral and rural contexts, CWS have the potential to generate a vivid environment, stimulate local interactions, and reactivate dynamics of cultural value creation, given the scarcity of physical sociocultural places for the local communities (Bähr et al., 2019; Vogl & Akhavan, 2022; Ubels et al., 2022). Despite the key role of CWS in connecting its members and the local communities, which are improbable to happen fortuitously, there might be the risk of creating tensions between them. In fact, attracting external individuals or businesses from the creative and cultural sector in the village, town, or neighbourhood could undermine development opportunities and devitalise local ties (Brown, 2017).

Proposed indicators to measure social impacts

Table 4 outlines the proposed output and outcome indicators to measure the social impact of CWS. Following the literature review, these five indicators presented in the table - *Collaboration, Peer-to-peer support, Training and mentoring programs, Skill exchange programs and events, Global pipeline* - can influence both the social impact of networking opportunities and the economic impact of innovation.

Table 4: Proposed output and outcome indicators for the measurement of social impact.

Impact	Indicator	Source	Question
Networking opportunities	Openness to non-members	Manager	Is the space accessible to anyone ⁶ ?
	Sociocultural events	Manager	How often do you organise the following social and cultural events: Community activities (lunches, happy hours, coffees, etc.); Cultural events and activities (music, theater, arts, etc.); Community-supported agriculture or agricultural activities; Events, initiatives, and projects dealing with environmental topics; Sport and recreational events and activities (yoga, Pilates, etc.); Social events and activities for children; Charity events and activities; Inspirational events (creative mornings, pitches, guest speakers, etc.)?
	Collaboration	User	With how many CWS members have you had formal collaborations? (e.g. worked on a project together, started a project / business / partnership together, hired another member)
	Peer-to-peer support	User	With how many CWS members are you comfortable asking for professional advice about your work?
	Training and mentoring programs	Manager	How often do you organise training programs and events for members on SOFT SKILLS ⁷ ? How often do you organise training programs and events for members on HARD SKILLS ⁸ ?
	Networking events	Manager	How often do you organise events to stimulate NETWORKING (among members, organisations, funders, etc.)?
	Social trust	User	How many members can you fully trust ⁹ ?
	Global pipeline	User	Did you increase your knowledge (know-how, market dynamics, etc.) by interacting with professionals not working in your CWS but that you met through the CWS? If yes, on which geographical level (local, regional, national, global)?
	Wider CWS networks	Manager	Is the CWS part of wider networks of CWS? If yes, on which geographical level (local, regional, national, global)?
	Interaction with medium and large firms	Manager	What type of interaction does the CWS have with big firms/corporates (more than 50 employees)? ¹⁰
Partnership with locally rooted industries	Manager	Does the space collaborate with or support traditional local industries (e.g. local artisan production or local-specific industries)?	

⁶ All areas are fully accessible to non-members; Only some areas are accessible to non-members; It is open only to the members, but open to anyone when public events are hosted; It is open only to the members.

⁷ Communication, marketing, management, transversal and transferable skills.

⁸ Technical and professional-specific skills.

⁹ Trust is intended as the expectation that arises within a community of regular, honest, cooperative behavior, based on commonly shared norms, on the part of other members of that community (Anheier & Toepler, 2009).

¹⁰ They invest in the space; They are ready to invest in startups; They rent space for their employees; They hire or look for new professionals to hire from the space; They subcontract projects to professionals; No relationships; I don't know; Other (please specify).

	Third sector support	Manager	What type of relationship do the CWS have with NGOs; Community organisations; Social enterprises; Charities; Neighbourhood groups; Labour associations? ¹¹
Social inclusion	Economic benefits for disadvantaged groups	Manager	What type of benefits does the CWS offer to disadvantaged groups?
	Social employment	Manager	How many of the employees are coming from disadvantaged groups (NEETs, long-term unemployed, economic migrants, refugees, and disabled persons)?
	Upskilling of disadvantaged groups	Manager	For each of the following categories of disadvantaged groups ¹² , could you indicate what type of up-skilling ¹³ is offered to them?
	Previous employment status	User	Where was your previous job status? ¹⁴
Local cultural value	Sustaining local culture	Manager	How do artists use the CWS? ¹⁵
	Local community cultural engagement	Manager	According to your estimations, how many people attend cultural events organised in the CWS on a monthly basis?
	Local identity	User	How has the CWS changed the city / neighborhood / town where it is located?

2.1.3.3. Environmental impact and potential indicators

This dimension aims at assessing the environmental impacts of CWS on users' habits and on the local surroundings, as well as evaluating the sustainable practices (e.g. shared utilities and supplies, exchange of services) of the CWS. Moreover, it includes CWS and users' commitment to mitigate climate change and promote a more sustainable lifestyle.

¹¹ We offer them space for free or at a discounted price; We offer them services; Both; None.

¹² Women , NEETs (young people aged 15-29 neither in employment nor in education or training), Long-term unemployed (more than 1 year), Economic migrants / refugees (no expats), Disabled persons.

¹³ Training on soft skills; Training on hard skills; Networking events; None.

¹⁴ If respondents answer "Unemployed" it can be considered as a proxy of one of the indicators measuring social innovation and inclusion impact.

¹⁵ As their permanent studio; As part of artist residency programs; For exhibitions and events; We do not host artists; Other (please specify)

In the literature on CWS, such spaces are deemed to contribute to the reduction of urban traffic congestion through a decrease in commuting times, offering an opportunity for workers in cities to move out of urban areas. The resulting reduction in commuting time is reflected in lower carbon emissions (Yu et al., 2019; Ohnmacht et al., 2020; Avdikos & Papageorgiou, 2021; Hölzel & de Vries, 2021; Mariotti et al., 2023; Vogl & Akhavan, 2022). As highlighted by the study of Ge et al. (2018), the flexibility offered by CWS to their members has positive effects on labour productivity; it shortens commuting time, and it mitigates traffic congestion. Nonetheless, it is crucial to consider potential rebound effects resulting from the employment of users' time and funds saved from the change in commuting patterns. In fact, the extra time gained and the money saved could be spent on goods, services, and activities characterised by great levels of carbon footprints (Vaddadi et al., 2020).

The measurement of the carbon emissions from the users of CWS commuting can be calculated having available the distance travelled by users per day or the time needed to commute, the number of days per week commuting to the CWS, and the mean of transportation used (Greenhouse Gas Protocol, 2011). In addition, it would be important to measure the carbon emissions associated with the businesses and organisations operating in CWS or, alternatively, to understand whether these businesses are taking actions to reduce their carbon emissions and whether they are committed to addressing environmental issues. In fact, some CWS specifically seek to bring in businesses actively focusing on creating solutions towards a more sustainable and equal society and aiming at creating environmental and social returns (Impact Hub Global, 2020).

Moreover, several CWS pursue a business model that can be considered as part of a larger paradigm shift from traditional models of economic development to a renewed local economic development where economic and social inequality and environmental degradation are acknowledged and condemned in favour of enhanced socio-economic equality among communities and higher environmental consciousness (Blakely & Leigh, 2013; Jamal, 2018). Therefore, CWS can contribute to promoting higher environmental consciousness and sustainability through sharing resources and using self-produced renewable energies, as well as advocating for more sustainable lifestyles and adopting organisational and business models foregrounding the environmental impact (Jamal, 2018; Berbegal-Mirabent, 2021). The sharing patterns and the sense of community, which are elements often associated with CWS, are also usually accompanied by sustainable practices and ecological beliefs (Bouncken et al., 2022). Some CWS organise their activities and infrastructures in a more environmentally conscious way to adapt to climate change by *“using eco-friendly building materials, renewable energy sources, energy-saving office equipment, and waste reduction, and emphasize social values nested in the explicit mission”* (Bouncken et al., 2023, p.2). Similarly, the role of the users of CWS is fundamental to creating a more environmentally sustainable setting in CWS (Magnusson et al., 2023). While users of CWS are generally following environmentally conscious conduct on an individual level, they hardly take into consideration the effects of their collective action. This is reflected in limited awareness concerning the implications of the digitalisation of labour, especially with regard to its energy costs and an overall overconsumption of energy (Ortar & Flipo, 2022).

Despite technological improvements as concerns energy efficiency, recently energy use in traditional office buildings is rising due to energy waste out of working hours, prolonged use of air-conditioning, particularly in Southern Europe, an increase in the quantity of energy needed resulting from the growing importance of digital technology in labour markets, and a few more (Mantesi et al., 2022). Traditional offices are the major electricity consumers in the service sector, accounting for 44% of the total electricity consumption in the European Union. In 2021, the electricity consumption per employee in traditional and commercial offices in the European Union was, on average, 4,319 kWh (Odyssee-Mure, 2021¹⁶).

With regard to the use of renewable energy in the European Union, in 2022 the share of energy consumption from renewable sources accounted for 22.5% of the total energy consumed. Renewable energy use in Europe is gradually but consistently increasing, but at this pace it will hardly meet the target of 42.5% for 2030, as dictated by the Renewable Energy Directive EU/2023/2413¹⁷ (European Commission, 2023¹⁸). Consequently, a radical transformation of the energy system will be necessary, and the service sector will have to play a key role in attaining the set objectives (European Environment Agency, 2023¹⁹).

Finally, CWS can confer a new function to previously abandoned buildings, which are extremely common to find in areas experiencing demographic reduction and socio-economic transformation, promoting innovation and growth and contributing to

¹⁶ <https://www.odyssee-mure.eu/publications/efficiency-by-sector/services/offices-specific-energy-and-electricity-consumption.html>

¹⁷ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023L2413&qid=1699364355105>

¹⁸ https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-targets_en#:~:text=The%20revised%20Renewable%20Energy%20Directive%20EU%2F2023%2F2413%20raises%20the,renewable%20energy%20in%20the%20EU.

¹⁹ <https://www.eea.europa.eu/en/analysis/indicators/share-of-energy-consumption-from?activeAccordion=ecdb3bcf-bbe9-4978-b5cf-0b136399d9f8>

processes of sociocultural regeneration (Manika, 2020; Nakano et al., 2020; Mariotti et al., 2021). These buildings can be transformed into sociocultural infrastructures, often aiming at the revitalisation of deprived areas as part of processes of urban regeneration (Avdikos & Papageorgiou, 2021). Approximately half of the CWS who participated in the Global Coworking Survey are located in buildings that were vacant or underused for at least six months (Mariotti et al., 2021). The recovery of inactive buildings falls within the principles of circular economy through the reuse of assets at the end of their life cycle, reducing energy and material waste (Durante & Turvani, 2018; Buonocore et al., 2020).

Proposed indicators to measure the environmental impact

Table 5 presents the proposed output and outcome indicators to measure the environmental impact of CWS. One or more questions are proposed for each indicator, and they can be directed to either CWS managers or CWS users.

Table 5: Proposed output and outcome indicators for the measurement of environmental impact.

Indicator	Source	Question
Individual carbon emission	User	How many days per week do you physically work in (or use) this CWS? How many minutes does it take you to get to the CWS from your home? What means of transportation do you primarily use to get to the CWS? Is your home somehow connected by public transport to the CWS?
Business carbon emissions	User	Is your business taking actions to reduce its CO2 emissions? (If you do not have a business or you do not work for a company or organisation, select 'Not applicable')
Business environmental commitment	User	What type of pressing social and environmental issues do you address with your work? ²⁰

²⁰ The answer could be a multiple choice with the list of Sustainable Development Goals (SDGs).

Share of resources	User	Do you share objects, tools, or products needed for your business and professional activities (e.g. printers, machinery, etc.), with the other users of the CWS?
Environmentally conscious design	User	Do you consider the CWS as consciously designed from an environmental perspective?
Energy consumption	Manager	How much did you spend monthly (or yearly) on average for electricity bills? ²¹
Renewable energy self-production	Manager	What percentage of the energy consumption of the CWS originated from self-produced renewable sources?
Regeneration of disused space	Manager	Is the CWS located in a former disused or abandoned space?

2.2. Research questions

After reviewing the framework and the output and outcome indicators connected to one or more dimensions of impact stemming from the current literature on the impacts of CWS, it is now possible to formulate the overarching research question as follows:

What are the economic, social, and environmental impacts of CWS in rural and peripheral areas on both users and local communities?

Initially, the objective of the research is to capture the impacts for all the proposed dimensions of impact. Thus, providing results on the impact of CWS in encouraging economic growth and employment, contributing to processes of innovation, promoting networking opportunities and social inclusions, and fostering cultural values on the local level, as well as addressing environmental issues. However, in practice, the essence of the research is to provide an overall vision on all these

²¹ Together with a question on the number of CWS and secondary data on the electricity cost in currency / kWh, we can find the electricity consumption per user.

dimensions to guide future researchers in developing more deeply one or more specific dimensions and including further indicators to better capture their impacts.

While in literature some quantitative studies address the economic impact of CWS, there is a lack of quantitative research on the social and environmental impact of CWS in response to key societal issues to counteract depopulation of peripheral areas, cultural erosion, social inequalities, and climate change. Thus, this research aims at proposing quantitative insights on networking opportunities and dynamics of social inclusion promoted by CWS, as well as on the environmental commitment of CWS.

The contribution of this research is threefold. Primarily, it offers a methodological framework to assess the different impacts of CWS. Then, it investigates the geography of CWS in Europe, aiming at better understanding their distribution and having an approximation of the total number of CWS currently operating in Europe. Finally, it applies the methodological framework to shed light on the role of CWS as providers of networking opportunities, as promoters of social inclusion, and as facilitators in creating local cultural value, as well as offering novel insights on the environmental impacts of CWS. In addition, the research aims at showing the geographical differences regarding such impacts between CWS located in urban areas and the ones in peripheral or rural areas.

More specifically, the research attempts to offer insights on the role of CWS as providers of networking opportunities on three dimensions. Firstly, it assesses whether CWS located outside cities are more likely to function as focal points for the local communities than the ones located in cities. Secondly, it examines whether the location of the CWS has an influence on participating in similar networks of CWS on the local, regional, national, and international levels. Thirdly, it investigates whether

the location of the CWS facilitates the connection with medium and large firms, traditional local industries, and the third sector.

Furthermore, the research addresses the role of CWS in fostering dynamics of social inclusion by offering direct benefits - such as free or discounted membership, use of the space for free, or provision of workshops and training - to disadvantaged groups, including long-term unemployed, NEETs, economic migrants and refugees, and people with disabilities, as well as to employ individuals from such groups within the CWS.

Additionally, the third dimension of social impact deals with the role of CWS in supporting the creative and cultural sectors, enhancing the cultural value of the local context by hosting artists in different ways, and stimulating people from the local communities to participate in cultural activities and events.

Finally, three research questions aim at understanding the environmental impact of CWS. Firstly, the research explores which characteristics of CWS increase the probability of them being located in abandoned buildings. Secondly, it analyses which characteristics of CWS encourage the adoption of renewable energies. Thirdly, it examines the characteristics of CWS related to the electricity consumption per user, comparing it to the one in normal offices.

2.3. Survey implementation

A crucial step in the implementation of a framework to measure the impacts of CWS is to design and select the relevant indicators for the assessment. These indicators are identified, rationalised and validated through literature review, thematic discussions with the early-stage researchers and supervisors part of the CORAL-ITN Network, and through the engagement with CWS managers and other academics.

The research relies on quantitative data collected through the implementation of a survey directed at managers and users of CWS. When it comes to quantitative research, the aim is to use a tool that can capture the perspective of a wide number of respondents. Hence, rather than interviews and other time-intensive methodologies to gather data, surveys and questionnaires can provide a reliable technique to assess the perspective of a large audience, allowing researchers to observe a phenomenon from a broader perspective. While a survey has the capacity to show overall trends related to a phenomenon, it is hardly able to provide a deeper understanding of such trends, which is more efficiently captured by qualitative methods of data collection.

In this research, the goal is to provide an overall view of the phenomenon of CWS in Europe by capturing not only the managers' perspective but also the one of the users. After defining all the indicators with corresponding questions and metrics, only a limited number of them were selected to be part of two different online surveys. The first one was directed to the CWS managers and hosts, while the second one was directed to the CWS users. This would ideally provide a more holistic view of the impact of CWS. However, the data collection process failed in providing a significant number of observations as regards the users of CWS, it being harder to find the contact details of users compared to the ones of managers. Therefore, the methodology applied offers only a partial perspective on the impacts of CWS in Europe, given that it could only capture the managers' perspective.

The research presented a relevant knowledge gap as regards the geography of CWS in Europe. Therefore, it was necessary to search for the amount and distribution of CWS,

which led to the mapping of 7,002 CWS in 37 European countries. Further details can be found in Chapter 3.

I contacted CWS managers or hosts via e-mail, asking them to fill in the questionnaire, as well as to share the questionnaire with the users of their CWS. The survey process was carried out from March to August 2023, covering 400 managers and users of CWS. Once removed the ones that did not complete the basic demographic section in the survey, as well as duplicates from the same CWS, the cross-sectional data pertaining to the final dataset contains answers from 273 CWS managers and 78 from CWS users. Thus, given the satisfactory number of responses from the managers, data from managers could be used for the econometric analysis. Whereas the number of respondents from users was not sufficient to ensure a reliable and robust econometric analysis.

2.4. Econometric analysis

The collected cross-sectional data from the survey is analysed through an econometric approach to highlight potential correlations and causal relationships among variables. Based on the different dependent variables analysed in Chapter 5, the econometric analyses applied ordered, multinomial, and binary probit estimation models, together with a maximum likelihood estimation, to solve the issues of deterministic and heteroscedastic residuals that characterise a simple linear probability model (Dougherty, 2016).

The econometric models can be explained as follows:

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

Where Y_i represents the binary, ordered, or categorical dependent variable, X_i is a vector of observed independent variables outlining the characteristics of the CWS, and β_1 is its vector of unknown parameters. Furthermore, β_0 is the intercept term, and ε_i is the unobserved error term.

Finally, two regressions in Chapter 5 applied a multiple log-linear regression model, given the continuous nature of the dependent variable and the non-normally distributed residuals of the regression. It is described by the following equation:

$$\ln(Y_i) = \beta_0 + \beta_1 X_i + \varepsilon_i$$

Apart from the different estimation technique, it differs from the previous equation given that the dependent variable Y_i is continuous, and it is transformed in a logarithmic scale to solve for the issue of non-normality of the distribution of the residuals, which is a key assumption in multiple linear regression models (Dougherty, 2016).

3. Geography of Collaborative Workspaces

One important step in the data collection process was the research of CWS in Europe, necessary both to share with them the survey and to understand their distribution and to have an estimation of the total number of them currently operating in the European countries. This research process mainly relied on the use of the Google Maps platform by searching as keywords: “Coworking”, “FabLab” and “Makerspace”. Hence, I found only CWS which defined themselves as such, excluding other spaces with definitions which are less common but that would still fall within the definition of “Collaborative Workspace”.

In addition, I consulted other websites, including lists of CWS on the European level, such as Coworker.com (<https://www.coworker.com/>), European Rural Coworking Project (<https://ruralcoworking.org/>), as well as many other databases and websites on the national level. The full list of sources used for each country can be found in Annex A2.

3.1. National concentration of CWS in Europe

This research led to the mapping of 12,009 CWS distributed in 23 European countries. Table 6 presents the 23 analysed countries with their national concentration, which provides the number of CWS in relation to the national population. It is calculated as follows:

$$\text{National concentration} = \frac{\text{Number of CWS}}{\text{National population}} * 100,000 \text{ inhabitants}$$

Ireland (12.75), Austria (5.08), the UK (4.14), Portugal (3.84), and the Netherlands (3.12) are the countries with the highest number of CWS per 100,000 inhabitants. Whereas the UK (2,761), France (1,932), Germany (1,543), Spain (1,223) and Italy (820) are the ones with the highest total number of CWS.

Table 6: Number of CWS in European countries and their national concentration.

	Country	No. of CWS	CWS per 100,000 inhabitants		Country	No. of CWS	CWS per 100,000 inhabitants
1	Ireland	645	12.75	13	Germany	1,543	1.85
2	Austria	456	5.08	14	Latvia	30	1.60
3	UK	2,761	4.14	15	Bulgaria	109	1.59
4	Portugal	398	3.84	16	Slovakia	83	1.53
5	Netherlands	549	3.12	17	Denmark	83	1.41
6	Norway	164	3.02	18	Italy	820	1.39
7	Switzerland	260	2.98	19	Lithuania	38	1.35
8	France	1,932	2.85	20	Czech Republic	137	1.30
9	Sweden	296	2.83	21	Finland	60	1.08
10	Spain	1,223	2.58	22	Greece	99	0.95
11	Belgium	262	2.26	23	Croatia	36	0.93
12	Estonia	25	1.88		Total	12,009	2.63

3.2. NUTS classification

To better understand their geographical location, CWS are grouped in three categories following the NUTS classification (Nomenclature of Territorial Units for Statistics) from Eurostat, which is a geographical nomenclature that *“provides a breakdown of the economic territory of the European Union into territorial units for the production of regional statistics and for targeting political interventions at a regional level”* (Eurostat, 2018a, p.4).

The geographical division of CWS follows the NUTS 3 level, which considers small regions (depending on the EU country, they can be districts, counties, administrative regions, provinces, departments, prefectures, groups of municipalities, etc.). Therefore, CWS can be located in predominantly urban, intermediate, or predominantly rural NUTS 3 regions. These are explained in detail in the next paragraph.

3.3. Urbanity-rurality & remoteness dimensions

The classification of NUTS 3 regions into these three categories is based on the definitions of rural areas and urban clusters from Eurostat. Rural areas are all areas located outside an urban cluster, which is *“a cluster of contiguous grid cells of 1 km² (including diagonals) with a population density of at least 300 inhabitants per km² and a minimum population of 5,000 inhabitants”* (Eurostat, 2018b, p.30).

Thus, Eurostat classifies NUTS 3 regions according to the share of population located in urban clusters and rural areas as follows (Eurostat, 2018b, p.74):

- ***predominantly urban regions***, NUTS level 3 regions where more than 80 % of the population live in urban clusters;
- ***intermediate regions***, NUTS level 3 regions where more than 50 % and up to 80 % of the population live in urban clusters;
- ***predominantly rural regions***, NUTS level 3 regions where at least 50 % of the population live in rural grid cells.

Secondly, NUTS 3 regions can change category depending on the presence of cities as follows (Eurostat, 2018b, p.74):

- any NUTS level 3 region which is classified (by the criteria described above) as predominantly rural becomes intermediate if it contains a city of more than 200,000 inhabitants representing at least 25 % of the region's total population;
- any NUTS level 3 region which is classified (by the criteria described above) as intermediate becomes predominantly urban if it contains a city of more than 500,000 inhabitants representing at least 25 % of the region's total population.

In addition, Eurostat classifies NUTS 3 regions based on their proximity to a city. All predominantly urban regions are considered close to a city, whereas concerning intermediate and predominantly rural regions, these are considered close to a city in case more than half of their residents can drive to the centre of a city of at least 50,000 inhabitants within 45 minutes. Conversely, they are considered remote.

3.4. CWS in urban, intermediate, and rural regions

Following this classification, Table 7 shows the share of CWS in predominantly urban, intermediate, and predominantly rural NUTS 3 regions in the 23 analysed countries. Furthermore, it presents the share of CWS which are not close to cities, thus being located in remote NUTS 3 regions.

Table 7: Shares of CWS in urban (1), intermediate (2) and rural (3) NUTS3 regions, as well as the share of CWS located in remote NUTS3 regions. Following the Eurostat definition²², the % of remote regions is a separate category of regions and is not added up to the urban, intermediate, and rural regions' sums.

	% of CWS in					% of CWS in			
	1	2	3	Remote		1	2	3	Remote

²² https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:Regional_typologies_overview&oldid=394702

UK	91.5%	8.5%	0.1%	0.3%	Bulgaria	56.0%	38.5%	5.5%	9.2%
Netherlands	86.7%	13.1%	0.2%	0.0%	Denmark	55.4%	32.5%	12.0%	4.8%
Lithuania	78.9%	21.1%	0.0%	2.6%	Switzerland	55.4%	41.2%	3.5%	8.5%
Latvia	76.7%	23.3%	0.0%	16.7%	Portugal	50.5%	17.6%	31.9%	13.6%
Spain	71.6%	27.2%	1.1%	3.3%	Czech Republic	47.4%	40.1%	12.4%	0.0%
Greece	68.7%	19.2%	12.1%	12.1%	Sweden	44.9%	44.9%	10.1%	19.9%
Germany	67.0%	25.0%	8.0%	1.6%	Croatia	41.7%	36.1%	22.2%	27.8%
Italy	63.4%	28.5%	8.0%	3.5%	Slovakia	37.3%	39.8%	22.9%	0.0%
Finland	61.7%	23.3%	15.0%	6.7%	Austria	33.8%	39.5%	26.8%	5.3%
Estonia	60.0%	0.0%	40.0%	16.0%	Norway	28.0%	55.5%	16.5%	27.4%
Belgium	59.2%	35.5%	5.3%	0.0%	Ireland	21.6%	9.3%	69.1%	21.7%
France	58.5%	22.1%	19.4%	5.4%	Europe	65.9%	24.4%	9.7%	4.4%

Overall, in these 23 European countries, 65.9% of the CWS are located in predominantly urban NUTS 3 regions, 24.4% are in intermediate regions, and 9.7% of CWS are in predominantly rural regions, while 4.4% of the CWS are found in remote intermediate or rural regions. Although in the literature CWS is mainly considered an urban phenomenon (Durante & Turvani, 2018; Coll-Martínez & Méndez-Ortega, 2023), these results suggest that one-third of the CWS part of the dataset are located outside predominantly urban NUTS 3 regions, being located in small and medium-sized cities and peripheral areas in Europe. Especially in countries like Ireland, Norway, Austria, Slovakia, Croatia, Sweden, and the Czech Republic, the share of CWS located in intermediate and predominantly rural NUTS 3 regions is higher than the ones located in predominantly urban regions. On the contrary, the UK (91.5%) and the Netherlands (86.7%) have very high concentrations of CWS in predominantly urban regions.

Moreover, the share of CWS located in remote regions is considerable in Croatia (27.8%), Norway (27.4%), Ireland (21.7%), Sweden (19.9%), Latvia (16.7%), Estonia (16%), Portugal (13.6%), and Greece (12.1%).

Finally, in Annex A3 it is possible to find national profiles of Austria, Belgium, France, Germany, Italy, the Netherlands, Portugal, Spain, Sweden and Switzerland. Moreover, Annex A4 presents the 40 NUTS 3 regions which have the highest location quotient, which is the ratio between the regional NUTS 3 concentration (number of CWS divided by the population) and the national concentration. It is calculated as follows:

$$\text{Location quotient} = \frac{\text{regional concentration (NUTS 3)}}{\text{national concentration}}$$

As expected, among the NUTS 3 regions with the greatest location quotient, the majority are located in predominantly urban regions. Nonetheless, 11 out of the top 40 NUTS 3 regions are located in intermediate (5) and predominantly rural regions (6). In addition, 6 out of 40 are located in regions which are considered remote (Marmo & Avdikos, 2024a).

In light of these results, in the last decade the geographical patterns of CWS are shifting, with an increasing number of CWS which are located outside urban areas. This phenomenon is directly connected to regional development strategies, which aim at responding to the main challenges belonging to peripheral and rural contexts, such as depopulation, brain drain, lack of creative and highly skilled workers, high rates of unemployment, lack of hard and soft infrastructures, and a significant loss of cultural roots.

4. Demographics of Collaborative Workspaces

This chapter outlines the main demographics of the survey directed to managers of CWS, showing the different characteristics of CWS with regard to their location, infrastructures, accessibility, functions, financial support strategies, typologies of users, ownership status, labour force, Sociocultural and professional events organised, and many more.

As described in paragraph 2.3, the final survey directed to managers includes 273 respondents from 34 European countries, which can be observed in Figure 4. The division between CWS located in cities and outside cities is based on the classification from Eurostat, the Degree of Urbanisation (DEGURBA)²³, which is available on the municipality level, namely the Local Administrative Units (LAU) level²⁴. The classification considers the percentage of the population living in urban and rural clusters²⁵. Urban clusters are the ones where the population density is greater than 300 inhabitants per km², and there is a minimum population of 5,000 inhabitants. Subsequently, clusters are grouped in centres²⁶, which in turn need to have a population density of at least 1,500 inhabitants per km² and a minimum population of 50,000 inhabitants to be considered urban centres. Therefore, the DEGURBA classification clusters all municipalities into three typologies of area. Firstly, cities (or densely populated areas)²⁷, which are characterised by at least 50% of the population living in one or more urban centres. Secondly, rural areas (or thinly populated areas)²⁸,

²³ <https://ec.europa.eu/eurostat/web/degree-of-urbanisation/background>

²⁴ <https://ec.europa.eu/eurostat/web/nuts/local-administrative-units>

²⁵ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Urban_cluster

²⁶ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Urban_centre

²⁷ <https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:City>

²⁸ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Rural_area

which are characterised by at least 50% of the population living in rural clusters. Thirdly, towns and suburbs (or intermediate density areas)²⁹, which are characterised by less than 50% of the population living in urban centres, as well as less than 50% of the population living in rural clusters.

Thus, 57.88% of CWS that participated in the survey are located in cities, 24.18% in towns and suburbs, and 17.95% in rural areas. As a result of the low number of respondents from CWS in rural areas, I grouped them with the CWS located in towns and suburbs, defining the new cluster as CWS located outside cities.

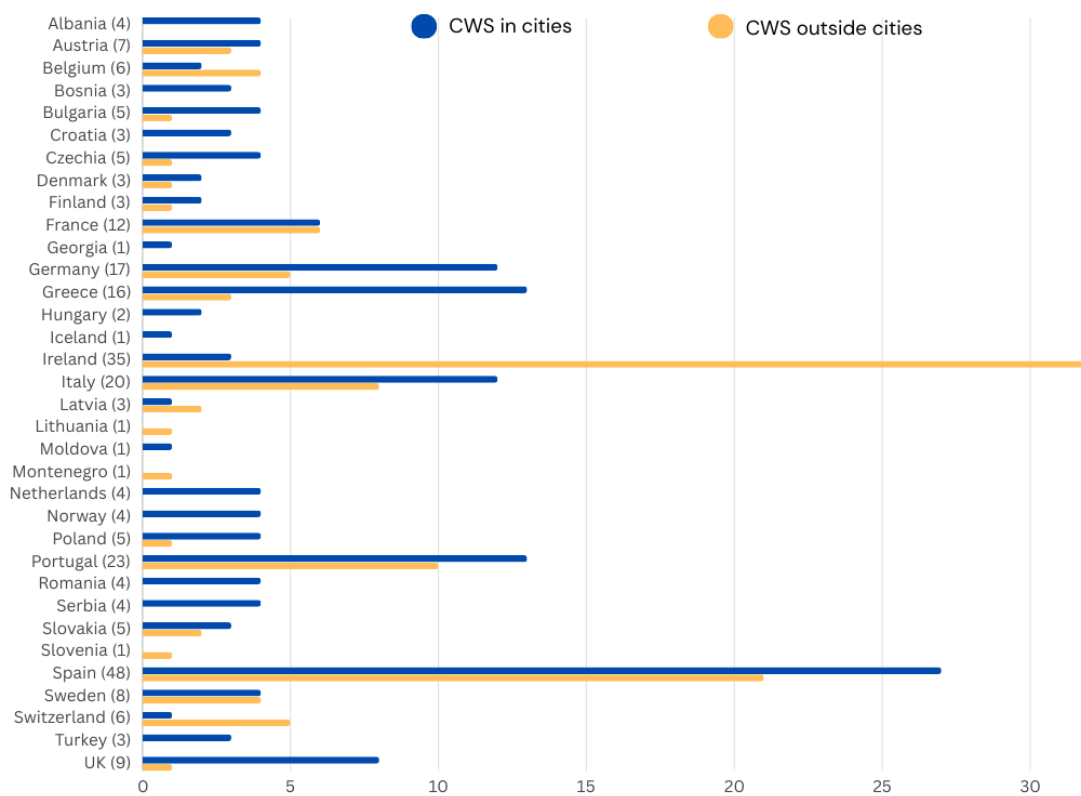


Figure 4: Respondents from 273 CWS located in the following 34 European countries. Source: Author.

²⁹ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Town_or_suburb

As shown in Figure 4, the highest number of responses comes from Spain with 48 CWS, Ireland with 35 CWS, and Portugal with 23 CWS. Spain is the country with the greatest number of CWS in cities, with 27 CWS, followed by Greece and Portugal with 13 CWS. Ireland is the country with the greatest number of CWS located outside cities, with 32 CWS, followed by Spain with 21 CWS and Portugal with 10 CWS.

Furthermore, this chapter presents the main demographics coming from the responses of the survey with regard to the year of opening of the CWS, self-definition of the CWS, size, income streams, paid and volunteering labour in the CWS, ownership status, capacity, type of users, occupancy rates, infrastructure, accessibility, and Sociocultural and professional events organised by the CWS.

4.1. Year of opening of the CWS

As shown by Figure 5, most of the CWS included in the survey started operating in the last decade, especially between 2018 and 2022, even though in 2020 only a few CWS opened, probably due to the COVID-19 pandemic. The highest number of CWS located in cities started operating in 2018 and 2019, with 20 new CWS in both years. Whereas the peak for CWS outside cities was in 2021 and 2022, with 22 and 19 new CWS, respectively.

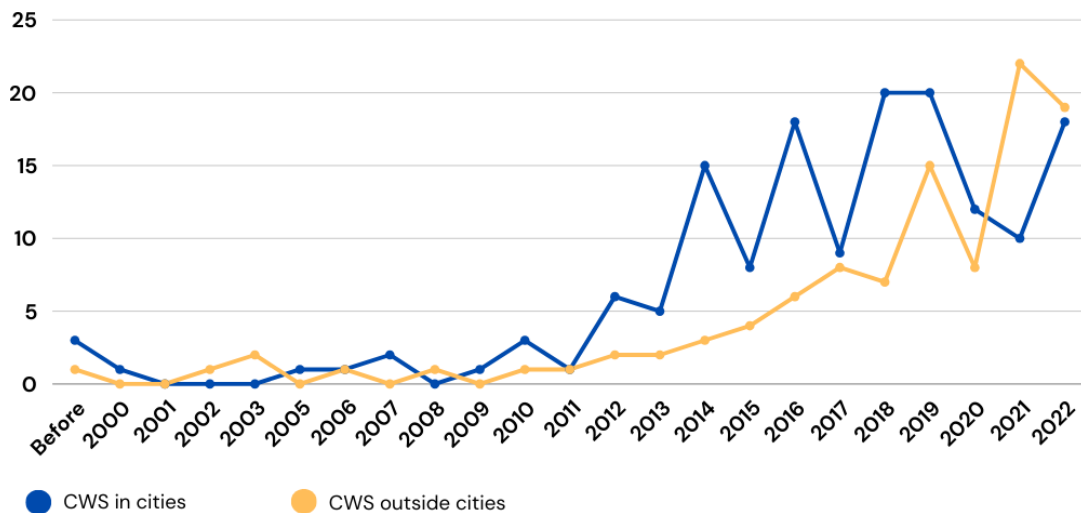


Figure 5: Year of opening of the 273 European CWS part of the dataset from the survey from 2023, divided according to their location.
Source: Author.

The scarce presence of CWS located outside cities that opened before 2012, combined with the fact that many of them started operating in the last years, could be the result of an ongoing social phenomenon characterised by the diffusion of CWS outside cities in peripheral and rural areas. More specifically, the Covid outbreak accelerated the remotisation of many types of jobs, encouraging many individuals with the possibility of working remotely to move out of cities, thus enhancing the demand for such CWS. Nonetheless, this trend could also suggest that CWS located in cities are more likely to survive than the ones outside cities, but we have no data to support such a claim.

4.2. Self definition of the CWS

There is a vast terminology to define CWS; thus, one of the questions present in the survey aimed at investigating which terms are used by managers of CWS to define their own CWS. Table 8 presents the different terminologies used by the managers, with 92% of them defining themselves as a coworking space, 25% as a cultural and

creative hub, 23% as a business incubator or start-up accelerator, and 14% as a makerspace or hackerspace. Furthermore, 9% of them define themselves as a community and youth centre, 8% as a Fab Lab, 7% as a space offering artist residencies, and 6% as a co-living space.

Table 8: Types of CWS according to managers' definitions in cities, outside cities, and in total (multiple answers).

	Cities		Outside cities		Total	
	Freq.	%	Freq.	%	Freq.	%
Coworking Space	145	92	102	90	247	92
Cultural & Creative Hub	42	27	26	23	68	25
Business Incubator or Start-up Accelerator	38	24	25	22	63	23
Makerspace & Hackerspace	22	14	15	13	37	14
Community and Youth Center	12	8	13	12	25	9
Fab Lab	9	6	12	11	21	8
Artist residency	11	7	9	8	20	7
Co-living Space	8	5	7	6	15	6
Total CWS	157		113		270	

Other terminology to indicate CWS worth mentioning are: event space, food lab, business center, multidisciplinary creative space, citizen activity hub, scale-up community, shared office space, land experimentation space, third space, collective workshop space, impact innovation lab, digital innovation lab, self-organised community space, playful space, and remote hub. This highlights the wide array of different spaces which fits under the umbrella term of CWS. These CWS usually provide different activities and services, given the necessity to diversify their portfolio of activities to be financially sustainable or attract the right people.

There are not significant differences between CWS in cities and CWS located outside cities, even though the former are more likely to function as cultural and creative hubs (27% compared to 23% outside cities), while the latter are more likely to function as

community and youth centres (12% compared to 8% in cities) and as Fab Labs (11% compared to 6% in cities).

4.3. Size of CWS

The average size of the CWS which participated in the survey is 1,182 m². If considering only the ones in cities, this average increases to 1,453 m², while for the ones located outside cities, it diminishes to 836 m².

CWS are divided into three groups depending on their size. Each group contains a third of the CWS. The two terciles that divide the ordered distribution into three sections are 180 m² and 500 m². Hence, a small CWS is identified as a CWS with a size that is lower or equal to 180 m², a medium CWS is between 180 and 500 m², and a large CWS has a size larger than 500 m².

Table 9 outlines these three groups. As shown, in cities CWS are more likely to be of medium or large size, while outside cities they are more likely to be rather small.

Table 9: Small, medium, and large CWS in cities and outside cities.

	Cities		Outside cities		Total	
	Freq.	%	Freq.	%	Freq.	%
Small CWS	29	23	49	49	78	34
Medium CWS	51	40	27	27	78	34
Large CWS	48	37	24	24	72	32
Total	128	100	100	100	228	100

4.4. Income streams

CWS rely on a wide range of sources of income to be economically sustainable. Table 10 summarises the most common sources of income, among which revenues from renting out space appear to be the most frequent, with 81% of CWS managers who rely on them. Subsequently, 36% and 32% of CWS seem to rely on self-finance

(personal investments or savings) and revenues from the provision of workshops, seminars, and educational content. Furthermore, 26% of CWS count on revenues from services offered in the CWS, for instance, from the bar or from events. A good share of CWS rely on public subsidies from local or regional governments (22%), from grants from national institutions (14%) or from the European Union and other international institutions (12%). Finally, a few ones count on private donations, sponsorship, or patronage sources (6%); public subsidies from their national government (5%); bank loans (4%); and equity financing (2%).

Table 10: CWS's main sources of income (multiple answers).

	Freq.	%
Revenues from renting out space	209	81
Self-finance (Personal investments / savings)	92	36
Revenues from offering workshops, seminars and educational content	83	32
Revenues from services offered in the space (bar, events, etc.)	68	26
Public subsidies from local or regional government	56	22
Grants from national sources	35	14
Grants from the European Union or other international institutions	32	12
Private donations, sponsorship or patronage sources	15	6
Public subsidies from national government	12	5
Bank loans	10	4
Equity finance (money is exchanged for part-ownership or shares in the company)	4	2
Total CWS	259	

Additionally, Table 11 illustrates which source of income was indicated from the CWS managers as their primary, secondary and tertiary income streams. As regards the primary source of income, 54% of CWS mainly rely on revenues from renting hot desks and office space, followed by 19% of CWS indicating personal investments or savings as their main income stream. Whereas revenues originating from the provision of workshops, seminars, and educational content is indicated as a secondary source of income from 22% of CWS and as a tertiary source from 18% of them. This data highlights a key role of CWS as providers of education and skills upgrading services for

a diverse audience ranging from users to external individuals part of specific groups such as NEETs, long-term unemployed, women, refugees and migrants, etc.

Table 11: CWS's primary, secondary, and tertiary income streams

	Primary		Secondary		Tertiary	
	Freq.	%	Freq.	%	Freq.	%
Revenues from renting out space	141	54	50	23	29	18
Self-finance (Personal investments / savings)	48	19	27	13	21	13
Revenues from offering workshops, seminars and educational content	6	2	48	22	29	18
Revenues from services offered in the space (bar, events, etc.)	7	3	35	16	26	17
Public subsidies from local or regional government	19	7	22	10	15	10
Grants from national sources	16	6	11	5	9	6
Grants from the European Union or other international institutions	11	4	12	6	9	6
Private donations, sponsorship or patronage sources	3	1	4	2	8	5
Public subsidies from national government	6	2	2	1	4	3
Bank loans	2	1	4	2	4	3
Equity finance (money is exchanged for part-ownership or shares in the company)	0	0	1	0.5	3	2
Total	259	100	216	100	157	100

Moreover, income streams were grouped into three categories: market streams, personal funds and external subsidies, and a mix of the two sources. In the category of market streams, we find revenues from renting out hot desks, private offices, and generally space; revenues from providing workshops, seminars, and educational content, revenues from services offered in the CWS (bar, events, etc.); and equity finance (money is exchanged for part-ownership or shares in the company). Whereas the category of personal funds and external subsidies includes self-finance (personal investments or savings); public subsidies from the local, regional, or national government; grants from national, European or international institutions; bank loans; and private donations, sponsorship or patronage sources. The third category indicates

that a CWS evenly relies on both typologies of income streams. Table 11 presents the distribution of CWS in these categories, with 45% of CWS mainly relying on market streams, 26% on personal funds and external subsidies, and 29% on a mix of the two typologies. Furthermore, CWS located in cities appear to count more on market streams than on personal funds and external subsidies (54% of CWS compared to 20% of CWS). Whereas CWS outside cities rely on both personal funds and external subsidies (35%) and market streams (31%). Finally, by observing the data, it seems that larger CWS are more likely to count on market streams, while smaller CWS would rely more on personal funds and external subsidies.

4.5. Paid and volunteering labour in CWS

Another aspect to consider when looking at the financial sustainability of CWS is the way in which labour is performed in CWS, which can either be paid or be based on volunteer labour. Table 12 presents the average full-time employees, part-time employees, and volunteers who work in CWS. On average a CWS has 3 or 4 full-time employees (3.46), 1 or 2 part-time employees (1.71), and 2 or 3 volunteers (2.48). Both full-time and part-time employees are more common in CWS located in cities, while volunteer labour is slightly more frequent in CWS located outside cities.

Table 12: CWS's Full-time, Part-time staff, and volunteers.

	Staff	Obs.	Mean (μ)	Std. Dev. (σ)	Min	Max
Cities	Full-Time Employees	126	4.40	8.00	0	40
	Part-Time Employees	126	1.94	3.39	0	20
	Volunteers	126	2.25	5.87	0	40
Outside cities	Full-Time Employees	96	2.24	5.86	0	40
	Part-Time Employees	96	1.42	2.58	0	20
	Volunteers	96	2.79	6.20	0	40
Total	Full-Time Employees	222	3.46	7.22	0	40
	Part-Time Employees	222	1.71	3.07	0	20

	Volunteers	222	2.48	6.01	0	40
--	------------	-----	-------------	------	---	----

Another question part of the demographics of the survey was the average number of hours per week of the volunteers operating in the CWS, which can be found in Table 13. Among the 109 respondents who stated to have at least one volunteer working in their CWS, the average weekly working hours per volunteer is 8.68. Furthermore, volunteers working in CWS located in cities appear to be working more hours a week (9.52 hours/week), than the ones operating in CWS outside cities (7.83 hours/week). Moreover, volunteers' weekly working hours tend to increase with the size of the CWS, with 7.18 hours per week in small CWS, 8.69 in medium CWS, and 9.76 in large ones. However, considering the median values, a volunteer works 6 hours per week regardless of the location of their CWS, whereas in small, medium and large CWS, the median volunteer works 5, 8 and 10 hours a week, respectively.

Table 13: Weekly working hours per volunteer in cities, outside cities, and according to the size of the CWS.

	Obs.	Mean (μ)	Std. Dev. (σ)	Min	Max
Cities	55	9.52	8.34	1	40
Outside cities	54	7.83	6.10	1	20
Small CWS	41	7.18	6.29	1	32
Medium CWS	34	8.69	6.54	2	25
Large CWS	32	9.76	7.36	1	30
Total	109	8.68	7.33	1	40

Table 14 presents the share of full-time employees, part-time employees, and volunteers compared to the total of the CWS' staff. On average 47% of individuals working in CWS are full-time employees, 25% of them are part-time employees, and 28% of them are volunteers. As mentioned before, CWS located outside cities are more likely to count on volunteer labour (37%) than CWS in cities (21%), while CWS in cities rely more on full-time employees (54%) than CWS outside cities (38%). Paid

labour in CWS appears to increase in parallel with the size of CW, while vice versa the share of volunteer labour on the total labour in CWS decreases with increasing size of CWS.

Table 14: Share of full-time employees, part-time employees, and volunteers compared to the total of the CWS staff, with geographic and CWS size differences.

	Full-Time Employees	Part-Time Employees	Volunteers
	%	%	%
Cities	54	25	21
Outside cities	38	24	37
Small CWS	44	18	38
Medium CWS	47	26	27
Large CWS	50	29	21
Total	47	25	28

When considering the total weekly working hours for these three categories of workers, it is possible to calculate it by multiplying the number of employees or volunteers by the average working hours per week, being full-time 40 hours a week and part-time 20 hours a week. Volunteer work can range from 1 to 40 hours a week. Table 15 shows that on average CWS employ 188 working hours a week to run their activities, of which 139 hours are from full-time employees, 34 hours from part-time employees, and 15 hours from volunteers.

Table 15: Total weekly working hours in CWS for full-time employees, part-time employees, and volunteers (given by the multiplication between the number of employees or volunteers and the average working hours per week for the specific category of employee or volunteer).

	Obs.	Mean (μ)	Std. Dev. (σ)	Min	Max
Full-Time Employees	222	138.56	288.66	0	1600
Part-Time Employees	222	34.23	61.38	0	400
Volunteers	222	15.15	35.03	0	300
Total	222	187.94	337.76	2	2200

Furthermore, as shown in Table 16, 81% of the total weekly working hours is paid, either full-time or part-time, meaning that 19% of the total labour is non-paid labour performed by volunteers. Paid labour is directly proportional to the size of CWS, with

small CWS having 71% of paid labour, medium CWS having 83%, and large ones 87%. CWS in cities are characterised by a higher share of paid labour (87%) compared to CWS located outside cities (72%).

Moreover, CWS which mainly rely on market streams on average have a greater share of paid labour (84%) compared to the ones mainly depending on personal funds and external subsidies (75%). Also, only 67% of total working hours is paid in CWS outside cities which mainly count on personal funds and external subsidies, whereas the share is higher in the ones relying on market streams (78%) or diversifying their income streams (74%). Quite interestingly, there are no significant differences in the share of paid labour for CWS located in cities that have different sources of income, ranging from 85% to 87%.

Table 16: Percentage of paid labour in total and according to CWS's main income streams (market streams, personal funds and external subsidies, or a mix of the both), in cities, outside cities, and according to the CWS' size.

	Personal funds and External subsidies		Mix		Market streams		Total	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Cities	24	85	32	87	68	87	126	87
Outside cities	32	67	30	74	31	78	96	72
Small CWS	26	69	23	74	21	73	72	71
Medium CWS	19	71	19	85	32	88	71	83
Large CWS	9	95	16	87	43	86	69	87
Total	56	75	62	81	99	84	222	81

4.6. Ownership status

A key element when observing the main demographics of CWS is the type of ownership or lease of the space. By looking at Table 17, 47% of CWS are located in buildings that are rented from private sources, while 11% are renting from public institutions. 32% of CWS directly own the space where they operate. Roughly 9% of

CWS can use their space on a free charge loan for a period that can vary from less than one year to more than five years. Finally, only a few CWS are located inside universities or schools.

Table 17: CWS's types of ownership or lease.

	Cities		Outside cities		Total	
	Freq.	%	Freq.	%	Freq.	%
We rent from privates owners	83	56	35	35	118	47
We own the space	41	28	39	39	80	32
We rent from public institutions	15	10	12	12	27	11
We have it on a free-of-charge loan for use for less than one year	1	0.7	1	1	2	1
We have it on free-of-charge loan for use for one to five years	2	1	9	9	11	4
We have it on free-of-charge loan for use for more than five years	7	5	4	4	11	4
Inside university	0	0	1	1	1	0.4
Total	149	100	101	100	250	100

All these different options were grouped in three categories: ownership, rent, and free concession. The first category includes only the CWS that own the space, the second one comprises CWS which rent the space from private or public institutions, and the third category includes all the spaces which obtained free-of-charge loans for use from public institutions.

As shown in Table 18, 32% of CWS own the space, 58% rent it, and 10% get it for free from public institutions. CWS in cities are more likely to rent the space (66%) compared to the ones outside cities (47%). Whereas it appears to be more frequent for CWS outside cities to own the space (39%) or to obtain it for free from public institutions (15%), compared to CWS in cities, where 28% of them own the space and only 7% obtained it for free.

Table 18: CWS which are owned, rented, or given for free from public institutions, with geographical and size differences.

	Owned		Rented		Free concession	
	Freq.	%	Freq.	%	Freq.	%
Cities	41	28	98	66	10	7
Outside cities	39	39	47	47	15	15
Total	80	32	145	58	25	10

4.7. Capacity, users and occupancy rates

The capacity of CWS mainly depends on the size of the space. Observing Table 19, the average maximum capacity of users that can be accommodated in the working areas is approximately 82 individuals, ranging from a minimum of 2 to a maximum of 1,000 users. As we would expect, this average is greater in CWS located in cities, accounting for 113 users, than in CWS outside cities, where on average we find 37 individuals. Nonetheless, the median value could be more informative than the average, which tends to exaggerate the number of individuals that can be accommodated in CWS given the presence of a few large CWS significantly increasing the arithmetic mean. Thus, the median maximum capacity in CWS located in cities is 50 individuals, outside cities is 20 individuals, while overall it is 30 individuals.

Table 19: Maximum number of users that can be accommodated in the working areas.

	Observations	Mean (μ)	Std. Dev. (σ)	Min	Max
Cities	152	112.93	196.74	2	1000
Outside cities	110	36.67	44.04	3	300
Total	262	81.91	156.93	2	1000

Once investigated, the maximum capacity of CWS, Table 20 presents the number of daily CWS users, which is on average roughly 36 individuals. In cities this average goes up to 52 individuals, while decreasing for CWS outside cities, which only have on average 13 individuals. Moreover, the median value of daily users of CWS is overall 12 individuals, with 20 individuals in cities and only 8 outside cities.

Table 20: Number of daily CWS users.

	Observations	Mean (μ)	Std. Dev. (σ)	Min	Max
Cities	154	52.07	111.81	2	1000
Outside cities	111	12.51	15.70	0	95
Total	265	35.50	87.93	0	1000

Thus, it is now possible to present the average occupancy rate in CWS, which is 42% overall, meaning that on a daily basis, slightly less than half of the available seats are occupied by the users. This average increases in cities (47%) while decreasing outside cities (36%). The occupancy rate tends to increase in parallel with the size of CWS, being 38% in small CWS, 42% in medium CWS, and 46% in large ones.

Moreover, Table 21 outlines the share of users that are not residing in the municipality of the space. On average, 34% of the users are not residing in the municipality of their CWS. As we would expect, this share tends to increase in CWS located outside cities (41%), while decreasing for the ones in cities (28%). Furthermore, small CWS appear to have a higher share of users not residing in the municipality where they are located (37%) than medium (34%) and large CWS (31%).

Table 21: Occupancy rate (given by the ratio between users of the space present on a daily basis and the maximum number of individuals that can be accommodated in the working areas) and percentage of users that are not residents in the municipality of the space.

	Occupancy rate		Users not residents in the municipality of the CWS	
	Freq.	%	Freq.	%
Cities	148	47	104	28
Outside cities	110	36	93	41
Small CWS	76	38	65	37
Medium CWS	76	42	63	34
Large CWS	70	46	61	31
Total	258	42	197	34

4.8. Hard infrastructure

Taking a look at the typologies of hard infrastructure present in CWS shown in Table 22, we can observe that almost all CWS provide meeting rooms (94%). Also social areas, such as cafes, kitchens, break rooms, and so on, are quite common (89%). Subsequently, other common infrastructures are hot desks (78%), event and activity rooms (70%), private offices (64%), and outdoor space (57%). Only a few CWS provide a gym, workout area, and other more specific social infrastructures (16%).

There are no major differences between CWS located in cities and outside cities, with the former ones that appear to be slightly better equipped than the latter ones, except for the provision of hot desks, which is slightly greater in CWS outside cities.

Table 22: CWS's hard infrastructure in cities, outside cities, and in total (multiple answers).

	Cities		Outside cities		Total	
	Freq.	%	Freq.	%	Freq.	%
Meeting Room	123	97	89	89	212	94
Social Area (cafe, kitchen, break room)	118	93	84	84	202	89
Hot Desk	96	76	80	80	176	78
Event & Activity Room	100	79	60	60	160	70
Private Office	86	68	59	59	145	64
Outdoor Space	74	58	56	56	130	57
Gym, workout area, other social infrastructures	22	17	14	14	36	16
Total CWS	127		100		227	

4.9. Social curation

Finally, Table 23 presents the percentage of labour from the staff, which is devoted to curating the CWS from a social perspective. On average, 45% of the total labour time is devoted to socially curating the CWS. This share is inversely proportional to the size of CWS. Furthermore, it seems that CWS mainly relying on personal funds and external subsidies invest more time in curating the CWS (51%) than the ones counting on

income streams (39%). Finally, there are no large differences between CWS in cities (44%) and outside cities (45%).

Table 23: The share of labour devoted to curating the CWS from a social perspective working in cities, outside cities, and according to the size of the CWS.

	Obs.	Mean (μ)	Std. Dev. (σ)	Min	Max
Cities	97	43.95	24.68	1	100
Outside cities	72	45.49	29.48	0	100
Small CWS	54	50.93	28.66	0	100
Medium CWS	54	44.67	28.23	1	100
Large CWS	58	39.78	22.51	0	95
Personal funds and External subsidies	47	51.19	30.44	1	100
Mix	42	47.91	26.50	0	100
Income streams	77	39.08	23.30	1	100
Total	169	44.60	26.75	0	100

5. Social and environmental impacts

This chapter outlines the social and environmental impacts of CWS on users and local communities resulting from the survey. Unlike the economic dimension of impact, both the social and environmental dimensions are still mainly unexplored areas when it comes to quantitative research. Therefore, the main contribution of this research is to propose and employ an impact assessment methodology on the European level focused on the social and environmental impacts of CWS. After defining the specific dimensions of impact in Chapter 2, this chapter presents several models aiming at capturing statistically significant relationships between the proposed indicators, or dependent variables, and the explanatory and control variables.

As previously mentioned in Section 2.3, the number of responses coming from users of CWS (78 observations) was not sufficient to analyse the suggested potential indicators directed to the users. Hence, the econometric models presented are based on the potential indicators directed to managers and hosts of CWS, with a total of 273 responses.

The econometric analysis considers the previously mentioned three dimensions of social impact - networking opportunities, social inclusion, and local cultural value - as well as the dimension of environmental impacts. All econometric models are presented, despite the fact that some of them do not present statistically significant results.

All models make use of the same set of independent and control variables, which are composed of five input indicators - size, full-time labour, volunteer labour, curation of

the CWS, and hard infrastructure - as well as three demographic indicators of CWS - location, main income streams, ownership status. These are presented in Table 24.

Table 24: Descriptive statistics of the independent and control variables.

	Explanatory variable (X)	Obs	Mean (μ)	Std. Dev. (σ)	Min	Max
1	Location	273	0.579	0.495	0	1
2	Size	228	1182.224	4711.709	10	63000
3	Full-time labour	222	138.559	288.66	0	1600
4	Volunteer labour	222	15.149	35.029	0	300
5	Curation of the CWS	169	44.604	26.753	0	100
6	Hard infrastructure	227	0.763	0.228	0.25	1
7	Main income stream	259	2.185	0.824	1	3
8	Ownership	250	1.78	0.611	1	3

Chapter 2 presented two categories of input indicators. The first one was about the enabling social factors, with two potential indicators proposed: *social expenses* and *social curation of the CWS*. Only the latter was included in the survey and thus in the regression models as the explanatory variable accounting for the enabling social factors in CWS. On average, CWS dedicate 45% of their working time to curating the CWS from a social perspective.

The second category of input indicators accounted for the physical enabling factors, including eight potential indicators proposed: *capacity*, *size*, *staff*, *hard infrastructure*, *flexibility of occupancy term*, *membership fee*, *multifunctionality*, and *layout adaptability*. As mentioned before, only the first four of these indicators were included in the survey directed to managers, while the last four were discarded to reduce the number of questions included in the survey, thus reducing the compilation time to ultimately increase the response rate. Among the four indicators left, *capacity* was excluded because of its positive correlation with the size of CWS (correlation coefficient of 0.522). Concerning the CWS staff, two explanatory variables were included: the total number of working hours per week for full-time employees and the

total number of working hours per week for volunteers operating in CWS. Likewise, the total number of working hours per week for part-time employees was discarded, being positively correlated with the total number of working hours per week for part-time employees (correlation coefficient of 0.626). Hence, *size*, *full-time labour*, *volunteer labour*, and *hard infrastructure* are the explanatory variables used in regression models to account for the physical enabling factors.

The first one, *size*, is a continuous variable measuring the number of square meters of the CWS, which is on average 1,182 m². The second and third variables, *full-time labour* and *volunteer labour*, are both continuous, and they measure the number of working hours per week for full-time employees and volunteers, which is on average 139 hours/week and 15 hours/week, respectively. The fourth variable, *hard infrastructure*, is an ordered categorical variable indicating the presence of different facilities in the CWS, such as hot desks, private offices, meeting rooms, and event rooms. In case all four of them are present, the CWS is provided with a very high professional infrastructure (39% of CWS). When only one out of four is present, then the CWS is provided with a low professional infrastructure (5% of CWS). 23% of CWS provide two out of four facilities, while 33% of them provide three out of four facilities. Moreover, it is worth mentioning that another input variable was created, accounting for the *social hard infrastructure*, such as the presence of a social area, an event and activity room, an outdoor space, a gym or workout area, or an extra social infrastructure. But since there is a high positive correlation between the two variables (0.437), only the *professional hard infrastructure* was included in the regression models.

Furthermore, there are three other explanatory variables which were described in Chapter 4 as part of the demographics of CWS: *location*, *main income stream*, and *ownership status*. Firstly, *location* is a dummy variable dividing CWS in the ones located in cities (1), and the ones located outside cities (0), following the classification of urbanity-rurality from Eurostat as explained in the previous chapters. 58% of CWS are located in cities, while 48% of them are outside cities. Secondly, the *main income stream* is a categorical variable which indicates the main source of income for CWS to be economically sustainable. It distinguishes three categories: (1) CWS mainly relying on subsidies and personal savings (26%); (2) CWS relying on a mix of subsidies and personal savings and market streams (29%); (3) CWS mainly counting on market streams (45%). Thirdly, *ownership status* is a categorical variable indicating whether CWS own the space (32%), rent it from privates or public institutions (58%), or it is given for free use for a determined period of time (10%).

5.1. Networking opportunities

As regards the social dimension of networking opportunities, this study considers thirteen dependent variables which can account for the role of CWS as providers of network opportunities: *openness to non-members*, *Sociocultural events*, *training and mentoring programs*, *networking events*, *wider CWS networks*, *interaction with medium and large firms*, *partnership with locally rooted industries*, and *third sector support* (NGOs, community organisations, social enterprises, charities, neighbourhood groups, and labour associations). The descriptive statistics of these output and outcome variables are briefly presented in Table 25.

Table 25: Descriptive statistics of the dependent variables accounting for the role of CWS as providers of network opportunities.

	Dependent variable (Y)	Obs	Mean (μ)	Std. Dev. (σ)	Min	Max
1	Openness to non-members	225	1.831	0.953	1	3
2	Sociocultural events	235	2.702	0.855	1	5
3	Training and mentoring programs	249	2.659	1.171	1	5
4	Networking events	252	3.210	1.187	1	5
5	Wider CWS networks	225	0.978	1.028	0	3
6	Medium and large firms' interaction	216	0.639	0.481	0	1
7	locally rooted industries' interaction	235	0.579	0.495	0	1
8	NGOs' interaction	228	0.649	0.478	0	1
9	Community organisations' interaction	228	0.689	0.464	0	1
10	Social enterprises' interaction	228	0.649	0.478	0	1
11	Charities' interaction	228	0.566	0.497	0	1
12	Neighbourhood groups' interaction	228	0.553	0.498	0	1
13	Labour associations' interaction	228	0.404	0.4092	0	1

5.1.1. Dependent variables

This section presents the dependent variables accounting for the role of CWS as providers of networking opportunities.

5.1.1.1. Openness to non-members

The first dependent variable is the *openness of CWS to non-members*, which is an ordered categorical variable having four different categories (0-3). CWS can be open exclusively to members (0), or they can be open only to members but open to anyone when public events are hosted (1). Alternatively, they can have some areas only accessible to members and other areas that are accessible to non-members (2). Finally, CWS can have all areas fully accessible to non-members (3). As shown in Table 26, roughly 36% of CWS are generally open only to members but open to anyone when public events are hosted. In contrast, approximately 32% of them are fully accessible to non-members, and 25% are partially accessible to non-members. Only 6% are

exclusively open to members. In addition, it is possible to observe the differences between CWS located in cities and the ones outside cities.

The latter ones appear to be either more accessible to non-members than in cities, with 44% compared to 23%, or open only to members, with 10% compared to 3% in CWS in cities. Whereas CWS in cities are either more likely to have some areas intended for members and other ones devoted to both members and non-members, with 42% of CWS compared to 30% outside cities, or to be open only to members unless hosting some public events, with 32% compared to 16% outside cities.

Table 26: CWS openness to non-members in cities, outside cities, and in total.

Value of Y		Cities		Outside cities		Total	
		Freq.	%	Freq.	%	Freq.	%
0	It is open only to the members	4	3	10	10	14	6
1	It is open only to the members but open to anyone when public events are hosted	53	42	29	30	82	36
2	Only some areas are accessible to non-members	41	32	16	16	57	25
3	All areas are fully accessible to non-members	29	23	43	44	72	32
Total		127	100	98	100	225	100

5.1.1.2. Sociocultural events

The second dependent variable is a composite variable made up of ten ordered categorical variables, which are related to the organisation of social and cultural events within CWS. Figure 6 outlines their frequency based on a Likert scale from 1 to 5, where “1” indicates that the specific activity is not organised in the CWS, while “2”, “3”, “4”, and “5” indicate that it is organised “rarely”, “sometimes”, “often”, and “very often”.

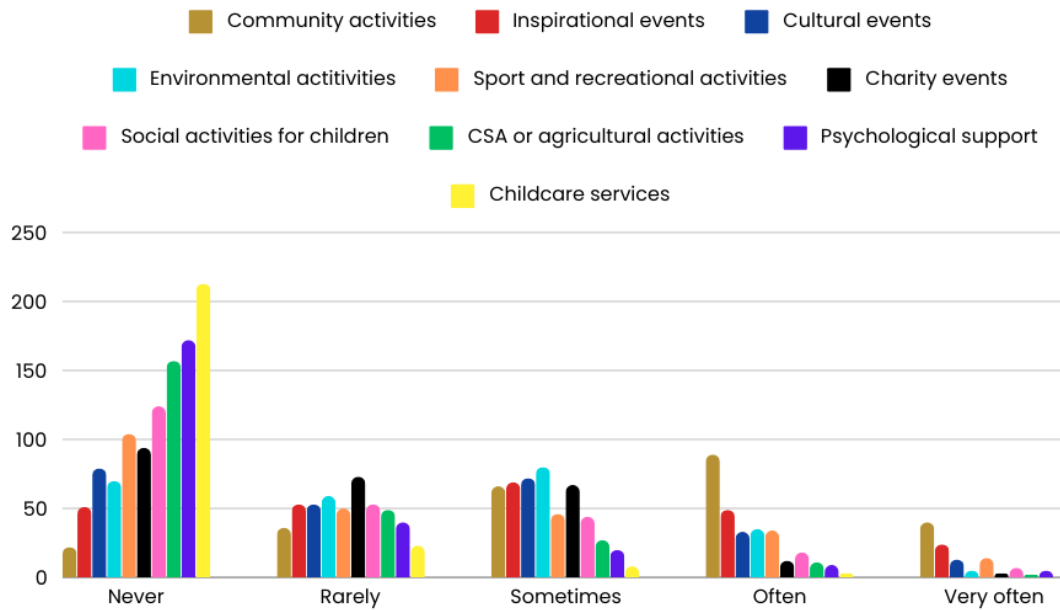


Figure 6: Provision of Sociocultural events and activities in CWS using a Likert scale (1-5). Source: Author.

As shown in Table 27, community activities such as lunches, happy hours, coffees, and so on are by far the most common social activities, with an average of 3.35 out of 5. Subsequently, other very frequent social activities are inspirational events such as creative mornings, pitches, guest speakers, etc. (2.76 out of 5); cultural events and activities related to the music, theatre, and arts (2.39 out of 5); events, initiatives, and projects dealing with environmental topics (2.38 out of 5); sport and recreational events and activities like yoga or Pilates (2.21 out of 5); charity events and activities (2.02 out of 5); and social events and activities for children (1.91 out of 5). Only a few CWS organise Community-supported agriculture and agricultural activities (1.52 out of 5); offer psychological support programs (1.52 out of 5); and childcare services (1.19 out of 5).

Table 27: Descriptive statistics on different typologies of Sociocultural activities using a Likert scale (1-5).

	Obs.	Mean (μ)	Std. Dev. (σ)	Min	Max
--	------	----------------	------------------------	-----	-----

Community activities (lunches, happy hours, coffees, etc.)	253	3.35	1.16	1	5
Inspirational events (creative mornings, pitches, guest speakers, etc.)	246	2.76	1.26	1	5
Cultural events and activities (music, theatre, arts, etc.)	250	2.39	1.21	1	5
Events, initiatives, and projects dealing with environmental topics	249	2.38	1.10	1	5
Sport and recreational events and activities (yoga, Pilates, etc.)	248	2.21	1.27	1	5
Charity events and activities	249	2.02	0.98	1	5
Social events and activities for children	246	1.91	1.11	1	5
Community-supported agriculture or agricultural activities	246	1.59	0.91	1	5
Psychological support	246	1.52	0.94	1	5
Childcare services	247	1.19	0.54	1	4

Alternatively, Table 28 presents the same categories of social events but this time considers the answers “never” and “rarely” as “0”, while “sometimes”, “often”, “very often” as “1”. Similarly to the previous table, community activities are the most frequent (77%), followed by inspirational events (58%), events and initiatives dealing with environmental topics (48%), and cultural events and activities (47%). Overall, CWS in cities appear to offer more events, even though the ones outside cities seem to focus more on social events and activities for children (31% compared to 26% in cities), as well as on agricultural activities or in the organisation of Community-supported agriculture groups (21% compared to 12% in cities).

Table 28: CWS’s typologies of social activities in cities, outside cities, and in total.

	Cities		Outside cities		Total	
	Freq.	%	Freq.	%	Freq.	%
Community activities (lunches, happy hours, coffees, etc.)	119	82	76	70	195	77
Inspirational events (creative mornings, pitches, guest speakers, etc.)	89	64	53	50	142	58
Events, initiatives, and projects dealing with environmental topics	74	52	46	43	120	48
Cultural events and activities (music, theater, arts, etc.)	74	52	44	41	118	47
Sport and recreational events and activities (yoga, Pilates, etc.)	54	39	40	37	94	38
Charity events and activities	48	34	34	32	82	33

Social events and activities for children	36	26	33	31	69	28
Community-supported agriculture or agricultural activities	17	12	23	21	40	16
Psychological support	24	17	10	9	34	14
Childcare services	5	4	6	6	11	4

Furthermore, Table 29 illustrates how the provision of such social events varies depending on the size of CWS. In fact, it seems that larger CWS are more likely to offer almost all typologies of social events and activities, except in the case of social events and activities for children, which is more common in small and medium-sized CWS.

Table 29: CWS's typologies of social activities in small, medium, and large CWS.

	Small CWS		Medium CWS		Large CWS	
	Freq.	%	Freq.	%	Freq.	%
Community activities (lunches, happy hours, coffees, etc.)	50	65	60	77	62	86
Inspirational events (creative mornings, pitches, guest speakers, etc.)	36	47	49	64	42	62
Events, initiatives, and projects dealing with environmental topics	30	38	38	49	39	56
Cultural events and activities (music, theater, arts, etc.)	33	42	39	50	38	54
Sport and recreational events and activities (yoga, Pilates, etc.)	26	34	24	31	36	51
Charity events and activities	17	22	29	38	27	38
Social events and activities for children	25	32	25	32	16	23
Community-supported agriculture or agricultural activities	11	14	10	13	17	2
Psychological support	5	6	13	17	15	22
Childcare services	3	4	6	8	2	3

Additionally, Table 30 presents the relationship between the offer of social events and the different sources of income of CWS. The ones mainly relying on market streams are more likely to offer community activities (85%) and sport and recreational events and activities (44%). Whereas CWS financially dependent on personal funds and external subsidies appear to offer more inspirational events (67%), events and initiatives dealing with environmental topics (60%), cultural events and activities (59%), social events and activities for children (39%), and childcare services (8%).

Finally, CWS relying on a mix of income streams generally appear to be less prone to organising social events.

Overall, it seems that CWS which are less market-oriented have a broader social focus (organising cultural events or events for a broad and diverse audience, e.g. children), while market-oriented CWS tend to organise social activities to support the well-being of their clients (sport and recreational events, community activities). Interestingly, in most of the types of social activities, CWS that rely on a mix of resources have the lowest percentages.

Table 30: CWS's typologies of social activities in CWS that rely mainly on income streams from the market, from personal funds or external subsidies, or a mix of the two.

	Personal funds and External subsidies		Mix		Market streams	
	Freq.	%	Freq.	%	Freq.	%
Community activities (lunches, happy hours, coffees, etc.)	48	76	46	66	94	85
Inspirational events (creative mornings, pitches, guest speakers, etc.)	41	67	35	51	60	57
Events, initiatives, and projects dealing with environmental topics	37	60	29	43	51	47
Cultural events and activities (music, theater, arts, etc.)	37	59	24	35	53	48
Sport and recreational events and activities (yoga, Pilates, etc.)	21	34	21	31	48	44
Charity events and activities	20	33	19	28	38	35
Social events and activities for children	24	39	17	25	27	25
Community-supported agriculture or agricultural activities	12	20	8	12	19	18
Psychological support	12	19	6	9	16	15
Childcare services	5	8	4	6	2	2

5.1.1.3. Training and mentoring programs

Similarly to the previous one, the third dependent variable is also a composite variable consisting of three ordered categorical variables concerning the training and mentoring programs offered in CWS, which can be divided into training programs and

events for members on soft and hard skills and training for individuals not working in the CWS (Figure 7).

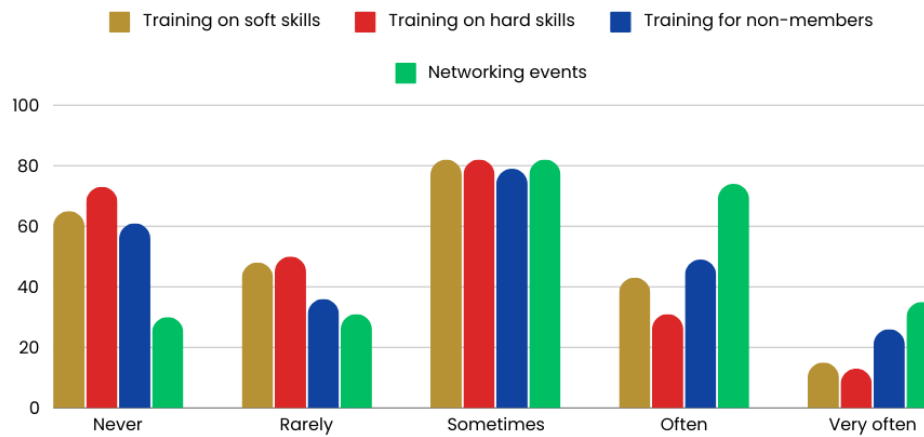


Figure 7: Offering training to members on soft skills and hard skills, to non-members, and networking events in CWS using a Likert scale (1-5).
Source: Author.

Table 31 presents their frequency based on a Likert scale from 1 to 5 in a similar way as explained for the Sociocultural events. On average, CWS appear to be more likely to offer training programs and events to non-members (2.77 out of 5) rather than to their members, with 2.58 out of 5 for soft skills and 2.44 out of 5 for hard skills.

Table 31: Descriptive statistics on training and mentoring programs in CWS using a Likert scale (1-5).

	Obs.	Mean (μ)	Std. Dev. (σ)	Min	Max
Training programs and events for members on soft skills (communication, marketing, management, transversal, and transferable skills)	253	2.58	1.21	1	5
Training programs and events for members on hard skills (technical and professional-specific skills)	249	2.44	1.18	1	5
Training programs for individuals not working in the CWS	251	2.77	1.30	1	5

Table 32 presents again the offering of Training and mentoring programs, but this time considering the answers “never” and “rarely” as “0” and “sometimes”, “often”, “very often” as “1”. Results are similar to the previous table, with 55% of CWS offering

training programs for members on soft skills and 51% of them on hard skills. Moreover, among the respondents, 61% of CWS offer training programs for non-members. The provision of such training and mentoring programs is more frequent in CWS located in cities. Moreover, training and mentoring programs are more likely to happen in medium and large CWS rather than in small ones. Finally, CWS mainly relying on personal funds and external subsidies are more likely to offer training and mentoring programs, compared to the ones relying on market streams or a mix of the two.

Table 32: Offering training and mentoring programs according to location, size, income streams, and in total.

		Training programs and events for members on soft skills	Training programs and events for members on hard skills	Training programs for individuals not working in the CWS
Cities	Freq.	86	76	89
	%	59	54	62
Outside cities	Freq.	54	50	65
	%	50	47	60
Small CWS	Freq.	35	31	42
	%	45	40	54
Medium CWS	Freq.	49	46	57
	%	63	60	74
Large CWS	Freq.	44	40	45
	%	62	57	64
Personal funds and External subsidies	Freq.	41	40	44
	%	65	65	70
Mix	Freq.	33	28	42
	%	47	40	61
Market streams	Freq.	62	57	61
	%	56	53	56
Total	Freq.	140	126	154
	%	55	51	61

5.1.1.4. Networking events

The fourth dependent variable is an ordered categorical variable, and it assesses the offering of networking events aimed at connecting members, several typologies of organisations, funders, and many other actors. Table 33 shows the frequency of such events based on a Likert scale from 1 to 5, where “1” indicates that the specific activity

is not organised in the CWS, while “2”, “3”, “4”, and “5” indicate that it is organised “rarely”, “sometimes”, “often”, and “very often”. Thus, the average is 3.21 out of 5.

Table 33: Descriptive statistics on networking events in CWS using a Likert scale (1-5).

	Obs.	Mean (μ)	Std. Dev. (σ)	Min	Max
Events to stimulate networking (among members, organisations, funders, etc.)	252	3.21	1.19	1	5

Additionally, Table 34 shows the same categories but this time considers the answers “never” and “rarely” as “0” and “sometimes”, “often”, “very often” as “1”. Therefore, 76% of CWS appear to offer events to stimulate networking, especially the ones in cities with 81% of them compared to 68% of CWS outside cities. Moreover, it seems that large CWS are more likely to offer events to stimulate networking (89%). Furthermore, 78% of both CWS mainly rely on market streams, and the ones depending on personal funds and external subsidies offer events to stimulate networking.

Table 34: Offering events to stimulate networking according to location, size, income streams, and in total.

Events to stimulate networking (among members, organisations, funders, etc.)			Large CWS	Freq.	63
				%	89
Cities	Freq.	118	Personal funds and External subsidies	Freq.	49
	%	81		%	78
Outside cities	Freq.	73	Mix	Freq.	51
	%	68		%	73
Small CWS	Freq.	47	Market streams	Freq.	85
	%	61		%	78
Medium CWS	Freq.	62	Total	Freq.	191
	%	79		%	76

5.1.1.5. Wider CWS networks

The fifth dependent variable is categorical. A CWS can be isolated, not being part of any network of CWS (0), but it can also be part of regional and national CWS networks

(1), international ones (2), or both (3). As shown in Table 35, 40% of CWS are not part of any CWS network, while 35% of them are only part of regional and national CWS networks. Then, 12% of CWS are part of only international networks of CWS, and 13% of them are part of both regional and national CWS networks and international ones. Moreover, CWS in cities appear to be more likely to participate in international CWS networks, while the ones located outside cities seem to be more likely to join regional and national CWS networks. Additionally, small- and medium-sized CWS seem to be more likely to join regional and national CWS than international ones, while large ones have a higher likelihood of participating in international networks. Finally, CWS mainly relying on subsidies and personal funds appear to participate more in wider networks of CWS, whereas the ones counting on market streams of income are less likely to join such networks.

Table 35: Wider networks of CWS according to location, size, income streams, and in total.

		Not part of any CWS network (0)	Part of regional or national CWS networks (1)	Part of international CWS networks (2)	Part of both types of CWS networks (3)	Total
Cities	Freq.	53	27	24	22	126
	%	42	21	19	17	
Outside cities	Freq.	38	51	2	8	99
	%	38	52	2	8	
Small CWS	Freq.	33	31	7	4	75
	%	44	41	9	5	
Medium CWS	Freq.	35	23	5	11	74
	%	47	31	7	15	
Large CWS	Freq.	19	19	13	15	66
	%	29	29	20	23	
Personal funds and subsidies	Freq.	16	25	5	9	55
	%	29	45	9	16	
Mix	Freq.	24	22	8	7	61
	%	39	36	13	11	
Market streams	Freq.	44	29	13	14	100
	%	44	29	13	14	
Total	Freq.	91	78	26	30	225
	%	40	35	12	13	

5.1.1.6. Interaction with medium and large firms

The sixth dependent variable is a dummy, indicating whether CWS have some kind of interactions with medium and large firms (Table 36). Out of 216 respondents, 64% of them do have some interactions with such companies, especially the ones located in cities (76% of them compared to 48% outside cities). Medium and large firms usually rent offices and hot desks for their employees (49%), they subcontract projects to professionals working in the CWS (18%), and they hire or look for new professionals to hire from the CWS (14%). A few ones also directly invest in the CWS (5.1%) or in startups within the CWS (8%). Additionally, small-sized CWS and CWS mainly relying on market streams seem to interact less with these companies than medium and large CWS and CWS counting on subsidies and personal savings, respectively.

Table 36: Types of interaction with medium and large firms in CWS according to location, size, income streams, and in total. Respondents could select multiple options.

		No interaction (0)	They invest in the CWS (1)	They are ready to invest in startups (1)	They rent space for their employees (1)	They hire or look for new professionals to hire from the CWS (1)	They subcontract projects to professionals (1)	Total
Cities	Freq.	29	8	14	71	21	28	121
	%	24	7	12	59	17	23	
Outside cities	Freq.	49	3	3	35	10	11	95
	%	52	3	3	37	11	12	
Small CWS	Freq.	44	4	5	19	4	6	70
	%	63	6	7	27	6	9	
Medium CWS	Freq.	18	3	3	37	12	17	69
	%	26	4	4	53	17	25	
Large CWS	Freq.	12	4	9	44	14	15	67
	%	18	6	13	66	21	22	
Personal funds & subsidies	Freq.	24	6	4	13	5	7	52
	%	46	12	8	25	10	13	
Mix	Freq.	25	1	4	29	11	8	60
	%	42	2	7	48	18	13	
Market streams	Freq.	25	4	9	62	15	24	97
	%	26	4	9	64	15	25	
Total	Freq.	78	11	17	106	31	39	216

	%	36	5	8	49	14	18	
--	---	----	---	---	----	----	----	--

5.1.1.7. Partnership with locally rooted industries

The seventh dependent variable is a dummy that describes whether CWS have a connection with locally rooted industries, either by directly collaborating or simply supporting them. Instances of locally rooted industries are local artisans, or agri-food businesses. CWS can offer them resources and support tailored to the necessities of traditional craftsmen, artisans or farmers, helping them modernise their practices, access new markets, or incorporate technology into their production processes. Table 37 presents whether the activities performed in the CWS are strongly related to these industries (11%), somehow related (46%), or not related at all (42%). It appears that the degree of interaction between CWS and traditional industries is directly proportional to the size of CWS. Additionally, CWS mainly relying on subsidies and personal funds seem to be more likely to interact with locally rooted industries than the ones relying on market streams.

Table 37: Degrees of relevance of the activities performed in CWS with regard to locally rooted industries according to location, size, income streams, and in total.

		Not related (0)	Partially related (1)	Strongly related (2)	Total
Cities	Freq.	54	67	11	132
	%	41	51	8	
Outside cities	Freq.	45	42	16	103
	%	44	41	16	
Small CWS	Freq.	34	30	8	72
	%	47	42	11	
Medium CWS	Freq.	31	35	7	73
	%	42	48	10	
Large CWS	Freq.	25	32	9	66
	%	38	48	14	
Personal funds and subsidies	Freq.	18	29	9	56
	%	32	52	16	
Mix	Freq.	29	31	5	65
	%	44	48	8	
Market streams	Freq.	49	46	10	105

	%	47	44	10	
Total	Freq.	99	109	27	235
	%	42	46	11	100

5.1.1.8. Third sector' support

Finally, the last dependent variables are dummies, and they describe the relationship with organisations from the third sector, such as NGOs, community organisations, social enterprises, charities, neighbourhood groups, labour associations, by offering them space for free or at a discounted price or by offering them services. As shown in Table 38, CWS are more likely to interact with community organisations (69%), NGOs (65%), and social enterprises (65%). Many of them also interact with charities (57%), neighbourhood groups (55%), and labour associations (40%). Relationships with NGOs appear to be more common in CWS in cities (70%), while the ones with community organisations are more frequent in CWS located outside cities (72%).

Table 38: CWS' interaction with organisations from the third sector according to location, size, income streams, and in total. Respondents could select multiple options.

		NGOs	Community organisations	Social enterprises	Charities	Neighbourhood groups	Labour associations	Total
Cities	Freq.	90	85	84	71	66	50	128
	%	70	66	66	55	52	39	
Outside cities	Freq.	50	72	64	58	60	42	100
	%	50	72	64	58	60	42	
Small CWS	Freq.	48	48	45	40	42	33	75
	%	64	64	60	53	56	44	
Medium CWS	Freq.	48	55	49	45	42	28	74
	%	65	74	66	61	57	38	
Large CWS	Freq.	48	48	50	39	39	30	68
	%	71	71	74	57	57	44	
Personal funds & subsidies	Freq.	36	43	40	32	36	24	56
	%	64	77	71	57	64	43	
Mix	Freq.	42	42	40	33	34	28	62
	%	68	68	65	53	55	45	
Market streams	Freq.	65	67	63	58	53	38	100
	%	65	67	63	58	53	38	
Total	Freq.	148	157	148	129	126	92	228

	%	65	69	65	57	55	40	
--	---	----	----	----	----	----	----	--

5.1.2. Models and results

After defining the dependent variables measuring the role of CWS as providers of network opportunities, this paragraph presents the regression models and their results. All models apply the same set of independent and control variables. The equation of the regressions for the simple, ordered, and multinomial probit models applied is as follows:

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

Y_i indicates the dependent variable, which is different for each model, while X_i is a vector of independent and control variables describing the demographics and the input indicators presented before, and β_1 represents its vector of unknown parameters. There are eight regressors: the location of the CWS, the size in square meters of the CWS, the total hours per week of paid work to full-time employees, the total hours per week of volunteer work, the percentage of labour devoted to curating the space from a social perspective, the presence of professional hard infrastructure, the main income streams of the CWS, and the ownership status of the CWS. Moreover, β_0 is the intercept term, and ε_i is the unobserved error term.

The models for the dependent variables Y_1 (CWS openness to non-members), Y_2 (provision of Sociocultural events), Y_3 (provision of training and mentoring programs), and Y_7 (interaction with locally rooted industries) are all characterised by ordinal responses. Hence, in all four cases an ordered probit model was applied, allowing us

to estimate different correlated ordinal outcomes in conjunction, showing the influence of the independent and control variables on each of the response variables while preserving the ordering on the categories of the dependent variable (Cappellari & Jenkins, 2003).

Furthermore, the regression model for the dependent variable Y_5 (participation in wider networks of CWS) is a multinomial probit model, which allows for more than two categories of the dependent variable. In this regard, it allows the analysis of the effects of one or more independent variables on the probability of being in a specific category rather than another category (Mustapha et al., 2017). In this specific case, to participate in a national or regional CWS network, an international one, or both types. Finally, given the binary nature of the dependent variables Y_4 (provision of networking events), Y_6 (interaction with medium and large firms), Y_8 (interaction with NGOs), Y_9 (interaction with community organisations), Y_{10} (interaction with social enterprises), Y_{11} (interaction with charities), Y_{12} (interaction with neighbourhood groups) and Y_{13} (interaction with labour associations), they are analysed through the use of simple probit regression models.

Before presenting and interpreting the results of the regression models, it is paramount to check for the model diagnostics regarding multicollinearity and heteroscedasticity. In case multicollinearity is present, then two or more independent variables in the regression model are linearly dependent, making the regression coefficient, and in turn the regression model, unreliable (Daoud, 2017). Thus, to test for multicollinearity, the Variance Inflation Factor (VIF) technique was applied. Usually, if the VIF value of an independent variable lies between 5 and 10, that variable should be excluded from the regression model due to the presence of multicollinearity

(Shrestha, 2020). As regards heteroscedasticity, it occurs when the standard deviations of an independent variable are not constant, suggesting that the regression model poses some issues of heteroscedasticity, which in probit and logit models can be examined using the Breusch-Pagan test. This test examines the null hypothesis of homoscedasticity, namely when the variance of the error terms is constant (Gikonyo et al., 2022).

5.1.2.1. Openness to non-members

As shown in Annex A5, the first model concerning the openness of CWS to non-members does not present multicollinearity problems given that the highest VIF value is 1.85. Moreover, when checking for heteroscedasticity of the model (as presented in Annex A6), given that the p-value is greater than 0.05, it is not possible to reject the null hypothesis of homoscedasticity. Thus, heteroscedasticity does not pose a problem for the model.

Nonetheless, as shown in Table 39, the LR chi-square of 12.56 with a p-value of 0.2495 indicates that the model is not statistically significant when comparing it to the null model with no explanatory variables. Thus, the model does not have a good fit, meaning that, with the data available, the explanatory variables selected are not able to explain the variation in the dependent variable, namely the openness of CWS to non-members. This could be caused by the small sample size or alternatively because the model does not include important variables that could explain the variance in the different levels of openness of CWS to non-members.

Table 39: Results of the ordered probit models for CWS' openness to non-members, organisation of Sociocultural events, Training and mentoring programs, and results of the simple probit model for the organisation of networking events.

VARIABLES	(Y ₁) CWS openness	(Y ₂) Sociocultural events	(Y ₃) Training & mentoring programs	(Y ₄) Networking events
Location	-0.428** (0.199)	0.0643 (0.209)	0.153 (0.193)	-0.239 (0.310)
Size	1.25e-05 (1.71e-05)	5.35e-05** (3.21e-05)	7.34e-06 (1.72e-05)	0.000317 (0.000232)
Full-time labour	-0.000105 (0.000345)	0.000426 (0.000458)	0.000367 (0.000340)	0.00252 (0.00171)
Volunteer labour	0.00427 (0.00301)	0.00412* (0.00280)	0.00532*** (0.00266)	0.0262** (0.0109)
Curation of the CWS	0.00286 (0.00378)	0.00935** (0.00399)	0.00220 (0.00363)	0.0103* (0.00620)
Professional hard infrastructure	0.517 (0.429)	0.888* (0.441)	1.466*** (0.420)	1.192* (0.672)
Main Income Stream (Mix of streams)	0.115 (0.262)	-0.525** (0.268)	-0.231 (0.251)	0.123 (0.419)
Main Income Stream (Market streams)	-0.0425 (0.246)	-0.0607 (0.260)	-0.530** (0.245)	0.0572 (0.402)
Ownership (Rent of the space)	0.0883 (0.229)	0.0816 (0.242)	0.0388 (0.226)	-0.462 (0.427)
Ownership (Free concession of the CWS)	0.429 (0.337)	0.590* (0.347)	0.622* (0.320)	-0.936* (0.485)
/cut1	-1.348*** (0.430)	-0.509 (0.428)	0.0237 (0.400)	
/cut2	0.199 (0.420)	1.287*** (0.443)	0.856* (0.408)	
/cut3	0.990** (0.421)	2.853*** (0.473)	1.951*** (0.422)	
/cut4			3.175*** (0.456)	
(Y ₁): Number of obs = 148; LR chi2(10) = 12.56; Prob > chi2 = 0.2495; Log pseudolikelihood = -174.28386; Pseudo R2 = 0.0348				
(Y ₂): Number of obs = 141; LR chi2(10) = 30.08; Prob > chi2 = 0.0008; Log pseudolikelihood = -139.85713; Pseudo R2 = 0.0971				
(Y ₃): Number of obs = 145; LR chi2(10) = 32.08; Prob > chi2 = 0.0004; Log pseudolikelihood = -194.32784; Pseudo R2 = 0.0762				
(Y ₄): Number of obs = 148; Wald chi2(10) = 20.13; Prob > chi2 = 0.0280; Log pseudolikelihood = -47.056825; Pseudo R2 = 0.1972				

Standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference category for Main Income Stream is "Personal savings and external subsidies", while for Ownership it is "Own the space".

5.1.2.2. Sociocultural events

Likewise, the second model with the provision of Sociocultural events as the dependent variable is also tested to check whether it presents some problems of

multicollinearity and heteroscedasticity. The model presents issues neither of multicollinearity nor of heteroscedasticity (see Annexes A5 and A6). Subsequently, the LR chi-square of 30.08 with a p-value of 0.0008 suggests that the model is statistically significant at a 1% level if compared to the null model without the regressors. Finally, the pseudo R_2 is 0.0971, indicating that 9.71% of the variability of the dependent variable is explained by the set of regressors applied in the model.

As shown in Table 39, there is a positive relationship between the size of CWS and the provision of Sociocultural events at a 5% significance level. Similarly, CWS relying more on volunteer work and the ones offering a better professional hard infrastructure are more likely to provide such events, both at a 10% significance level. As one could expect, CWS that invest more time in curating the space from a social perspective are more likely to offer Sociocultural events at a 5% significance level. Moreover, CWS mainly counting on external subsidies or personal savings have a greater likelihood of organising Sociocultural events than the ones relying on a mix of income streams at a 5% significance level. Finally, CWS that obtained the use of their space for free from public institutions are more likely to organise such events compared to CWS that own their space at a 10% significance level.

5.1.2.3. Training and mentoring programs

As regards the regression model dealing with training and mentoring programs, neither the VIF technique and the Breusch-Pagan test detects in the model the presence of multicollinearity and heteroscedasticity, respectively (see Annexes A5 and A6). Based on the LR chi-square of 32.08 and its p-value of 0.0004, the model is statistically significant at a 1% level when compared to the null model in the absence

of independent variables. The pseudo R_2 is 0.0762, meaning that 7.62% of the variability of the dependent variable can be explained by the set of independent variables applied in the regression model.

With a statistical significance of 1%, CWS counting more on volunteer labour have a greater probability of offering training and mentoring programs, as well as the ones having a better professional hard infrastructure. Nonetheless, CWS mainly relying on market streams appear to be less likely to offer such training programs when compared to CWS predominantly counting on personal savings or external subsidies at a 5% significance level. Finally, CWS with a concession of their space for free are more likely to offer training and mentoring programs than the ones that own the space, at a 10% significance level.

5.1.2.4. Networking events

Concerning the variable on networking events, multicollinearity does not pose a problem, while the same cannot be said for heteroscedasticity. In fact, the p-value for the Breusch-Pagan test is lower than 0.05, which indicates that it is possible to reject the null hypothesis of homoscedasticity (see Annex A6). As a consequence, to adjust for heteroscedasticity, it is possible to use robust standard errors, which are meant to adjust for non-constant variance while simultaneously preserving the coefficient estimates (Gikonyo et al., 2022). Moreover, the regression model is statistically significant at a 5% level, with a Wald chi-square of 20.13 and a p-value of 0.0280. The pseudo coefficient of determination is 0.1972; thus, 19.72% of the variability of the variable on networking events is explained by the regressors.

According to the results, CWS that employ more volunteer work are more likely to offer networking events at a 5% significance level. Moreover, the organisation of networking events is directly proportional to the share of labour devoted to socially curating the CWS, as well as to the quality of the professional hard infrastructure offered by the CWS, both at a 10% significance level. Additionally, CWS that own their space are more likely to offer networking events compared to the ones that temporarily got the use of the space for free, at a 10% significance level. Table 40 presents the marginal effects of the regressors on the organisation of networking events in CWS. Thus, each additional weekly hour of volunteer work increases the likelihood of organising networking events by 0.462%, while the probability of organising networking events increases by 0.182% for each 1% increase in the share of time spent curating the space from a social perspective. Furthermore, the probability of offering such events increases by 21% for each additional provision of a professional hard infrastructure. Finally, CWS owners of the space have a higher likelihood of 17.2% of organising networking events compared to the ones with a free concession of the CWS.

Table 40: Marginal effects for the regression model on networking events.

Networking events	Marginal effects	Standard errors
Location	-0.0421	(0.0552)
Size	5.57e-05	(4.20e-05)
Full-time labour	0.000443	(0.000304)
Volunteer labour	0.00462**	(0.00190)
Curation of the CWS	0.00182*	(0.00109)
Professional hard infrastructure	0.210*	(0.113)
Main Income Stream (Mix of streams)	0.0216	(0.0734)
Main Income Stream (Income streams)	0.0104	(0.0731)
Ownership (Rent of the space)	-0.0689	(0.0571)
Ownership (Free concession of the CWS)	-0.172*	(0.0953)

Standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference category for Main Income Stream is “*Personal savings and external subsidies*”, while for Ownership it is “Own the space”.

5.1.2.5. Wider CWS networks

Table 41 outlines the results for the multivariate probit model regarding the participation of CWS in wider networks of CWS on the regional, national, and international levels. Similarly to the previous dependent variables, the model was tested and does not present any issues of multicollinearity and heteroscedasticity (see Annexes A5 and A6). Subsequently, the model is statistically significant at a 5% level of significance (Wald chi-square of 50.73 with its p-value of 0.0104).

The regression model indicates a relationship between the location of CWS and the participation in networks of CWS. More specifically, CWS located outside cities are 26.31% more likely to only be part of regional or national networks of CWS at a 10% significance level, whereas the ones located in cities have a 26.11% greater probability of being part of international networks of CWS at a 1% significance level. Concerning the size of CWS, there is a positive and statistically significant correlation at a 5% level between the size and the participation in only regional or national networks. More specifically, for each additional square meter there is a 0.00221% increase in the likelihood of being part of only regional and national networks, or alternatively, for each additional 1,000 m² the likelihood increases by 2.21%. Moreover, for each additional weekly hour of paid labour in the CWS, the likelihood of participating in only regional or national networks decreases by 0.115%, at a 1% significance level. Subsequently, a 1% increase in time spent curating the space from a social perspective on the total working time results in a 0.162% greater probability of being part of international networks at a 10% significance level. Finally, CWS that have a free

concession for use of their space have a 33.28% greater probability of being part of both regional or national networks and international networks, if compared to the ones owning their CWS, at a 1% significance level.

Table 41: Results of the multinomial probit model regarding regional, national, and international networks of CWS.

Variables	CWS part of regional or national networks		CWS part of international networks		CWS part of both regional/national and international networks	
	Estimated coefficient	Marginal effects	Estimated coefficient	Marginal effects	Estimated coefficient	Marginal effects
Location	-0.695* (0.376)	-0.2631 (0.7603)	1.653*** (0.572)	0.2611 (0.07602)	0.602 (0.455)	0.06247 (0.06131)
Size	8.91e-05** (4.28e-05)	2.21e-05 (8.80e-06)	-2.13e-05 (4.51e-05)	-6.24e-06 (6.77e-06)	-2.26e-05 (4.47e-05)	-7.83e-06 (7.33e-06)
Full-time labour	-0.00488*** (0.00176)	-0.001150 (0.000354)	0.000584 (0.000789)	0.0002806 (0.0001213)	0.000608 (0.000673)	0.0003507 (0.000127)
Volunteer labour	-0.00105 (0.00760)	-0.000921 (0.001397)	0.00167 (0.00745)	-0.000198 (0.0008958)	0.0108 (0.00666)	0.001784 (0.000773)
Curation of the CWS	0.0102 (0.00733)	0.001426 (0.001398)	0.0144* (0.00863)	0.001621 (0.001157)	0.00380 (0.00814)	-0.000622 (0.001151)
Prof. hard infrastr.	1.247 (0.799)	0.2724 (0.1541)	-0.826 (0.953)	-0.2203 (0.1321)	0.759 (0.946)	0.09488 (0.1376)
Income Stream (Mix of streams)	-0.753 (0.502)	-0.2076 (0.09958)	0.406 (0.633)	0.08534 (0.07798)	0.184 (0.591)	0.05512 (0.07499)
Income Stream (Market streams)	-0.772 (0.475)	-0.2102 (0.09761)	0.341 (0.590)	0.07403 (0.06661)	0.206 (0.557)	0.06369 (0.06985)
Ownership (Rent of the space)	0.249 (0.423)	0.05728 (0.08382)	0.143 (0.536)	0.01851 (0.07401)	-0.169 (0.496)	-0.04438 (0.07412)
Ownership (Free concession of CWS)	1.166 (0.812)	-0.02633 (0.1194)	1.488 (0.905)	0.01356 (0.1049)	2.285*** (0.819)	0.3328 (0.1356)
Constant	-0.355 (0.767)		-2.382** (1.005)		-2.215** (0.986)	

(Y₅): Number of observations = 148; Wald chi2(30) = 50.73; Prob > chi2 = 0.0104; Log pseudolikelihood = -158.22404

*** p<0.01, ** p<0.05, * p<0.1, Standard errors are in parentheses; The reference category is to not be part of any networks. The reference category for Main Income Stream is “*Personal savings and external subsidies*”, while for Ownership it is “*Own the space*”.

5.1.2.6. Interaction with medium and large firms

The model with interaction with medium and large firms as the dependent variable does not show problems concerning multicollinearity. Nevertheless, the Breusch-Pagan test detects heteroscedasticity in the model, meaning that the standard deviation of the independent variables is not constant (see Annexes A5 and A6). Thus, robust standard errors are used in the regression model to account for heteroscedasticity.

Table 42 presents the regression models regarding CWS’ interactions with medium and large firms, locally rooted industries, NGOs, and community organisations.

Table 42: Results of the simple probit models for the CWS’ interactions with medium and large firms, NGOs, and community organisations, and results of the ordered probit model for the CWS’ interaction with locally rooted industries.

VARIABLES	(Y ₆) Firms’ interaction	(Y ₇) locally rooted industries’ interaction	(Y ₈) NGOs’ interaction	(Y ₉) Community organisations’ interaction
Location	0.641*** (0.249)	-0.126 (0.214)	0.578** (0.243)	0.0732 (0.258)
Size	8.30e-06 (5.28e-05)	1.64e-05** (1.83e-05)	0.000148* (8.23e-05)	0.000142* (7.48e-05)
Full-time labour	0.000945 (0.000616)	-0.000120 (0.000384)	0.000309 (0.000660)	0.000202 (0.000606)
Volunteer labour	0.00606* (0.00340)	0.000430 (0.00283)	0.0108 (0.00792)	0.00681 (0.00529)
Curation of the CWS	-0.0112** (0.00500)	0.0101** (0.00418)	0.0148*** (0.00511)	0.0170*** (0.00591)
Professional hard infrastructure	1.142** (0.562)	0.124 (0.452)	0.0146 (0.552)	-0.537 (0.508)
Main Income Stream (Mix of streams)	0.482 (0.325)	-0.230 (0.277)	0.270 (0.329)	-0.249 (0.355)
Main Income Stream (Market streams)	0.414 (0.321)	-0.229 (0.269)	0.112 (0.298)	-0.0937 (0.319)
Ownership (Rent of the space)	0.340 (0.295)	-0.0603 (0.257)	-0.160 (0.289)	-0.370 (0.289)

Ownership (Free concession of the CWS)	0.512 (0.435)	0.0993 (0.356)	0.464 (0.477)	0.391 (0.534)
/cut1	-0.922 (0.561)	-0.0205 (0.469)	-0.592 (0.501)	0.568 (0.484)
/cut2		1.402*** (0.479)		

(Y₆): Number of obs = 142; Wald chi2(10) = 27.31; Prob > chi2 = 0.0023; Log pseudolikelihood = -68.809259; Pseudo R2 = 0.1850

(Y₇): Number of obs = 138; LR chi2(10) = 10.47; Prob > chi2 = 0.3999; Log pseudolikelihood = -133.04878; Pseudo R2 = 0.0379

(Y₈): Number of obs = 149; Wald chi2(10) = 24.40; Prob > chi2 = 0.0066; Log pseudolikelihood = -69.867554; Pseudo R2 = 0.1520

(Y₉): Number of obs = 149; Wald chi2(10) = 16.52; Prob > chi2 = 0.0856; Log pseudolikelihood = -67.466278; Pseudo R2 = 0.1296

Standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference category for Main Income Stream is “*Personal savings and external subsidies*”, while for Ownership it is “Own the space”.

The regression model on interaction with medium and large firms is statistically significant at a 1% level, and its regressors can explain 18.5% of the variance of the dependent variable. Results show a positive and statistically significant relationship between the location of CWS in cities and the interaction with such firms at a 1% significance level. More specifically, CWS located in cities are 17.4% more likely to interact with medium and large firms than the ones located outside cities, as shown by Table 43, which describes the marginal effects of the model. Moreover, CWS employing more volunteer labour have a greater likelihood of interacting with such firms at a 10% significance level. Each additional hour of volunteer work per week enhances the probabilities of interacting with medium and large firms by 0.165%. Furthermore, CWS with a better professional hard infrastructure are more likely to interact with such firms, while better curation of the CWS from a social perspective reduces the likelihood of interacting with medium and large firms; both these relationships are statistically significant at a 5% level. Each additional facility provided by the CWS increases the probability of interaction by 31.1%, whereas each additional

1% of working time spent socially curating the CWS decreases the chances of interacting with medium and large firms by 0.306%.

Table 43: Marginal effects for the regression model on the interaction with medium and large firms.

Interaction with medium and large firms	Marginal effects	Standard errors
Location	0.174***	(0.0636)
Size	2.26e-06	(1.44e-05)
Full-time labour	0.000257	(0.000169)
Volunteer labour	0.00165*	(0.000931)
Curation of the CWS	-0.00306**	(0.00129)
Professional hard infrastructure	0.311**	(0.145)
Main Income Stream (Mix of streams)	0.140	(0.0957)
Main Income Stream (Income streams)	0.122	(0.0977)
Ownership (Rent of the space)	0.0968	(0.0856)
Ownership (Free concession of the CWS)	0.140	(0.111)

Standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference category for Main Income Stream is “*Personal savings and external subsidies*”, while for Ownership it is “*Own the space*”.

5.1.2.7. Partnership with locally rooted industries

The model applied for the dependent variable indicating the interaction with locally rooted industries is an ordered probit model, which does not presents issues related either to multicollinearity or to heteroscedasticity. Nonetheless, the LR chi-square of 10.47 is not statistically significant (p-value of 0.3999), meaning either that the sample size is too small or that the chosen independent variables cannot explain the variation in the interaction with locally rooted industries due to the absence of other key explanatory variables, which instead would explain the variance of the dependent variable.

5.1.2.8. Third sector’ support

This paragraph illustrates the results of the models regarding the interactions with organisations from the third sector.

Firstly, the model on NGOs does not present any issues with multicollinearity, but the standard deviation of its independent variables is not constant (see Annexes A5 and A6). Hence, the model is adjusted by applying robust standard errors. The regression model is statistically significant at a 1% level (Wald chi-square of 24.40 and its p-value of 0.0066), and 15.2% of the variance of the dependent variable is explained by the selected regressors.

Observing the results of the model, there is a positive correlation between location and the interaction with NGOs at a 5% significance level. In this regard, as shown in Table 44, CWS in cities are 15.3% more likely to interact with NGOs than the ones outside cities. Moreover, the probability of interacting with NGOs is directly proportional to the size of CWS with a level of significance of 10%. Each additional square meter results in an increase in the likelihood of interacting with NGOs by 0.00391%, or alternatively by 3.91% every additional 1,000 m². Finally, with a strong statistical significance of 1%, a 1% increase in working time spent for social curation of the CWS translates into a 0.391% increase in the probability of interaction with NGOs.

Table 44: Marginal effects for the regression model on the interaction with NGOs.

Interaction with NGOs	Marginal effects	Standard errors
Location	0.153**	(0.0626)
Size	3.91e-05*	(2.21e-05)
Full-time labour	8.17e-05	(0.000173)
Volunteer labour	0.00286	(0.00202)
Curation of the CWS	0.00391***	(0.00125)
Professional hard infrastructure	0.00387	(0.146)
Main Income Stream (Mix of streams)	0.0709	(0.0862)
Main Income Stream (Income streams)	0.0307	(0.0822)
Ownership (Rent of the space)	-0.0433	(0.0762)
Ownership (Free concession of the CWS)	0.102	(0.0979)

Standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference category for Main Income Stream is “*Personal savings and external subsidies*”, while for Ownership it is “Own the space”.

Similarly to the previous one, the model on the interaction with community organisations is not characterised by multicollinearity, but it is characterised by heteroscedasticity (see Annexes A5 and A6). Thus, it is regressed with robust standard errors to solve the issue of heterogeneity of variance. The model is statistically significant at a 10% level, and the regressors are able to explain 12.96% of the variance of the dependent variable. As shown in Table 45, the variable accounting for the size of CWS and the interaction with community organisations are positively correlated and statistically significant at a 10% level. Each additional square meter enhances the likelihood of interaction with community organisations by 0.00364%. Furthermore, CWS that invest more working time in curating the CWS from a social perspective are more likely to interact with such organisations. A 1% increase in working time spent curating the CWS results in a 0.436% increase in the probability of interacting with community organisations.

Table 45: Marginal effects for the regression model on the interaction with community organisations.

Interaction with community organisations	Marginal effects	Standard errors
Location	0.0188	(0.0659)
Size	3.64e-05*	(1.97e-05)
Full-time labour	5.16e-05	(0.000154)
Volunteer labour	0.00175	(0.00132)
Curation of the CWS	0.00436***	(0.00138)
Professional hard infrastructure	-0.138	(0.131)
Main Income Stream (Mix of streams)	-0.0644	(0.0918)
Main Income Stream (Income streams)	-0.023	(0.0775)
Ownership (Rent of the space)	-0.0945	(0.0692)
Ownership (Free concession of the CWS)	0.0723	(0.087)

Standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference category for Main Income Stream is “*Personal savings and external subsidies*”, while for Ownership it is “Own the space”.

After having analysed the interactions with NGOs and community organisations, Table 46 outlines the regression models for the last four typologies of organisations from the third sector: social enterprises, charities, neighbourhood groups, and labour associations.

Table 46: Results of the simple probit models for the CWS' interactions with social enterprises, charities, neighbourhood groups, and labour associations.

VARIABLES	(Y ₁₀) Social enterprises' interaction	(Y ₁₁) Charities' interaction	(Y ₁₂) Neighbourhood groups' interaction	(Y ₁₃) Labour associations' interaction
Location	0.385 (0.244)	-0.0372 (0.243)	-0.157 (0.238)	0.161 (0.243)
Size	0.000155* (8.25e-05)	5.23e-05 (6.28e-05)	5.90e-05 (5.39e-05)	0.000133* (7.56e-05)
Full-time labour	0.000395 (0.000740)	0.000371 (0.000465)	-0.000183 (0.000453)	-0.000498 (0.000520)
Volunteer labour	0.00554 (0.00529)	0.0124** (0.00638)	0.0118** (0.00498)	0.0137*** (0.00528)
Curation of the CWS	0.0105** (0.00480)	0.0157*** (0.00486)	0.00952** (0.00470)	0.0140*** (0.00461)
Professional hard infrastructure	0.651 (0.512)	0.611 (0.509)	-0.722 (0.508)	0.374 (0.504)
Main Income Stream (Mix of streams)	-0.124 (0.328)	0.135 (0.320)	-0.0114 (0.323)	0.447 (0.313)
Main Income Stream (Market streams)	-0.241 (0.299)	0.276 (0.309)	-0.201 (0.296)	-0.0761 (0.298)
Ownership (Rent of the space)	0.00813 (0.284)	-0.183 (0.282)	-0.239 (0.262)	-0.247 (0.282)
Ownership (Free concession of the CWS)	0.400 (0.435)	-0.134 (0.426)	0.336 (0.442)	-0.340 (0.415)
Constant	-0.699 (0.493)	-1.087** (0.493)	0.705 (0.490)	-1.224** (0.492)

(Y₁₀): Number of obs = 149; Wald chi2(10) = 17.90; Prob > chi2 = 0.0567; Log pseudolikelihood = -76.243773; Pseudo R2 = 0.1204

(Y₁₁): Number of obs = 149; LR chi2(10) = 22.06; Prob > chi2 = 0.0148; Log pseudolikelihood = -86.536346; Pseudo R2 = 0.1130

(Y₁₂): Number of obs = 149; Wald chi2(10) = 17.19; Prob > chi2 = 0.0704; Log pseudolikelihood = -84.58673; Pseudo R2 = 0.1165

(Y₁₃): Number of obs = 149; LR chi2(10) = 30.28; Prob > chi2 = 0.0008; Log pseudolikelihood = -87.976367; Pseudo R2 = 0.1468

Standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference category for Main Income Stream is "Personal savings and external subsidies", while for Ownership it is "Own the space".

The regression model dealing with interaction with social enterprises does not present correlation between independent variables, while the standard deviations of its regressors are not constant (see Annexes A5 and A6). Hence, robust standard errors are added to the regression model.

Similarly to the previous model dealing with community organisations, the likelihood of interacting with social enterprises is positively correlated to the size of the space at a 10% significance level, as well as to the curation of the CWS at a 5% significance level. Following Table 47, each additional square meter translates into a 0.00452% increase in the probability of interaction with social enterprises, while each additional 1% in socially curating the space results in a 0.304% greater likelihood of such interaction.

Table 47: Marginal effects for the regression model on the interaction with social enterprises.

Interaction with social enterprises	Marginal effects	Standard errors
Location	0.112	(0.0687)
Size	4.52e-05*	(2.42e-05)
Full-time labour	0.000115	(0.000213)
Volunteer labour	0.00161	(0.00152)
Curation of the CWS	0.00304**	(0.00133)
Professional hard infrastructure	0.189	(0.148)
Main Income Stream (Mix of streams)	-0.0345	(0.0912)
Main Income Stream (Income streams)	-0.069	(0.0841)
Ownership (Rent of the space)	0.00245	(0.0857)
Ownership (Free concession of the CWS)	0.108	(0.111)

Standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference category for Main Income Stream is “Personal savings and external subsidies”, while for Ownership it is “Own the space”.

Then, the regression model addressing the interaction with charities was also tested for multicollinearity and heteroscedasticity, which do not pose any problem (see Annexes A5 and A6). The LR chi-squared of 22.06 is statistically significant at a 5% level, and the pseudo coefficient of determination indicates that the regressors can explain 11.3% of the variance of the dependent variable.

Observing the results, CWS that rely more on volunteer labour and invest more time in curating the CWS have a greater probability of interacting with charities at a 5% and 1% significance levels, respectively. According to Table 48, which indicates the marginal effects of the independent variables on the dependent one, each additional weekly hour of volunteer work results in a 0.41% increase in the probability of interaction with charities, as well as each 1% rise in the time spent socially curating the CWS leads to a greater likelihood of interaction by 0.519%.

Table 48: Marginal effects for the regression model on the interaction with charities.

Interaction with charities	Marginal effects	Standard errors
Location	-0.0123	(0.0804)
Size	1.73e-05	(2.06e-05)
Full-time labour	0.000123	(0.000153)
Volunteer labour	0.00410**	(0.00205)
Curation of the CWS	0.00519***	(0.00144)
Professional hard infrastructure	0.202	(0.166)
Main Income Stream (Mix of streams)	0.0456	(0.108)
Main Income Stream (Income streams)	0.0917	(0.103)
Ownership (Rent of the space)	-0.0597	(0.09)
Ownership (Free concession of the CWS)	-0.0433	(0.138)

Standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference category for Main Income Stream is “*Personal savings and external subsidies*”, while for Ownership it is “*Own the space*”.

Subsequently, the model dealing with neighbourhood groups is not characterised by multicollinearity, but it requires robust standard errors due to the heteroscedasticity (see Annexes A5 and A6). Additionally, the model is statistically significant at a 10% level, with a Wald chi-square of 17.19. The pseudo coefficient of determination suggests that the independent variables are able to explain 11.65% of the variance of the outcome variable.

Similarly to the model addressing the interaction with charities, this model also shows a positive correlation with volunteer labour and social curation of the CWS, both at a 5% significance level. As presented in Table 49, for each additional hour per week of

volunteer work and for each 1% increase in work time on the curation of CWS, the likelihood of interacting with neighbourhood groups increases by 0.381% and 0.307%, respectively.

Table 49: Marginal effects for the regression model on the interaction with neighbourhood groups.

Interaction with neighbourhood groups	Marginal effects	Standard errors
Location	-0.0508	(0.0769)
Size	1.91e-05	(1.72e-05)
Full-time labour	-5.89e-05	(0.000146)
Volunteer labour	0.00381**	(0.00153)
Curation of the CWS	0.00307**	(0.00146)
Professional hard infrastructure	-0.233	(0.162)
Main Income Stream (Mix of streams)	-0.00362	(0.102)
Main Income Stream (Income streams)	-0.0658	(0.0964)
Ownership (Rent of the space)	-0.079	(0.0849)
Ownership (Free concession of the CWS)	0.0969	(0.12)

Finally, the model on the interaction with labour associations does not present issues related to multicollinearity and heteroscedasticity (see Annexes A5 and A6), and it is statistically significant at a 1% level, with an LR chi-square of 30.28. The pseudo R_2 indicates that the regressors explain 14.68% of the variance of the outcome variable. The independent variables that positively influence the interaction with labour associations are size of CWS, volunteer labour, and curation of the CWS, at a 10%, 1%, and 1% significance levels (Table 50). Each additional square meter increases the likelihood of interaction with labour associations by a 0.00446%, each additional weekly hour of volunteer work enhances the chances of such interaction by 0.461%; and each 1% increase in working time destined for socially curating the CWS results in a 0.472% greater probability of interacting with labour associations.

Table 50: Marginal effects for the regression model on the interaction with labour associations.

Interaction with labour associations	Marginal effects	Standard errors
Location	0.054	(0.0812)

Size	4.46e-05*	(2.47e-05)
Full-time labour	-0.000167	(0.000173)
Volunteer labour	0.00461***	(0.00165)
Curation of the CWS	0.00472***	(0.00141)
Professional hard infrastructure	0.126	(0.169)
Main Income Stream (Mix of streams)	0.155	(0.107)
Main Income Stream (Income streams)	-0.026	(0.102)
Ownership (Rent of the space)	-0.0825	(0.0934)
Ownership (Free concession of the CWS)	-0.113	(0.135)

Standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference category for Main Income Stream is “Personal savings and external subsidies”, while for Ownership it is “Own the space”.

5.2. Social inclusion

The dimension of social inclusion includes 9 dependent variables. These outcome variables are meant to capture the role of CWS in fostering dynamics of social inclusion, and their descriptive statistics are presented in Table 51.

Table 51: Descriptive statistics of the dependent variables accounting for the role of CWS in fostering social inclusion.

	Dependent variable (Y)	Obs	Mean (μ)	Std. Dev. (σ)	Min	Max
1	Free membership	247	0.344	0.476	0	1
2	Free use of the space	247	0.389	0.488	0	1
3	Training and workshops	247	0.235	0.425	0	1
4	Employment for disadvantaged groups	222	0.180	0.385	0	1
5	Training and workshops for long-term unemployed	247	0.154	0.362	0	1
6	Training and workshops for NEETs	247	0.154	0.362	0	1
7	Training and workshops for migrants	247	0.142	0.349	0	1
8	Training and workshops for disabled individuals	247	0.186	0.390	0	1
9	Training and workshops for women	247	0.101	0.302	0	1

5.2.1. Dependent variables

This section presents the dependent variables accounting for the role of CWS in fostering social inclusion.

5.2.1.1. Benefits for disadvantaged groups

The first three outcome variables address the benefits that CWS provide to long-term unemployed, NEETs, economic migrants and refugees, and disabled persons. These can be free or discounted membership (34.4% of CWS), free or discounted use of the space for events and gatherings (38.9% of CWS), and training and workshops (23.5% of CWS).

As shown in Table 52, the offering of such benefits does not appear to be particularly influenced by the location of the CWS. As regards the size, large CWS are more likely to offer free or discounted use of the space for events & gatherings (45%), whilst it is more likely that medium CWS offer free or discounted membership (41%), as well as training and workshops (31%). Then, CWS that mainly rely on personal funds and subsidies are more likely to offer free or discounted use of the space for events & gatherings (48%) and training and workshops (42%), while CWS that rely on a mix of income streams are more likely to offer free or discounted membership (41%). CWS mainly relying on market streams overall are less likely to offer benefits for disadvantaged groups.

Table 52: Benefits to disadvantaged groups according to location, size, income streams, and in total.

		Free membership	Free use of the space	Training and workshops
Cities	Freq.	50	56	33
	%	35	40	23
Outside cities	Freq.	35	40	25
	%	33	38	24
Small CWS	Freq.	27	34	20
	%	35	44	26
Medium CWS	Freq.	32	24	24
	%	41	31	31
Large CWS	Freq.	22	32	14
	%	31	45	20

Personal funds and External subsidies	Freq.	20	30	26
	%	32	48	42
Mix	Freq.	28	28	14
	%	41	41	20
Market streams	Freq.	30	35	16
	%	28	33	15
Total	Freq.	85	96	58
	%	34	39	23

5.2.1.2. Employment for disadvantaged groups

The fourth dependent variable deals with the presence of employees in CWS coming from disadvantaged groups such as previously long-term unemployed, previously NEETs, economic migrants and refugees, and disabled persons.

Among the 161 CWS that stated to have at least one full-time employee, 28 of them hired at least one full-time employee coming from disadvantaged groups. Furthermore, 33 out of 123 CWS have at least one part-time employee affirmed to have at least one of them coming from disadvantaged groups. Overall, 40 out of 222 CWS have at least one employee coming from disadvantaged groups, accounting for 18% of CWS (Table 53). Additionally, 21% of CWS located in cities and 14% of the ones outside cities have at least one employee from such groups. The employment of individuals from disadvantaged groups is directly proportional to the size of the CWS, and it appears to be more common in CWS mainly relying on market streams rather than the ones mainly counting on personal funds and external subsidies.

Table 53: Presence in CWS of at least one employee coming from disadvantaged groups according to location, size, income streams, and in total.

Employment for disadvantaged groups			Large CWS	Freq.	16
				%	23
Cities	Freq.	27	Personal funds and External subsidies	Freq.	8
	%	21		%	14
Outside cities	Freq.	13	Mix	Freq.	11
	%	14		%	18
Small CWS	Freq.	11	Market streams	Freq.	21

	%	15		%	21
Medium CWS	Freq.	12	Total	Freq.	40
	%	17		%	18

5.2.1.3. Training and workshops

Finally, the last dependent variables relate to the previous outcome variable measuring the offering of training and workshops to disadvantaged groups. Each of these dependent variables focuses on a specific disadvantaged group: long-term unemployed (Y_5), NEETs (Y_6), economic migrants and refugees (Y_7), and disabled people (Y_8). Additionally, the ninth dependent variable addresses the offering of training and workshops directed to women (Y_9).

As shown in Table 54, training and workshops for long-term unemployed and NEETs are offered in 15% of CWS, for economic migrants and refugees in 14% of CWS, and for disabled individuals only in 10% of CWS. Moreover, 19% of CWS offer training and workshops directed to women. There are not notable differences between CWS located in cities and the ones outside cities, whilst it seems that CWS larger in size are more likely to offer such activities than the smaller ones. Finally, CWS mainly counting on personal funds and subsidies appear to be more inclined to offer training and workshops to all groups than the ones relying on market streams.

Table 54: Benefits to disadvantaged groups according to location, size, income streams, and in total.

		Long-term unemployed	NEETs	Migrants & refugees	Disabled individuals	Women
Cities	Freq.	21	23	22	14	28
	%	15	16	16	10	20
Outside cities	Freq.	17	15	13	11	18
	%	16	14	12	10	17
Small CWS	Freq.	11	12	14	8	15
	%	14	15	18	10	19
Medium CWS	Freq.	16	15	13	9	19
	%	21	19	17	12	24

Large CWS	Freq.	11	11	8	8	12
	%	15	15	11	11	17
Personal funds and External subsidies	Freq.	15	17	14	7	19
	%	24	27	23	11	31
Mix	Freq.	11	9	11	10	11
	%	16	13	16	14	16
Market streams	Freq.	11	11	9	7	15
	%	10	10	8	7	14
Total	Freq.	38	38	35	25	46
	%	15	15	14	10	19

5.2.2. Models and results

After defining the outcome variables regarding the role of CWS as promoters of social inclusion, this paragraph presents the regression models and their results. Similarly to the previous section on networking opportunities, these models apply the same set of independent variables. The equation of the regressions for the nine simple probit models is as follows:

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

Y_i indicates the dependent variable, which is different for each model, while X_i is a vector of independent and control variables describing the demographics and the input indicators presented before, and β_1 represents its vector of unknown parameters. As already mentioned, there are eight regressors: the location of the CWS, the size in square meters of the CWS, the total hours per week of paid work to full-time employees, the total hours per week of volunteer work, the percentage of labour devoted to curating the space from a social perspective, the presence of professional hard infrastructure, the main income streams of the CWS, and the ownership status of the CWS. Finally, β_0 is the intercept term, and ε_i is the unobserved error term.

5.2.2.1. Benefits to disadvantaged groups

Table 55 presents the three simple probit models related to the offering of benefits to disadvantaged groups from CWS, namely *free or discounted membership*, *free or discounted use of the space for events and gatherings*, and *training and workshops*. Furthermore, it outlines the simple probit model concerning the employment of individuals from such groups, which is discussed later on.

Despite the fact that all three models (Y_1 , Y_2 , Y_3) do not present issues concerning multicollinearity and heteroscedasticity (see Annexes A5 and A6), only the one related to the offering of training and workshops (Y_3) has an LR chi-squared which is statistically significant at a 5% level. Therefore, the selected independent variables are not able either to explain the variation in the offering of free or discounted membership fees or the variation in the offering of free or discounted space for gathering and events given the lack of other crucial regressors which would be able to capture such variance. Nonetheless, the model regarding the offering of training and workshops to disadvantaged groups has a statistically significant LR chi-square of 22.58 (p-value of 0.0124), and its pseudo coefficient of determination indicates that the independent variables can explain 12.54% of the variance of the outcome variable.

Table 55: Results of the simple probit models regarding the offer to disadvantaged groups of free or discounted membership, free use of the space, and training and workshops, as well as concerning the presence of employees working in the CWS coming from disadvantaged groups.

VARIABLES	(Y ₁) Free membership	(Y ₂) Free use of the space	(Y ₃) Training & workshops	(Y ₄) Employment for disadvantaged groups
Location	-0.125 (0.234)	0.268 (0.234)	0.0671 (0.250)	0.220 (0.267)
Size	-6.05e-05 (6.99e-05)	-9.71e-06 (2.36e-05)	-0.000161 (0.000112)	1.86e-05 (2.36e-05)
Full-time labour	0.000524	0.000211	0.000769*	0.00156**

	(0.000425)	(0.000416)	(0.000454)	(0.000744)
Volunteer labour	0.00450	-0.00178	0.00479	0.00406
	(0.00369)	(0.00345)	(0.00318)	(0.00333)
Curation of the CWS	0.00606	-0.000439	0.00854*	0.00603
	(0.00439)	(0.00442)	(0.00466)	(0.00483)
Professional hard infrastructure	0.812	-0.195	0.451	1.325**
	(0.511)	(0.494)	(0.536)	(0.621)
Main Income Stream (Mix of streams)	0.196	0.256	-0.268	0.419
	(0.300)	(0.299)	(0.317)	(0.378)
Main Income Stream (Market streams)	-0.00836	-0.0359	-0.322	0.395
	(0.293)	(0.294)	(0.312)	(0.377)
Ownership (Rent of the space)	0.102	0.00582	-0.144	-0.167
	(0.275)	(0.276)	(0.294)	(0.319)
Ownership (Free concession of the CWS)	0.115	0.526	0.350	-0.822
	(0.392)	(0.383)	(0.402)	(0.617)
Constant	-1.279**	-0.416	-1.141**	-2.773***
	(0.499)	(0.473)	(0.527)	(0.624)

(Y₁): Number of obs = 148; LR chi2(10) = 12.29; Prob > chi2 = 0.2659; Log pseudolikelihood = -94.143302; Pseudo R2 = 0.0613

(Y₂): Number of obs = 148; LR chi2(10) = 5.45; Prob > chi2 = 0.8590; Log pseudolikelihood = -95.437193; Pseudo R2 = 0.0278

(Y₃): Number of obs = 148; LR chi2(10) = 22.58; Prob > chi2 = 0.0124; Log pseudolikelihood = -78.775286; Pseudo R2 = 0.1254

(Y₄): Number of obs = 149; Wald chi2(10) = 22.56; Prob > chi2 = 0.0125; Log pseudolikelihood = -62.39705; Pseudo R2 = 0.2080

Standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference category for Main Income Stream is "Personal savings and external subsidies", while for Ownership it is "Own the space".

As shown in Table 56, there is a negative and statistically significant relationship between paid labour and the offering of training and workshops to disadvantaged groups at a 10% level. Each additional hour of paid labour decreases the likelihood of offering such training and workshops by 0.0232%. Moreover, the social curation of the CWS positively influences the probability of having training and workshops in the CWS at a 10% level of significance. Each 1% increase in time devoted to the social curation of the CWS enhances the likelihood of offering such training and workshops by 0.258%.

Table 56: Marginal effects for the regression model on the offering of training and workshops to disadvantaged groups in CWS.

Training and workshops	Marginal effects	Standard errors
Location	0.0202	(0.0754)
Size	-4.85e-05	(3.34e-05)

Full-time labour	-0.000232*	(0.000133)
Volunteer labour	0.00144	(0.000942)
Curation of the CWS	0.00258*	(0.00136)
Professional hard infrastructure	0.136	(0.161)
Main Income Stream (Mix of streams)	-0.0859	(0.102)
Main Income Stream (Income streams)	-0.102	(0.102)
Ownership (Rent of the space)	-0.0437	(0.0903)
Ownership (Free concession of the CWS)	0.117	(0.137)

Standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference category for Main Income Stream is “Personal savings and external subsidies”, while for Ownership it is “Own the space”.

5.2.2.2. Employment for disadvantaged groups

The regression model accounting for the presence of employees in the CWS part of disadvantaged groups (Y_4) does not present problems of multicollinearity, but it is characterised by heteroscedasticity (see Annexes A5 and A6). Once adjusted with robust standard errors, the model is statistically significant, with a Wald chi-square of 22.56 and a p-value of 0.0125. The pseudo r-squared indicates that the explanatory variables are able to explain 20.8% of the variance of the dependent variable.

Table 57 illustrates the marginal effects between the dependent variable and its independent variables. As concerns full-time labour in CWS, each hour increase in paid labour translates into a 0.0365% greater likelihood of having employees coming from disadvantaged groups, at a 5% significance level. Furthermore, for each additional professional facility, there is a 30.9% higher probability of having employees from disadvantaged groups at a 5% significance level.

Table 57: Marginal effects for the regression model on the employment of individuals from disadvantaged groups.

Employment for disadvantaged groups	Marginal effects	Standard errors
Location	0.0515	(0.0625)
Size	4.35e-06	(5.55e-06)
Full-time labour	0.000365**	(0.000164)
Volunteer labour	0.000948	(0.000785)
Curation of the CWS	0.00141	(0.00109)
Professional hard infrastructure	0.309**	(0.142)

Main Income Stream (Mix of streams)	0.0904	(0.0794)
Main Income Stream (Income streams)	0.0842	(0.0765)
Ownership (Rent of the space)	-0.0426	(0.0828)
Ownership (Free concession of the CWS)	-0.163	(0.100)

Standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference category for Main Income Stream is “*Personal savings and external subsidies*”, while for Ownership it is “Own the space”.

5.2.2.3. Training and workshops

Finally, Table 58 shows the regression models regarding the offering of training and workshops to long-term unemployed (Y_5), NEETs (Y_6), economic migrants and refugees (Y_7), disabled people (Y_8), and women (Y_9).

After performing the test for multicollinearity through the VIF technique and the Breusch-Pagan test for heteroscedasticity, all five regression models do not present issues regarding multicollinearity, but the standard deviations of their dependent variables are non-constant, meaning that all the models are characterised by heteroscedasticity (see Annexes A5 and A6). Thus, the standard errors of the five models are adjusted by applying robust ones. Nonetheless, none of the five models is statistically significant at a 10% level. Consequently, the selected explanatory variables cannot explain the variation in the provision of training and workshops for long-term unemployed, NEETs, economic migrants and refugees, disabled individuals, and women, probably because some independent variables essential to explain such variance are missing in the regression models.

Table 58: Results of the simple probit models regarding the offer of training and workshops to long-term unemployed, NEETs, economic migrants and refugees, disabled people, and women.

VARIABLES	(Y_5) Long-term Unemployed	(Y_6) NEETs	(Y_7) Migrants & refugees	(Y_8) Disabled people	(Y_9) Women
Location	0.0854 (0.274)	0.316 (0.270)	0.105 (0.267)	-0.00312 (0.280)	0.167 (0.254)
Size	-7.61e-05 (9.26e-05)	-6.99e-05 (6.85e-05)	-0.000112 (0.000114)	-4.83e-05 (7.27e-05)	-0.000136 (0.000102)

Full-time labour	-0.000144 (0.000365)	0.000546 (0.000426)	0.000720* (0.000385)	0.000649 (0.000450)	0.000913* (0.000482)
Volunteer labour	0.00298 (0.00337)	0.000643 (0.00332)	0.00706 (0.00508)	0.00449 (0.00349)	0.00359 (0.00382)
Curation of the CWS	0.0106** (0.00479)	0.00927** (0.00466)	0.00593 (0.00469)	0.00340 (0.00526)	0.00484 (0.00441)
Professional hard infrastructure	0.601 (0.566)	-0.264 (0.551)	-0.116 (0.559)	-0.0754 (0.621)	0.136 (0.552)
Main Income Stream (Mix of streams)	0.107 (0.337)	-0.0792 (0.326)	0.290 (0.325)	0.654* (0.353)	-0.0951 (0.323)
Main Income Stream (Market streams)	0.0171 (0.333)	-0.321 (0.322)	-0.191 (0.326)	0.132 (0.369)	-0.209 (0.304)
Ownership (Rent of the space)	-0.417 (0.313)	-0.00346 (0.305)	0.216 (0.332)	-0.193 (0.323)	-0.0819 (0.305)
Ownership (Free concession of the CWS)	-0.0175 (0.401)	0.0429 (0.392)	0.0568 (0.451)	-0.269 (0.464)	-0.198 (0.412)
Constant	-1.644*** (0.517)	-1.082** (0.478)	-1.425*** (0.498)	-1.428** (0.563)	-1.022** (0.474)

(Y₅): Number of obs = 148; Wald chi2(10) = 9.86; Prob > chi2 = 0.4525; Log pseudolikelihood = -67.969931; Pseudo R2 = 0.0717

(Y₆): Number of obs = 148; Wald chi2(10) = 10.56; Prob > chi2 = 0.3928; Log pseudolikelihood = -71.488125; Pseudo R2 = 0.0748

(Y₇): Number of obs = 148; Wald chi2(10) = 14.12; Prob > chi2 = 0.1675; Log pseudolikelihood = -64.26215; Pseudo R2 = 0.1223

(Y₈): Number of obs = 148; Wald chi2(10) = 8.37; Prob > chi2 = 0.5926; Log pseudolikelihood = -55.898516; Pseudo R2 = 0.0752

(Y₉): Number of obs = 148; Wald chi2(10) = 9.17; Prob > chi2 = 0.5165; Log pseudolikelihood = -75.705423; Pseudo R2 = 0.0780

Standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference category for Main Income Stream is "Personal savings and external subsidies", while for Ownership it is "Own the space".

5.3. Local cultural value

The dimension regarding local cultural value includes 5 dependent variables. These outcome variables are designed to capture the role of CWS in supporting culture on the local level. Their descriptive statistics are presented in Table 59.

Table 59: Descriptive statistics of the dependent variables accounting for the role of CWS in supporting local culture.

	Dependent variable (Y)	Obs	Mean (μ)	Std. Dev. (σ)	Min	Max
1	Artists	241	0.564	0.497	0	1
2	Permanent studios	241	0.199	0.400	0	1
3	Residency programs	241	0.133	0.340	0	1

4	Exhibitions and events	241	0.402	0.491	0	1
5	Visitors	148	-2.328	1.503	-5.704	1.386

5.3.1. Dependent variables

This section presents the dependent variables accounting the role of CWS in supporting local culture.

5.3.1.1. Sustaining local culture

Interactions between artists and CWS are very frequent, with 56% of CWS having some kind of relationship with artists. The most common way is by offering them space for exhibitions and events, with roughly 40% of CWS stating that their venues generally host artistic exhibitions and events. Moreover, artists can have their permanent studios directly inside CWS. In this regard, one out of five CWS do host artists in their spaces permanently. Another common way of interacting with artists is through residency programs, with 13% of CWS that participate in such programs. Finally, very few artists could come as users of CWS to use or lend specific tools, equipment and machinery, to practise or rehearse sporadically, or for admin tasks.

Table 60 indicates that interactions with artists are more frequent in CWS located in cities than outside cities. Additionally, the frequency of interactions with artists seems to be directly proportional to the size of CWS, with larger CWS usually being more involved in organising artistic activities and being more likely to grant part of their space to artists than the small ones. Finally, CWS mainly counting on external subsidies and personal funds appear to have greater interaction with artists (66%) compared to the ones relying on market streams, even though the latter ones seem to be more likely to have permanent studios for artists (23% compared to 16%).

Table 60: Relationship between CWS and artists according to location, size, income streams, and in total.

		Artists	Permanent studios	Residency programs	Exhibitions & events
Cities	Freq.	85	31	20	64
	%	62	22	14	46
Outside cities	Freq.	51	17	12	33
	%	50	17	12	32
Small CWS	Freq.	39	13	8	25
	%	51	17	11	33
Medium CWS	Freq.	47	12	7	34
	%	61	16	9	44
Large CWS	Freq.	43	22	17	34
	%	62	32	25	49
Personal funds and External subsidies	Freq.	40	10	8	31
	%	66	16	13	51
Mix	Freq.	32	12	8	23
	%	49	18	12	35
Market streams	Freq.	59	24	15	39
	%	56	23	14	37
Total	Freq.	136	48	32	97
	%	56	20	13	40

5.3.1.2. Local community cultural engagement

Another element to consider when attempting to measure CWS' efforts to support art and create cultural value in their local contexts is the number of external individuals who participate in cultural activities offered by CWS. Table 61 illustrates the number of people engaging in cultural activities organised in CWS on a monthly basis, as well as the density of visitors, which is the number of individuals engaging in cultural activities organised monthly in CWS divided by the size of the CWS in square meters. This variable was created to control for the explanatory variable regarding the size of CWS, given the extremely high and positive correlation between the number of visitors and the size of CWS (correlation coefficient of 0.9073). On average, roughly 190 individuals participate on a monthly basis in cultural events organised by CWS. As one would expect, this average is greater in CWS in cities, with approximately 282

people attending each month, and lower in CWS located outside cities, with roughly 62 people per month. This large difference concerning the location of CWS reduces when controlling for the size of CWS, with a general average of 0.22 individuals per square meter, that increases to 0.24 individuals/m² for CWS in cities and decreases to 0.20 individuals/m² for the ones outside cities. Small CWS seems to have a greater density of visitors compared to larger ones. Vice versa, the number of visitors is higher for larger CWS. Furthermore, CWS mainly relying on personal funds and subsidies appear to have a lower number of visitors than CWS counting on market streams of income. Nonetheless, they have a greater density of visitors.

Table 61: Number of monthly visitors of cultural events in CWS and density of monthly visitors of the CWS, in cities, outside cities, and in total.

	Staff	Obs.	Mean (μ)	Std. Dev. (σ)	Min	Max
Cities	Number of visitors	112	281.96	1,898.12	0	20,000
	Density of visitors	105	0.24	0.51	0	4
Outside cities	Number of visitors	80	61.66	243.60	0	2,000
	Density of visitors	77	0.20	0.40	0	2
Small CWS	Number of visitors	62	34.85	52.57	0	250
	Density of visitors	62	0.41	0.70	0	4
Medium CWS	Number of visitors	63	42.83	68.58	0	400
	Density of visitors	63	0.13	0.17	0	0.8
Large CWS	Number of visitors	57	547.18	2659.37	0	20,000
	Density of visitors	57	0.13	0.28	0	1.54
Personal funds and subsidies	Number of visitors	52	75.21	197.99	0	1,400
	Density of visitors	50	0.29	0.43	0	2.22
Mix	Number of visitors	49	97.94	314.12	0	2,000
	Density of visitors	46	0.24	0.65	0	4
Market streams	Number of visitors	87	318.25	2149.90	0	20,000
	Density of visitors	83	0.18	0.35	0	2
Total	Number of visitors	192	190.17	1,459.53	0	20,000
	Density of visitors	182	0.22	0.46	0	4

5.3.2. Models and results

After defining the five dependent variables concerning the support of CWS to culture, this paragraph illustrates the regression models and their results.

5.3.2.1. Sustaining local culture

Similarly to the previous sections on networking opportunities and social inclusion, these models apply the same set of independent variables. The equation of the regressions for the four simple probit models is as follows:

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

Y_i indicates the dependent variable, which is different for each model, while X_i is a vector of independent and control variables describing the demographics and the input indicators presented before, and β_1 represents its vector of unknown parameters. As already mentioned, there are eight regressors: the location of the CWS, the size in square meters of the CWS, the total hours per week of paid work to full-time employees, the total hours per week of volunteer work, the percentage of labour devoted to curating the space from a social perspective, the presence of professional hard infrastructure, the main income streams of the CWS, and the ownership status of the CWS. Then, β_0 is the intercept term, and ε_i is the unobserved error term.

Table 62 outlines the results of the four regression models. All models are not characterised by multicollinearity, whereas the one regarding the presence of permanent artist studios in CWS (Y_2) and the participation in residency programs (Y_3) does have issues of heteroscedasticity (see Annexes A5 and A6). Hence, these two regression models are adjusted with robust standard errors. The first model is statistically significant at a 1% level, and its regressors can explain 17.73% of the variance of the relationship between CWS and artists. Conversely, the second model is not statistically significant (p-value of 0.2732); thus, the results cannot be

interpreted. Finally, both the third and fourth models are statistically at the 5% and 1% level, respectively.

Table 62: Results of the simple probit models on the support of CWS to local culture.

VARIABLES	(Y ₁) Artists	(Y ₂) Permanent studios	(Y ₃) Residency programs	(Y ₄) Exhibitions and events
Location	0.582** (0.258)	0.110 (0.253)	-0.120 (0.271)	0.728*** (0.253)
Size	0.000424** (0.000174)	6.31e-05 (5.01e-05)	6.68e-05 (5.69e-05)	0.000276** (0.000134)
Full-time labour	0.000199 (0.000481)	0.000130 (0.000367)	0.00118*** (0.000430)	0.000715 (0.000521)
Volunteer labour	0.00643 (0.00547)	-0.000267 (0.00322)	0.00394 (0.00303)	0.00425 (0.00459)
Curation of the CWS	0.00674 (0.00505)	0.00938** (0.00459)	0.00599 (0.00577)	-0.00283 (0.00479)
Professional hard infrastructure	-0.747 (0.536)	-0.702 (0.520)	-0.809 (0.541)	-0.910* (0.517)
Main Income Stream (Mix of streams)	-0.644* (0.345)	-0.0977 (0.343)	0.380 (0.385)	-0.454 (0.321)
Main Income Stream (Market streams)	-0.737** (0.330)	0.149 (0.317)	0.495 (0.387)	-0.803** (0.327)
Ownership (Rent of the space)	0.0781 (0.292)	0.500 (0.324)	-0.342 (0.336)	0.194 (0.294)
Ownership (Free concession of the CWS)	0.576 (0.471)	0.640 (0.428)	0.464 (0.441)	-0.116 (0.421)
Constant	0.305 (0.514)	-1.174** (0.546)	-1.078* (0.583)	0.353 (0.503)

(Y₁): Number of obs = 144; LR chi2(10) = 33.60; Prob > chi2 = 0.0002;
Log pseudolikelihood = -77.939127; Pseudo R2 = 0.1773

(Y₂): Number of obs = 144; Wald chi2(10) = 12.18; Prob > chi2 = 0.2732; Log pseudolikelihood = -75.121553; Pseudo R2 = 0.0845

(Y₃): Number of obs = 144; Wald chi2(10) = 18.52; Prob > chi2 = 0.0468; Log pseudolikelihood = -57.357377; Pseudo R2 = 0.1565

(Y₄): Number of obs = 144; LR chi2(10) = 33.52; Prob > chi2 = 0.0002;
Log pseudolikelihood = -82.930255; Pseudo R2 = 0.1681

Standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference category for Main Income Stream is "Personal savings and external subsidies", while for Ownership it is "Own the space".

Table 63 presents the marginal effects for the three statistically significant regression models. There is a positive and statistically significant relationship at a 5% level between artists and CWS located in cities. In fact, CWS in cities are 17.8% more likely to have some kind of relationship with artists compared to the ones located outside

cities. Moreover, larger CWS have a greater likelihood of interacting with artists at a 1% significance level, with a 0.013% increase in probability for each additional square meter. Then CWS mainly relying on subsidies and personal savings are respectively 18.9% and 21.9% more likely to interact with artists than CWS relying on a mix of income streams and the ones counting on market streams, at a 10% and 5% significance level.

As concerns the model on residency programs, the only statistically significant relationship is with the presence of paid labour in the CWS. For each additional weekly hour of paid labour, the likelihood of participating in residency programs increases by 0.026%, with a significance level of 1%.

Regarding the organisation of artistic exhibitions and cultural events, there are two statistically significant and positive relationships with the location and the size of CWS, at 1% and 5% respectively, while there are two statistically significant and negative relationships with the presence of hard infrastructure and the CWS that mainly count on market streams of income, at a 10% and 1% significance level. CWS in cities are 23.8% more likely to organise artistic exhibitions and cultural events than the ones outside cities. Then, for each additional square meter the likelihood of organising such events increases by 0.00901%. With regard to professional infrastructure, each additional professional facility results in a 29.7% decrease in the probability of organising exhibitions and events. Finally, CWS mainly relying on subsidies and personal savings are 26.3% more likely to organise such events than the ones counting on market streams.

Table 63: Marginal effects for the regression models on the relationship between CWS and artists, on the participation in residency programs, and on the organisation of artistic exhibitions and events.

	Artists		Residency programs		Exhibitions and events	
	Marginal effects	Standard errors	Marginal effects	Standard errors	Marginal effects	Standard errors
Location	0.178**	(0.0743)	-0.0265	(0.0590)	0.238***	(0.0746)
Size	0.00013***	(4.97e-05)	1.47e-05	(1.26e-05)	9.01e-05**	(4.20e-05)
Full-time labour	6.09e-05	(0.000147)	0.00026***	(8.97e-05)	0.000233	(0.000167)
Volunteer labour	0.00197	(0.00165)	0.000867	(0.000656)	0.00139	(0.00149)
Curation of the CWS	0.00206	(0.00152)	0.00132	(0.00126)	-0.000925	(0.00156)
Professional hard infrastructure	-0.229	(0.160)	-0.178	(0.118)	-0.297*	(0.163)
Main Income Stream (Mix of streams)	-0.189*	(0.0990)	0.0727	(0.0701)	-0.149	(0.104)
Main Income Stream (Income streams)	-0.219**	(0.0912)	0.0998	(0.0707)	-0.263***	(0.0990)
Ownership (Rent of the space)	0.0249	(0.0933)	-0.0750	(0.0786)	0.0631	(0.0948)
Ownership (Free concession of the CWS)	0.170	(0.133)	0.138	(0.135)	-0.0368	(0.133)

Standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference category for Main Income Stream is "Personal savings and external subsidies", while for Ownership it is "Own the space".

5.3.2.2. Local community cultural engagement

As regards the last model, the study applies a multiple linear regression model due to the fact that the dependent variable is continuous. When applying this typology of regression model, as a first step it is crucial to control whether the assumption of normality is met, namely if the residuals of the regression are normally distributed (Dougherty, 2016). To check for normality, the Shapiro-Wilk test and skewness and kurtosis tests are performed (see Annex A7). For both tests the p-value is lower than 0.05, which indicates that it is possible to reject the null hypothesis of normality in the distribution of residuals. Thus, they are not normally distributed. When a regression model is characterised by non-linearity of the residuals, the application of a log-linear

regression model is a widely used technique (Qin, 2020). Consequently, the dependent variable measuring the number of visitors per square meter is transformed in a logarithmic scale. The same tests are performed to check for the normality of distribution of the residuals. This time both tests cannot be rejected, meaning that the residuals are normally distributed. Moreover, the regression model does not present issues regarding either multicollinearity or heteroscedasticity (see Annexes A5 and A6). The following equation describes the applied log-linear regression model:

$$\ln(Y_i) = \beta_0 + \beta_1 X'_i + \varepsilon_i$$

Where Y_i is a continuous dependent variable, transformed in logarithmic scale, indicating the number of visitors per square meter of the CWS, and X'_i is a vector of observed independent variables that are applied all over the chapter. Table 64 presents the results of the regression model, which is statistically significant at a 1% level, and its coefficient of determination indicates that 31.52% of the variance of the outcome variable is explained by the set of regressors. By looking at the coefficients, volunteer labour and professional hard infrastructure are both statistically significant at a 1% level. Each additional weekly hour of volunteer work increases the visitors' density by 0.00991%. For instance, if the size of a CWS is 100 m², and considering the average density of visitors of 0.22 individuals per square meter in CWS, each additional weekly hour of volunteer work would increase the density of visitors by roughly 22 additional visitors per month ³⁰. Finally, each additional professional hard

³⁰ For each additional weekly hours of volunteer work a new density needs to be calculated as such: new density = old density × (1 + percentage Increase). Thus, the new density is of 0.2222 people/m² = 0.22 × (1 + 0.00991). Then, the new density is multiplied by the square meters. In case of 100 m², then the increase is of 22.22 people.

infrastructure present in the CWS decreases the density of visitors by 0.0412%. Following the previous example, if the size of a CWS is 100 m², and considering the average density of visitors of 0.22 individuals per square meter in CWS, each additional professional infrastructure present in the CWS would decrease the number of monthly visitors by approximately 21 people.

Table 64: Results of the simple probit models on the logarithmic value of the number of monthly visitors per square meter.

VARIABLES	(Y ₅) Ln (visitors/m2)
Location	0.332 (0.290)
Size	8.05e-06 (2.41e-05)
Full-time labour	5.25e-05 (0.000516)
Volunteer labour	0.00991*** (0.00358)
Curation of the CWS	0.000556 (0.00539)
Professional hard infrastructure	-3.188*** (0.610)
Main Income Stream (Mix of streams)	0.141 (0.374)
Main Income Stream (Market streams)	-0.119 (0.350)
Ownership (Rent of the space)	-0.0191 (0.346)
Ownership (Free concession of the CWS)	-0.250 (0.487)
Constant	-0.138 (0.615)

(Y₅): Number of obs = 110; F(10, 99) = 4.56; Prob > F = 0.0000; R2 = 0.3152

Standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference category for Main Income Stream is "Personal savings and external subsidies", while for Ownership it is "Own the space".

5.4. Environmental impact

The last dimension addresses the environmental impact of CWS, and it includes three dependent variables. These dependent variables are designed to shed light on the

patterns of CWS regarding the reuse of vacant buildings, renewable energy production, and electricity consumption. Their descriptive statistics are presented in Table 65.

Table 65: Descriptive statistics of the dependent variables regarding the environmental impact of CWS.

	Dependent variable (Y)	Obs	Mean (μ)	Std. Dev. (σ)	Min	Max
1	Reuse of vacant buildings	231	0.359	0.481	0	1
2	Renewable energy production	236	0.424	0.495	0	1
3	Electricity consumption per user	167	7.394	1.229	1.858	11.237

5.4.1. Dependent variables

This section presents the dependent variables accounting for the environmental impact of CWS.

5.4.1.1. Reuse of vacant buildings

Concerning the first dependent variable, Table 66 indicates the share of CWS located in formerly disused or abandoned buildings depending on the location, size, and main income streams of CWS. Generally, 36% of CWS are located in formerly disused or abandoned buildings. CWS located outside cities seems to be slightly more likely to be located in formerly vacant buildings than in cities (38% compared to 34% of CWS). Furthermore, the share of CWS located in formerly abandoned buildings increases remarkably depending on the size of CWS, with 48% in large CWS and only 30% in small-sized CWS. Finally, 51% of CWS that mainly rely on personal funds and external subsidies are located in such buildings, compared to only 25% of CWS that mainly count on market streams of income.

Table 66: share of CWS located in formerly vacant buildings according to location, size, income streams, and in total.

Reuse of vacant buildings			Large CWS	Freq.	34
				%	48
Cities	Freq.	44	Personal funds and External subsidies	Freq.	29
	%	34		%	51
Outside cities	Freq.	39	Mix	Freq.	25
	%	38		%	41
Small CWS	Freq.	22	Market streams	Freq.	26
	%	30		%	25
Medium CWS	Freq.	25	Total	Freq.	83
	%	34		%	36

5.4.1.2. Renewable energy production

The second dependent variable deals with the self-production of renewable energy from CWS. As shown in Table 67, 42% of CWS stated that they produce some amount of energy originating from renewable sources. Self-production seems to be more likely in CWS located outside cities, with 47% against 39% of them in CWS in cities. Moreover, the likelihood of self-producing renewable energies appears to increase with the size of CWS, with 49% of them in large CWS compared to 36% in small-sized CWS. Finally, self-production of renewable energy is more frequent in CWS mainly relying on market streams (47%) than in CWS mainly counting on personal funds and external subsidies (39%).

Table 67: share of CWS that rely on self-produced energy from renewable sources according to location, size, income streams, and in total.

Renewable energy production			Large CWS	Freq.	35
				%	49
Cities	Freq.	52	Personal funds and External subsidies	Freq.	23
	%	39		%	39
Outside cities	Freq.	48	Mix	Freq.	27
	%	47		%	43
Small CWS	Freq.	27	Market streams	Freq.	49
	%	36		%	47
Medium CWS	Freq.	35	Total	Freq.	100
	%	47		%	42

5.4.1.3. Electricity consumption per user

The third outcome variable indicates the average annual electricity consumption per user in kilowatt-hours in 2022. Table 68 shows that, on average annually, CWS consume 4,469 kWh per user. Comparing this figure to the electricity consumption per employee in traditional and commercial offices in the EU in 2021, which was on average 4,319 kWh/user (Odyssee-Mure, 2021³¹), it appears that there are no major differences between CWS and such offices. Moreover, the average annual electricity consumption is way higher in CWS outside cities (6,071 kWh/user) than in the ones in cities (3,379 kWh/user). As we would expect, large-sized CWS consume more electricity (6,119 kWh/user) than the small ones (3,398 kWh/user). Additionally, CWS relying on a mix of income streams appear to consume more electricity (7,855 kWh/user), compared to the ones counting on personal funds and external subsidies (2,492 kWh/user) or on market streams (3,302 kWh/user).

Table 68: average annual electricity consumption (kWh/user) in CWS in 2022 according to location, size, income streams, and in total.

Electricity consumption per user	Obs	Mean (μ)	Std. Dev. (σ)	Min	Max
Cities	100	3,379	7,590	96	55,863
Outside cities	68	6,071	16,115	6	108,827
Small CWS	51	3,398	10,463	6	75,867
Medium CWS	60	3,880	8,515	214	55,862
Large CWS	56	6,119	15,613	96	108,827
Personal funds and external subsidies	32	2,492	2,981	247	12,962
Mix	50	7,855	19,023	214	108,827
Market streams	83	3,302	7,446	96	55,863
Total	168	4,469	11,836	6	108,827

³¹ <https://www.odyssee-mure.eu/publications/efficiency-by-sector/services/offices-specific-energy-and-electricity-consumption.html>

5.4.2. Models and results

After defining the five dependent variables concerning the support of CWS to culture, this paragraph illustrates the regression models and their results.

Similarly to the previous sections on networking opportunities, social inclusion, and local cultural value, the three regression models presented apply the same set of independent variables. The equation of the regressions for the two simple probit models (Y_1, Y_2) is as follows:

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

Y_i indicates the dependent variable, which is different for each model, while X_i is a vector of independent and control variables describing the demographics and the input indicators presented before; β_1 represents its vector of unknown parameters, β_0 is the intercept term, and ε_i is the unobserved error term.

Furthermore, the regression model on electricity consumption (Y_3) is a multiple linear model given that the dependent variable is characterised by continuous values. As a consequence, it is crucial to control whether the residuals of the regression are normally distributed (Dougherty, 2016). As shown in Annex A7, the Shapiro-Wilk test and skewness and kurtosis tests are performed to check for normality. Both tests present a p-value which is lower than 0.05, indicating that it is possible to reject the null hypothesis of normality in the distribution of residuals. Hence, residuals are not normally distributed. Once again, the non-linearity of the residuals can be adjusted through the application of a log-linear regression model (Qin, 2020). Therefore, the outcome variable measuring the annual electricity consumption per user is

transformed in a logarithmic scale. The same tests are performed to check for the normality of distribution of the residuals. As shown in Annex A7, both tests cannot be rejected, indicating that the residuals are normally distributed. Additionally, the regression model does not present issues concerning multicollinearity and heteroscedasticity.

The following equation describes the log-linear regression model:

$$\ln(Y_i) = \beta_0 + \beta_1 X'_i + \varepsilon_i$$

Where Y_i is a continuous dependent variable, transformed in logarithmic scale, indicating the annual electricity consumption per user, and X'_i is the vector of independent variables already used for all regression models in this study.

Table 69 presents the results for the three regression models on reuse of vacant buildings, production of renewable energy, and annual electricity consumption per user. As shown in Annex A5 and A6, none of the three regression models present issues of multicollinearity, while only the regression model Y_3 is characterised by heteroscedasticity, namely the standard deviation of the independent variables is not constant. Thus, robust standard errors are applied to the regression. The first model on the reuse of vacant buildings (Y_1) is statistically significant at a 1% level, and its regressors can explain 17.42% of the variance of the dependent variable. Conversely, the second model on self-production of renewable energy is not statistically significant (p-value of 0.2003), meaning that the regressors cannot capture the variance of the outcome variable. Finally, the third model on electricity consumption per user is

statistically significant at a 1% level, and the independent variables can explain 12.93% of the variance of the dependent variable.

Table 69: Results of the regression models for the environmental impact of CWS.

VARIABLES	(Y ₁) Reuse of vacant buildings	(Y ₂) Renewable energy production	(Y ₃) Electricity consumption
Location	0.0838 (0.256)	-0.517** (0.239)	0.170 (0.224)
Size	0.000168** (7.58e-05)	1.86e-05 (3.41e-05)	1.08e-05 (1.17e-05)
Full-time labour	-0.000814 (0.000626)	0.000649 (0.000511)	3.64e-06 (0.000472)
Volunteer labour	0.00359 (0.00334)	0.00697* (0.00407)	0.00770*** (0.00263)
Curation of the CWS	0.00560 (0.00471)	-0.00364 (0.00446)	-0.00567 (0.00378)
Professional hard infrastructure	-0.0550 (0.551)	0.219 (0.498)	-0.0853 (0.445)
Main Income Stream (Mix of streams)	-0.309 (0.320)	0.137 (0.305)	0.693** (0.318)
Main Income Stream (Market streams)	-0.803** (0.320)	0.286 (0.297)	0.467* (0.244)
Ownership (Rent of the space)	-0.156 (0.286)	-0.0709 (0.271)	-0.620** (0.287)
Ownership (Free concession of the CWS)	0.769* (0.406)	-0.483 (0.397)	-0.860* (0.486)
Constant	-0.240 (0.509)	-0.0280 (0.486)	7.496*** (0.483)

(Y₁): Number of obs = 143; LR chi2(10) = 33.35; Prob > chi2 = 0.0002; Log pseudolikelihood = -79.058907; Pseudo R2 = 0.1742

(Y₂): Number of obs = 147; LR chi2(10) = 13.44; Prob > chi2 = 0.2003; Log pseudolikelihood = -95.144159; Pseudo R2 = 0.0660

(Y₃): Number of obs = 115; F(10, 104) = 3.93; Prob > F = 0.0001; R2 = 0.1293

Standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference category for Main Income Stream is “*Personal savings and external subsidies*”, while for Ownership it is “*Own the space*”.

5.4.2.1. Reuse of vacant buildings

Table 70 presents the marginal effects for the model on the reuse of vacant buildings.

With a level of significance of 5%, there is a positive relationship between the reuse of vacant buildings and the size of CWS. For each additional square meter, the likelihood of being located in a former abandoned building increases by 0.00525%.

Moreover, CWS that mainly rely on subsidies and personal savings are 27% more likely

to be located in such buildings than the ones counting on market streams, at a 5% significance level. Finally, CWS that received space loans from public institutions have a 26.8% greater probability of being located in formerly abandoned buildings compared to CWS which own directly their premises, at a 10% significance level.

Table 70: Marginal effects for the regression model on the reuse of vacant buildings.

Reuse of vacant buildings	Marginal effects	Standard errors
Location	0.0262	(0.0799)
Size	5.25e-05**	(2.26e-05)
Full-time labour	-0.000255	(0.000193)
Volunteer labour	0.00112	(0.00104)
Curation of the CWS	0.00175	(0.00145)
Professional hard infrastructure	-0.0172	(0.172)
Main Income Stream (Mix of streams)	-0.110	(0.113)
Main Income Stream (Income streams)	-0.270**	(0.109)
Ownership (Rent of the space)	-0.0513	(0.0949)
Ownership (Free concession of the CWS)	0.268*	(0.137)

Standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference category for Main Income Stream is “Personal savings and external subsidies”, while for Ownership it is “Own the space”.

5.4.2.2. Electricity consumption per user

As regards the model on electricity consumption per user, there is a positive and statistically significant relationship at a 1% level between volunteer work and electricity consumption. Each additional hour of volunteer work results in an approximate increase of 0.77% in the electricity consumption per user. Moreover, CWS mainly relying on market streams of income are more likely to consume roughly double the amount of electricity that is consumed in CWS mainly counting on personal savings and external subsidies, at a 10% level of significance. Similarly, CWS relying on a mix of financial streams consume 59.52% more electricity per user than the ones mainly counting on savings and subsidies, at a 5% significance level. Additionally, CWS that directly own their premises have a 46.21% higher electricity consumption per user than CWS renting their premises, at a 5% significance level, and a 57.68% greater

electricity consumption than CWS using their space for free from public institutions, at a 10% significance level.

5.5. Discussion

This section summarises the results from the regression models presented above, and it aims at conveying a few points of reflection on the social and environmental impacts of CWS, bearing in mind the limitations of the research regarding sample size and geographical representativity which are discussed in the next section.

All the proposed output and outcome indicators are meant to capture the effects and changes of the presence of CWS on their users and related communities for the different dimensions that are part of the proposed impact assessment framework, namely the social dimensions of networking opportunities, social inclusion, and local cultural value, as well as the environmental dimension of impact. All those indicators are outcome variables in the regression models presented above. For all regressions, the same set of independent variables was applied to identify the correlations between regressors and dependent variables and to point out the determinants influencing each specific output and outcome indicator. Table 71 illustrates all regression models and such correlations. The colour of the cells indicates whether the correlation between a dependent variable and an independent variable is positive (green cell) or negative (red cell), but only if the whole regression model proved to be statistically significant at least at a 10% significance level.

Table 71: Summary of all the regression models. The ones that are not statistically significant are written in red. All statistically significant correlations between dependent variables (rows) and independent variables (columns) are highlighted in green when positive and red when negative.

	DEPENDENT VARIABLES	INDEPENDENT VARIABLES									
		Location	Size	Full-time labour	Volunteer labour	Curation of the CWS	Professional hard infrastructure	Main Income Stream		Ownership	
								Mix of streams	Market streams	Rent	Free concession
NETWORKING OPPORTUNITIES	Openness to non-members										
	Socio-cultural events		Green		Green	Green	Green	Red			Green
	Training and mentoring programs				Green	Green	Green		Red		Green
	Networking events				Green	Green	Green				Red
	CWS part of regional or national networks	Red	Green	Red							
	CWS part of international networks	Green				Green					
	CWS part of both regional/national and international networks										Green
	Medium and large firms' interaction	Green			Green	Red	Green				
	Locally-rooted industries' interaction										
	NGOs' interaction	Green	Green			Green					
	Community organisations' interaction		Green			Green					
	Social enterprises' interaction		Green			Green					
	Charities' interaction				Green	Green					
	Neighbourhood groups' interaction				Green	Green					
	Labour associations' interaction		Green		Green	Green					
SOCIAL INCLUSION	Free membership										
	Free use of the space										
	Training and workshops			Red		Green					
	Employment for disadvantaged groups			Green			Green				
	Training and workshops for long-term unemployed										
	Training and workshops for NEETs										
	Training and workshops for migrants										
	Training and workshops for disabled individuals										
	Training and workshops for women										
LOCAL CULTURAL VALUE	Artists	Green	Green					Red	Red		
	Permanent studios										
	Residency programs			Green							
	Exhibitions and events	Green	Green				Red		Red		
	Visitors				Green		Red				
ENVIRONMENT	Reuse of vacant buildings		Green						Red		Green
	Renewable energy production										
	Electricity consumption per user				Green			Green	Green	Red	Red

The reference category for Main Income Stream is “Personal savings and external subsidies”, while for Ownership it is “Own the space”.

First of all, the social dimension of networking opportunities attempts to capture the role of CWS in facilitating networking opportunities for their users and all individuals and groups actively engaging with the CWS. The first typology of networking opportunities relates to the role of CWS as focal points, or reference points, helping a wide array of actors to engage in interactions which can favour informal exchange of ideas, knowledge, and skills, displaying certain dynamics that resemble, on a smaller

scale, what has been seen in industrial clusters (Capdevila, 2013; Clifton et al., 2019; Schmidt, 2019). The output and outcome indicators meant to measure the role of CWS as focal points are the openness to non-members, the provision of sociocultural events, training and mentoring programs, and events to stimulate networking. Unfortunately, the model regarding the CWS' openness to non-members is not statistically significant. However, the model concerning the offering of sociocultural events provides some positive and statistically significant correlations with the size of CWS, the amount of volunteer labour, the time dedicated to socially curating the CWS, and the presence of professional hard infrastructure. CWS that are large in size, which are highly reliant on volunteer work, that put greater efforts into curating the CWS, and that have better professional facilities tend to provide more sociocultural events and activities. They function as semi-public spaces, where members, users, and wider communities of residents gather and engage in activities which facilitate the sharing of ideas, knowledge, and skills on various levels (Brown, 2017; Avdikos & Merkel, 2020; Bosworth et al., 2023). Moreover, CWS mainly relying on public subsidies and personal savings have a higher likelihood of organising sociocultural events than the ones relying on a mix of income sources, while the ones using their premises free of charge are more likely to offer such events compared to CWS that directly own their space. On the one hand, CWS that focus more on sociocultural activities seem to rely more on subsidies or savings; they are more likely to obtain a loan for use of the space from public institutions and invest more working time in social curation of the CWS, especially counting on volunteer labour rather than paid labour. On the other hand, the provision of sociocultural events does depend on the size of CWS and on the quality of hard infrastructure and the presence of diverse facilities. Likewise, the

organisation of training and mentoring programs in CWS strongly depends on the presence of volunteer labour, as well as on the presence of better hard infrastructure. Once again, CWS relying on subsidies and savings have a greater probability of offering training and mentoring programs than the ones mainly counting on market streams of income, and CWS that use their space for free are more likely to provide such programs compared to the ones owning their premises. Conversely, CWS that own their space have a greater likelihood of providing events to stimulate networking than CWS using the space for free, by mediating between businesses, startups, and freelancers operating in the CWS and external actors, such as businesses, potential customers, and funders (Cabral & van Winden, 2016; Brown, 2017). Similarly to the provision of sociocultural events, CWS are more likely to provide networking events when they are characterised by a higher presence of volunteer labour, greater time invested in curating the space from a social perspective, and better hard infrastructure. These elements in CWS can facilitate informal interactions and the formation of “weak ties” through the use of the same facilities, which can result in the creation of new networks, stimulating the diffusion of knowledge and the conception of new ideas, paving the way for the development of new communities with shared values and common identities (Clifton et al., 2019; Avdikos & Pettas, 2021).

The second dimension of networking opportunities addresses the participation of CWS in wider networks of CWS, which can be on the regional and national level and on the international level. These networks help connect members, users, and wider communities around CWS to similar ones, favouring the sharing of ideas, knowledge, and funding opportunities (Nakano et al., 2020). They can contribute to the financial sustainability of CWS, through exclusive access to specific funds, by helping them

obtain institutional recognition from public entities, or by teaching CWS how to apply for such funds, which are particularly important for CWS mainly relying on grants and subsidies from public institutions. Overall, results show that CWS located in cities tend to connect more with international CWS networks, whereas CWS outside cities consider it more important to connect with networks of CWS on the regional and national level. These results are in line with the idea that CWS outside metropolitan areas have to develop wider networks to address the issues resulting from their remoteness. In this regard, CWS located in non-agglomerative economic areas seem to prefer networks of CWS situated geographically close to them, so as to assist their users in connecting with agglomeration economies and partially remedy the lack of resources in the local context, whereas CWS in agglomerative economic areas appear to prefer CWS networks not only on the regional and national level but internationally. In this way they act as “global pipelines”, connecting managers and users with other professionals and actors in peer CWS globally, with the aim of improving and developing skills, enhancing competitiveness, and accelerating the diffusion of new technologies and practices (Richardson, 2017; Avdikos & Merkel, 2020). Furthermore, larger CWS have a greater likelihood to take part in regional and national networks of CWS, while the ones that invest more working time in socially curating the CWS are more likely to participate in international CWS networks. Finally, more paid labour within the CWS seems to discourage participation in CWS networks on the regional and national level. Overall, the participation in wider networks of CWS provides crucial networking opportunities that can facilitate social and open innovation by enabling the sharing and diffusion of new materials and ideas beyond geographical distance (Avdikos and Pettas, 2021).

The third dimension of networking opportunities examines the connections between CWS and external actors, such as medium and large companies, traditional local industries, and organisations from the third sector. As expected, relationships with medium and large firms are more frequent in metropolitan areas due to the fact that those companies generally locate in agglomerative local areas and less frequently in suburbs, towns, and rural areas. Many of them seem to be interested in investing directly in the CWS or in the small firms, startups and professionals operating within the CWS. Alternatively, medium and large firms are interested in hiring or subcontracting projects to professionals in CWS. This is because CWS are generally well connected with the local entrepreneurial ecosystems and characterised by high innovative potential coming from initiatives started in CWS. Moreover, CWS are generally rich in talented and highly skilled labour. The combination of these two features makes CWS perfect entities for large companies to acquire successful ideas and projects, so as not to only rely on their employees from the research and development facilities, but instead outsource part of the creative and innovative processes to freelancers, startups, and small companies located in CWS, through venture capital investments in existing CWS or by directly establishing new ones (Moriset, 2013; Fiorentino, 2019; Avdikos and Pettas, 2021; Coll-Martínez & Méndez-Ortega, 2023). Results highlight the importance for medium and large companies to find CWS with good quality professional hard infrastructure while, at the same time, not investing so much labour time in socially curating the space. In this regard, medium and large firms seem to prefer less socially orientated CWS, favouring the ones that endorse a neo-corporate nature, focus on the development of specific knowledge and skills, and are characterised by the presence of many freelancers

mainly joining CWS to seek professional connections and contracts (Gandini & Cossu, 2019). Moving on to other external actors, this study cannot provide insights on the connection between CWS and locally rooted industries, such as local artisans, craftsmen, or agri-food businesses, given the statistical non-significance of the regression model. Conversely, there are significant results concerning the connection with organisations from the third sector, such as NGOs, social enterprises, community organisations, charities, neighbourhood groups, and labour associations. First of all, CWS that invest a greater time in curating the space from a social perspective have a greater likelihood of interacting with all six typologies of organisations from the third sector. Moreover, at least for charities, neighbourhood groups, and labour associations, the probability of interaction increases with the amount of volunteer labour in CWS. These two results can be explained by the fact that CWS mainly relying on volunteer labour and dedicating more time to the social curation of the space are usually characterised by a strong connection with local communities and a strong social (and sometimes political) orientation. Therefore, such CWS aim at supporting well-being, enhancing community cohesion, promoting welfare, promoting humanitarian non-profit purposes, and responding to social challenges, all elements that often align with the objectives pursued by organisations from the third sector (Sivesind et al., 2014; Roberts, 2016; Gandini and Cossu, 2019; Tremblay & Scaillez, 2020; Akhavan et al., 2021). Additionally, the size of CWS also plays a role in favouring the connection between CWS and certain organisations from the third sector, namely NGOs, community organisations, social enterprises, and labour associations. One potential explanation is that larger CWS can offer more space for free to organisations from the third sector to operate and use the CWS as a reference point for volunteers

and employees of such organisations. Finally, as stated by Merket et al. (2023), relationships between NGOs and CWS are more likely to be found in metropolitan areas, also because of the higher presence of NGOs in cities, rather than in more peripheral and rural areas.

The second dimension of social impact investigates the role of CWS in promoting dynamics of social inclusion towards disadvantaged groups within the CWS and beyond. Free or discounted membership, free or discounted use of the space, specific training and workshops, and employment of individuals from such groups are among the outcome indicators identified to measure the benefits offered by CWS to disadvantaged groups. The regression models for the first two indicators are not statistically significant at a 10% level (free or discounted membership, free or discounted use of the space), while the other two regarding the offering of training and workshops and the direct employment for individuals from disadvantaged groups are statistically significant. Training and workshops can focus on developing soft skills related to communication, marketing, or management, and on hard skills, which are more technical depending on specific professions. Additionally, CWS can connect the participants of training and workshops to wider professional networks otherwise hard to reach. Results from the regression model show that a better curation of the space from a social perspective influences the likelihood of offering training and workshops to disadvantaged groups. This reflects the fact that more socially orientated CWS aim at addressing dynamics of social exclusion and empowering more marginalised groups, such as long-term unemployed, NEETs, economic migrants and refugees, and disabled people, as well as women, through the provision of training and workshops. The objective of upskilling individuals from those groups has the potential to enhance the

level of social capital and to undertake social issues present within the local communities (Garcia et al., 2015; Gandini & Cossu, 2019; Berbegal-Mirabent, 2021). For instance, the offering of training and workshops could enable NEETs and long-term unemployed to access new professional opportunities, help women-led businesses to access key skills and networks, or facilitate the socio-economic inclusion of economic migrants and refugees or individuals with physical and mental disabilities. Furthermore, the provision of learning facilities from CWS not only facilitates the participants of such training and workshops in developing new professional skills, but it can also boost their confidence and inspire them to follow their interests and passions (Roberts, 2016). Another statistically significant result coming from the regression indicates that there is an inversely proportional relationship between the offering of training and workshops and the amount of paid hours of labour in CWS. This result could imply that generally CWS with more employees have a lower interest in providing opportunities for upskilling to individuals from disadvantaged groups, probably focusing their energies on more economically orientated activities. Additionally, all five regression models on the offering of training and workshops for long-term unemployed, NEETs, economic migrants and refugees, disabled people, and women do not provide any statistically significant result at a 10% level, probably due to the small sample size. Finally, CWS with a greater amount of paid labour within the CWS and with better professional hard infrastructure are more likely to employ individuals coming from such disadvantaged groups. Both these results are not surprising, since generally a higher presence of paid labour and better professional infrastructure reflect a greater number of employees and thus also of employees from disadvantaged groups. Nonetheless, CWS usually are characterised by more

innovative organisational structures that can stimulate higher rates of employment and nurture the local employment, which in turn could result in a greater likelihood for previously unemployed and marginalised individuals to be hired (Schmidt, 2019; Tomaz et al., 2022).

The third and last social dimension addresses the role of CWS in supporting processes of cultural value creation. Many CWS interact with artists in different ways and use their venues for the realisation of creative and cultural events of various natures, ranging from art exhibitions to music events. Generally, CWS have a greater likelihood of interacting with artists when located in cities, when large in size, and when mainly counting on subsidies and personal savings rather than relying on market streams of income. These results are not surprising, since artists are generally located in metropolitan areas due to the greater presence of peers and opportunities. Moreover, larger CWS can provide more space for exhibitions, events, and permanent studios and ateliers. Then, CWS focusing on more creative and cultural activities may need greater public support through subsidies and grants to financially sustain themselves. These CWS aim at incentivising youth engagement and collective initiatives through the establishment of a resilient local cultural value, which could in the medium- and long-term shape individuals to become active citizens willing to participate in their local communities and encourage the development of grassroots initiatives addressing socio-economic issues, proposing alternative models of governance, and influencing the top-down agenda of the local institutions (Garcia et al., 2015; Gandini & Cossu, 2019). The other three regression models investigate the typology of relationship between CWS and artists. Usually artists can make use of CWS as their permanent studios and ateliers, organise exhibitions and events, or join CWS as part

of residency programs. The model concerning the presence of permanent studios in CWS is not statistically significant at a 10% level, while the other two models offer some results. Firstly, CWS with more employees are more likely to participate in residency programs and host artists, probably because of the necessity to collaborate and follow artists in their creative processes during the residency period. Secondly, as explained before, CWS located in cities, large in size, and mainly counting on personal savings or subsidies have a greater probability of hosting cultural and artistic exhibitions and events. Additionally, CWS with better professional infrastructure are less likely to organise such events. This can be explained by the fact that CWS focusing on the promotion of local cultural value have less interest in providing certain professional infrastructures, such as hot desks, private offices, or meeting rooms. Finally, CWS can attract many visitors who participate in cultural events, favouring the creation of community ties, stimulating local interactions, and reactivating dynamics of cultural value creation (Roberts, 2016; Bähr et al., 2019; Vogl & Akhavan, 2022; Ubels et al., 2022). In this regard, results show that the engagement of local communities in cultural events organised in CWS is positively influenced by the presence of volunteer labour in the CWS, while it is negatively influenced by the presence of better professional infrastructure. Thus, volunteer labour plays a key role in socially- and culturally orientated CWS, without which the realisation of many activities would probably not be possible.

Lastly, the environmental dimension of impact deals with the reuse of underused or abandoned buildings, the production of renewable energies, and the electricity consumption of CWS. The transformation of previously abandoned buildings in sociocultural infrastructures can contribute to processes of urban regeneration and

revitalisation of deprived areas (Manika, 2020; Mariotti et al., 2021; Avdikos & Papageorgiou, 2021). Moreover, the reuse of abandoned buildings is in accordance with the principles of circular economy by recovering assets at the end of their life cycle, which results in a reduction of energy and material waste (Durante & Turvani, 2018; Buonocore et al., 2020). Results from the model indicate that CWS located in formerly abandoned buildings have a greater probability of being large-sized, probably because many of them previously were industrial structures that became brownfields seeking to find a new economic or sociocultural function. Moreover, CWS located in such buildings are more likely to rely on subsidies and personal savings than market streams of income. In this regard, probably more market orientated CWS prefer to locate in more centralised and commercial office spaces, while CWS mainly relying on subsidies would locate in such buildings provided free of charge by public institutions to reduce their expenses and be financially sustainable. Another result in support of this explanation indicates that CWS using previously abandoned buildings are more likely to use such buildings for free rather than owning them. This is because usually abandoned buildings that are transformed in sociocultural infrastructures are given in concession free of charge from local or regional authorities for a predefined time period, as part of policies supporting the development of CWS. Moving on, the regression model on self-production of renewable energy from CWS is not statistically significant at a 10% level, whereas the one on electricity consumption provides us with some results. First of all, CWS relying more on volunteer labour have a greater electricity consumption. A partial explanation is that CWS with more volunteers could organise a set of extra activities that may result in a higher electricity consumption than CWS with less volunteer labour. Secondly, CWS mainly counting on market

streams of income, as well as the ones relying on a mix of sources, tend to consume more electricity than CWS counting on subsidies and personal savings. Thirdly, CWS owning their premises tend to consume more electricity than the ones renting them or having them free of charge from public institutions. Both these two results indicate that more market orientated CWS tend to consume more electricity given the ever-increasing necessity of energy resulting from the growing importance of digital technology in labour markets (Mantese et al., 2022). In this regard, market orientated CWS can be compared to traditional and commercial offices, which are the major electricity consumers in the service sector in the EU, accounting for 44% of the total electricity consumption (Odyssee-Mure, 2021). On the other hand, CWS not owning their premises and mainly relying on subsidies and personal savings consume less electricity, having consumption patterns that resemble more the ones related to the sub-sector of the service sector in the EU engaging with arts, entertainment, and recreation, which generally consumes less energy than other sub-sectors of the service sector in the EU³².

5.6. Limitations, challenges and future research

Part of the results from the regression models illustrated in this research are in accordance with the results stemming from the present literature on CWS, whereas other ones need further investigation in future research due to the limitations present in this research, which will be discussed in this section.

³² https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Final_energy_consumption_in_services_-_detailed_statistics&stable=0#:~:text=With%20a%20consumption%20of%205,only%20exceeding%20agriculture%2C%20forestry%20and

First of all, the substantial differences among typologies of CWS are a serious threat to the reliability of the results. The CWS considered in this research could be multifunctional spaces involved in the economic, social, and cultural sphere but also simply provide offices and hot desks similarly to business centers. Thus, with a larger number of observations, future surveys could strengthen their results by clustering CWS depending on their specific characteristics and functions. Nonetheless, all CWS included in this research do share many characteristics. They are all spaces where work is performed, although in different manners, and they all provide, to varying degrees, a physical space where people can exchange ideas, knowledge, and skills, trying to make different actors and groups coexist under the same roof. Hence, bearing in mind this critical limitation, the research still provides relevant quantitative insight on the phenomenon of CWS in Europe that would need to be supported by more qualitative research on the matter.

Secondly, the impact assessment of CWS is a complicated task, especially when considering the social and environmental impacts of CWS. Quite often medium- and long-term changes and effects of the presence of CWS on their users, communities, and overall on their territories cannot be objectively quantified. In fact, what would be considered an irrelevant achievement in a certain context may be extremely significant in others. For instance, one common way to measure innovation is by counting the number of patents and licences granted in a specific geographical area in a specific timeframe. However, this is only the tip of the iceberg, which does not include other crucial steps and elements facilitating innovators in the achievement of such a result. Similarly, CWS are by nature enablers, helping individuals and businesses access relevant knowledge, skills, and key partnerships to facilitate them in their

processes of making, as well as in their processes of self-realisation. All these steps are nearly impossible to grasp simply with survey-like questions. Can we objectively quantify social innovation, degrees of social inclusion, or the creation of cultural value? The subjectivity of such impacts is a key limitation that needs to be added to the discussion.

Thirdly, the research aimed at measuring the geographical differences of CWS on three levels - predominantly urban, intermediate, predominantly rural - following the Eurostat categorisation of urbanity and rurality on a municipal scale. Unfortunately, responses from CWS located in rural areas were low and could not represent the overall European context. Therefore, the research grouped together in a single category "outside cities" CWS located in towns and suburbs (intermediate level) and rural areas. In this way, results are more reliable but also less detailed and nuanced than having three geographical categories. If capable of collecting geographically balanced responses, future research could enrich the understanding of the differences between CWS and grasp the nuances of the social and environmental impacts of CWS in cities, towns and suburbs, and rural areas.

Furthermore, the main aim of the research is to provide a wide framework to assess the potential impacts of CWS, covering several dimensions on the economic, social, and environmental levels. In this regard, the research proposes a multitude of indicators, but only some of them were included in the surveys directed to both managers and users of CWS. During the process of implementation of the surveys, due to the length of the questionnaires, all indicators pertaining to the economic dimension of impact were excluded. Thus, by focusing exclusively on the social and environmental dimensions, two different surveys were created, the first one

addressing managers of CWS, while the second one was directed to users. Both these two perspectives are crucial to understanding the potential impacts of CWS on their communities, their territories, and beyond. Unfortunately, the response rate from users of CWS was scarce, which prevented the analysis of the indicators meant to capture the users' perspective. In the absence of such a point of view, the research can provide only partial results regarding the social and environmental impacts of CWS. Future research could focus on the members and users of CWS by applying the proposed indicators of this research in a survey, which would help draw a more holistic view on the social and environmental impacts of CWS. For instance, from a social perspective, measuring the level of social trust within CWS, as well as the role that formal and informal collaborations play in the personal and professional development of CWS' members and users and on their well-being. From an environmental perspective, a survey directed to members and users could help explore the environmental commitment of individuals and businesses operating in CWS, as well as provide new insight on the sharing of resources and other sustainable behavioural patterns of CWS' users.

Finally, another element that could enhance the validity of the impact assessment methodology in future research would be to collect panel data or cross-sectional time-series data rather than collecting data only at one point in time. Such data allows for longitudinal analyses that would strengthen the results by observing the changes across time on the same set of respondents, especially in the field of social sciences (Wei et al., 2009; Dougherty, 2016).

6. Conclusions

Keeping in mind the limitations and challenges faced throughout the research process, it is now possible to draw some conclusions.

The contribution of this research is threefold. Firstly, it proposes a methodology to assess the impacts of CWS with a specific focus on the ones located in peripheral and rural areas. This is the main aim of the research, and it presents several difficulties. In fact, the design of a methodology influences the corresponding results, which are quite sensitive to the chosen methodology as well as the specific context where the methodology is applied. In this regard, the function and scope of CWS strongly depend on their context, with CWS in more peripheral and rural areas, for instance, usually putting more efforts into assuming the role of reference points for their communities in terms of social interactions than the ones in cities, which, on the other hand, may focus more on professionally connecting different actors. When designing an impact assessment methodology, the first step is to identify the goals that a specific program or intervention wants to achieve. In this case, the impacts that CWS intend to attain can differ depending on their function, scope, location, and so on. Thus, the selection of a set of objectives which, in theory, the majority of CWS want to achieve presents some issues, given that it fails to cover all potential goals of CWS. Another problematic element concerns the identification of key indicators to measure the impacts. Once again, the substantial differences among CWS make the selection of key indicators a complicated and arguable process, especially when selecting a set of indicators measuring social impacts, which, due to their subjective nature, are hard to quantify.

Nonetheless, the applied framework identifies several input, output and outcome indicators, and it develops an ad-hoc impact assessment methodology which results from combining the Theory of Change and the Multidimensional Approach, two widespread impact assessment methodologies used in the field of social sciences. Such a methodology is based on the design of input and output or outcome indicators. The former (inputs) can favour the achievement of the latter (outputs and outcomes), which in turn can increase the probability of fulfilling a certain impact. For example, CWS investing more time in socially curating their space (input) would be more likely to organise several sociocultural events (output-outcome), as well as training and mentoring programs (output-outcome), and thus the individuals and communities around that CWS would be more likely to achieve greater networking opportunities (social impact), as well as to contribute to processes of innovation (economic impact). Secondly, the research illustrates the geography of CWS in Europe by shedding light on the amount and distribution of 12,009 CWS in 23 European countries at NUTS 3 level. Results indicate that the phenomenon of CWS is spreading out of urban areas, with roughly one third of the CWS located in peripheral or rural regions. It is important to keep in mind the limitations in the identification process of CWS. All CWS that do not identify themselves on Google Maps as a “coworking”, “makerspace”, or “FabLab” were not included, even though they might fall within the definition of “Collaborative Workspace”. In addition, there could be many other CWS which cannot be found through the identified sources (Google Maps and the regional, national and European datasets of CWS included in this research).

Thirdly, the research applies the proposed methodological framework for impact assessment by using a subset of indicators to measure the social and environmental

impacts of CWS. The applied models focus only on these two dimensions while excluding the analysis of the indicators connected to the economic dimension of impact. This choice is motivated by the lack of quantitative research on the social and environmental dimensions of impact addressing CWS in the European Union. As concerns the social dimension of impact, the research addresses the role of CWS in facilitating networking opportunities and promoting social inclusivity among the actors and the communities around them, as well as enhancing the local cultural value of their territories. Whereas the environmental dimension of impact focuses on the role of CWS in giving new life to previously abandoned buildings and in producing renewable energy, as well as exploring CWS' electricity consumption patterns.

The methodology applied an econometric approach based on cross-sectional data from a survey carried out from March to August 2023 directed to managers of CWS, counting a total of 273 respondents from 34 European countries. The econometric analysis applied binary and ordered multinomial probit estimation models, as well as multiple log-linear estimation models. All regression models apply the same set of regressors, including CWS' location, CWS' size, quality of professional infrastructure, financial support strategy, ownership status, labour force, and social curation of the space.

Results indicate that CWS located in cities are more likely to be part of international networks of CWS, to interact with medium and large firms and NGOs, and to host artists, particularly by offering them space for their artistic exhibitions and cultural events. Whereas CWS located outside cities have a greater likelihood of participating in regional and national networks of CWS to partially respond to the lack of resources and economic opportunities which characterises rural and peripheral areas. Moreover,

larger CWS have a higher probability of organising sociocultural events, participating in regional and national networks of CWS, interacting with artists and many organisations from the third sector, and being located in formerly abandoned buildings. Furthermore, CWS with many employees tend to organise more residency programs for artists and to employ individuals from disadvantaged groups. On the contrary, they are less likely to participate in regional and national networks of CWS or to organise training and workshops directed at disadvantaged groups. Additionally, CWS relying on volunteer labour are more likely to organise sociocultural and networking events, offer training and mentoring programs, and interact with medium and large companies, charities, neighbourhood groups, and labour associations. Then, they tend to have greater external participation in cultural events and higher electricity consumption. A better curation of CWS from a social perspective translates into more frequent sociocultural and networking events, greater likelihood in providing training and workshops for disadvantaged groups, and more frequent interactions with organisations from the third sector. In addition, they are more likely to be part of international networks of CWS but less likely to interact with medium and large firms. The provision of good professional infrastructure enhances the likelihood of organising sociocultural and networking events, and training and mentoring programs, while reducing the likelihood of organising exhibitions and events and thus of having many external visitors. Also, better professional infrastructure leads to greater interactions with medium and large companies, and it enhances the likelihood of employing individuals from disadvantaged groups. Moreover, compared to CWS relying on market streams of income, CWS mainly counting on subsidies, grants, or personal funds tend to organise more sociocultural

events, offer more training and mentoring programs, host more artists, and locate in formerly abandoned buildings, while having lower electricity consumption patterns. Furthermore, CWS renting their premises tend to have lower electricity consumption than the ones owning their premises. Finally, CWS that directly own their premises are more likely to organise networking events and to consume more electricity than the ones able to use the space in a free-of-charge loan from public institutions. However, they also tend to organise fewer sociocultural events, offer fewer training and mentoring programs, be less likely to join regional or national networks of CWS, and be located in formerly abandoned buildings.

It is worth mentioning that the results of this research have significant limitations, as explained in the previous section. In fact, they only consider the perspective of managers, whereas it would be crucial to also include the perspective of users and wider communities. Moreover, the substantial differences in typologies of CWS present a serious threat to the generalisability of the results. In addition, many impact assessment methodologies can rely on cross-sectional time-series data, which is able to provide an estimation of the effects and changes that a specific intervention caused during a set period of time. Instead, this research cannot fully identify such changes in the absence of panel data. Therefore, future research should consider having at least two separate data collection processes with the same set of respondents so as to fully test the suggested impact assessment methodology. Despite the limitations, this methodology is meant to lay the foundations to guide future researchers and policy makers in the evaluation of the impacts of CWS, bearing in mind that the development of an impact assessment methodology is an ongoing process based on previous endeavours steering the design of novel and improved methodologies.

Reference

Akhavan, M., Mariotti, I., Astolfi, L., & Canevari, A. (2019). Coworking spaces and new social relations: A focus on the social streets in Italy. *Urban Science*, 3(1), 2. Assessment”, TSI Working Paper Series No. 1. Seventh Framework program.

Alomoto, W., Niñerola, A., & Pié, L. (2021). Social Impact Assessment: A Systematic Review of Literature. *Social Indicators Research*, 1-26.

Anheier, H. K., & Toepler, S. (Eds.). (2009). *International encyclopedia of civil society*. Springer Science & Business Media.

Avdikos, V., & Merkel, J. (2020). Supporting open, shared and collaborative workspaces and hubs: recent transformations and policy implications. *Urban Research & Practice*, 13(3), 348-357.

Avdikos, V., & Papageorgiou, A. (2021). Public support for collaborative workspaces: Dispersed help to a place-based phenomenon? *Local Economy: The Journal of the Local Economy Policy Unit*, 36(7–8), 669–682.

Avdikos, V., & Pettas, D. (2021). The new topologies of collaborative workspace assemblages between the market and the commons. *Geoforum*, 121, 44-52.

Bähr, U., Biemann, J., Lietzau, J., Hentschel, P. (2019). Rural Coworking. People, Models, Trends. CoWorkLand eG. Netzwerk Zukunftsorte e.V. Bertelsmann Stiftung (Ed.).

Barska, A., Jędrzejczak-Gas, J., Wyrwa, J., & Kononowicz, K. (2020). Multidimensional assessment of the social development of EU countries in the context of implementing the concept of sustainable development. *Sustainability*, 12(18), 7821.

Berbegal-Mirabent, J. (2021). What do we know about co-working spaces? Trends and challenges ahead. *Sustainability*, 13(3), 1416.

Blakely, E. J., & Leigh, N. G. (2013). Planning local economic development. Sage.

Bompard, E. F., Corgnati, S. P., Grosso, D., Huang, T., Mietti, G., & Profumo, F. (2022). Multidimensional assessment of the energy sustainability and carbon pricing impacts along the Belt and Road Initiative. *Renewable and Sustainable Energy Reviews*, 154, 111741.

Bosworth, G., Whalley, J., Fuzi, A., Merrell, I., Chapman, P., & Russell, E. (2023). Rural co-working: New network spaces and new opportunities for a smart countryside. *Journal of Rural Studies*, 97, 550-559.

Bouncken, R. B., & Reuschl, A. J. (2018). Coworking-spaces: How a phenomenon of the sharing economy builds a novel trend for the workplace and for entrepreneurship. *Review of Managerial Science*, 12(1), 317–334.

Bouncken, R. B., Aslam, M. M., Gantert, T. M., & Kallmuenzer, A. (2023). New work design for knowledge creation and sustainability: An empirical study of coworking-spaces. *Journal of Business Research*, 154, 113337.

Bouncken, R. B., Lapidus, A., & Qui, Y. (2022). Organizational sustainability identity: ‘New Work’ of home offices and coworking spaces as facilitators. *Sustainable Technology and Entrepreneurship*, 1(2), 100011.

Bouncken, R. B., Ratzmann, M., Barwinski, R., & Kraus, S. (2020). Coworking spaces: Empowerment for entrepreneurship and innovation in the digital and sharing economy. *Journal of Business Research*, 114, 102-110.

Brooke, R., Openshaw, G., Farrow, L., Scott, F., Drake, G., Harris, R., & Ramanandi, R. (2014). Supporting places of work: Incubators, accelerators and co-working spaces. On behalf of the Great London Authority. London.

Brown, J. (2017). Curating the “Third Place”? Coworking and the mediation of creativity. *Geoforum*, 82, 112-126.

Bueno, S., Rodríguez-Baltanás, G., & Gallego, M. D. (2018). Coworking spaces: A new way of achieving productivity. *Journal of Facilities Management*.

Buonocore, F., de Gennaro, D., & Romanelli, M. (2020). Collaborative spaces for urban regeneration: The case of Complesso di Santa Caterina a Formiello in Naples. In *Collaborative Spaces at Work* (pp. 50-63). Routledge.

Cabral, V., & Winden, W. V. (2016). Coworking: an analysis of coworking strategies for interaction and innovation. *International Journal of Knowledge-Based Development*, 7(4), 357-377.

Capdevila, I. (2013). Knowledge dynamics in localized communities: Coworking spaces as microclusters. Available at SSRN 2414121.

Cappellari, L., & Jenkins, S. P. (2003). Multivariate probit regression using simulated maximum likelihood. *The Stata Journal*, 3(3), 278-294.

Caprioli, C., Oppio, A., Baldassarre, R., Grassi, R., & Dell'Ovo, M. (2021). A multidimensional assessment of ecosystem services: from grey to green infrastructure. In *Computational Science and Its Applications–ICCSA 2021: 21st International Conference, Cagliari, Italy, September 13–16, 2021, Proceedings, Part VII 21* (pp. 569-581). Springer International Publishing.

Chuah, V. (2016). *Beyond the core: The role of co-working spaces in local economic development* (Doctoral dissertation, Columbia University).

Clifton, N., Füzi, A., & Loudon, G. (2019). Coworking in the digital economy: Context, motivations, and outcomes. *Futures*, 102439.

Coll-Martínez, E., & Méndez-Ortega, C. (2023). Agglomeration and coagglomeration of co-working spaces and creative industries in the city. *European Planning Studies*, 31(3), 445-466.

Daoud, J. I. (2017). Multicollinearity and regression analysis. In *Journal of Physics: Conference Series* (Vol. 949, No. 1, p. 012009). IOP Publishing.

Di Marino, M., & Lapintie, K. (2018). Exploring multi-local working: challenges and opportunities for contemporary cities. *International Planning Studies*.

Dias, R., & Smith, A. (2018). Making in Brazil: can we make if work for social inclusion? *Journal of Peer Production*.

Dougherty, C. (2016). *Introduction to econometrics*. Oxford university press, USA.

Douthwaite, B., Ahmad, F., & Shah, G. M. (2020). Putting theory of change into use in complex settings. *Canadian Journal of Program Evaluation*, 35(1).

Durante, G., & Turvani, M. (2018). Coworking, the sharing economy, and the city: which role for the 'coworking entrepreneur'?. *Urban Science*, 2(3), 83.

Eurostat (2018a). *Regions in the European Union Nomenclature of territorial units for statistics - NUTS 2016/EU-28* (Edition 2018). Publications Office of the European Union.

Eurostat (2018b). *Methodological manual on territorial typologies* (Edition 2018). Publications Office of the European Union.

Fiorentino, S. (2019). Different typologies of 'co-working spaces' and the contemporary dynamics of local economic development in Rome. *European Planning Studies*, 27(9), 1768–1790.

Foertsch, C. (2017). Global Coworking Survey. URL: <https://www.slideshare.net/carstenfoertsch/the-first-results-of-the-2017-globalcoworking-survey>.

Gandini, A., & Cossu, A. (2019). The third wave of coworking: 'Neo-corporate' model versus 'resilient' practice. *European Journal of Cultural Studies*, 24(2), 430-447.

García, M., Eizaguirre, S., & Pradel, M. (2015). Social innovation and creativity in cities: A socially inclusive governance approach in two peripheral spaces of Barcelona. *City, Culture and Society*, 6(4), 93-100.

Ge, J., Polhill, J. G., & Craig, T. P. (2018). Too much of a good thing? Using a spatial agent-based model to evaluate “unconventional” workplace sharing programs. *Journal of Transport Geography*, 69, 83-97.

Gikonyo, N. W., Busienei, J. R., Gathiaka, J. K., & Karuku, G. N. (2022). Analysis of household savings and adoption of climate smart agricultural technologies. Evidence from smallholder farmers in Nyando Basin, Kenya. *Heliyon*, 8(6).

Goermar, L., Barwinski, R. W., Bouncken, R. B., & Laudien, S. M. (2021). Co-Creation in coworking-spaces: Boundary conditions of diversity. *Knowledge Management Research & Practice*, 19(1), 53-64.

Granovetter, M. S. (1973). The strength of weak ties. *The American Journal of Sociology*, 78(6), 1360–1380. Groves and Marlow, 2016.

Greenhouse Gas Protocol. (2011). Corporate Value Chain (Scope 3) Accounting and Reporting Standard. <https://ghgprotocol.org/sites/default/files/2022-12/Chapter7.pdf>

Grieco, C., Michellini, L., & Iasevoli, G. (2015). Measuring value creation in social enterprises: A cluster analysis of social impact assessment models. *Nonprofit and voluntary sector quarterly*, 44(6), 1173-1193.

Hicks, M., & Faulk, D. G. (2018). Do entrepreneur-focused facility incentives create economic impacts? *Journal of Entrepreneurship and Public Policy*.

Hölzel, M., & De Vries, W. T. (2021). Digitization as a Driver for Rural Development—An Indicative Description of German Coworking Space Users. *Land, 10*(3), 326.

Hölzel, M., & Vogl, T. (2023). Impact of the COVID-19 pandemic on remote working and coworking spaces in Germany—narrative literature analyses. In *European Narratives on Remote Working and Coworking During the COVID-19 Pandemic: A Multidisciplinary Perspective* (pp. 39-51). Cham: Springer Nature Switzerland.

Impact Hub Global (2020). Impact report 2020. <https://impacthub.net/impact-report-2020/>.

INTRAC (2017). Outputs, outcomes and Impact. Intrac for civil society. <https://www.intrac.org/wpcms/wp-content/uploads/2017/01/Outputs-outcomes-and-impact.pdf>

Jamal, A. (2018). Coworking spaces in mid-sized cities: A partner in downtown economic development. *Environment and Planning, 50*(4), 773-788.

Janssen, S., Moeller, K., & Schlaefke, M. (2011). Using performance measures conceptually in innovation control. *Journal of Management Control, 22*, 107-128.

Khandker, S. R., Koolwal, G. B., & Samad, H. A. (2009). Handbook on impact evaluation: quantitative methods and practices. World Bank Publications.

Liodaki, D. (2024). Alternative futures “in the making”: Insights from three makerspaces in peripheral Greece. *Futures*, 103481.

Magnusson, D., Raharjo, H., & Bosch-Sijtsema, P. (2023). Sustainable coworking: The member perspective. *Journal of Corporate Real Estate*.

Manika, S. (2020). Transforming Vacant Commercial Spaces: From Localized Hotspots of Urban Shrinkage to “Smart” Co-Working Places. *Open Journal of Social Sciences*, 08(06), 86–97.

Mantesi, E., Chmutina, K., & Goodier, C. (2022). The office of the future: Operational energy consumption in the post-pandemic era. *Energy Research & Social Science*, 87, 102472.

Mariotti, I., Akhavan, M., & Di Matteo, D. (2021). The geography of coworking spaces and the effects on the urban context: are pole areas gaining?. *New Workplaces—Location Patterns, Urban Effects and Development Trajectories: A Worldwide Investigation*, 169-194.

Mariotti, I., Akhavan, M., & Rossi, F. (2023). The preferred location of coworking spaces in Italy: an empirical investigation in urban and peripheral areas. *European Planning Studies*, 31(3), 467-489.

Marmo, L. & Avdikos, V. (2024, a) *The regional geography of Collaborative Workspaces in Europe*, MSCA CORAL-ITN Brief 1, Athens.

Marmo, L. & Avdikos, V. (2024, b) *The CORAL-ITN survey: demographics and functions of Collaborative Workspaces in Europe*, MSCA CORAL-ITN Brief 2, Athens.

Mayne, J. (2015). Useful theory of change models. *Canadian Journal of Program Evaluation*, 30(2).

Merkel, J. (2015). Coworking in the city. *ephemera*, 15(2), 121-139.

Merkel, J., Avdikos, V., & Pettas, D. (2023). Coworking Spaces: Alternative Topologies and Transformative Potentials. In *Coworking Spaces: Alternative Topologies and Transformative Potentials* (pp. 1-14). Cham: Springer International Publishing.

Merrell, I., Phillipson, J., & Gorton, M. (2022). Enterprise hubs to support rural development. *State of the Art Review*.

Morgan, G. (2020). 'Meaning and Soul': Co-working, Creative Career and Independent Co-work Spaces. *Pathways into creative working lives*, 139-158.

Moriset, B. (2013). Building new places of the creative economy. The rise of coworking spaces.

Mustapha, S., Mohammed, T., & Abukari, I. (2017). Application of multinomial logistic to smallholder farmers' market participation in Northern Ghana. *International Journal of Agricultural Economics*, 2(3), 55-62.

Nakano, D., Shiach, M., Koria, M., Vasques, R., dos Santos, E. G., & Virani, T. (2020). Coworking spaces in urban settings: Prospective roles?. *Geoforum*, 115, 135-137.

OECD (2010). Glossary of Key Terms in Evaluations and Results Based Management. OECD, 2002, re-printed in 2010.

OECD Directorate for Science, Technology and Innovation (2014). "Assessing the Impact of State Interventions in Research – Techniques, Issues and Solutions", unpublished manuscript.

Ohnmacht, T., Z'Rotz, J., & Dang, L. (2020). Relationships between coworking spaces and CO₂ emissions in work-related commuting: First empirical insights for the case of Switzerland with regard to urban-rural differences. *Environmental Research Communications*, 2(12), 125004.

Orel, M., Mayerhoffer, M., Fratricova, J., Pilkova, A., Starnawska, M., & Horvath, D. (2022). Coworking spaces as talent hubs: The imperative for community building in the changing context of new work. *Review of Managerial Science*, 16(5), 1503-1531.

Ortar, N., & Flipo, A. (2022). The Hidden Energies of Work Digitisation: A View from France Through the Use of Coworking Spaces. In *Digitisation and Low-Carbon Energy Transitions* (pp. 115-134). Cham: Springer International Publishing.

Parsons, J., Gokey, C., & Thornton, M. (2013). Indicators of inputs, activities, outputs, outcomes and impacts in security and justice programming. *Vera Institute of Justice*.

Qin, Z. (2020). The Application in Log Linear Regression Model. In *Proceedings of the 3rd international conference on economic management and green development* (ICEMGD 2020), ed. X. Li (Oak Brook, IL: CSP) (pp. 90-94).

Rammer, C., Kinne, J., & Blind, K. (2016). Microgeography of innovation in the city: Location patterns of innovative firms in Berlin. *ZEW-Centre for European Economic Research Discussion Paper*, (16-080).

Rice, W. S., Sowman, M. R., & Bavinck, M. (2020). Using Theory of Change to improve post-2020 conservation: A proposed framework and recommendations for use. *Conservation Science and Practice*, 2(12), e301.

Richardson, L. (2017). Sharing as a postwork style: Digital work and the co-working office. *Cambridge Journal of Regions, Economy and Society*, 10(2), 297–310.

Roberts, C. (2016). Start me up: The value of workspaces for small businesses, entrepreneurs and artists in London, IPPR.
<http://www.Roberts.org/publications/start-me-up-the-value-of-open-workspaces>

Sandoval, M. (2016). Fighting Precarity with co-oPeration? worker co-oPeratives in the cultural sector. *New Formations*, 88(88), 51-68.

Sanna, V. S., & Michelini, L. (2021). Mapping the impact: assessment methodologies and policy implications of the Collaborative and Sharing Economy. *Becoming a platform in Europe*, 231.

Schmidt, S. (2019). In the making: Open Creative Labs as an emerging topic in economic geography?. *Geography compass*, 13(9), e12463.

Schmidt, S., Brinks, V., & Brinkhoff, S. (2014). Innovation and creativity labs in Berlin: Organizing temporary spatial configurations for innovations. *Zeitschrift für Wirtschaftsgeographie*, 58(1), 232-247.

Shrestha, N. (2020). Detecting multicollinearity in regression analysis. *American Journal of Applied Mathematics and Statistics*, 8(2), 39-42.

Sivesind K.H., Simsa, R., Rauscher, O., et.al. (2014). "Methodological Guideline For Impact Assessment", TSI Working Paper Series No. 1. Seventh Framework program (grant agreement 613034), European Union. Brussels: Third Sector Impact.

Sokolowski, S. W. (2014). Measuring Social Consequences of Non-Profit Institution Activities: A Research Note (Vol. 50). Working Papers of the Johns Hopkins Comparative Nonprofit Sector Project.

Spinuzzi, C. (2012). Working alone together: Coworking as emergent collaborative activity. *Journal of business and technical communication*, 26(4), 399-441.

Stockdale, C., & Avdikos, V. (2024). Transformative social innovation and rural collaborative workspace assemblages as a means of prefiguring community economies. *Open Research Europe*, 4, 205.

Tidd, J., & Bessant, J. R. (2014). *Strategic innovation management*. John Wiley & Sons.

Tomaz, E., Moriset, B., & Teller, J. (2022). Rural coworking spaces in the COVID-19 era: A window of opportunity?. In *The COVID-19 pandemic and the future of working spaces* (pp. 122-135). Routledge.

Tremblay, D. G., & Scaillerez, A. (2020). The modern city and third places: new sources of sustainable entrepreneurs and competitiveness. *Towards a Competitive, Sustainable Modern City*, 16.

Tumen, S., & Zeydanli, T. (2016). Social interactions in job satisfaction. *International Journal of Manpower*.

Ubels, H., Haartsen, T., & Bock, B. (2022). Social innovation and community-focussed civic initiatives in the context of rural depopulation: For everybody by everybody? Project Ulrum 2034. *Journal of Rural Studies*, 93, 176-186.

Vaddadi, B., Pohl, J., Bieser, J., & Kramers, A. (2020). Towards a conceptual framework of direct and indirect environmental effects of co-working. Proceedings of the 7th *International Conference on ICT for Sustainability*, 27–35.

van Leeuwen, E. S., Nijkamp, P., & Rietveld, P. (2005). Regional input-output analysis. In *Encyclopedia of social measurement* (pp. 317-323). Elsevier.

Vidaillet, B., & Bousalham, Y. (2020). Coworking spaces as places where economic diversity can be articulated: Towards a theory of syntopia. *Organization*, 27(1), 60-87.

Vogel , I. (2012). Review of the use of “Theory of Change” in international development. UK Department for International Development (DFID) . Retrieved from http://www.theoryofchange.org/pdf/DFID_ToC_Review_VogelV7.pdf

Vogl, T., & Akhavan, M. (2022). A systematic literature review of the effects of coworking spaces on the Sociocultural and economic conditions in peripheral and rural areas. *Journal of Property Investment & Finance*, 40(5), 465-478.

Wang, Y., Zhang, D., Ji, Q., & Shi, X. (2020). Regional renewable energy development in China: A multidimensional assessment. *Renewable and Sustainable Energy Reviews*, 124, 109797.

Waters-Lynch, J., & Potts, J. (2017). The social economy of coworking spaces: a focal point model of coordination. *Review of Social Economy*, 75(4), 417-433.

Wei, W., & Bandara, Y. M. (2009). FDI spillovers: The strategy for Chinese economic development. *WTO, Accession and Socio-Economic Development in China*, 111-134.

Wigboldus, S., & Brouwers, J. (2011). Rigid plan or vague vision: How precise does a ToC need to be?. Hivos E-dialogues. Available at: <http://www.hivos.nl/eng/HivosKnowledgeprogram/Themes/Theory-of-Change/E-dialogues/E-dialogue-2>.

Yu, R., Burke, M., & Raad, N. (2019). Exploring impact of future flexible working model evolution on urban environment, economy and planning. *Journal of Urban Management*, 8(3), 447-457.

Annex

A1: List of proposed output and outcome indicators

Table 72: Proposed output and outcome indicators for the measurement of economic, social, and environmental impact.

Indicator	Question	Source	Impact	Dimension
Revenues	Indicate in percentage how much your earnings have increased / decreased since you started working in this CWS.	User	Economic	Economic growth
Agreement with local services	Have you benefited from discounts and agreements with local services (restaurants, laundries, other businesses) offered by the CWS?	User	Economic	Economic growth
Business retained in local area	What is the percentage of businesses that used the space in the last year which went on to leave the neighborhood / village / town?	Manager	Economic	Economic growth
New business start	Did you (your company) start operating in the last year?	User	Economic	Economic growth
Skills development	How often do you organise training programs for individuals not working in the CWS?	Manager	Economic	Employment & skills development
Job creation	How many additional jobs have been created in the last year?	Manager	Economic	Employment & skills development
Local employment	How many coworkers have been hired from the local community in the last year? How many local startups have you hosted in the last year?	Manager	Economic	Employment & skills development
Recruitment of unemployed	Were you unemployed before joining the CWS?	User	Economic	Employment & skills development
Sales of innovative products	What percentage of your turnover originated from new or significantly improved products?	User	Economic	Innovation
Collaboration	With how many CWS members have you had formal collaborations? (e.g. worked on a project together, started a project / business / partnership together, hired another member)	User	Economic & Social	Innovation & Networking Opportunities
Peer-to-peer support	With how many CWS members are you comfortable asking for professional advice about your work?	User	Economic & Social	Innovation & Networking Opportunities
Training and mentoring programs	How often do you organise training programs and events for members on SOFT SKILLS ³³ ? How often do you organise training	Manager	Economic & Social	Innovation & Networking Opportunities

³³ Communication, marketing, management, transversal and transferable skills.

	programs and events for members on HARD SKILLS ³⁴ ?			
Networking events	How often do you organise events to stimulate NETWORKING (among members, organisations, funders, etc.)?	Manager	Economic & Social	Innovation & Networking Opportunities
Global pipeline	Did you increase your knowledge (know-how, market dynamics, etc.) by interacting with professionals not working in your CWS, but that you met through the CWS? If yes, on which geographical level (local, regional, national, global)?	User	Economic & Social	Innovation & Networking Opportunities
Openness to non-members	Is the space accessible to anyone ³⁵ ?	Manager	Social	Networking Opportunities
Sociocultural events	How often do you organise the following social and cultural events: Community activities (lunches, happy hours, coffees, etc.); Cultural events and activities (music, theater, arts, etc.); Community-supported agriculture or agricultural activities; Events, initiatives, and projects dealing with environmental topics; Sport and recreational events and activities (yoga, Pilates, etc.); Social events and activities for children; Charity events and activities; Inspirational events (creative mornings, pitches, guest speakers, etc.)?	Manager	Social	Networking Opportunities
Social trust	How many members can you fully trust ³⁶ ?	User	Social	Networking Opportunities
Wider CWS networks	Is the CWS part of wider networks of CWS? If yes, on which geographical level (local, regional, national, global)?	Manager	Social	Networking Opportunities
Interaction with medium and large firms	What type of interaction does the CWS have with big firms/corporates (more than 50 employees)? ³⁷	Manager	Social	Networking Opportunities
Partnership with locally rooted industries	Does the space collaborate or support traditional local industries (e.g. local artisan production or local specific industries)?	Manager	Social	Networking Opportunities
Third sector support	What type of relationship the CWS have with NGOs; Community organisations; Social enterprises; Charities; Neighbourhood groups; Labour associations? ³⁸	Manager	Social	Networking Opportunities
Economic benefits for	What type of benefits does the CWS offer to disadvantaged groups?	Manager	Social	Social Inclusion

³⁴ Technical and professional-specific skills.

³⁵ All areas are fully accessible to non-members; Only some areas are accessible to non-members; It is open only to the members, but open to anyone when public events are hosted; It is open only to the members.

³⁶ Trust is intended as the expectation that arises within a community of regular, honest, cooperative behavior, based on commonly shared norms, on the part of other members of that community (Anheier & Toepler, 2009).

³⁷ They invest in the space; They are ready to invest in startups; They rent space for their employees; They hire or look for new professionals to hire from the space; They subcontract projects to professionals; No relationships; I don't know; Other (please specify).

³⁸ We offer them space for free or at a discounted price; We offer them services; Both; None.

disadvantaged groups				
Social employment	How many of the employees are coming from disadvantaged groups (NEETs, long-term unemployed, economic migrants, refugees, disabled persons)?	Manager	Social	Social Inclusion
Up-skilling of disadvantaged groups	For each of the following categories of disadvantaged groups ³⁹ , could you indicate what type of up-skilling ⁴⁰ is offered to them?	Manager	Social	Social Inclusion
Previous employment status	Where was your previous job status? ⁴¹	User	Social	Social Inclusion
Sustaining local culture	How do artists use the CWS? ⁴²	Manager	Social	Local Cultural Value
Local community cultural engagement	According to your estimations, how many people attend cultural events organised in the CWS on a monthly basis?	Manager	Social	Local Cultural Value
Local identity	How has the CWS changed the city / neighborhood / town where it is located?	User	Social	Local Cultural Value
Individual carbon emission	How many days per week do you physically work in (or use) this CWS? How many minutes does it take you to get to the CWS from your home? What means of transportation do you primarily use to get to the CWS? Is your home somehow connected by public transport to the CWS?	User	Environmental	
Business carbon emissions	Is your business taking actions to reduce its CO2 emissions? (If you do not have a business or you do not work for a company or organisation, select 'Not applicable')	User	Environmental	
Business environmental commitment	What type of pressing social and environmental issues do you address with your work? ⁴³	User	Environmental	
Share of resources	Do you share objects, tools or products needed for your business and professional activities (e.g. printers, machineries, etc.), with the other users of the CWS?	User	Environmental	
Environmental conscious design	Do you consider the CWS as consciously designed from an environmental perspective?	User	Environmental	
Energy consumption	How much did you spend monthly (or yearly) on average for electricity bills? ⁴⁴	Manager	Environmental	

³⁹ Women , NEETs (young people aged 15-29 neither in employment nor in education or training), Long-term unemployed (more than 1 year), Economic migrants / refugees (no expats), Disabled persons.

⁴⁰ Training on soft skills; Training on hard skills; Networking events; None.

⁴¹ If respondents answer "Unemployed" it can be considered as a proxy of one of the indicators measuring social innovation and inclusion impact.

⁴² As their permanent studio; As part of artist residency programs; For exhibitions and events; We do not host artists; Other (please specify)

⁴³ The answer could be a multiple choice with the list of Sustainable Development Goals (SDGs).

⁴⁴ Together with a question on the number of CWS and secondary data on the electricity cost in currency / kWh, we can find the electricity consumption per user.

Renewable energy self-production	What percentage of the energy consumption of the CWS originated from self-produced renewable sources?	Manager	Environmental
Regeneration of disused space	Is the CWS located in a former disused or abandoned space?	Manager	Environmental

A2: Sources for each country

Table 73: List of sources for each country.

Country	Sources
Austria	Individual dataset
Belgium	Google Maps
Bulgaria	Google Maps
Croatia	Google Maps
Czech Republic	Coworkingy v Česku (https://navolnenoze.cz/novinky/coworkingy/)
Denmark	Google Maps
Estonia	Google Maps
Finland	Google Maps
France	Google Maps & France Tiers Lieu (https://francetierslieux.fr/quest-ce-quun-tiers-lieu/)
Germany	The Coworking Map (https://coworkingmap.de/en/home-4erslider-english/)
Greece	Google Maps
Ireland	Connected Hubs (https://connectedhubs.ie/)
Italy	Coworking Italia (https://coworkingitalia.org/), South Working (https://www.southworking.org/), and Google Maps
Latvia	Google Maps
Lithuania	Google Maps
Netherlands	Google Maps
Norway	Google Maps
Portugal	Google Maps & Work From Centro de Portugal (https://workfrom.turismodocentro.pt/espacos/)
Slovakia	Google Maps
Spain	Google Maps
Sweden	Google Maps
Switzerland	Coworking Switzerland (https://www.coworking.ch/coworking-spaces)
UK	Flexible Space Association (https://www.flexsa.co.uk/), Hubble HQ (https://hubblehq.com/), & LoopNet (https://www.loopnet.com/) and Google Maps

A3: National Profiles

In the next paragraphs the national profiles of Austria, Belgium, France, Germany, Italy, Netherlands, Portugal, Spain, Sweden and Switzerland are presented.

Austria

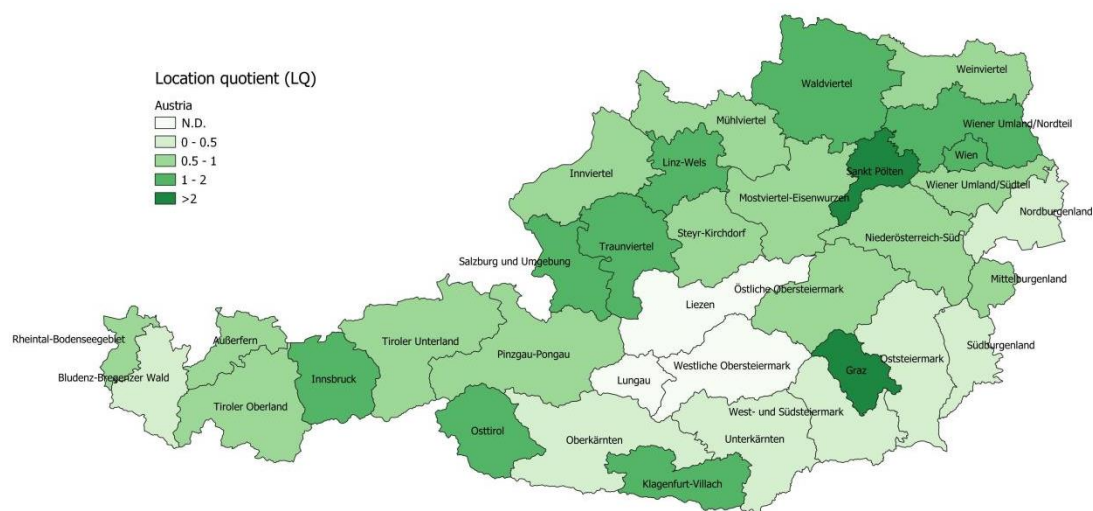


Figure 8: Location quotient (LQ) in Austria.

As regards Austria, we mapped 456 CWS located in 32 out of 35 groups of districts (NUTS3 regions). Considering the national population of almost 9 million inhabitants, it was possible to calculate the national concentration of CWS. Thus, there are 5.08 CWS per 100,000 inhabitants, which is almost double compared to the European average of 2.62. Approximately one-third of them are located in predominantly urban groups of districts (33.8%), while the intermediate and predominantly rural ones account for 39.5% and 26.8% of CWS respectively. Austria has the fourth highest share of CWS located in rural regions, following Ireland (69.1%), Estonia (40%), and Portugal (31.9%). Furthermore, 5.3% CWS are located in groups of districts that are considered remote. Among the 35 groups of districts, 8 have a higher concentration of CWS per population than the national average. Quite surprisingly, only 1 out of 8 is considered predominantly urban, while the rural ones are three: Sankt Pölten, Traunviertel, Osttirol. The majority are located in mountainous areas. The top-three groups of districts are Graz, Sankt Pölten, and Klagenfurt-Villach with a LQ of 2.9, 2.6, and 1.5 respectively. In absolute numbers, the groups of districts with the highest presence of CWS are the ones which contain the three largest cities of Austria: Wien, Graz, and Linz-Wels with 103, 66, and 40 CWS respectively.

Table 74: Distribution of CWS in Austrian NUTS3 regions.

	NUTS 3	Characteristic	N. CWS	LQ	Geography
1	Graz	Intermediate	66	2.9	Mountainous
2	Sankt Pölten	Rural	21	2.6	
3	Klagenfurt-Villach	Intermediate	22	1.5	Mountainous
4	Innsbruck	Urban	21	1.3	Mountainous
5	Linz-Wels	Intermediate	40	1.3	

6	Traunviertel	Rural	15	1.2	Mountainous
7	Osttirol	Rural and remote	3	1.2	Mountainous
8	Salzburg und Umgebung	Intermediate	22	1.2	Mountainous
9	Wien	Urban	103	1.0	
10	Wiener Umland/Nordteil	Urban	18	1.0	
11	Waldviertel	Rural and remote	11	1.0	
12	Wiener Umland/Südteil	Intermediate	17		

Belgium

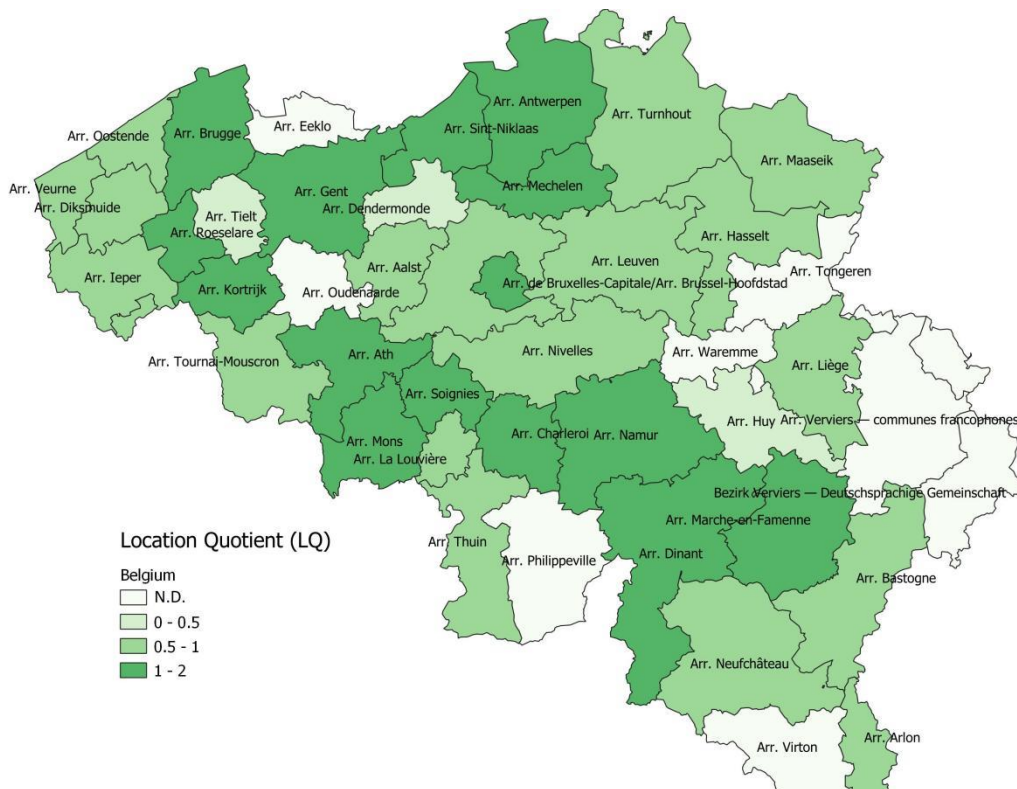


Figure 9: Location quotient (LQ) in Belgium.

In Belgium we found 262 CWS across 44 arrondissements (NUTS3 regions), with 36 of them having at least one CWS. 59.2% of the CWS are located in predominantly urban regions, 35.5% in intermediate regions, and 5.3% in predominantly rural regions. Given the characteristics of the Belgian territory, all these spaces are located close to a city given the lack of arrondissements considered remote. None of the CWS is thus located in a remote region, as observed as well in the Czech Republic, Slovakia, and the Netherlands. With a population of 11.6 million inhabitants, the density of CWS is equal to 2.26 CWS per 100,000 inhabitants, slightly lower than the European average of 2.62. Among the 44 arrondissements, 12 have LQ which is greater than 1, meaning

they have a greater presence of CWS compared to the national average. Among these 12, 5 are located in intermediate regions and 1 in predominantly rural ones. The top-three arrondissements are Namur, Brussels-Capital, and Brugge respectively with a LQ of 1.9, 1.7 and 1.7. Interestingly, both the arrondissements of Namur and Brugge are considered intermediate regions. In absolute numbers, the top-three arrondissements are Brussels-Capital with 48 CWS, Antwerpen with 26, and Gent with 21. The predominantly rural arrondissement of Dinant has a higher share of CWS compared to the national average. These can be partially explained due to its proximity to the arrondissement of Namur, which, as we saw before, is highly dense with CWS.

Table 75: Distribution of CWS in Belgian NUTS3 regions.

	NUTS 3	Characteristic	N. CWS	LQ	Geography
1	Arr. Namur	Intermediate	14	1.9	
2	Arr. de Bruxelles-Capitale	Urban	48	1.7	
3	Arr. Brugge	Intermediate	11	1.7	Coastal
4	Arr. Mons	Urban	10	1.7	
5	Arr. Gent	Intermediate	21	1.6	Coastal
6	Arr. Mechelen	Urban	11	1.4	Coastal
7	Arr. Soignies	Intermediate	3	1.2	
8	Arr. Kortrijk	Urban	8	1.2	
9	Arr. Sint-Niklaas	Urban	7	1.2	Coastal
10	Arr. Dinant	Rural	3	1.2	
11	Arr. Roeselare	Intermediate	4	1.1	Coastal
12	Arr. Antwerpen	Urban	26	1.1	Coastal
13	Arr. Ath	Rural	3	1.0	
14	Arr. Charleroi	Urban	9	1.0	
15	Arr. Tournai-Mouscron	Intermediate	5	1.0	

France

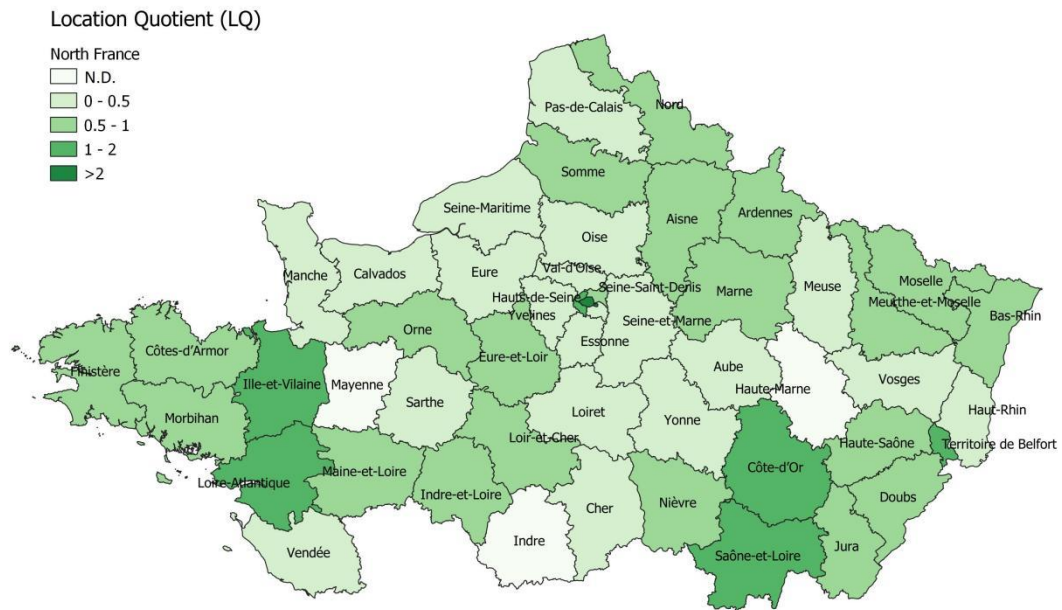


Figure 10: Location quotient (LQ) in North France.

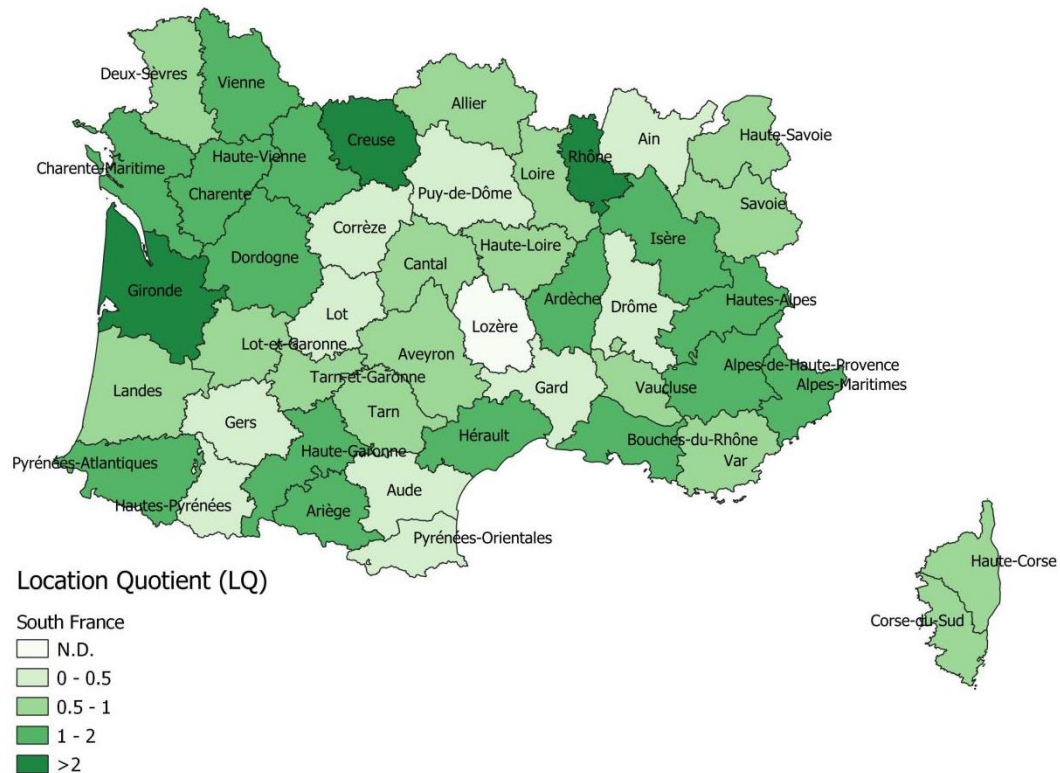


Figure 11: Location quotient (LQ) in South France.

In France we have mapped 1,932 CWS across 95 departments (NUTS3 regions), while the 6 remaining departments do not have any CWS. With approximately 67.9 million inhabitants, France has on average 2.85 CWS, which is slightly higher than the European average of 2.62. Overall, 58.5% of CWS are in predominantly urban departments, 22.1% in intermediate departments, and 19.4% in predominantly rural departments, while about 5.4% of them are located in departments considered remote. As such, the CWS in France are also well established outside the large urban centres. 21 NUTS3 regions have a LQ which is greater than 1, meaning that the concentration of CWS per population in these regions exceeds the average national concentration. Out of these 21 departments, Paris ranks first with 394 CWS and a LQ value of 6.5, while 8 departments are urban, 4 are intermediate and 9 are predominantly rural departments. Moreover, looking at other characteristics of these 21 NUTS3 regions, eight of them are coastal regions and seven are mountainous ones. Rural and remote departments, like Creuse, Ariège and Hautes-Alpes rank high in LQs and are attractive tourist destinations.

Table 76: Distribution of CWS in French NUTS3 regions.

	NUTS 3	Characteristic	N. CWS	LQ	Geography
1	Paris	Urban	394	6.5	
2	Creuse	Rural and remote	9	2.8	
3	Rhône	Urban	140	2.6	Mountainous
4	Gironde	Urban	118	2.5	Coastal
5	Alpes-Maritimes	Urban	61	1.9	Coastal & Mountainous
6	Vienne	Rural	24	1.9	
7	Loire-Atlantique	Urban	77	1.8	Coastal
8	Bouches-du-Rhône	Urban	88	1.5	Coastal
9	Ardèche	Rural	14	1.5	Mountainous
10	Charente	Rural	14	1.4	
11	Ariège	Rural and remote	6	1.4	Mountainous
12	Ille-et-Vilaine	Intermediate	43	1.4	Coastal
13	Hautes-Alpes	Rural and remote	5	1.3	Mountainous
14	Pyrénées-Atlantiques	Intermediate	23	1.2	Coastal
15	Haute-Vienne	Rural	12	1.1	
16	Hérault	Intermediate	38	1.1	Coastal
17	Isère	Intermediate	40	1.1	Mountainous
18	Haute-Garonne	Urban	44	1.1	
19	Charente-Maritime	Rural	20	1.1	Coastal
20	Alpes-de-Haute-Provence	Rural and remote	5	1.1	Mountainous
21	Hauts-de-Seine	Urban	49	1.1	

Germany

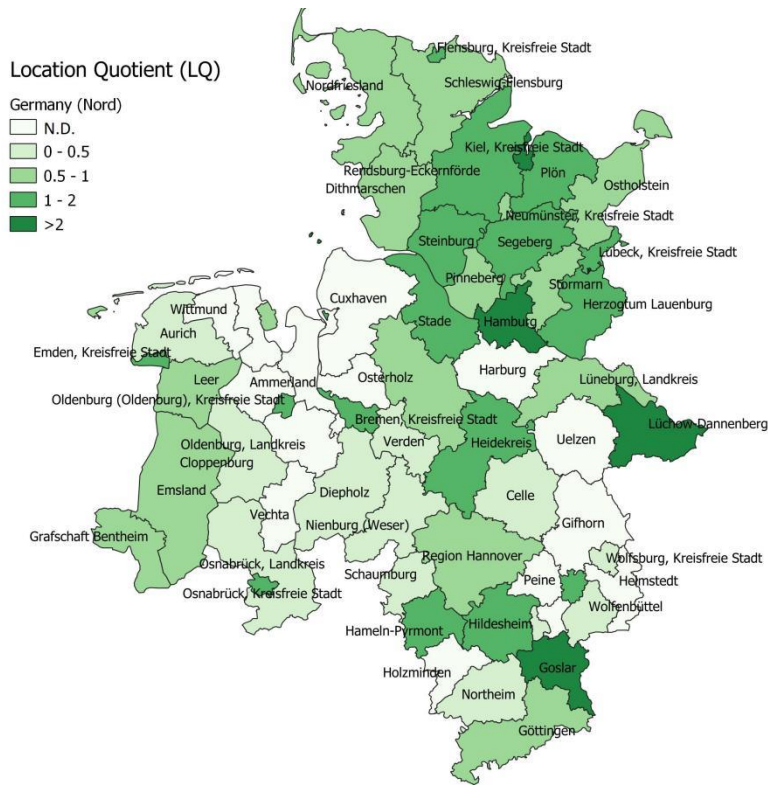


Figure 12: Location quotient (LQ) in North Germany.

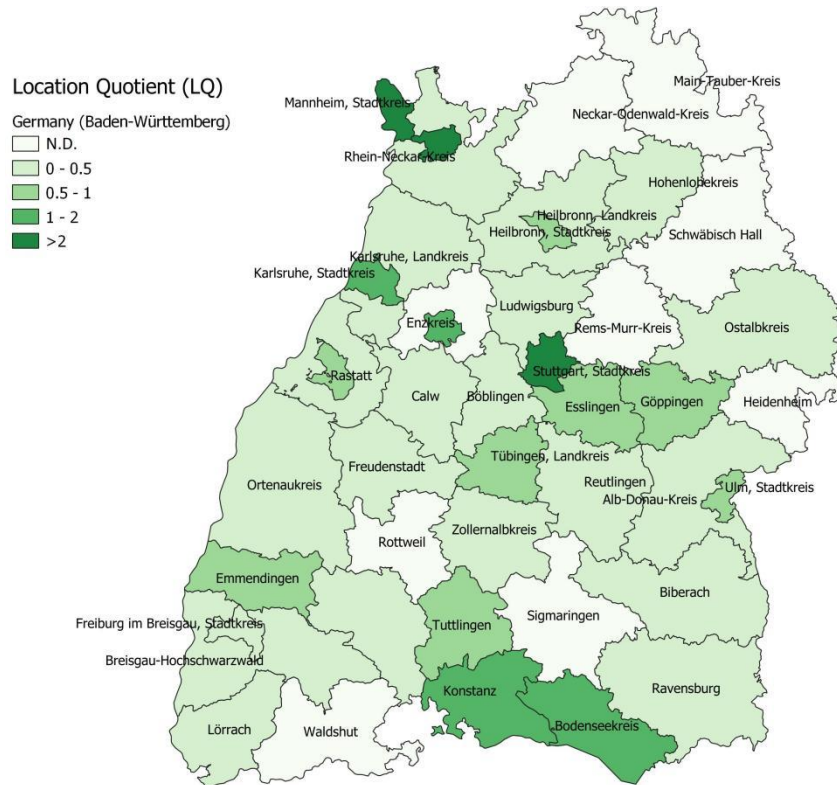


Figure 13: Location quotient (LQ) in Germany Baden-Württemberg.

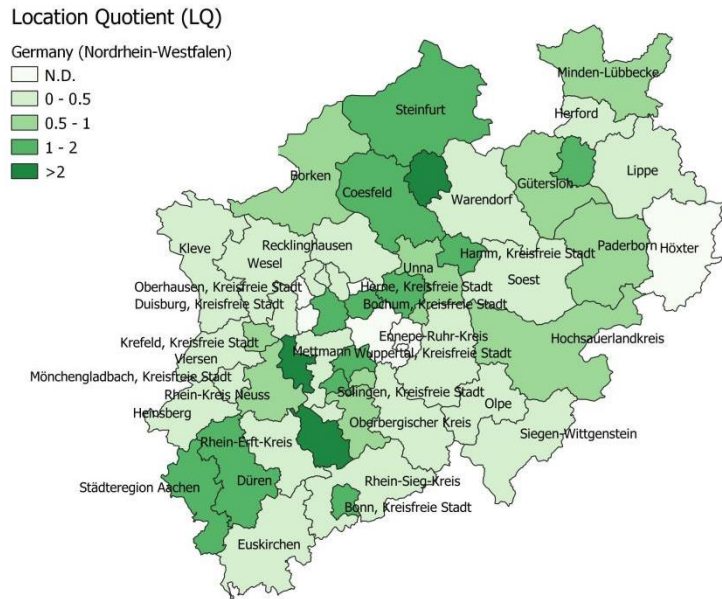


Figure 14: Location quotient (LQ) in Germany Nordrhein-Westfalen.

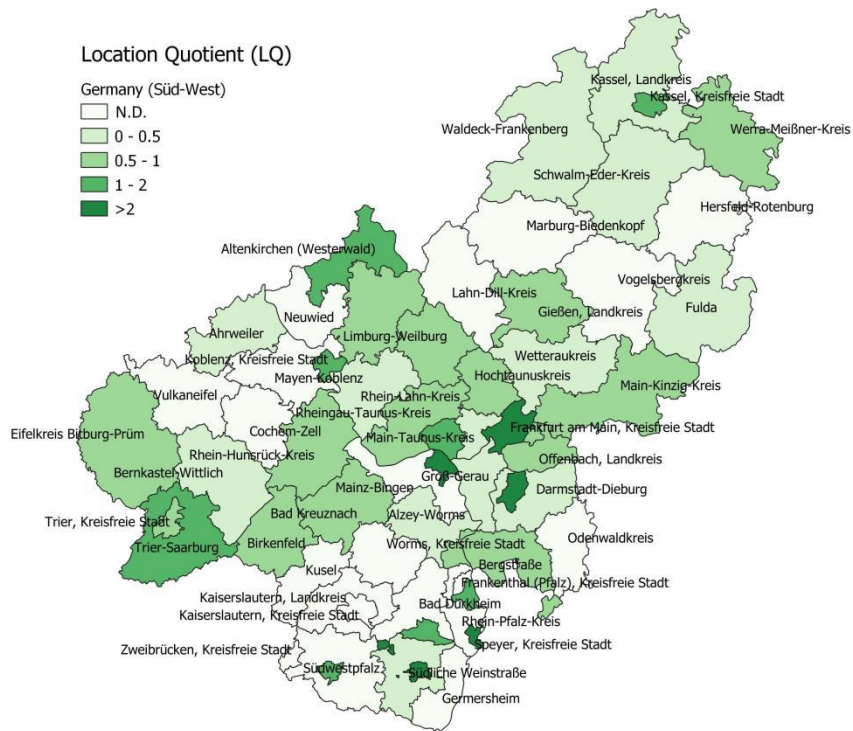


Figure 15: Location quotient (LQ) in South-West Germany.

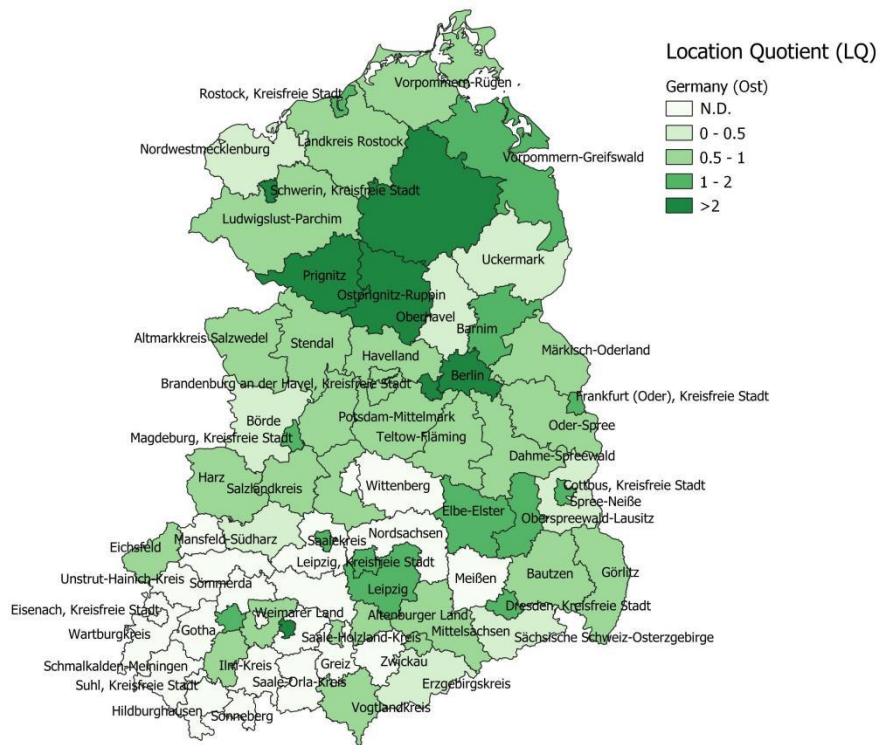


Figure 16: Location quotient (LQ) in East Germany.

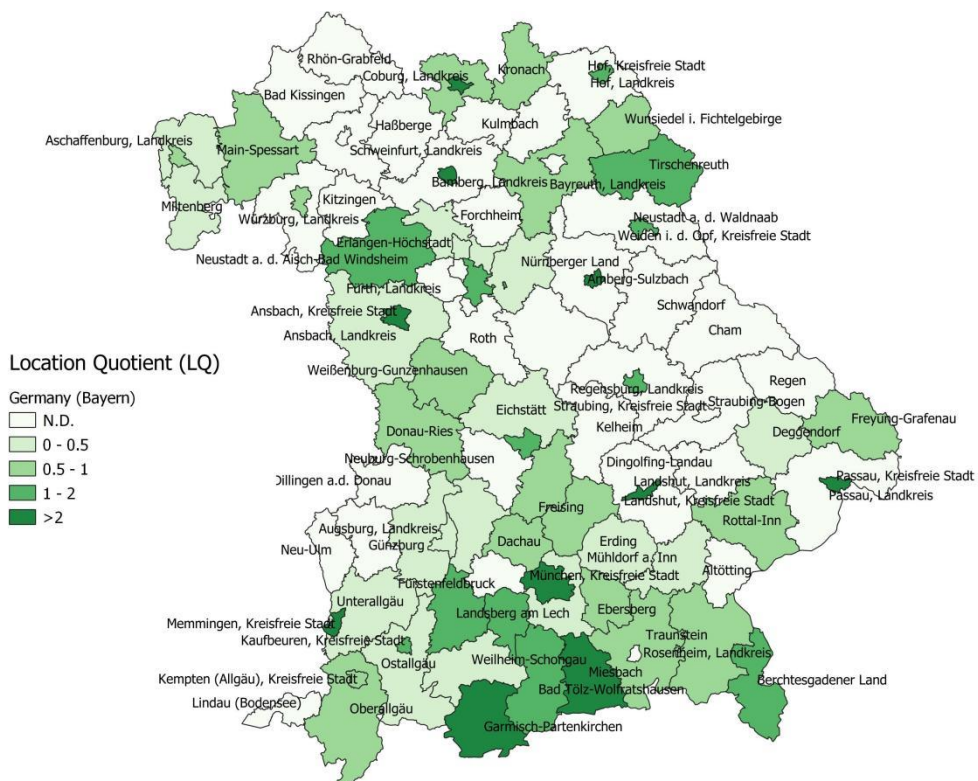


Figure 17: Location quotient (LQ) in Germany Bayern.

In Germany we mapped 1,543 CWS across 284 out of 401 districts (NUTS3 regions). Considering a population of 83.2 million inhabitants, Germany has on average 1.85 CWS every 100,000 inhabitants, which is lower than the European average of 2.62. 67%

of the mapped CWS are in predominantly urban districts, 25% in intermediate and 8% in predominantly rural districts, while just 1.6% of them are in remote areas. As such, the phenomenon of CWS development in Germany is predominantly an urban one. 91 NUTS3 regions have a LQ higher than 1, meaning that the concentration of CWS per population in these regions exceeds the average national concentration in Germany. The following table ranks the first 30 NUTS3 regions with the highest LQ. Large cities, such as Frankfurt am Main, Düsseldorf, München, Stuttgart, Berlin, Hamburg, and Köln are in the first 16 districts. In absolute numbers, the districts having the three most populated cities are also the ones with the largest number of CWS, with Berlin, Hamburg, and München having respectively 188, 92, and 114 CWS. However, despite having a fifth of Berlin's population, a third of Hamburg's, and half of München's population, Frankfurt am Main is the district with the highest LQ (6.7), having 94 CWS. Overall, 17 districts are considered predominantly urban, 8 are intermediate and 5 are predominantly rural districts.

Table 77: Distribution of CWS in German NUTS3 regions.

	NUTS3	Characteristics	N. CWS	LQ	Geography
1	Frankfurt am Main, Kreisfreie Stadt	Urban	94	6,7	
2	Düsseldorf, Kreisfreie Stadt	Urban	57	5,0	
3	Landau in der Pfalz, Kreisfreie Stadt	Urban	4	4,6	
4	München, Kreisfreie Stadt	Urban	114	4,1	Mountainous
5	Heidelberg, Stadtkreis*	Urban	12	4,1	Coastal
6	Kiel, Kreisfreie Stadt	Urban	18	3,9	
7	Amberg, Kreisfreie Stadt	Intermediate	3	3,9	
8	Stuttgart, Stadtkreis	Urban	39	3,4	Mountainous
9	Miesbach*	Intermediate	6	3,2	
10	Berlin	Urban	188	2,8	
11	Mainz, Kreisfreie Stadt	Urban	11	2,7	Coastal
12	Hamburg	Urban	92	2,7	
13	Mannheim, Stadtkreis	Urban	15	2,6	Mountainous
14	Garmisch-Partenkirchen*	Intermediate	4	2,4	Mountainous
15	Jena, Kreisfreie Stadt*	Intermediate	5	2,4	
16	Köln, Kreisfreie Stadt	Urban	48	2,4	
17	Potsdam, Kreisfreie Stadt	Intermediate	8	2,4	
18	Mecklenburgische Seenplatte	Rural	11	2,3	Coastal
19	Schwerin, Kreisfreie Stadt	Rural	4	2,3	
20	Landshut, Kreisfreie Stadt	Rural	3	2,2	
21	Ostprignitz-Ruppin	Rural	4	2,2	
22	Prignitz	Rural and remote	3	2,1	
23	Bamberg, Kreisfreie Stadt	Intermediate	3	2,1	

24	Münster, Kreisfreie Stadt	Urban	12	2,0	
25	Darmstadt, Kreisfreie Stadt	Urban	6	2,0	Mountainous
26	Goslar*	Intermediate	5	2,0	
27	Leipzig, Kreisfreie Stadt	Urban	22	2,0	
28	Leipzig	Urban	9	1,9	
29	Dortmund, Kreisfreie Stadt	Urban	20	1,8	
30	Magdeburg, Kreisfreie Stadt	intermediate	8	1,8	

Italy

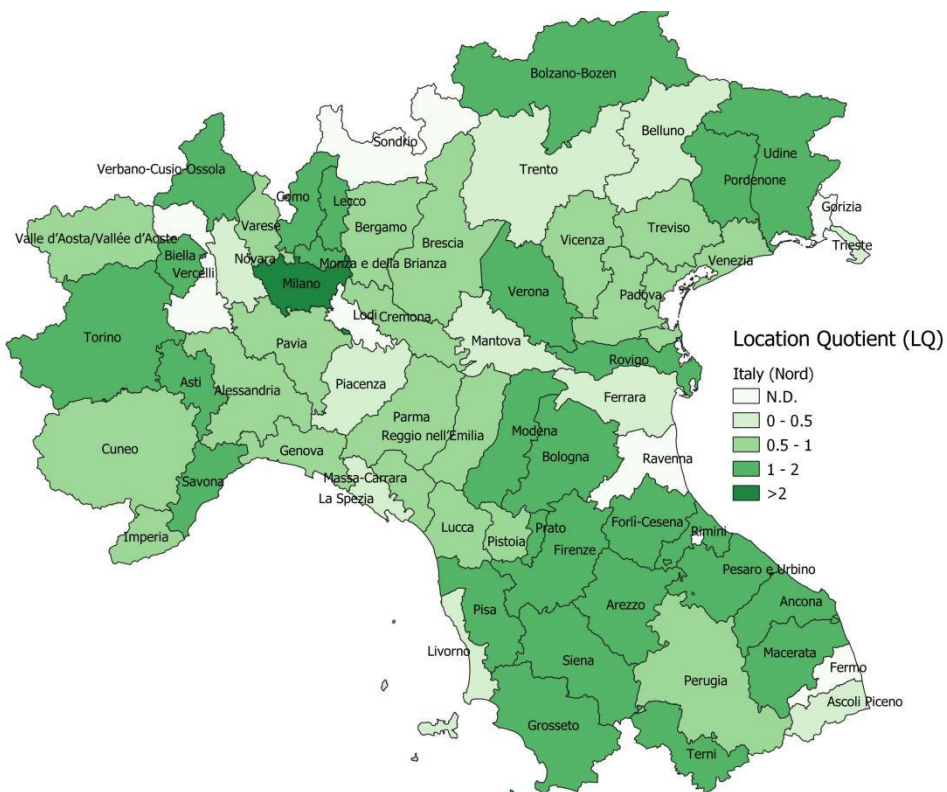


Figure 18: Location quotient (LQ) in North Italy.

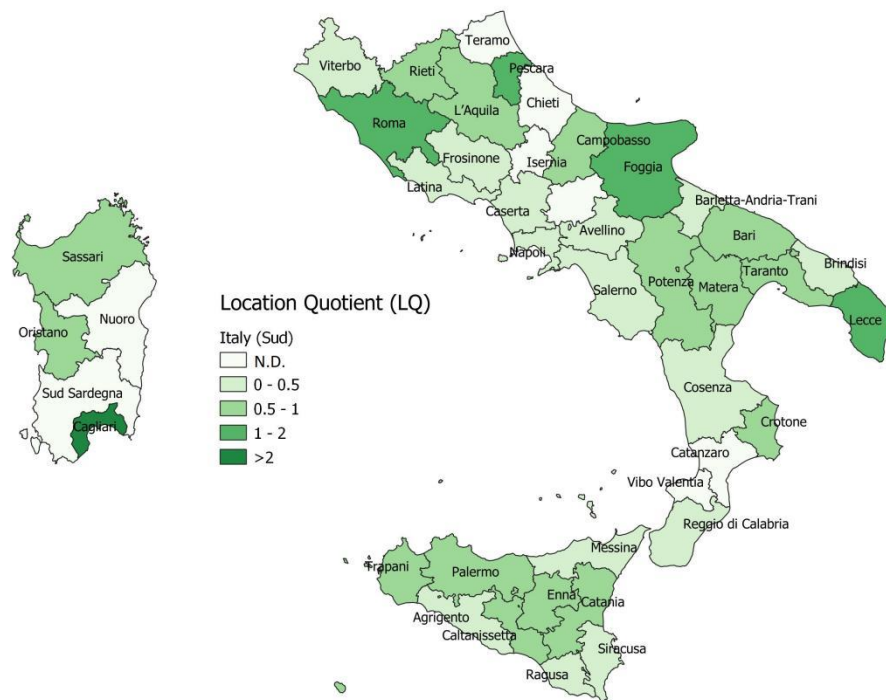


Figure 19: Location quotient (LQ) in South Italy.

In Italy we mapped 820 CWS in 93 out of 107 provinces (NUTS3 regions). If we consider 59 million inhabitants, in the country there are 1.39 CWS per 100,000 inhabitants, which is roughly half of the European average of 2.62. CWS in predominantly urban provinces account for 63.4%, while CWS in intermediate and predominantly rural provinces represent 28.5% and 8% respectively. Only 3.5% of CWS are located in provinces considered remote. In absolute numbers the provinces with the highest presence of CWS are the ones where the two largest cities are located, Milano and Roma, with 124 and 76 respectively. The province of Milano is also the one with the highest concentration of CWS per population with a LQ of 3.5, followed by other three urban provinces, Cagliari (2.3), Monza-Brianza (1.9), and Firenze (1.8). 31 provinces have a higher concentration of CWS per population compared to the national average. Among those, 6 are considered predominantly rural and 14 intermediate. These rural or intermediate provinces are located in different parts of Italy very diverse among each other. Some contain major cities (Bologna, Verona), or close to major cities (Asti, Siena, Savona), or industrial areas (Rovigo, Modena, Pordenone). Some others are attractive tourist destinations (Bolzano, Forlì-Cesena). The majority of these provinces are located either in the North or Centre of Italy, reflecting a low presence of CWS in Southern Italy, given that it still remains less economically developed than the Northern and Central areas. In the next years there will be more efforts to enhance connectivity and digitalise the more remote Italian areas, with a national strategic plan 2023-2027 in line with the European Common Agricultural Policy (CAP)⁴⁵. Thus, reflecting in a more favourable environment for a higher presence of CWS in rural areas, and more specifically, in Southern Italy.

⁴⁵ <http://www.pianetapsr.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/2851>

Table 78: Distribution of CWS in Italian NUTS3 regions.

	NUTS 3	Characteristic	N. CWS	LQ	Geography
1	Milano	Urban	124	3.5	
2	Cagliari	Urban	11	2.3	Coastal & Mountainous
3	Monza e Brianza	Urban	18	1.9	
4	Firenze	Urban	20	1.8	Mountainous
5	Pesaro e Urbino	Intermediate	7	1.8	Coastal & Mountainous
6	Pordenone	Intermediate	6	1.7	Coastal
7	Asti	Rural	4	1.7	
8	Siena	Rural	5	1.7	Mountainous
9	Bologna	Intermediate	19	1.7	
10	Roma	Urban	76	1.6	Coastal
11	Forlì-Cesena	Intermediate	7	1.6	Coastal & Mountainous
12	Ancona	Intermediate	8	1.6	Coastal
13	Prato	Urban	4	1.4	Mountainous
14	Bolzano-Bozen	Rural	8	1.4	Mountainous
15	Savona	Intermediate	4	1.3	Coastal & Mountainous
16	Torino	Urban	32	1.3	Mountainous
17	Pisa	Intermediate	6	1.3	Coastal
18	Grosseto	Rural, remote	3	1.2	Coastal
19	Terni	Intermediate	3	1.2	Mountainous
20	Udine	Intermediate	7	1.2	Coastal & Mountainous
21	Como	Urban	8	1.2	Mountainous
22	Macerata	Intermediate	4	1.2	Coastal & Mountainous
23	Rovigo	Rural	3	1.2	Coastal
24	Lecce	Urban	10	1.2	Coastal
25	Modena	Intermediate	9	1.2	
26	Pescara	Intermediate	4	1.1	Coastal & Mountainous
27	Lecco	Urban	4	1.1	Mountainous
28	Arezzo	Intermediate, remote	4	1.1	Mountainous

29	Verona	Intermediate	11	1.1	
30	Rimini	Urban	4	1.1	Coastal
31	Foggia	Rural	7	1.1	Coastal

Netherlands

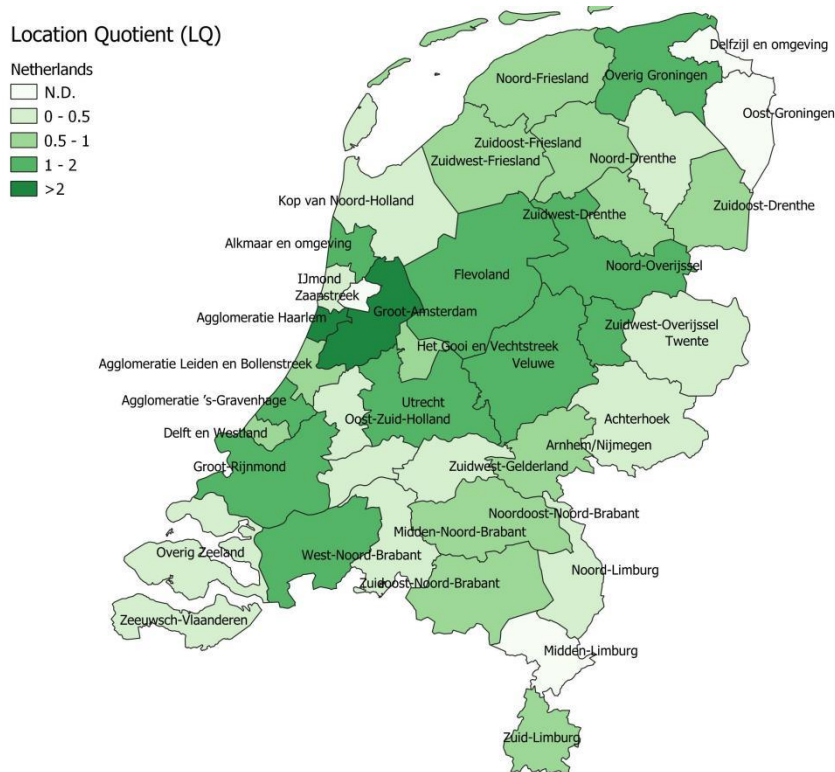


Figure 20: Location quotient (LQ) in the Netherlands.

In the Netherlands it was possible to map 549 CWS in 40 NUTS3 regions. Only 4 out of 40 regions do not host any CWS. The majority of CWS are located in predominantly urban regions accounting for 86.7% of Dutch CWS. According to this percentage the Netherlands is the country in the EU with the highest concentration of CWS in the urban context, and only second to the UK in the 23 countries considered in this report. The share of CWS located in intermediate and predominantly rural regions are 13.1% and 0.2% respectively. Similarly to Belgium, all CWS are located close to a city, given the lack in the Dutch territory of regions considered remote. Considering the population of the Netherlands, which amounts to about 17.6 million inhabitants, the national concentration of CWS is equal to 3.12 CWS per 100,000 inhabitants, way above the European average of 2.62. As regards the presence of CWS, only 8 regions out of 40 are above the national average, accounting for 68.9% of all the CWS in the country. Among these regions, only the region of Overig Groningen is considered intermediate, despite the presence of Groningen, the seventh-most populated municipality of the country with almost 200,000 inhabitants. The top-three regions are Groot-Amsterdam, Agglomeratie Haarlem, and Utrecht with a LQ of 3.1, 2.2, and

1.9 respectively. The highest regions in absolute number of CWS are Groot-Amsterdam, Utrecht, and Groot-Rijnmond (135, 82, 50 respectively), where three among the biggest cities in the country are located: Amsterdam, Utrecht, and Rotterdam.

Table 79: Distribution of CWS in Dutch NUTS3 regions.

	NUTS 3	Characteristic	N. CWS	LQ	Geography
1	Groot-Amsterdam	Urban	135	3.1	Coastal
2	Agglomeratie Haarlem	Urban	16	2.2	Coastal
3	Utrecht	Urban	82	1.9	
4	Veluwe	Urban	29	1.3	
5	West-Noord-Brabant	Urban	22	1.1	Coastal
6	Overig Groningen	Intermediate	14	1.1	Coastal
7	Groot-Rijnmond	Urban	50	1.1	Coastal
8	Agglomeratie 's-Gravenhage	Urban	30	1.1	Coastal
9	Flevoland	Urban	14	1.0	Coastal
10	Alkmaar en omgeving	Urban	8	1.0	Coastal
11	Zuidwest-Overijssel	Intermediate	5	1.0	
12	Noord-Overijssel	Intermediate	12	1.0	

Portugal

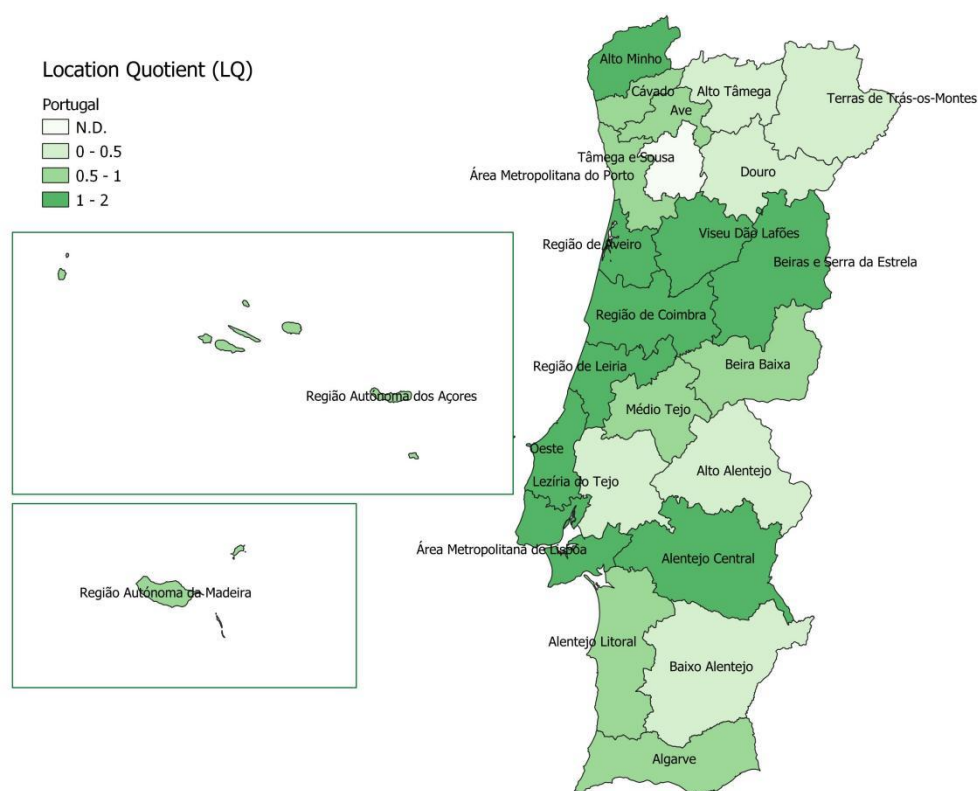


Figure 21: Location quotient (LQ) in Portugal.

As regards Portugal, we mapped 398 CWS in 25 subregions (NUTS3 regions), among which only one does not have any CWS on its territory (Tâmega e Sousa). Slightly more than half of the CWS (50.5%) are located in predominantly urban subregions, 17.6% in intermediate subregions, and 31.9% are located in predominantly rural subregions. Portugal is therefore the third country in the EU with the highest share of CWS in rural contexts, following Ireland (69.1%) and Estonia (40%). Furthermore, 13.6% of CWS are located in a subregion considered remote. With a population of approximately 10.4 million inhabitants, the national concentration equals 3.84 CWS per 100,000 inhabitants, which is above the European average of 2.62. As shown in Figure 10, 9 subregions out of 25 have a concentration of CWS that is higher than the national average. 7 among these 9 subregions are considered predominantly rural - of which two are also considered remote - one intermediate, and only one predominantly urban. The top-three subregions are Região de Coimbra, Região de Aveiro, and Alentejo Central, with a LQ of 1.8, 1.7, and 1.4 respectively. While, as we would expect, the subregions with the highest absolute number of CWS are Área Metropolitana de Lisboa and Área Metropolitana do Porto with 126 and 66 CWS respectively, where the two largest cities are located, accounting for the 48.2% of the total of CWS in the country.

A potential explanation for these results in favour of the rural areas is that Portugal has become in the last years one of the most popular destinations for digital nomads from all over the world. In fact, the majority of these subregions are located either in coastal or mountainous areas.

Furthermore, roughly 33% of the Portuguese population live in rural areas, and the employment in the primary sector represents 9%, which is more than twice the European average. Consequently, some of the main challenges for regional policy-makers have been to increase the competitiveness of smallholder farms, promote better cooperation by encouraging, for instance, the creation of producers organisations, and support the commitment in the sector of new generations. While, as regards the tertiary sector, policy-makers invested in improving access to broadband connection and strengthening digital skills in rural areas⁴⁶. In 2021, the ministry of agriculture allocated new funds to support rural development, with a focus on young agricultural entrepreneurs and on the adoption of more sustainable technologies⁴⁷. In addition, in rural areas of Portugal on average 11.5% of the population between 15 and 29 years old are NEETs⁴⁸. The most qualified young people in these areas move to urban areas due to the lack of opportunities, while the less qualified remain and they are often condemned to precarious labour conditions⁴⁹. This scenario confirms that CWS located in rural areas are usually designed to host digital nomads from abroad, rather than young Portuguese people. For the latter it is more likely to aim at moving to large cities like Lisbon or Porto.

Table 80: Distribution of CWS in Portuguese NUTS3 regions.

	NUTS 3	Characteristic	N. CWS	LQ	Geography
1	Região de Coimbra	Rural	30	1,8	Coastal
2	Região de Aveiro	Intermediate	24	1,7	Coastal
3	Alentejo Central	Rural and remote	8	1,4	
4	Beiras e Serra da Estrela	Rural and remote	11	1,4	Mountainous
5	Oeste	Rural	19	1,3	Coastal
6	Viseu Dão Lafões	Rural	13	1,3	Mountainous
7	Região de Leiria	Rural	14	1,3	Coastal
8	Área Metropolitana de Lisboa	Urban	126	1,1	Coastal
9	Alto Minho	Rural	10	1,1	Coastal & Mountainous
10	Cávado	Intermediate	16	1,0	Coastal & Mountainous
11	Área Metropolitana do Porto	Urban	66	1,0	Coastal
12	Beira Baixa	Rural and remote	3	1,0	

⁴⁶ https://portugal.representation.ec.europa.eu/estrategia-e-prioridades/principais-politicas-da-ue-para-portugal/politica-agricola-comum-europeia-em-portugal_pt

⁴⁷ <https://www.portugal.gov.pt/pt/gc22/comunicacao/noticia?i=novas-medidas-de-apoio-ao-desenvolvimento-rural>

⁴⁸ The young persons neither in education nor employment or training (NEET).

⁴⁹ <https://www.publico.pt/2021/03/04/p3/noticia/zonas-rurais-sao-jovens-nao-estudam-trabalham-1952952>

Spain

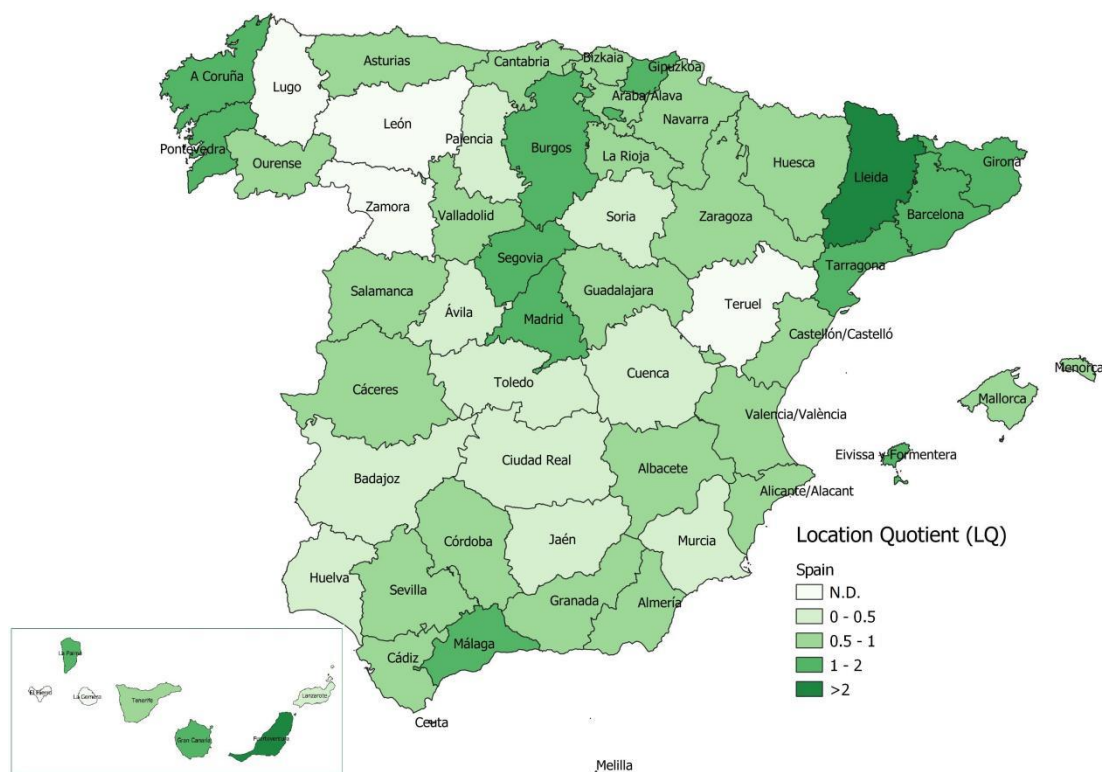


Figure 22: Location quotient (LQ) in Spain.

In Spain we found 1,223 CWS located in 53 out of 59 provinces (NUTS3 regions). With 47.4 million inhabitants, Spain has 2.58 CWS per 100,000 inhabitants, which is in line with the European average of 2.62. A high concentration of them are in predominantly urban NUTS3 regions (71.6%), with Barcelona (276 CWS) and Madrid (242 CWS), accounting for roughly 42% of all the Spanish CWS. While CWS in intermediate and predominantly rural provinces are 27.2% and 1.1% respectively. Moreover, 3.3% of the CWS are located in provinces that are considered remote. As shown in figure 6 - where NUTS3 regions are ranked according to the LQ, keeping only the ones that have a higher concentration of CWS per population than the national average - we see that 6 out of 12 are provinces considered intermediate (and some also remote). The intermediate provinces of Fuerteventura, Eivissa y Formentera, La Palma, as well as the urban provinces of Gran Canaria, along with Gipuzkoa (San Sebastian), are all tourism-oriented regions attracting a large number of remote workers.

Table 81: Distribution of CWS in Spanish NUTS3 regions.

	NUTS 3	Characteristic	N. CWS	LQ	Geography
1	Fuerteventura	Intermediate and remote	7	2,2	Coastal
2	Lleida	Intermediate	24	2,1	Mountainous
3	Barcelona	Urban	276	1,9	Coastal & Mountainous
4	Eivissa y Formentera	Intermediate and remote	7	1,6	Coastal
5	Girona	Intermediate	31	1,5	Coastal & Mountainous

6	Madrid	Urban	242	1,4	
7	La Palma	Intermediate and remote	3	1,3	Coastal & Mountainous
8	A Coruña	Intermediate	36	1,2	Coastal & Mountainous
9	Burgos	Intermediate	11	1,2	Mountainous
10	Gipuzkoa	Urban	22	1,2	Coastal & Mountainous
11	Málaga	Urban	49	1,1	Coastal & Mountainous
12	Gran Canaria	Urban	25	1,1	Coastal & Mountainous
13	Tarragona	Intermediate	22	1,0	Coastal & Mountainous
14	Pontevedra	Intermediate	25	1,0	Coastal & Mountainous
15	Segovia	Rural	4	1,0	
16	Valladolid	Intermediate	13	1,0	

Sweden

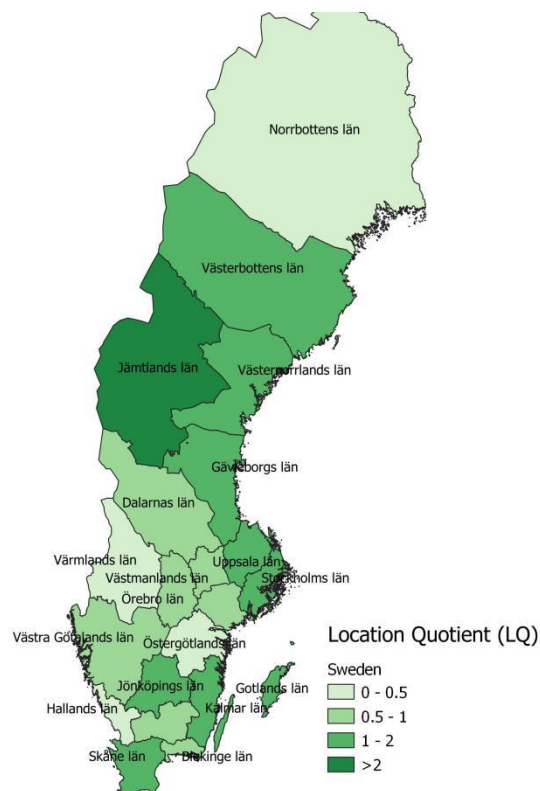


Figure 23: Location quotient (LQ) in Sweden.

In Sweden we found 296 CWS, distributed in all the 21 counties (NUTS3 regions). 44.9% of CWS are located in predominantly urban counties. Likewise, 44.9% are located in intermediate counties. Thus, CWS in predominantly rural counties account for 10.1%. Moreover, 19.9% of CWS are located in counties considered remote. With a population of 10.4 million inhabitants, there are 2.83 CWS per 100,000 inhabitants, which is slightly greater than the European average (2.62). 8 counties have a higher concentration of CWS compared to the national average. Among them, Jämtlands län

and Kalmar län are both rural and remote, 5 are intermediate, and only the county of Stockholm is considered urban. The counties with the highest concentration of CWS are Jämtlands län, Stockholms län, and Västernorrlands län with 2.9, 1.4, 1.4 respectively. As we could expect, the county with the greatest absolute number of CWS is the one around Stockholm with 99 CWS, followed by Skåne län with 42 CWS. The latter is the southernmost county where Malmö is located, which is the third most populated Swedish city with 300,000 inhabitants, as well as being close to the city of Copenhagen (Denmark).

Table 82: Distribution of CWS in Swedish NUTS3 regions.

	NUTS 3	Characteristic	N. CWS	LQ	Geography
1	Jämtlands län	Rural and remote	11	2,9	Mountainous
2	Stockholms län	Urban	99	1,4	Coastal
3	Västernorrlands län	Intermediate and remote	10	1,4	Coastal
4	Gävleborgs län	Intermediate and remote	11	1,3	Coastal
5	Uppsala län	Intermediate	13	1,2	Coastal
6	Kalmar län	Rural and remote	8	1,1	Coastal
7	Jönköpings län	Intermediate	11	1,1	
8	Skåne län	Intermediate	42	1,1	Coastal
9	Västerbottens län	Intermediate	8	1,0	Coastal

Switzerland

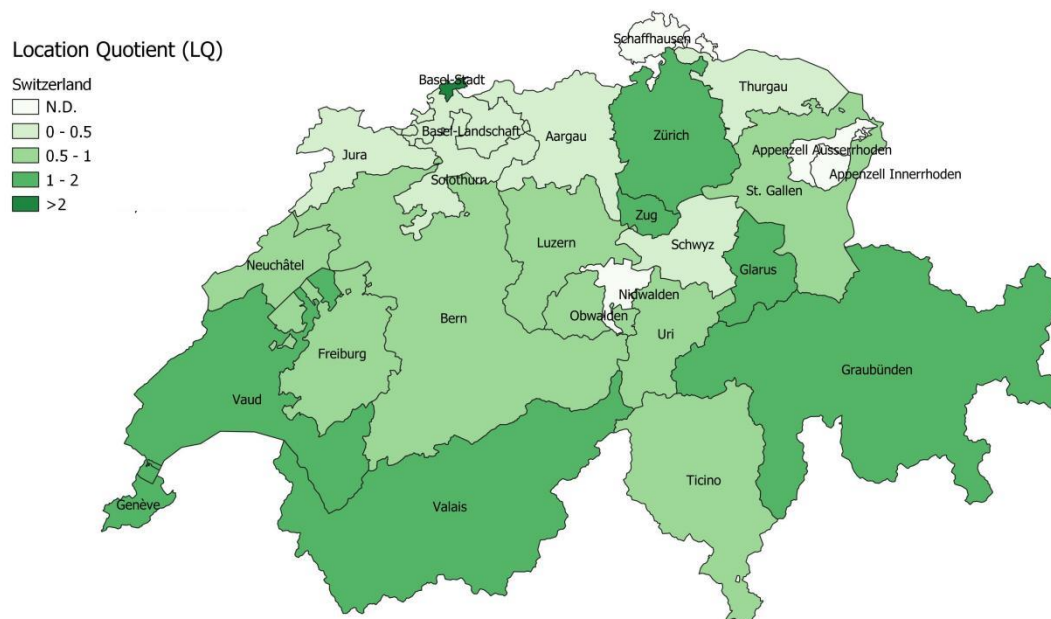


Figure 24: Location quotient (LQ) in Switzerland.

As regards Switzerland, we mapped 260 CWS in 22 out of 26 cantons (NUTS3 regions). With 8.7 million inhabitants, Switzerland has a national concentration of 2.98 CWS per 100,000 inhabitants, slightly higher than the European average (2.62). The predominantly urban cantons host 55.4% of CWS, while CWS in intermediate and predominantly rural cantons account for 41.2% and 3.5% respectively. Moreover, 8.5% of CWS are located in cantons which are considered remote. 7 cantons have a higher concentration of CWS per population compared to the national average. In fact, 69% of Swiss CWS are located in these cantons. The top-three are Basel-Stadt, Genève, and Zürich with a LQ of 3.6, 1.8, and 1.5 respectively. In fact, these are the three urban cantons where the three main Swiss cities are located. Graubünden appears as the only rural and remote canton among the 7 cantons with high concentration of CWS per population. In this regard, Graubünden is a popular mountainous tourist destination, including several alpine villages, such as St.Moritz. Moreover, it is bordered with Austria, Italy, and Liechtenstein. Other non-urban cantons among the 7 considered are Valais and Vaud, both mountainous regions close to the French and Italian borders, attracting many tourists all year round.

Table 83: Distribution of CWS in Swiss NUTS3 regions.

	NUTS 3	Characteristic	N. CWS	LQ	Geography
1	Basel-Stadt	Urban	21	3.6	
2	Genève	Urban	28	1.8	Mountainous
3	Zürich	Urban	70	1.5	Mountainous
4	Graubünden	Rural and remote	8	1.3	Mountainous
5	Valais	Intermediate and remote	14	1.3	Mountainous
6	Vaud	Intermediate	32	1.3	Mountainous
7	Zug	Urban	5	1.3	Mountainous
8	Luzern	Intermediate	12	1.0	Mountainous
9	Neuchâtel	Intermediate	5	1.0	Mountainous

A4: Top 40 NUTS3 regions ranked according to the location quotient

Table 84: Top 40 NUTS3 regions ranked according to the location quotient.

	Country	NUTS 3	Characteristic	N. CWS	LQ
1	UK	Camden and City of London	urban	349	31.20
2	UK	Westminster	urban	245	23.36
3	Germany	Frankfurt am Main, Kreisfreie Stadt	urban	94	6.68
4	Norway	Oslo	urban	46	6.57
5	France	Paris	urban	394	6.54

6	UK	Manchester	urban	121	5.28
7	Germany	Düsseldorf, Kreisfreie Stadt	urban	57	4.96
8	Slovakia	Bratislavský kraj	urban	31	4.94
9	UK	Kensington & Chelsea and Hammersmith & Fulham	urban	68	4.83
10	UK	Bristol, City of	urban	92	4.75
11	Germany	Landau in der Pfalz, Kreisfreie Stadt	urban	4	4.60
12	Norway	Nordland	rural, remote	11	4.58
13	Norway	Vestfold og Telemark	intermediate, remote	18	4.24
14	Greece	Lesvos, Limnos	rural, remote	4	4.20
15	UK	Haringey and Islington	urban	89	4.16
16	Germany	München, Kreisfreie Stadt	urban	114	4.13
17	Greece	Kentrikos Tomeas Athinon	urban	39	4.12
18	Germany	Heidelberg, Stadtkreis	urban	12	4.07
19	Denmark	Byen København	urban	46	4.04
20	Germany	Kiel, Kreisfreie Stadt	urban	18	3.94
21	Norway	Agder	intermediate	12	3.86
22	Germany	Amberg, Kreisfreie Stadt	intermediate	3	3.85
23	UK	Tower Hamlets	urban	49	3.70
24	Czechia	Hlavní město Praha	urban	60	3.61
25	Switzerland	Basel-Stadt	urban	21	3.60
26	Norway	Trøndelag	intermediate	16	3.37
27	Germany	Stuttgart, Stadtkreis	urban	39	3.36
28	Germany	Miesbach	intermediate	6	3.24
29	Italy	Milano	urban	142	3.18
30	UK	Lewisham and Southwark	urban	81	3.12
31	UK	Lambeth	urban	42	3.09
32	Netherlands	Groot-Amsterdam	urban	135	3.07
33	Sweden	Jämtlands län	rural, remote	11	2.94

34	Bulgaria	Sofia (stolitsa)	urban	61	2.93
35	UK	Nottingham	urban	40	2.91
36	Austria	Graz	intermediate	66	2.87
37	UK	Edinburgh, City of	urban	60	2.78
38	France	Creuse	rural, remote	9	2.77
39	Germany	Berlin	urban	188	2.76
40	Croatia	Istarska županija	rural, remote	5	2.75

A5: Tests for multicollinearity with the Variance Inflation Factor (VIF) technique

1. Networking opportunities:

Openness CWS	VIF	1/VIF
Location	1.15	0.870898
Size	1.17	0.851697
Full-time labour	1.26	0.791368
Volunteer labour	1.14	0.876151
Curation of the CWS	1.17	0.852125
Professional hard infrastructure	1.16	0.863152
Main Income Stream (Mix of streams)	1.55	0.646682
Main Income Stream (Income streams)	1.85	0.540035
Ownership (Rent of the space)	1.54	0.650075
Ownership (Free concession of the CWS)	1.54	0.651271
Mean VIF	1.35	

Sociocultural events	VIF	1/VIF
Location	1.15	0.870898
Size	1.17	0.851697
Full-time labour	1.26	0.791368
Volunteer labour	1.14	0.876151
Curation of the CWS	1.17	0.852125
Professional hard infrastructure	1.16	0.863152
Main Income Stream (Mix of streams)	1.55	0.646682
Main Income Stream (Income streams)	1.85	0.540035
Ownership (Rent of the space)	1.54	0.650075
Ownership (Free concession of the CWS)	1.54	0.651271
Mean VIF	1.35	

Training and mentoring programs	VIF	1/VIF
Location	1.17	0.856750
Size	1.17	0.852263
Full-time labour	1.26	0.790962
Volunteer labour	1.15	0.872995
Curation of the CWS	1.15	0.869490
Professional hard infrastructure	1.17	0.852669

Main Income Stream (Mix of streams)	1.54	0.649771
Main Income Stream (Income streams)	1.88	0.530990
Ownership (Rent of the space)	1.56	0.640224
Ownership (Free concession of the CWS)	1.55	0.643220
Mean VIF	1.36	

Networking events	VIF	1/VIF
Location	1.16	0.861611
Size	1.17	0.852673
Full-time labour	1.26	0.796717
Volunteer labour	1.15	0.872980
Curation of the CWS	1.16	0.865318
Professional hard infrastructure	1.17	0.851984
Main Income Stream (Mix of streams)	1.54	0.650314
Main Income Stream (Income streams)	1.86	0.536679
Ownership (Rent of the space)	1.57	0.637242
Ownership (Free concession of the CWS)	1.55	0.645086
Mean VIF	1.36	

Wider CWS networks	VIF	1/VIF
Location	1.15	0.870081
Size	1.17	0.852858
Full-time labour	1.25	0.798245
Volunteer labour	1.14	0.880069
Curation of the CWS	1.16	0.863034
Professional hard infrastructure	1.17	0.857389
Main Income Stream (Mix of streams)	1.55	0.643927
Main Income Stream (Income streams)	1.86	0.536917
Ownership (Rent of the space)	1.55	0.646134
Ownership (Free concession of the CWS)	1.56	0.641413
Mean VIF	1.36	

Interaction with medium and large firms	VIF	1/VIF
Location	1.16	0.862813
Size	1.18	0.849837
Full-time labour	1.27	0.788860
Volunteer labour	1.14	0.879920
Curation of the CWS	1.17	0.856338
Professional hard infrastructure	1.18	0.850657
Main Income Stream (Mix of streams)	1.57	0.636969
Main Income Stream (Income streams)	1.89	0.528943
Ownership (Rent of the space)	1.56	0.640537
Ownership (Free concession of the CWS)	1.57	0.637361
Mean VIF	1.37	

Partnership with locally rooted industries	VIF	1/VIF
Location	1.18	0.847720
Size	1.18	0.845520
Full-time labour	1.26	0.792484
Volunteer labour	1.15	0.869389
Curation of the CWS	1.15	0.868999

Professional hard infrastructure	1.16	0.862933
Main Income Stream (Mix of streams)	1.54	0.650944
Main Income Stream (Income streams)	1.91	0.523692
Ownership (Rent of the space)	1.60	0.626345
Ownership (Free concession of the CWS)	1.63	0.614999
Mean VIF	1.38	

Interaction with organisations from the third sector	VIF	1/VIF
Location	1.16	0.864825
Size	1.17	0.852920
Full-time labour	1.25	0.798253
Volunteer labour	1.14	0.880014
Curation of the CWS	1.16	0.861290
Professional hard infrastructure	1.17	0.854502
Main Income Stream (Mix of streams)	1.54	0.648815
Main Income Stream (Income streams)	1.86	0.538408
Ownership (Rent of the space)	1.55	0.644717
Ownership (Free concession of the CWS)	1.54	0.648000
Mean VIF	1.35	

2. Social inclusion:

Benefits for disadvantaged groups	VIF	1/VIF
Location	1.16	0.859143
Size	1.17	0.851536
Full-time labour	1.26	0.792131
Volunteer labour	1.14	0.874437
Curation of the CWS	1.16	0.863807
Professional hard infrastructure	1.17	0.851365
Main Income Stream (Mix of streams)	1.54	0.650253
Main Income Stream (Income streams)	1.86	0.538307
Ownership (Rent of the space)	1.56	0.640720
Ownership (Free concession of the CWS)	1.55	0.645917
Mean VIF	1.36	

Employment for disadvantaged groups	VIF	1/VIF
Location	1.16	0.864825
Size	1.17	0.852920
Full-time labour	1.25	0.798253
Volunteer labour	1.14	0.880014
Curation of the CWS	1.16	0.861290
Professional hard infrastructure	1.17	0.854502
Main Income Stream (Mix of streams)	1.54	0.648815
Main Income Stream (Income streams)	1.86	0.538408
Ownership (Rent of the space)	1.55	0.644717
Ownership (Free concession of the CWS)	1.54	0.648000
Mean VIF	1.35	

3. Local cultural value:

Sustaining local culture	VIF	1/VIF
Location	1.14	0.873604
Size	1.17	0.852550
Full-time labour	1.26	0.794264
Volunteer labour	1.14	0.874173
Curation of the CWS	1.15	0.865885
Professional hard infrastructure	1.16	0.863068
Main Income Stream (Mix of streams)	1.52	0.658527
Main Income Stream (Income streams)	1.83	0.546981
Ownership (Rent of the space)	1.54	0.647725
Ownership (Free concession of the CWS)	1.56	0.640827
Mean VIF	1.35	

Local community cultural engagement	VIF	1/VIF
Location	1.14	0.876054
Size	1.19	0.843439
Full-time labour	1.28	0.782441
Volunteer labour	1.16	0.863832
Curation of the CWS	1.19	0.839449
Professional hard infrastructure	1.16	0.864823
Main Income Stream (Mix of streams)	1.44	0.695395
Main Income Stream (Income streams)	1.80	0.555602
Ownership (Rent of the space)	1.60	0.626554
Ownership (Free concession of the CWS)	1.60	0.624891
Mean VIF	1.35	

4. Environmental impact:

Reuse of vacant buildings	VIF	1/VIF
Location	1.18	0.849725
Size	1.21	0.829227
Full-time labour	1.28	0.783382
Volunteer labour	1.16	0.864005
Curation of the CWS	1.16	0.864520
Professional hard infrastructure	1.17	0.851910
Main Income Stream (Mix of streams)	1.58	0.632040
Main Income Stream (Income streams)	1.99	0.503325
Ownership (Rent of the space)	1.55	0.643635
Ownership (Free concession of the CWS)	1.54	0.649843
Mean VIF	1.38	

Renewable energy production	VIF	1/VIF
Location	1.18	0.848704
Size	1.17	0.853237
Full-time labour	1.25	0.798570
Volunteer labour	1.14	0.875292
Curation of the CWS	1.17	0.856707
Professional hard infrastructure	1.18	0.849203
Main Income Stream (Mix of streams)	1.55	0.643534
Main Income Stream (Income streams)	1.89	0.529045
Ownership (Rent of the space)	1.56	0.640194

Ownership (Free concession of the CWS)	1.54	0.648258
Mean VIF	1.36	

Electricity consumption per user	VIF	1/VIF
Location	1.22	0.822533
Size	1.27	0.789334
Full-time labour	1.33	0.754690
Volunteer labour	1.20	0.836586
Curation of the CWS	1.18	0.848686
Professional hard infrastructure	1.13	0.881398
Main Income Stream (Mix of streams)	1.96	0.509826
Main Income Stream (Income streams)	2.15	0.466116
Ownership (Rent of the space)	1.53	0.653298
Ownership (Free concession of the CWS)	1.40	0.715865
Mean VIF	1.44	

A6: Tests for heteroscedasticity with Breusch-Pagan test

1. Networking opportunities:

Openness CWS
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Openness CWS
chi2(1) = 0.00
Prob > chi2 = 0.9735

Sociocultural events
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Sociocultural events
chi2(1) = 0.00
Prob > chi2 = 0.9771

Training and mentoring programs
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Training and mentoring programs
chi2(1) = 0.08
Prob > chi2 = 0.7820

Networking events
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Networking events
chi2(1) = 22.08
Prob > chi2 = 0.0000

Wider CWS networks
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance
Variables: fitted values of Wider CWS networks
chi2(1) = 0.72
Prob > chi2 = 0.3955

Interaction with medium and large firms
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Interaction with medium and large firms
chi2(1) = 6.82
Prob > chi2 = 0.0090

Partnership with locally rooted industries
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Partnership with locally rooted industries
chi2(1) = 0.26
Prob > chi2 = 0.6103

Interaction with NGOs
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Interaction with NGOs
chi2(1) = 12.15
Prob > chi2 = 0.0005

Interaction with community organisations
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Interaction with community organisations
chi2(1) = 10.02
Prob > chi2 = 0.0015

Interaction with social enterprises
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Interaction with social enterprises
chi2(1) = 5.49
Prob > chi2 = 0.0192

Interaction with charities
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Interaction with charities
chi2(1) = 2.12
Prob > chi2 = 0.1455

Interaction with neighbourhood groups
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance
Variables: fitted values of Interaction with neighbourhood groups
chi2(1) = 8.18
Prob > chi2 = 0.0042

Interaction with labour associations
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Interaction with labour associations
chi2(1) = 0.29
Prob > chi2 = 0.5881

2. Social inclusion:

Free or discounted membership fee
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Free or discounted membership fee
chi2(1) = 0.30
Prob > chi2 = 0.5866

Free or discounted use of the space
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Free use of the space
chi2(1) = 1.03
Prob > chi2 = 0.3094

Training and workshops
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Training and workshops
chi2(1) = 3.77
Prob > chi2 = 0.0522

Employment for disadvantaged groups
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Employment for disadvantaged groups
chi2(1) = 18.82
Prob > chi2 = 0.0000

Training and workshops for long-term unemployed
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Training and workshops for long-term unemployed
chi2(1) = 11.61
Prob > chi2 = 0.0007

Training and workshops for NEETs

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Training and workshops for NEETs
chi2(1) = 8.89
Prob > chi2 = 0.0029

Training and workshops for economic migrants and refugees
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Training and workshops for economic migrants and refugees
chi2(1) = 30.04
Prob > chi2 = 0.0000

Training and workshops for disabled people
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Training and workshops for disabled people
chi2(1) = 24.26
Prob > chi2 = 0.0000

Training and workshops for women
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Training and workshops for women
chi2(1) = 6.40
Prob > chi2 = 0.0114

3. Local cultural value:

Artists
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Artists
chi2(1) = 2.65
Prob > chi2 = 0.1039

Permanent studios
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Permanent studios
chi2(1) = 4.38
Prob > chi2 = 0.0363

Residency programs
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Residency programs
chi2(1) = 8.69
Prob > chi2 = 0.0032

Exhibitions and events

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Exhibitions and events
chi2(1) = 0.30
Prob > chi2 = 0.5820

Visitors
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Visitors
chi2(1) = 0.03
Prob > chi2 = 0.8526

4. Environmental impact:

Reuse of vacant buildings
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Vacant buildings
chi2(1) = 0.60
Prob > chi2 = 0.4377

Renewable energy production
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Renewable energy
chi2(1) = 0.12
Prob > chi2 = 0.7273

Electricity consumption per user
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Electricity consumption per user
chi2(1) = 2.88
Prob > chi2 = 0.0894

A7: Tests for the assumption of normality of the distribution of residuals

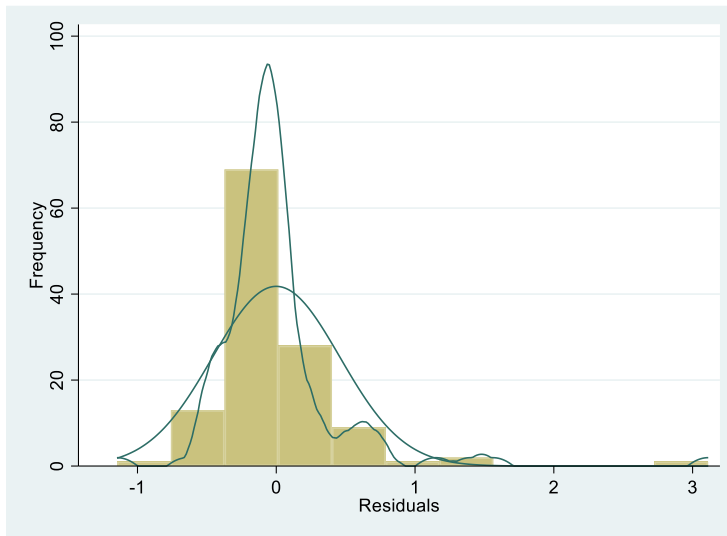
1. Regression model regarding monthly visitors per square meter:

- *Distribution of residuals for the number of monthly visitors per square meter:*

Shapiro-Wilk W test for normal data					
Variable	Obs	W	V	z	Prob>z
res	124	0.73519	26.199	7.329	0.00000

Skewness/Kurtosis tests for Normality					
				----- joint -----	
				-	
Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	Adj chi2(2)	Prob>chi2

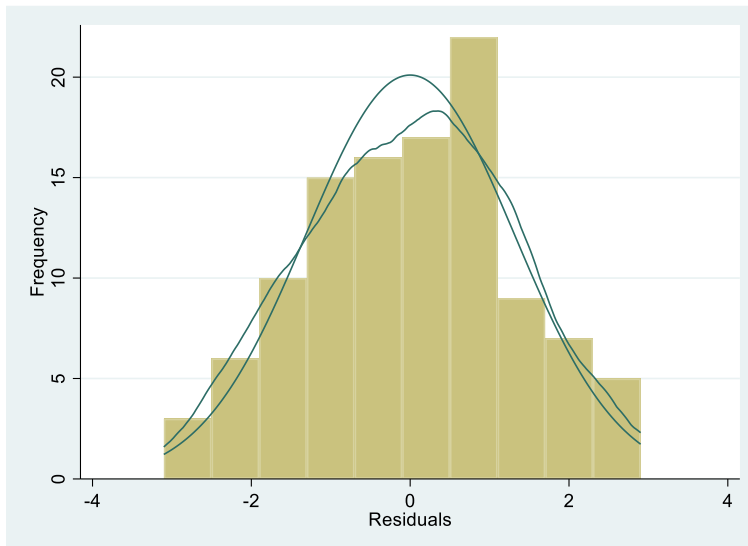
res	124	0.0000	0.0000	.	0.0000
-----	-----	--------	--------	---	--------



- *Distribution of residuals for the logarithmic number of monthly visitors per square meter:*

Shapiro-Wilk W test for normal data					
Variable	Obs	W	V	z	Prob>z
Residuals	110	0.99150	0.760	-0.611	0.72956

Skewness/Kurtosis tests for Normality					
					----- joint -----
-					
Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	Adj chi2(2)	Prob>chi2
Residuals	110	0.8666	0.1904	1.78	0.4103

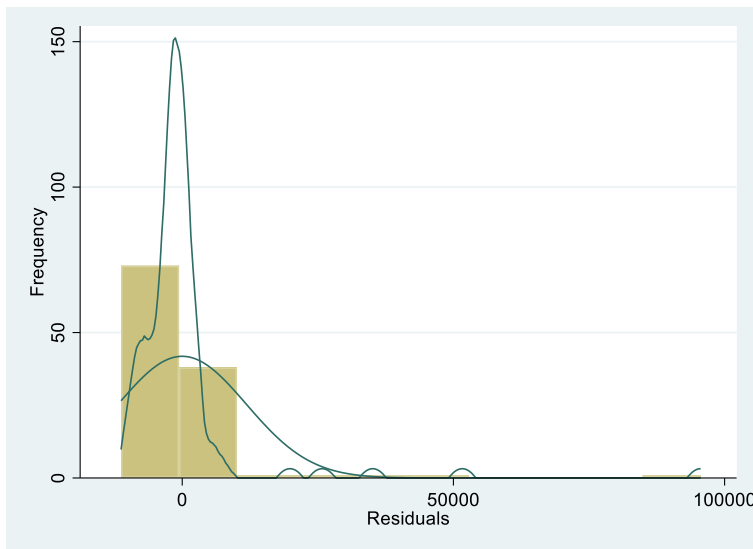


2. Regression model regarding annual electricity consumption per user:

- *Distribution of residuals for the annual electricity consumption per user in kWh:*

Shapiro-Wilk W test for normal data					
Variable	Obs	W	V	z	Prob>z
res	116	0.45594	50.876	8.787	0.00000

Skewness/Kurtosis tests for Normality					
					----- joint -----
					-
Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	Adj chi2(2)	Prob>chi2
res	116	0.0000	0.0000	.	0.0000



- *Distribution of residuals for the logarithmic number of the annual electricity consumption per user in kWh:*

Shapiro-Wilk W test for normal data					
Variable	Obs	W	V	z	Prob>z
Residuals	115	0.98306	1.573	1.012	0.15569

Skewness/Kurtosis tests for Normality					
					----- joint -----
					-
Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	Adj chi2(2)	Prob>chi2
Residuals	115	0.0567	0.2616	4.90	0.0865

