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**GRINS**  
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## Spoke 8 – D1.2 Report on social sustainability indices across Italy

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## Executive summary

This report addresses issues related to the conceptualisation and measurement of Social Sustainability (SS) with a focus on the Italian case. The analysis confirms SS as a multifaceted term stemming both from its multidimensional nature and the interdisciplinary interest it attracts in the extant literature. Acknowledged intertwined dimensions include adaptability, equity, safety and security, social inclusion and cohesion, and quality of life.

The evidence collected in this report confirms that - despite the strong links between dimensions - the variety registered with respect to both its conceptualisations and operationalisations across disciplines (e.g. urban planning, economics, social sciences, sociology, and public administration) makes SS a concept *diversely comprehended* which is most often subject to a *separate* treatment tending to over-rationalisation.

With regard to the Italian case, interesting results are worth noticing in this report. As for the relationship between GDP (Gross Domestic Product) and multidimensional SS, a 'threshold effect' is detected in the empirical literature. That is to say, the growth in GDP does not necessarily contribute to sustainable welfare. Indeed, there is evidence that social welfare stagnated after 1991 due to rising inequality and reduced non-market contributions, despite the registered growth in GDP. Undeniably, this divergence is a piece of further evidence that highlights the limits of GDP as a welfare measure.

At a more granular spatial level, by considering Italian municipalities, a multidimensional approach to SS highlighted a significant north-south gradient, therefore, confirming from a different standpoint the Italian long-standing socio-economic spatial divide. Furthermore, an analysis with a microeconomic approach conducted on 418 business plans from the "Imprenderò" program (in Friuli Venezia Giulia region) shows that private entrepreneurship is effective in fostering SS. More in detail, a shred of clear evidence emerges that the network of both formal and informal relationships along with the interaction between private agents and public sector bodies are crucial to fostering female entrepreneurship.

Traditional methods of measuring SS have attracted some criticism to the extent that both elementary indicators and composite indices are somehow deemed insufficient for capturing the complexity of social

systems. To address this issue a shift towards non-aggregative and structural approaches is advocated. More in detail, alternative complexity-reduction techniques, applying methods such as Self-Organising Maps and partial order theory to OECD data on regional well-being have been applied in the extant literature. A peculiar strength of these methods lays in their ability to preserve the multidimensional structure of social data revealing the underlying patterns at the same time as limiting oversimplification issues.

Overall, based on the evidence collected in this report the following recommendations can be made:

- **Considering SS aspects along with GDP and alike measures of economic performance in policy assessments is a crucial exercise.** Lack of consideration of the SS dimension of the effects of policy intervention narrows down the perspective up to the point of missing the evaluation of policies on the more vulnerable social groups which, most often, are more in need of effective and efficient public intervention.
- The discourse around SS, however, is often fragmented across different conceptualisations, approaches, and disciplines. This shredded analytical framework jeopardises the possibility of more effective cross-contributions stemming from different standpoints. **This evidence calls for a closer interdisciplinary work aiming for a more holistic approach.**
- Such an approach building upon interdisciplinary contributions using both quantitative and qualitative multidimensional approaches to SS can offer policymakers a tool to target interventions more effectively at the local level, where inequalities and SS issues are most pronounced. **Hence, the effort should focus on the local spatial dimension.**

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Appendix A

# 1. Introduction

The report reviews and critically assesses the extant literature on the definition and measurement of Social Sustainability (SS). A focus on indices applied to the Italian case is developed.

One of the study's main motivations lies in the debate, and somehow, the uncertainty about what SS is. Indeed, the issue attracts multidisciplinary interest from various disciplines, each adopting a peculiar approach and perspective to the analysis of social and economic aspects of SS (Vallace et al., 2011). More in detail, the discourse around SS over the past few decades involved the issue of what SS should encompass, including, but not limited to urban sustainable development, corporate social responsibility, and sustainable management. Moreover, generally speaking, across approaches and discipline, congruency between SS and resilience is found (Ly and Cope, 2023).

Within this general framework, the analysis of literature developed with specific reference to the Italian case focuses on three main interrelated aspects. Namely, the relationship between GDP and measures of SS, the spatial divide in SS, and, at the micro level, gender issues in SS. As for the latter, a study at the firm level specifically considering this aspect shows how private entrepreneurship represents an effective route toward higher SS. In this respect, key drivers to effective SS enhancement include the network of both formal and informal relationships and the interaction between private agents and the public sector. As for the former, the collected empirical evidence shows a rather weak link between GDP and SS. Indeed, it has been revealed how GDP and (a multidimensional measure of) SS can follow substantially different trends over time. More in detail, at the same time as GDP grows, SS can register a decreasing trend due to rising inequality and reduced non-market contributions.

As for the spatial pattern of SS in Italy, there is evidence that SS is unevenly distributed across Italian municipalities. Overall, the spatial inequality pattern overlaps the well-known north-south divide. This evidence confirms that such a spatial divide involves aspects much deeper than simple mainstream measures of economic performance.

At the margin, however, it is worth noticing how preliminary evidence of a novel empirical analysis implemented within the GRINS project somehow challenges this evidence by looking at multidimensional perceived inequality. More specifically, while it confirms that multidimensional

poverty captured by such an empirical exercise is much wider than the one captured by GDP, its initial findings indicate that measuring poverty through a multidimensional perspective presents a markedly different picture for Italy compared to traditional absolute and relative poverty levels at the regional level. Indeed, the obtained rate of multidimensional poverty is nearly double that of relative poverty, with 12% of individuals in Italy classified as multidimensionally poor in 2021, compared to 6% according to relative poverty indices. Moreover, the novel index reveals significant regional disparities. Regions traditionally perceived as having lower rates of relative poverty, such as Lombardia and Piemonte, show high percentages of multidimensionally poor individuals. Besides, southern regions like Basilicata show a significantly lower percentage of multidimensionally poor individuals.

On a more general premise, a strand of criticism on traditional methods of measuring SS advocates for further research in alternative complexity-reduction techniques to preserve the multidimensional structure of social data, revealing the underlying patterns while limiting oversimplification issues.

## 2. Conceptualisation and measurement of Social Sustainability

Historically, the concern of SS stems from the effects of the transition toward a capitalist society, entailing higher levels of inequality between genders and ethnicities along with environmental degradation and higher vulnerability. Since the very beginning, although not yet under the label of sustainability, it referred to an economic activity taking into account both economic efficiency and intertemporal exploitation of resources. Indeed, the concept stems from Hans Carl von Carlowitz's 'Sylviculture Oeconomica' (Ly and Cope, 2024) as a reaction to the 'wood crisis' experienced across central Europe from the end of the 16<sup>th</sup> century and the beginning of the 19<sup>th</sup> century (Schmithüsen, 2013). Since then, the discourse on 'sustainability' mainly developed around the idea of responsible use of resources and environmental degradation (Marsh, 1864; Carson, 2002). This is a shared vision in the 1983 UN report *Our Common Future* (known as the Brundtland report) that points attention toward the concept of 'sustainable development' and the need to include it in the policy discussion.

However, despite a mention of social issues in the report (e.g. poverty and inequality), the report lacks a definition of *social* sustainability in development.

In this regard, it is worth noticing how, contrarily to common wisdom, ‘sustainability’ (as a philosophy of long-term goals) is distinguished from ‘sustainable development’ (as a policy imperative) (see, for example, UN, 2022). These different nuances are echoed in the different narratives among policy practitioners, mainly referring to the latter, and scholars where the concept of ‘sustainability’ gained higher momentum. As a consequence, focusing on the social aspects, policymakers and academia do not align with each other when referring to SS. Put differently, policymakers and academia seem to speak different languages when it comes to SS. This calls for an additional effort in order to converge toward a shared vision fostering a better analytical framework and a more effective policy intervention.

More in detail, as testified by the well-known Millennium Development Goals (MDGs), governments and policymakers approach SS by setting goals operationalised by indicators and targets. Within this framework, issues such as poverty and hunger, education, gender inequality, and maternal and children’s health are somehow translated into quantitative measures to be evaluated. On the one hand, such an approach allows for a clearer evaluation of the policy intervention. On the other hand, however, a potential drawback of such an approach consists in focusing on measurable dimensions of SS at the expense of the intangible ones. Hence, despite the multifaceted nature of the concept, the policy intervention narrows down to a subset of aspects, only. This has been the case, for example, of the *Sustainable Communities: Building for Future* plan in the UK. While the programme did consider intangible values and psychological mores, the plan developed mainly around physical infrastructure, substantially neglecting the dimension of ‘community’ which turns out to be essential for a sustainable society.

The way SS is addressed in academia reflects the challenges arising from its multidimensional nature. Indeed, its treatment calls for research from various disciplines (Dillar et al., 2009; William et al., 2012). Within this interdisciplinary framework, the contributions of economists, urban planners, sociologists, demographers, political scientists, and anthropologists are acknowledged (Hutchins et al., 2023; Sarkis et al., 2010; Stren and Polese, 2000; Wallance, 2011). This interdisciplinary interest, in turn, added vagueness to the concept of SS (Boyer et al., 2016; Wallance, 2011). Table 1 reports a synoptic view of selected contributions from different disciplines.

Table 1 – Social Sustainability across selected disciplines.

Discipline	Definition
Urban Planning	Social sustainability for a city is defined as development (and/or growth) that is compatible with the harmonious evolution of civil society, fostering an environment conducive to the compatible cohabitation of culturally and socially diverse groups while at the same time encouraging social integration, with improvements in the quality of life for all segments of the population (Stren and Polese, 2000)
Economics	A socially sustainable system must achieve fairness in distribution and opportunity, adequate provision of social services, including health and education, gender equity, and political accountability and participation (Harris et al., 2001)
Social Science	Social sustainability is a positive condition within communities, and a process within communities that can achieve that condition (McKenzie, 2004).
Sociology	Social sustainability is a quality of societies. It signifies the nature-society relationships, mediated by work, as well as relationships within the society. Social sustainability is given if work within a society and the related institutional arrangements satisfy an extended set of human needs [and] are shaped in a way that nature and its reproductive capabilities are preserved over a long period of time and the normative claims of social justice, human dignity and participation are fulfilled" (Litting and Griessler, 2005)
Public Administration	Social sustainable concerns the ability of human beings of every generation to not merely survive, but to thrive (Magis and Shinn, 2009)

Source: adapted from Ly and Cope (2024)

The set of definitions reported in Table 1 shows that SS, rather than being a 'missing pillar' (Boström, 2012), appears to be a concept diversely comprehended. To some extent, this contributes toward a *separate* treatment tending to "over rationalize both the problem and the solution" (William et al., 2012) and, in turn, as aforementioned, it calls for a closer interdisciplinary work aiming to a more holistic approach.

That said, across disciplines, the concept of sustainability mainly developed around the concept of risk. Different risks attracted different interests and fostered elaborations from different perspectives. For example, Eizenberg and Jabareen (2017) cogently noted that 'risk' as a systematic way to deal with hazard and insecurity - along with its three key dimensions (i.e., spatial, temporal, and social) (Beck and Cross, 2005) - can be considered the "ontological foundation" of SS.

Side by side with 'risk', the concept of SS unfolds along the dimensions of 'social capital'. Indeed, resource endowment is a crucial factor in shaping the overall response to risk. In this respect, social capital is a pivotal factor in making societies sustainable (see, among others, Ly and Cope, 2023). Therefore, the specific risk-mitigating strategies and the total assets, including the intangible ones like the social capital, are constitutive elements of SS. On a similar premise, 'social capital' is considered a collective resource representing at the same time a private good that individuals can benefit from *and* a public good that benefits *other* individuals as a whole represented by their social

group or, indeed, a society (Bourdieu, 1986; Coleman, 1988; Putnam, 2000). Put differently, each member of the society will have access to additional ‘capital’ to the extent that membership in a group grants access to collectively-owned capital (Bourdieu, 1986). Access to this collective property, in turn, happens *via* the memberships intended as resource facilitators for individual development. As a consequence, a sustainable society is one where individuals can progress using the shared resources, including the ‘social capital’, they possess. It is apparent, therefore, that the main form of social capital here is to be considered the ‘bonding’ one such as extended families and neighbours building upon “solidarity-driven empathy and behaviour” (Nanetti et al., 2016).

From a more policy-oriented perspective, it is worth noticing how social capital contributes towards more effective community participation and involvement. In this regard, social capital is a factor able to uplift the policy response from the mere contribution of its members (Coleman, 1988). Undeniably, this also improves both communities’ sustainability, through a more democratic use of resources, and resilience, through a collective response to the shock, increasing the sense of solidarity. In Putnam et al. (1994)’s terms, social capital as a public good somehow translates into mutual trust that facilitates action for mutual benefit. To this end, as aforementioned, ‘bonding’, and ‘bridging’ social capital are more effective as a (social) asset in its linking form to foster development. More precisely, it refers to “structural links with decision-making institutions that are recognized as important interlocutors and toward which the engaged networks address their demands to produce development results from innovative and responsive policy decision” (Nanetti et al., 2016). Further, it can facilitate SS to the extent it provides vision, network, and tools to face a variety of shocks. More in detail, under this respect, the complex relationship between SS and can be articulated into 5 main dimensions. Namely, safety and security, equity, adaptability, social inclusion and cohesion, and quality of life. Figure 1 below summarises.



Figure 1. Social Capital and Social Sustainability. Source: Ly and Cope (2023)

‘Safety and security’ refers to the absence of exposition to vulnerable situations threatening individuals mentally, physically, and emotionally. Here social capital contributes to access proper resources to satisfy basic needs such as water, food, shelter, and rest. Satisfaction of basic needs, in turn, reduces the probability of crime and antisocial behaviour. Put differently, “in a sustainable society, the basic constituents of human well-being are secured, and people are provided with freedom and capability to achieve a decent level of safety” (Ly and Cope, 2023). Social capital could be managed to provide extra support to the provision of basic needs. As for its measurement, referring to the extensive exercise of OECD (2024a, b) this dimension of SS is measured along with the lines reported in Table 2 below.

Dimension	Measures
Risk	crime rates, and violence rates, including domestic violence, sexual violence, youth and dating violence, child abuse, elder abuse, and technology-assisted abuse
Well-being and basic needs	health (self-report) and life expectancy
Safety	feeling walking alone after dark, feeling safe from serious problems of crime, feeling safe from disturbance by children/youth or traffic, and feeling comfortable/safe waiting for public transport

Table 2. Social Sustainability as Safety and Security. Source: authors elaboration from OECD (2024a, b)

The ‘equity’ (or justice) dimension refers to the distributional issues of SS. More precisely, inequality – as the concentration of resources - could foster unsustainable use of them (mainly as overconsumption from the high-end of the society), and over-exposure to risk of the lower-end distributional part of the society. As a consequence, equity has a long tradition in the extant literature on SS unfolding along the lines of accessibility to both tangible and intangible goods and opportunity (Omann and Spangenberg, 2002), political (and policy) recognition toward vulnerable and marginalised groups (Carmin, 2011; Scholsberg, 2007), and intergenerational equity in the distribution of both burdens and resources between present and future generations (Eizenberg and Jabareen, 2017). Access to resources and facilities are generally used as proxies for such a dimension (McKenzie, 2004; Dempsey et al., 2011; Winter et al., 1997).

‘Adaptability’ refers to the ability of a society to stay sustainable even in the presence of shocks. More in detail, adaptability has been defined as “resiliency for both individuals and communities and the ability to respond appropriately and creatively to change. Adaptability is a process of building

upon what already exists and learning from and building upon experiences from both within and outside the community” (Gates and Lee, 2005). It builds upon the ability of learning and self-organisation intended as a commitment from each and every entity to learn and organise together (Missimer et al., 2017) in order to identify communities’ strengths and weaknesses for further improvement (McKenzie, 2004). In other words, a sustainable society works, at a variety of levels including households, community, regional, and national governments (Berkes and Ross, 2013; Fazey et al., 2007), toward the removal of obstacles for people to transfer their learning and self-organisation experiences to an organisational level (Missimer et al., 2017). Undeniably, adaptability entails the utilisation and production of innovations (technological, organisational, social, and institutional) to move toward social sustainability (Vallance and Perkins, 2011) in a society that values and accepts innovation as a main driver for resilience. Two main metrics to measure adaptability refer to ‘subjective resilience’ (mainly based on individual well-being) and ‘objective resilience’ (Magis, 2010).

The dimension of ‘social inclusion and cohesion’ is strongly related to ‘equity’ and ‘social capital’. It refers to the extent a society encourages public participation and engagement (Nanetti and Holgoiun, 2016; Messer et al., 2009), enhancing social trust (Missimer et al., 2017). In this respect, a strong sense of community, intended as both a sense of place and a community’s collective values, acts as a catalyst to improve social inclusion and cohesion through a motivation for collective contribution (Bramley et al., 2006). As for its measurement, measures used in the extant literature include: the level of public participation in communal activities and collective networks in a community; the extent to which decision-making processes are shared and consider cultural differences; the openness of a community to receive support and ideas from the outside (Magis, 2010; Dempsey et al., 2011).

In short, SS as ‘quality of life’ refers to the ability of a society to be a place for every member to choose how they want to live and work (Omann, I.; Spangenberg, 2002; Magis et al., 2009; Harris and Goodwin, 2001). To this end, human dimensions such as education, recreation and leisure, social relationships, and social fulfilment should be part of a democratic self-determination process (Magis et al., 2009). It is worth noticing here that the link of quality of life to economic indicators assumed to be more correlated with elevated levels of ‘happiness’ (Harjula, 2012) is to be considered rather weak, eventually. Indeed, Jackson (2009) argued that there are essential social indicators that better measure the social well-being of a society building upon dimensions (or domains) such as family, health, education, and social relationships. Moreover, a sustainable quality of life entails the absence (or at least protection from) manufactured risks such as social prejudices and oppression both for

individuals and groups (minorities) (US FEMA, 2020). As for its specific measurement, the quality of life dimension of SS is measured along with the ability the extent to which “identity, autonomy, and self-determination freedom to move about and choose a job; home and social relationships; education and knowledge; fulfillment and creative outlets; and time and space for recreation, connection with nature and beauty, and hope for the future” (Rogers et al., 2012) are granted to people. On more practical grounds, this dimension is generally measured through surveys such as the Satisfaction with Life Scale (SWLS) (Diener et al., 1985) and the Cantril Ladder Method, which was used in the World Happiness Report (Levine et al., 2014).

### **3. Additional definitional and measurement issues of Social Sustainability detected within the research activity of the GRINS project**

Based on the content of the supplementary material linked to this report (Tomaselli\_Tentative Classification of Social Sustainability papers.docx), specific details, methodology, and findings specifically related to research on social sustainability definition and classification obtained within the research activity of the GRINS project are provided.

The research on SS undertaken as part of Spoke 8 of the GRINS project at the same time as confirming the complexity of the issue reveals significant definitional challenges. Indeed, as mentioned, SS while being generally considered a crucial pillar of sustainable development, lacks a universally accepted definition, which complicates both academic research and policy-making. Therefore, the GRINS project deemed to properly address these issues as preliminary and background elements of the whole project. In this regard, this study employs a systematic approach to address the current state of the literature on SS focusing on its conceptualization, definition(s), and measurement.

To establish a foundation, the research team conducted an extensive search across both Google Scholar and Scopus using specific keywords like 'SDGs', 'sustainability indicators', and 'social indicators'. Boolean operators were used to refine the search and yield the most relevant studies, narrowing the pool of documents to those that are directly related to SS and published between 1998 and 2023. Through rigorous inclusion criteria, which limited the selection to English-language documents in final publication stages, the researchers identified an initial "seed" of 94 core documents. These works were chosen based on their citation impact, publication in leading journals, and relevance to foundational concepts of social sustainability.

The analysis confirmed that SS definitions vary widely across the literature. As mentioned, key themes include social inclusion, equity, well-being, and the resilience of communities. Moreover, some researchers focus on measurable aspects such as social indicators and statistical measures, while others consider broader and more subjective dimensions, such as quality of life and community cohesion. Our research identifies seminal works that contribute to this definitional landscape, including Einzeberg et al.'s framework on social sustainability and Vallace et al.'s clarification of its key concepts. Murphy's framework, which emphasizes policy analysis, also features prominently, reflecting the field's focus on integrating SS into decision-making frameworks.

From our review of studies, it is apparent that a significant challenge in defining SS lies in its interdisciplinary nature. Unlike environmental sustainability, which has a rather well-defined metrics, SS has a more complex conceptual framework involving both quantitative and qualitative elements. This complexity leads to various interpretations, with some scholars proposing narrow, indicator-based frameworks and others advocating for broader, inclusive approaches. To this end, it is worth noticing how our literature review highlights an ongoing debate about whether SS should be tightly defined for measurement purposes or broadly conceptualized to encompass diverse social values.

To refine the classification further, the study utilized OpenAlex's R API for a high level of semantic attribution, allowing a nuanced categorization based on specific thematic expressions related to the original research queries. This semantic analysis facilitated the identification of five primary thematic categories: Conceptual Framework, Sustainability, Sustainable Development, Social Sustainability, and Sustainability Indicators. This approach allowed the researchers to move beyond general definitions and align the literature more closely with specific aspects of SS, providing a structured way to understand and evaluate the varying definitions within the field.

Since the operationalization of SS within the Spoke 8 GRINS project focuses on translating theoretical frameworks into practical approaches, allowing for effective application in policy-making and academic research, the study conducted a systematic literature review to assess how SS is implemented and measured, using advanced bibliographic tools to build a networked understanding of the field.

More in detail, to this end the aforementioned initial "seed" of 94 core documents on social sustainability was expanded through the use of Research Rabbit, an AI-driven tool that identifies related research by establishing connections among similar works. The software created a network diagram, where each node represented a paper and the size of each node indicated its relevance within the topic network. This process yielded an additional 53 documents, selected based on their thematic relevance and added to the seed to create a comprehensive bibliography for further analysis. This AI-enhanced approach allowed us to visualize and better detect the broader network of social sustainability studies.

To systematically categorize operational approaches, we used OpenAlex's semantic capabilities, organizing papers based on themes most aligned with the study's original queries. The main categories for operational approaches included 'Sustainability Indicators' and 'Sustainability Indexes'. These indicators are essential for assessing social sustainability, as they provide measurable aspects such as social equity, inclusion, and well-being that can be tracked over time. Examples of these indices include the Social Progress Index and other composite indicators designed to evaluate societal health and inclusivity.

Further categorization within operational approaches highlights the role of urban planning, policy frameworks, and Corporate Social Responsibility (CSR). The selected literature suggests that operationalizing SS requires policies focused on community engagement, equitable access to resources, and participatory governance. This approach reflects the emphasis on creating inclusive, resilient societies through practical applications of SS principles.

One of the primary challenges noted in operationalizing SS is the lack of standardized indicators. The qualitative nature of social dimensions, like community cohesion or subjective well-being, further complicates the creation of universal measures. Generally speaking, the reviewed studies suggest that operational frameworks must be both flexible and context-sensitive, with a balance between quantitative and qualitative metrics to capture the full scope of SS.

Examples where cities and corporations have effectively incorporated SS include urban planning initiatives that prioritize affordable housing, accessible public spaces, and community participation. Similarly, companies adopting CSR practices—such as ethical labour practices, community involvement, and diversity promotion—contribute to social goals beyond profit, aligning business objectives with societal well-being.

The analysis indicates that future operational approaches will benefit from adaptive frameworks that can be tailored to different cultural and regional contexts. The continued evolution of SS metrics, supported by advancements in semantic analysis and AI tools, envisages improvement toward the alignment of theoretical principles with real-world applications. Furthermore, the study emphasizes the need for flexible, interdisciplinary frameworks that can bridge the gap between theory and practice, fostering resilient and inclusive communities as envisioned by SS goals.

## 4. Social sustainability indices: a focus on the Italian subnational case

At the regional level the concept of SS has been addressed from a variety of perspectives. For example, Bălăcescu et al. (2022) evaluate the sustainability performance of European regions, focusing on Human Well-being, Environmental Well-being, and Economic Well-being, using the Sustainable Society Index (SSI). The study covers 40 countries and uses hierarchical cluster analysis to group regions based on 21 SSI indicators. To test for significance in regional clusters, Levene's test assesses variance homogeneity, with the Welch test used if variances differ. Geographic and cluster analyses reveal disparities between European regions, particularly regarding climate, energy, and economic well-being, highlighting the need for targeted regional policies.

In line with the focus on the Italian case of the GRINS project, once presented the overarching scheme involving SS and its dimensions, this section provides an overview SS indices specifically developed with reference to the Italian case.

To begin with, Ronchi et al. (2002) introduce the Integrated Indicator for Sustainable Development in Italy (ISSI), which evaluates sustainability across the country by integrating three domains: socio-

economic development, environmental quality, and resource use. The ISSI index is built on 10 key indicators per domain, such as life expectancy, income inequality, greenhouse gas emissions, and energy consumption, drawing from international benchmarks like OECD and EU standards. The indicators are normalized by comparing them to targets (e.g., 2012 Rio+20 goals) and then aggregated through a weighted averaging system that gives more importance to areas lagging behind in meeting sustainability objectives. The main result is a single score that allows for comparisons across regions and with other countries. Additionally, a computerized dashboard visualizes performance, enabling real-time monitoring and updates based on evolving sustainability goals. This comprehensive framework ensures a transparent and adaptable approach to sustainability measurement at both national and regional levels. Table 3 below focuses on the set of socio-economic indicators used in their analysis.

Red set: socio-economic development key indicators

S&E	Socio-economic development key indicators	Target
1	Life expectancy (male–female weighted average, years)	Best country
2	Per capita income (€)	Best country
3	% GDP of public aid to development (ODA, %)	Rio commitment
4	Unemployment rate (%)	3
5	Income inequality, Gini index (%)	Best country
6	Educational level (% of high school and university graduates)	Best country
7	Per capita health, social security and instruction expenditure (€)	Best country
8	Computers households ownership (%)	100
9	Cultural and recreational households % expenditure (%)	Best country
10	Scientific research % expenditure (%)	Best country

Table 3 – Socio-economic development key indicators. Source: Ronchi et al. (2002)

Similarly, Monedero et al. (2023) explore the link between ICT usage and socio-economic SDG progress in European regions from 2011 to 2020. Using Eurostat data, the study examines 20 variables related to ICT and SDG indicators, applying exploratory factor analysis (EFA) and geospatial mapping to reveal regional disparities. The EFA identifies key factors linking ICT adoption to socio-economic outcomes, such as education and health. The results show that peripheral and eastern regions lag in both ICT and SDG progress, highlighting the need for policies addressing digital and socio-economic inequalities across Europe.

Focusing on the work dimension, Conigliaro (2022)'s study explores how Decent Work (DW) affects social sustainability and subjective well-being, employing a multi-dimensional approach with 16 indicators from the European Pillar for Social Rights scoreboard. Using the POSET method, a non-aggregative technique based on discrete mathematics, the study compares country profiles through Hasse diagrams. Indicators are recoded into ordinal variables and synthesized in two steps: first, by

dimension (e.g., inequality, resilience factors), and then globally to rank countries on DW conditions. The study classifies countries according to EU SDGs and emphasizes the need to preserve multidimensionality in DW assessments. Figure 2 below report the complex multidimensional framework of DW.

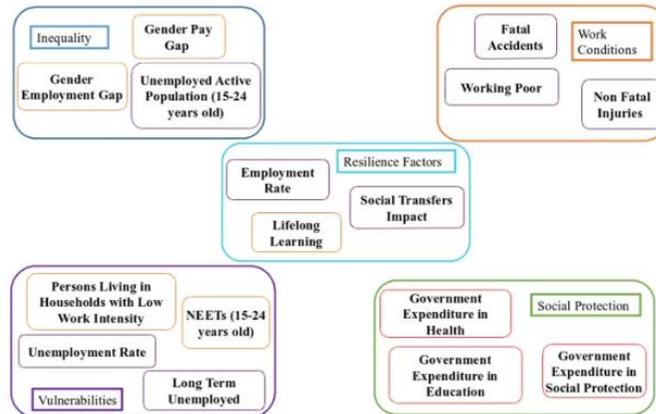


Figure 2 – The framework of multidimensional Decent Work (DW). Source: Conigliaro (2022).

Armiento (2018) specifically addressed the link between sustainability and GDP focusing on the Italian case. More specifically, his study focuses on the construction of a Sustainable Welfare Index (SWI), a composite indicator to assess welfare sustainability in Italy from 1960 to 2014 and analyse its trend side-by-side with Italian GDP. The SWI aggregates 17 socio-economic and environmental components, such as private consumption, health, education, R&D, and environmental costs, using flow-based indicators to capture annual changes.

When compared to GDP, a ‘threshold effect’ seems to arise: while GDP continued to grow, sustainable welfare per capita stagnated after 1991 due to rising inequality and reduced non-market contributions. This divergence highlights the limits of GDP as a welfare measure and underscores the importance of sustainability in policy assessments. Figure 2 below graphically reports such a relationship between GDP and SWI.

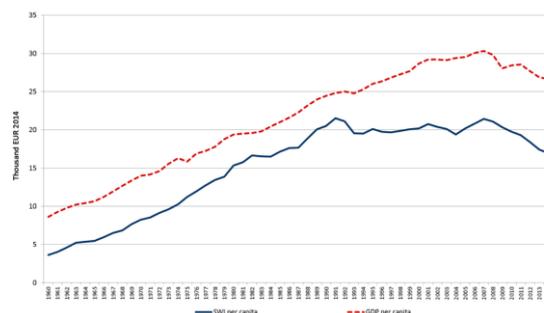


Figure 3 - Sustainable Well-being Index (SWI) and GDP in Italy. Source: Armiento (2018).

With a more subnational (regional) focus, building upon a relational capital perspective on SS, Dal Mas and Paoloni (2019) employ a mixed-method approach to explore gender differences and the role of relational capital in entrepreneurship. Their model stems from the tenet that private entrepreneurship is a key element to promote economic growth and to enhance sustainability. Methodologically, first, a quantitative analysis was conducted on 418 business plans from the "Imprenderò" program, which aimed to foster new ventures in the Friuli Venezia Giulia region. The data, which included variables such as entrepreneurs' experience, venture complexity, and control factors like age, were analyzed using logistic regression to assess the likelihood of starting a business. In the second phase, a qualitative case study of a female entrepreneur was conducted, applying the CAOS model (Characteristics, Ambience, Organisation, Sustainability) and Paoloni's network relations framework to map relational capital during the start-up phase. This sequential approach provided a comprehensive understanding of the relationship between gender, relational capital, and entrepreneurship. Figure 4 summarises the network relations considered in the analysis.

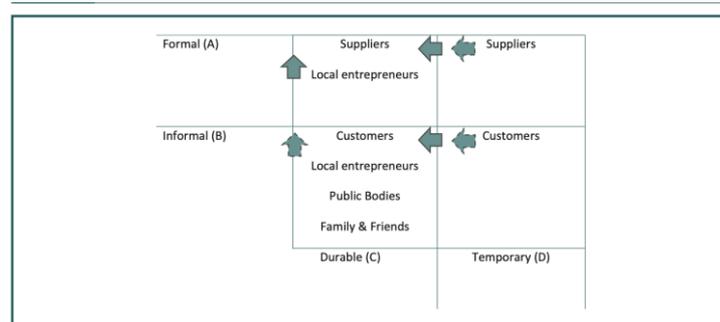


Figure 4 – Network relations and female entrepreneurship. Source: Dal Mas and Paoloni (2019).

From Figure 4 emerges that the network of both formal and informal relationships along with the interaction between private agents and public sector bodies are crucial to fostering female entrepreneurship.

At a more granular level, Salvati and Carlucci (2014) develop a composite index to measure sustainable development at the local scale, focusing on 8100 Italian municipalities. Their methodology integrates Geographic Information Systems (GIS) with multivariate statistical analysis and employs the Factor Weighting Model (FWM), which aggregates 99 variables across domains such as economic structure, labor market, social characteristics, and environment. A Principal Component Analysis (PCA) was used to objectively assign weights to variables, with the most influential ones being related to the labor market, income and wealth, and population dynamics. The variables were

selected from official sources, normalized using various statistical methods, and grouped into six themes and 14 research dimensions. Figure 5 below reports the composite index enabling a spatial comparison of sustainability performance across municipalities.

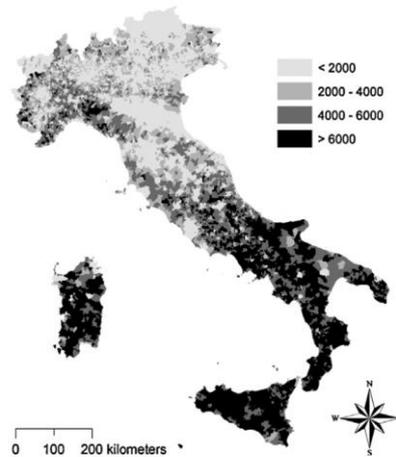


Figure 5 – Sustainable development (rank, municipalities). Source: adapted from Salvati and Carlucci (2014).

As it appears from Figure 5, the analysis highlighted a significant north-south gradient, reflecting Italy's long-standing socio-economic disparities. This approach offers policymakers a tool to target sustainability interventions at the local level, where regional inequalities are most pronounced.

It is worth noticing how Arcagni et al. (2021) critique traditional methods of measuring social sustainability by combining conceptual analysis with empirical applications. The authors argue that both elementary indicators and composite indices are insufficient for capturing the complexity of social systems. They propose a shift towards non-aggregative, structural approaches. The empirical part of their study explores alternative complexity-reduction techniques, applying methods like Self-Organising Maps (SOMs) and partial order theory (POSET) to OECD data on regional well-being. These methods preserve the multidimensional structure of social data, revealing patterns without oversimplification. The critique advocates for more tools to measure social sustainability.

## 5. Advances in defining and measuring social sustainability: a mention to contributions within the GRINS project

The GRINS project addresses the issue of SS from a variety of perspectives. This report will mention two contributions specifically dealing with this issue.

### ***Social Sustainability and Participation Measures by source integration at the Municipal level.***

The exploration of Social Sustainability underscores the critical interplay between theoretical frameworks and operational methodologies, aiming to construct a cohesive system that not only conceptualizes social sustainability but also translates it into actionable tools and structured datasets. In this regard, a structured database, to integrate in AMELIA platform for Spoke 0, was created delivering the practical implementation of theoretical insights that compiles socio-economic and demographic indicators for Italian municipalities over the period 2013–2024.

This database, established via a formalized algorithmic process in R, leverages the conceptual frameworks and methodological guidelines explored within our research to systematically and longitudinally measure social sustainability. The associated metadata codebook provides comprehensive documentation of the database variables, including calculation methods and data sources, thereby facilitating transparent and replicable analyses that align with the equity and sustainable well-being objectives delineated in the present document.

By standardizing data and integrating indicators aligned with domains of Equitable and Sustainable Well-being (BES), the database supports the operationalization of the theoretical constructs. This operational framework enables the practical evaluation, and monitoring of social sustainability

dimensions, effectively illustrating the transition from conceptual frameworks to structured data and practical measurement of social sustainability

*Income inequality and perceived inequality in Italy at a regional level.*

The second contribution proposes to explore the relationship between real income inequality and perceived inequality in Italy at a regional level. Through specific questions, the study aims to verify whether there is a gap between objective measures of inequality and how people perceive inequality. The study also proposes to study the intergenerational transmission of income inequality in Italy expressed in terms of social mobility by collecting information for three generations (grandparents, parents and children). And, lastly, through an experimental setup that employs various methodologies, such as controlled interventions and simulated scenarios, this study aims to evaluate the causal link between increased awareness of inequality and the inclination towards the approval of redistributive policies.

Furthermore, we aim to identify the economic, social and demographic factors that influence inequality in the spatial context. The development economics literature on poverty argues that total income is not the only indicator of poverty. Multidimensional poverty measures provide a more comprehensive picture, revealing the various ways individuals experience poverty and the range of different disadvantages they face. Indeed, as aforementioned, a poor individual can suffer multiple disadvantages simultaneously, such as poor health or malnutrition, lack of clean water or electricity, poor quality of work, or lack of education. To capture these multidimensional aspects, we build an indicator of multidimensional poverty. Specifically, we define an individual as "multidimensional poor" if they are deprived in at least one out of three dimensions: economic, material, or health. The economic dimension is measured by perceived income poverty, health by self-assessed and BMI indexes. Whereas material deprivation is measure using a list of goods claimed to be essential for living. We provide geographical evidence of this index and some spatial econometric analysis.

Preliminary evidence shows that multidimensional poverty in Italy is much wider than the one captured by GDP and alike measures. Indeed, our initial findings indicate that measuring poverty through a multidimensional perspective presents a markedly different picture for Italy compared to traditional absolute and relative poverty levels at the regional level. We found that the rate of multidimensional poverty is nearly double that of relative poverty, with 12% of

individuals in Italy classified as multidimensionally poor in 2021, compared to 6% according to relative poverty indices. Moreover, our index reveals significant regional disparities. Regions traditionally perceived as having lower rates of relative poverty, such as Lombardia and Piemonte, show high percentages of multidimensionally poor individuals. Conversely, regions like Basilicata, typically ranked among those with high relative poverty, show a lower percentage of multidimensionally poor individuals according to our index.

## 6. Concluding Remarks

Building upon the link between resilience and SS, this report critically assessed the issue of definition and measurement of SS with a focus on extant literature dealing with the Italian case. Although with different nuances, the multidimensional nature of the concept emerged across contributions from different disciplines.

Since mainstream single-metric measures such as GDP show significant limitations when compared to alternative multidimensional measures of SS, a multidimensional approach appears to be unavoidable. In this respect, the Italian case does not make an exception. Indeed, GDP and SS can have substantially different trends.

Within such a multidimensional framework, the main drivers for SS include the network of both formal and informal relationships and the interaction between private agents and the public sector. Hence, with respect to the Italian case, different spatial patterns of social capital and institutional quality contribute to the observed north-south divide in SS. Therefore, such a spatial divide is much deeper than the one that simple mainstream measures of economic performance can capture.

While the above well-known regional pattern is confirmed at the more granular municipal level in the extant literature, a novel approach adopted within the GRINS project based on multidimensional (perceived) poverty reveals different nuances in the pattern of Italian spatial disparities. As aforementioned, differences involve both the magnitude and the relative positioning of Italian regions.

This preliminary evidence, along with the persistent strand of criticism on traditional methods of measuring SS, calls for further research balancing complexity and multidimensionality in a more effective manner.

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## Appendix A

# The path of the systematic research of SOCIAL SUSTAINABILITY literature

With the aim to describe the procedure of classification of papers about the current state of the art regarding Social Sustainability topic for the deliverables of Spoke 8 of GRINS project, we have employed a systematic research approach based on advanced search engines and thematic classification system by *OpenAlex* software.

The analysis focused on publication trends by year, document types, country analysis, and specific areas of interest.

Firstly, a cross-referencing search was conducted to retrieve papers of interest from Google Scholar and Scopus databases. The search strings were crafted through relevant keywords pertaining the topic. Boolean operators such as "AND," "OR," and "NOT" were employed to combine the keywords and obtain more precise results.

For the Scopus database, the search strings were the following:

*(TITLE-ABS-KEY (concept AND sustainability) AND TITLE -ABS- KEY (SDGs) OR TITLE -ABS- KEY (measurement) AND TITLE-ABS-KEY (sustainability AND indicators) AND TITLE-ABS-KEY (statistical AND measures) AND TITLE-ABS-KEY (social AND indicators\*) OR TITLE-ABS-KEY (economic AND indicators\*) OR TITLE-ABS-KEY (sustainability AND indexes\*))*

Table A1 - *Database search identification.*

Keywords	<i>Concept of sustainability</i> <i>SDGs</i> <i>Measurement</i> <i>Sustainability indicators</i> <i>Statistical measures</i> <i>Social indicators*</i> <i>Economic indicators*</i> <i>Sustainability indexes*</i>
Boolean operator	<i>AND – OR</i>
Time	1998 - 2023

The main exclusion criteria were identified and summarized as follows:

1. Documents not related to the sustainability
2. Duplicate documents.

While, the inclusion criteria identified are:

1. Only articles at the final state of publication.
2. English language documents only.

From this research, we extracted an initial seed of about 94 documents particularly central to the definition of social sustainability, according to criteria based on the number of citations, publication in prestigious journals, and presenting a diachronic idea of the evolution of underlying concepts.

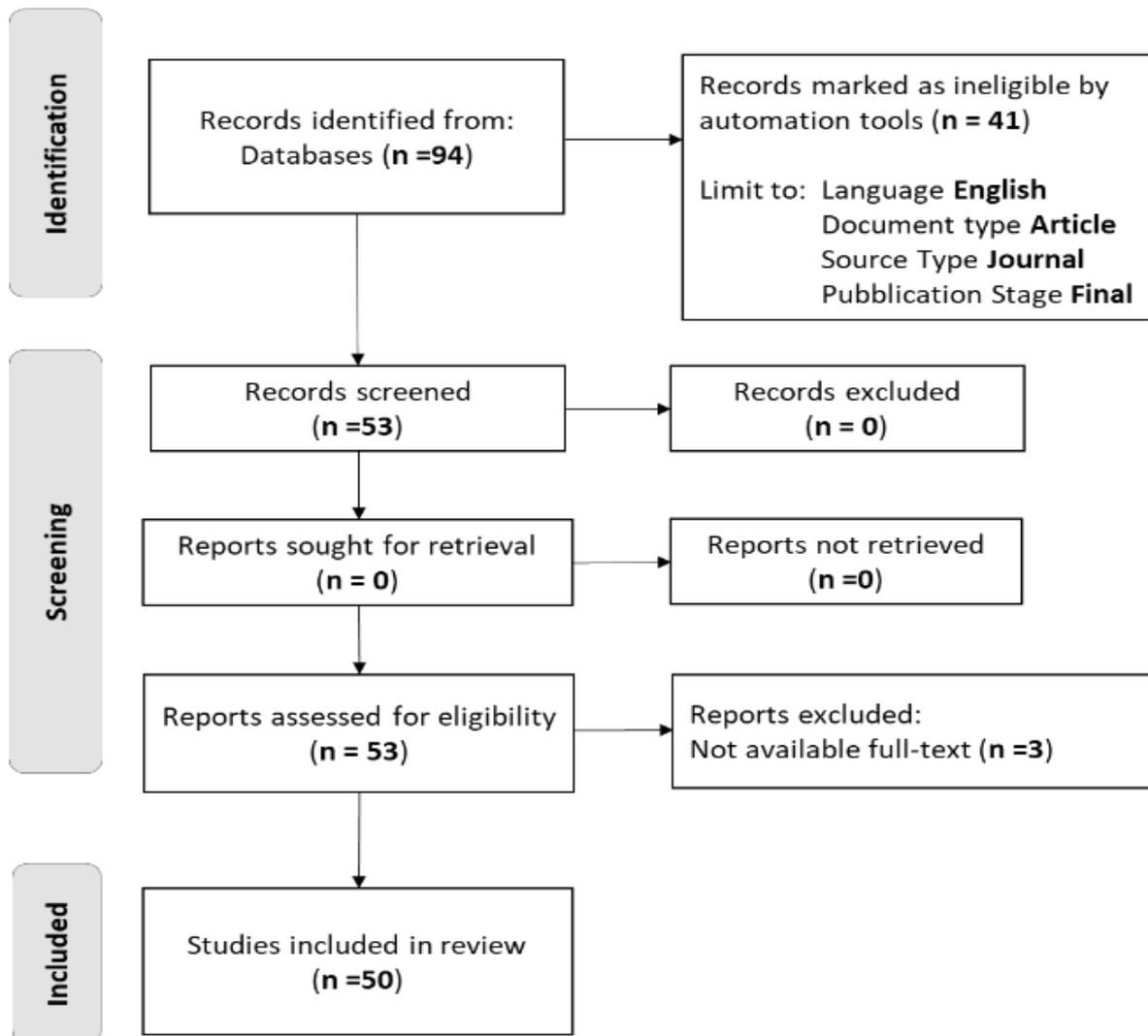


Figure A1 – Flow chart for identification of studies (Source: author's elaboration).

The 'seed' was subjected to the AI-based search engine *Research Rabbit*, which suggested a plethora of similar works through a tree structure, starting from similar works and emphasizing works that connect with the seed.

The network of the papers connected to the topics is clearly highlighted in Figure 2 where the size of the node shows the importance of the paper for the network:

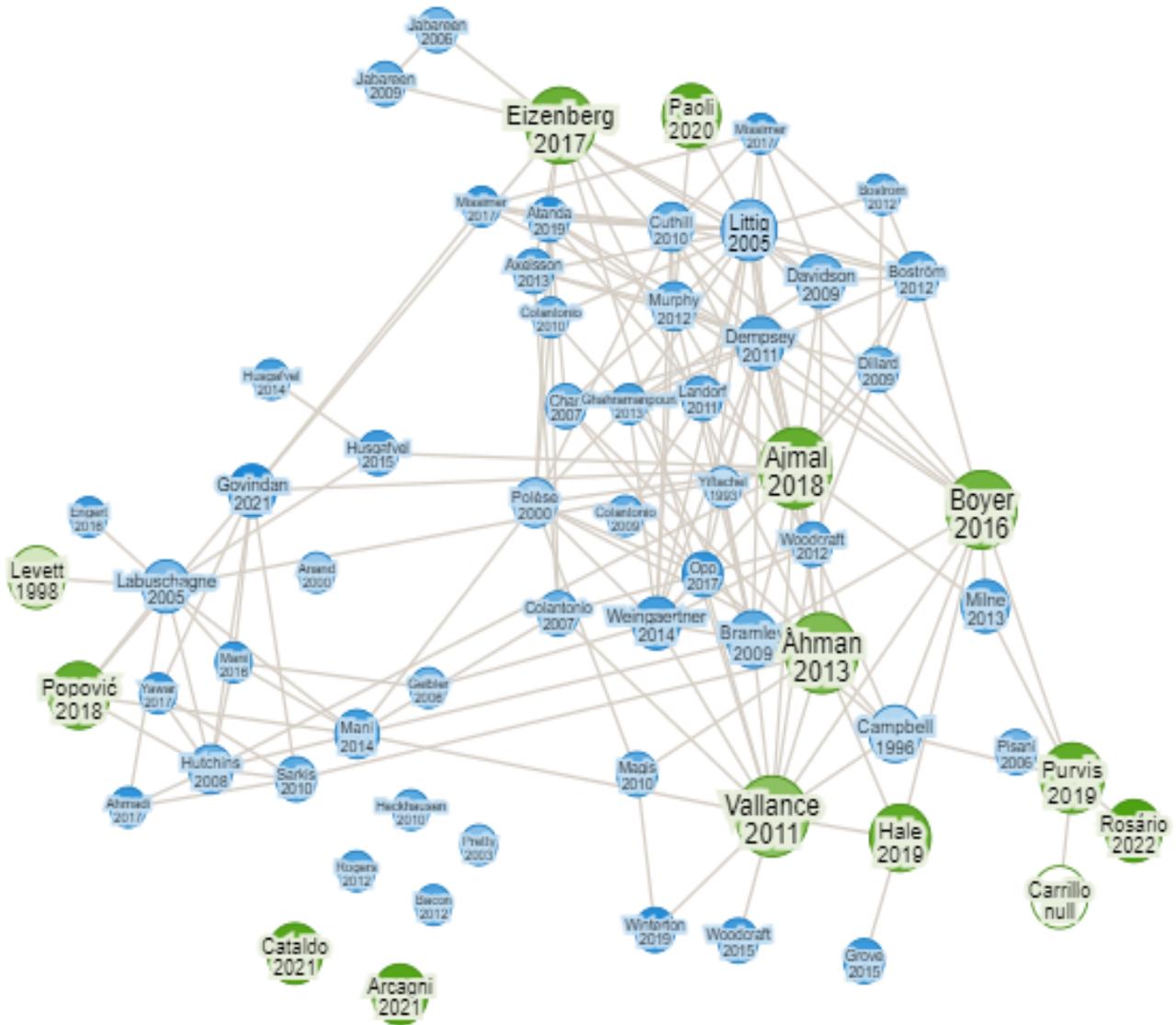


Figure A2 - Co-occurrence analysis (Source: Research Rabbit).

From here, we selected 53 suggested works, which were added to the seed to form the complete bibliography.

For category attribution, we queried the *OpenAlex* database through *R API*, which has a very specific level of semantic attributions. From here, we made a second selection of works associated with semantic expressions most in line with the original research queries.

Based on this procedure, we classified the papers according with the following substantive criteria:

- Conceptual framework

- Sustainability
- Sustainable Development
- Social Sustainability
- Sustainability Indexes
- Sustainability Indicators.

The tentative classification of the papers is shown in the following table 2.

As the collection of the papers is currently evolving, the classification and categories may change and so may the assignments of studies in the categories as the present papers are reviewed and new ones are added.

<b>Year</b>	<b>Author</b>	<b>Title</b>	<b>DOI</b>	<b>Issue</b>
2017	Einzeberg et al.	<i>Social Sustainability: A New Conceptual Framework</i>	<a href="https://doi.org/10.3390/su9010068">https://doi.org/10.3390/su9010068</a>	Conceptual framework
2011	Vallace et al.	<i>What is social sustainability? A clarification of concepts</i>	<a href="https://doi.org/10.1016/j.geoforum.2011.01.002">https://doi.org/10.1016/j.geoforum.2011.01.002</a>	Conceptual framework
2012	Murphy	<i>The social pillar of sustainable development: a literature review and framework for policy analysis</i>	<a href="https://doi.org/10.1080/15487733.2012.1190808">https://doi.org/10.1080/15487733.2012.1190808</a> 1	Conceptual framework
2017	Missimer et al.	<i>A strategic approach to social sustainability – Part 2: a principle-based definition</i>	<a href="https://doi.org/10.1016/j.jclepro.2016.04.059">https://doi.org/10.1016/j.jclepro.2016.04.059</a>	Conceptual framework
2023	Ly et al.	<i>New Conceptual Model of Social Sustainability: Review from Past Concepts and Ideas</i>	<a href="https://doi.org/10.3390/ijerph20075350">https://doi.org/10.3390/ijerph20075350</a>	Conceptual framework
2019	Pieper et al.	<i>The SOLA Model: A Theory-Based Approach to Social Quality and Social Sustainability</i>	<a href="https://doi.org/10.1007/s11205-019-02127-7">https://doi.org/10.1007/s11205-019-02127-7</a>	Conceptual framework
2012	Boström	<i>A missing pillar? Challenges in theorizing and practicing social sustainability: introduction to the special issue</i>	<a href="https://doi.org/10.1080/15487733.2012.1190808">https://doi.org/10.1080/15487733.2012.1190808</a> 0	Conceptual framework
1998	Marcuse	<i>Sustainability is not enough</i>	<a href="https://doi.org/10.1177/095624789801000201">https://doi.org/10.1177/095624789801000201</a>	Sustainability

2014	Stewart	<i>Sustainability and Inequality</i>	<a href="https://doi.org/10.1057/dev.2015.1">https://doi.org/10.1057/dev.2015.1</a>	Sustainability
2022	Rosário et al.	<i>Sustainability and the Digital Transition: A Literature Review</i>	<a href="https://doi.org/10.3390/su14074072">https://doi.org/10.3390/su14074072</a>	Sustainability
2007	Scoones	<i>Sustainability</i>	<a href="https://doi.org/10.1080/09614520701469609">https://doi.org/10.1080/09614520701469609</a>	Sustainability
2023	Martinez-Pelàez	<i>Role of Digital Transformation for Achieving Sustainability: Mediated Role of Stakeholders, Key Capabilities, and Technology</i>	<a href="https://doi.org/10.3390/su151411221">https://doi.org/10.3390/su151411221</a>	Sustainability
2019	Purvis et al.	<i>Three pillars of sustainability: in search of conceptual origins</i>	<a href="https://doi.org/10.1007/s11625-018-0627-5">https://doi.org/10.1007/s11625-018-0627-5</a>	Sustainability
2023	Camminatiello et al.	<i>A Model for Evaluating Inequalities in Sustainability</i>	<a href="https://doi.org/10.1007/s11205-023-03152-3">https://doi.org/10.1007/s11205-023-03152-3</a>	Sustainability
2006	Gibson	<i>Beyond the Pillars: Sustainability Assessment as a Framework for Effective Integration of Social, Economic and Ecological Considerations in Significant Decision-Making</i>	<a href="https://doi.org/10.1142/s1464333206002517">https://doi.org/10.1142/s1464333206002517</a>	Sustainability
2012	Hansmann	<i>Principal sustainability components: empirical analysis of synergies between the three pillars of sustainability</i>	<a href="https://doi.org/10.1080/13504509.2012.696220">https://doi.org/10.1080/13504509.2012.696220</a>	Sustainability
2022	Verma et al.	<i>The role of ICT diffusion in sustainable human development: an empirical analysis from SAARC economies</i>	<a href="https://doi.org/10.1007/s11356-022-23174-7">https://doi.org/10.1007/s11356-022-23174-7</a>	Sustainable Development

2007	Campbell	<i>Green Cities, Growing Cities, Just Cities?: Urban Planning and the Contradictions of Sustainable Development</i>	<a href="https://doi.org/10.1080/01944369608975696">https://doi.org/10.1080/01944369608975696</a>	Sustainable Development
2012	Murphy	<i>The social pillar of sustainable development: a literature review and framework for policy analysis</i>	<a href="https://doi.org/10.1080/15487733.2012.11908081">https://doi.org/10.1080/15487733.2012.11908081</a>	Sustainable Development
2023	Taghvaei	<i>Sustainability spillover effects of social, environment and economy: mapping global sustainable development in a systematic analysis</i>	<a href="https://doi.org/10.1007/s41685-022-00231-0">https://doi.org/10.1007/s41685-022-00231-0</a>	Sustainable Development
2021	Kumar Singh et al.	<i>Assessment of Global Sustainable Development, Environmental Sustainability, Economic Development and Social Development Index in Selected Economies</i>	<a href="https://doi.org/10.18280/ijstdp.160113">https://doi.org/10.18280/ijstdp.160113</a>	Sustainable Development
1998	Custance et al.	<i>Statistical Issues in Developing Indicators of Sustainable Development</i>	<a href="https://doi.org/10.1111/1467-985x.00108">https://doi.org/10.1111/1467-985x.00108</a>	Sustainable Development
2021	Cataldo et al.	<i>Sustainable Innovation: The Italian Scenario Studied Through Higher-Order Partial Least Squares-Path Modeling</i>	<a href="https://doi.org/10.1007/s11205-021-02846-w">https://doi.org/10.1007/s11205-021-02846-w</a>	Sustainable Development
2020	Delli Paoli et al.	<i>Sustainability and Sustainable Development Goals (SDGs): From Moral Imperatives to Indicators and Indexes. A Methodology for Validating and AssessingSDGs</i>	<a href="https://doi.org/10.1007/978-3-030-33173-3_5">https://doi.org/10.1007/978-3-030-33173-3_5</a>	Sustainable Development

2022	Murillo-Aviña et al.	<i>Challenges and Opportunities Post Pandemic of Organizational Ergonomics to Promote the Social Sustainability in Cultural and Creative Industries: A Critical Review and Future Research Agenda</i>	<a href="https://doi.org/10.3390/su142215120">https://doi.org/10.3390/su142215120</a>	Social sustainability
2021	Conigliaro	<i>Between Social Sustainability and Subjective Well-being: The Role of Decent Work</i>	<a href="https://doi.org/10.1007/s11205-020-02564-9">https://doi.org/10.1007/s11205-020-02564-9</a>	Social sustainability
2013	Åhman	<i>Social sustainability – society at the intersection of development and maintenance</i>	<a href="https://doi.org/10.1080/13549839.2013.788480">https://doi.org/10.1080/13549839.2013.788480</a>	Social sustainability
2019	Atanda	<i>Developing a social sustainability assessment framework</i>	<a href="https://doi.org/10.1016/j.scs.2018.09.023">https://doi.org/10.1016/j.scs.2018.09.023</a>	Social sustainability
2012	Boström	<i>A missing pillar? Challenges in theorizing and practicing social sustainability: introduction to the special issue</i>	<a href="https://doi.org/10.1080/15487733.2012.11908080">https://doi.org/10.1080/15487733.2012.11908080</a>	Social sustainability
2017	Ajmal et al.	<i>Conceptualizing and incorporating social sustainability in the business world</i>	<a href="https://doi.org/10.1080/13504509.2017.1408714">https://doi.org/10.1080/13504509.2017.1408714</a>	Social sustainability
2016	Boyer et al.	<i>Five Approaches to Social Sustainability and an Integrated Way Forward</i>	<a href="https://doi.org/10.3390/su8090878">https://doi.org/10.3390/su8090878</a>	Social sustainability
2019	D'Eusano et al.	<i>Social sustainability and supply chain management: Methods and tools</i>	<a href="https://doi.org/10.1016/j.jclepro.2019.06.323">https://doi.org/10.1016/j.jclepro.2019.06.323</a>	

				Social sustainability
2019	Hale et al.	<i>Social sustainability indicators as performance</i>	<a href="https://doi.org/10.1016/j.geoforum.2019.03.008">https://doi.org/10.1016/j.geoforum.2019.03.008</a>	Social sustainability
2013	Magee et al.	<i>Reframing social sustainability reporting: towards an engaged approach</i>	<a href="https://doi.org/10.1007/s10668-012-9384-2">https://doi.org/10.1007/s10668-012-9384-2</a>	Social sustainability
2019	Johnston et al.	<i>Reclaiming the Definition of Sustainability</i>	<a href="http://dx.doi.org/10.1065/espr2007.01.375">http://dx.doi.org/10.1065/espr2007.01.375</a>	Social sustainability
2017	Shirazi	<i>Critical reflections on the theory and practice of social sustainability in the built environment – a meta-analysis</i>	<a href="https://doi.org/10.1080/13549839.2017.1379476">https://doi.org/10.1080/13549839.2017.1379476</a>	Social sustainability
2016	Opp	<i>The forgotten pillar: a definition for the measurement of social sustainability in American cities</i>	<a href="https://doi.org/10.1080/13549839.2016.1195800">https://doi.org/10.1080/13549839.2016.1195800</a>	Social sustainability
2022	<u>Dörffel</u> et al.	<i>What is Inclusive Development? Introducing the Multidimensional Inclusiveness Index</i>	<a href="https://doi.org/10.1007/s11205-021-02860-y">https://doi.org/10.1007/s11205-021-02860-y</a>	Sustainability Indexes
2021	Arcagni et al.	<i>Some Critical Reflections on the Measurement of Social Sustainability and Well-Being in Complex Societies</i>	<a href="https://doi.org/10.3390/su132212679">https://doi.org/10.3390/su132212679</a>	Sustainability Indexes
2012	Mori et al.	<i>Review of sustainability indices and indicators: Towards a new City Sustainability Index (CSI)</i>	<a href="https://doi.org/10.1016/j.eiar.2011.06.001">https://doi.org/10.1016/j.eiar.2011.06.001</a>	Sustainability Indexes

2023	Benecchi et al.	<i>Digitalisation in Italy: Evidence from a New Regional Index</i>	<a href="https://doi.org/10.1007/s11205-023-03153-2">https://doi.org/10.1007/s11205-023-03153-2</a>	Sustainability Indexes
2008	Hutchins et al.	<i>An exploration of measures of social sustainability and their application to supply chain decisions</i>	<a href="https://doi.org/10.1016/j.jclepro.2008.06.001">https://doi.org/10.1016/j.jclepro.2008.06.001</a>	Sustainability Indicators
2017	Peiró-Palomino et al.	<i>OECD: One or Many? Ranking Countries with a Composite Well-Being Indicator</i>	<a href="https://doi.org/10.1007/s11205-017-1747-5">https://doi.org/10.1007/s11205-017-1747-5</a>	Sustainability Indicators
2022	Carrillo	<i>Measuring Progress towards Sustainability in the European Union within the 2030 Agenda Framework</i>	<a href="https://doi.org/10.3390/math10122095">https://doi.org/10.3390/math10122095</a>	Sustainability Indicators
2018	Popovic et al.	<i>Quantitative indicators for social sustainability assessment of supply chains</i>	<a href="https://doi.org/10.1016/j.jclepro.2018.01.142">https://doi.org/10.1016/j.jclepro.2018.01.142</a>	Sustainability Indicators

Note: Classification categories may change and so may the attributions of studies in the categories as the studies are reviewed.