


Review

# A Framework for Analyzing Co-Creation Value Chain Mechanisms in Community-Based Approaches: A Literature Review

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**Abstract:** Community co-creation is critical for tackling complex challenges and building a sustainable future, and necessitates collaboration between public and private sectors to co-create value chains. This paper highlights existing frameworks and proposes a heuristic approach that integrates Collective Impact (CI), Social Impact Assessment (SIA), and Community Capital (CC). Through a narrative review, the paper explores how SIA and CC can empower CI by aligning objective data with community context, ensuring solutions that resonate with local needs, promoting equity by fostering inclusive participation and understanding diverse perspectives, and revealing valuable resources within communities and leveraging their strengths for sustainable development. Although the paper delves into roles and responsibilities for each sector involved in co-creation, it acknowledges limitations in areas such as leadership-capacity building for effective collaboration and long-term commitment, impact measurement methodologies that capture nuanced social change over time, and inclusion of diverse participation methods to ensure all voices are heard and represented. By addressing these limitations, the paper calls for further research and development to strengthen community-driven social change.

**Keywords:** collective impact; social impact assessment; community capital framework



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## 1. Introduction

Local sustainability and decarbonization initiatives are crucial for creating sustainable societies and mitigating climate change [1,2]. Communities often face local and global issues simultaneously (e.g., demographic changes; declining local economy and industries; increasing fragility of community bonds; and landscape, cultural, and ecological degradation), and these issues are often linked to the local context. In the past, the public sector was responsible for addressing local societal issues [3]; however, the public sector is limited in what it can achieve, particularly with regard to tackle wicked problems or issues that involve conflicting values such as not-in-my-back-yard issues [4,5]. Thus, the public sector needs to deal with more sophisticated and comprehensive community-driven policies and programs. One potential approach for providing these improved strategies to local problem-solving could be the engagement of the private sector and other stakeholders to co-create value chains. Such co-created value chains, together with data- and context-driven analyses, may help to create community-based approaches to address the most pressing of wicked problems that are hampering the creation of a more sustainable society [6–8].

For the co-creation of value chains in the private sector, the use of conceptual models with antecedents and internal/external stakeholder network engagement is important [9].

In these models, private firms play the main role in promoting co-creation with local stakeholders [9]. However, for solving wicked problems at the local level, private firms, public-sector actors, non-profit organizations, researchers, coordinators, and other capable parties should also play main roles [10,11]. Public–private hybrid collaboration is indispensable for connecting the two sectors to co-create approaches involving various parties [12,13]. A number of studies have highlighted the importance of community co-creation in fields such as urban planning [8], renewable energy [14], healthcare [15], organization morphology [16], business models [16,17], digital communication [18], and consumer behavior [19]. However, despite the outcomes of these studies, practical frameworks and tools for analyzing co-creation value chains in community governance have yet to fully mature. Therefore, moving forward, it will be essential to delve deeper into specific methodologies that can drive effective collaboration and meaningful change. Three key concepts stand out in this regard: collective impact (CI), social impact assessment (SIA), and community capital (CC). These concepts offer multifaceted strategies for engaging stakeholders, evaluating outcomes, and harnessing local resources to build sustainable communities.

CI is the commitment of a group of actors to a common agenda for solving a specific issue. Originating from case studies of social solutions to educational problems, Kania and Kramer first proposed the CI approach in 2011 together with the following five conditions necessary for achieving co-creation in a community: a common agenda, shared measurement systems, mutually reinforcing activities, continuous communication, and a backbone organization [20]. In short, CI emphasizes the effectiveness of a collaborative process focusing on representing “a fundamentally different, more disciplined, and higher performing approach to achieving large-scale social impact” [20] (p. 2). Since its inception, CI has been used by social organizations to address issues related to public health and the local environmental in the United States, Australia, and Canada, and in the context of aid provision to developing countries [21]. However, the initial publication was in a quarterly magazine rather than a journal, and this may have hampered interdisciplinary development of the approach because such magazines are not indexed within primary academic databases. Therefore, despite CI being a broad approach, the original concept may have been overlooked with respect to its application in research fields other than the social sciences, such as environmental science, sustainable urban and rural communities, and community problem solving.

Kania has suggested that effective shared measurement systems are crucial for public–private sector collaborations to have large-scale social impact on specific issues [22]. SIA is a practical methodology for identifying and measuring the impacts of a program or policy on its stakeholders [23]. This methodology considers both short output and long-term outcomes and visualizes stakeholder interactions by using a logic model [23]. In this context, design thinking can be a valuable tool because it can help the assessment improvement process by gathering participant’s idea [24]. The existing literature on SIA offers practical method into measurement systems [25]. A major disadvantage of SIA is that it is occasionally subjective, making it challenging to select appropriate indicators [26–28]. In addition, although the logic models used in SIAs describe causal relationships between elements extracted from sets of collated data and community knowledge, these causal relationships are usually too simple and singular to deal with integrative value chains across multiple policies and programs [23]. To address this issue, we use a framework that incorporates not only systems thinking, but also the Theory of Change (ToC). That is, the ToC provides a framework that can be used to identify the causal relationships between the indicators included in the SIA, while systems thinking provides a tool for understanding the complexity of the identified relationships and their impact on the community.

Two issues remain, however. The first is that the combination of ToC and systems thinking may not fully leverage the existing community power because it can overlook or undervalue the strengths and assets already present in the community [29]. This may result in a lack of ownership and investment from community members because of insufficient bottom-up capacity building, leading to limited sustainability and impact [30]. The second issue is that the individual indicators may have different dimensions, making it challenging

to handle their relationship when there is a lack of integration between the different dimensions [31]. This means that, although the logic model approach can sometimes be extended to capture the complexity of community dynamics and the interrelationships between various factors contributing to social change and to the assets and resources available in the community, this is not always possible. Therefore, to help overcome these limitations and recognize a community's strengths and weaknesses and leverage its assets and resources in a co-creative approach, we propose also incorporating the concept of CC to allow the inclusion of natural, financial, manufactured social, human, cultural, political, and digital capital [32,33].

Thus, here we present a heuristic framework for analyzing the process of co-creation value chains within community-based approaches. By integrating the strengths of CI, SIA, and CC, we expect our framework will facilitate navigation of the complexities of managing individual policies and programs within a community setting. This framework fosters public-private collaboration and meaningful community engagement, enabling context-specific initiatives. However, it is crucial to acknowledge limitations related to the governance context. The effectiveness of the framework is limited in situations with weak democratic governance or a dominant private sector in a case of situations of development assistance [34] and disaster relief in developing countries [35]. In such scenarios, strong public accountability is essential before private and public collaboration. Conversely, this framework could be functional in the cases with the rigidity of public governance, particularly in East Asia and certain parts of Europe [36], which limit private sector and civil society participation and co-determination, while complete autonomy can also make it difficult to build trust and cooperation across sectors. These issues can potentially exacerbate existing inequalities in social justice, depending on project participation, sector capacity, and governance effectiveness.

The introduction provides a point of view interplaying among the various concepts discussed herein, including the concepts of CI, SIA, and CC. In the following Section, we conduct a literature review that clarify the relationship between CI and the other two concepts and outline the concepts of SIA (Section 3), and CC (Section 4). In Section 5, as a discussion part, we propose our heuristic framework with each of the concepts in relation to their use in for understanding community co-creation value chain mechanisms, and then discuss the possibilities and limitations. Finally, we conclude with suggestions for future research in Section 6.

## 2. CI and Its Relationship with the Other Concepts

### 2.1. Literature Review

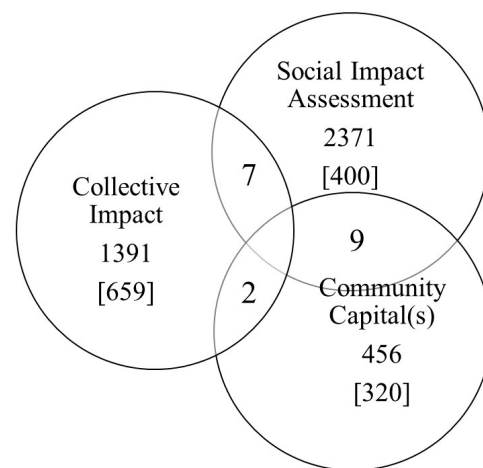
To provide a solid foundation for the discussion exploring the relationships among the concepts of CI, SIA, and CC and their potential contributions to our framework, we conducted a literature review using the Science Direct database. First, we searched the database using the terms “collective impact”, “social impact assessment”, and “community capital (or capitals)” to obtain publications related to CI, SIA, and CC, respectively. As a result, 1391 publications related to CI were obtained, 2371 related to SIA, and 456 related to CC. We then applied the following inclusion criteria to the obtained publications. Literature type: journal articles or review articles; language: English only; time period: before December 2023; subject areas: Environmental science, Social sciences, Business, Management and Accounting, Agricultural and Biological Sciences, and Energy. As a result, 659 publications related to CI were obtained, 400 related to SIA, and 320 related to CC.

To ensure we only captured publications relevant to CI while ensuring consistency with our understanding of the concept and excluding irrelevant results, we filtered the obtained publications using the combined search term “collective impact & common agenda”, resulting in the 20 articles shown in Table 1. To understand more about the relationships between pairs of concepts, similar searches of the obtained publications were conducted using the combined terms “collective impact & social impact assessment”, “collective impact & community capital”, and “collective impact & social impact assessment”. As a result,

five publications were identified for “collective impact & social impact assessment”, five for “collective impact & community capital”, and two for “collective impact & social impact assessment”. In total, 18 publications were identified. The outcomes of the literature review are summarized as a Venn diagram in Figure 1, and each of the papers are summarized in Table 1. We reviewed each of the identified publications to ensure that the authors’ understanding of the concepts was consistent with our own and excluded articles that focused solely on a keyword without addressing the intended meaning.

**Table 1.** The result of search in terms of “collective impact” and “collective impact” and “common agenda”.

Citation	Site	City	Targeted Area	References
“collective impact” and “common agenda”	USA	-	Public health	[37]
	Niger	-	Education	[38]
	Canada	Vancouver	Childcare	[39]
	USA	Northwest Indiana	Socio-economic issues	[21]
	USA	Northwest Indiana	Socio-economic issues	[40]
	Denmark	-	Land use	[41]
	Review	-	Childcare	[42]
	Australia	the Northern Territory	Resource management	[43]
	USA	Washington State	Childcare	[44]
	Nordic countries	-	Public health	[45]
	Kenya	Nakuru County,	Public health	[46]
	USA	-	Education	[47]
	USA & UK	-	Food	[48]
	USA	Columbia	Land use	[49]
	USA	Michigan	land use	[50]
	USA	-	Education & climate change	[51]
	Review	-	Public health	[52]
	Australian	the Western Australian	Resource management	[53]
	UK, Haiti	London, Rekót	Non-profit partnership	[54]
“collective impact” and “social impact assessment”	USA	-	Environmental Policy	[55]
	Developing countries	-	CSR	[56]
	Review	-	Environmental policy, Climate change, sustainability, etc.	[57]
“collective impact” and “community capital(s)”	Review	-	Agriculture	[58]
	Australia	Queensland	Coast	[59]
“community capital(s)” & “social impact assessment”	USA	Wyoming	Land use	[60]
	Review	-	Environment, sustainability	[61]
	USA	West Coast	Fishery	[62]
	Italy and the Netherlands	-	Circular economy	[63]
	Australia	-	Resource management	[64]
	A company	-	Employee	[65]
	Australia	-	Resource management	[66]



**Figure 1.** A Venn diagram of the literature results for CI, SIA, and CCs.

Searching for “collective impact & common agenda” yielded a total of 20 publications, which we confirmed cited or described the framework presented by Kania and Kramer in 2011 [20]. Among these 20 publications, the most commonly described applications of CI were in the fields of education, health, and local environmental issues in the USA and Canada. The CI approach has also been used in Australia for stakeholder dialogue and collaboration in mining development.

Searching for “collective impact” alone yielded 1391 publications, which contained 30 review articles that mention “common agenda”. Each of these review articles also contained more general allusions to “collective impact” or “common agenda”. This finding was expected because Kania and Kramer’s 2011 paper is not included in the primary literature databases such as Science Direct.

Outside of the literature identified here, research is making progress in understanding the nuanced dynamics of co-creation value chains in community-based approaches. In particular, the development of digital technologies for co-creation has become a major field of research. Several research groups have contributed to enhancing bottom-up approaches by analyzing empirical textual data through proactive approaches using gamification [67,68], artificial intelligence [69], and social media [70,71]. This review is limited in that it does not consider these issues.

## 2.2. CI Framework

CI was first proposed by Kania and Kramer in 2011 and was positioned as a framework within which stakeholders from various sectors could collaborate to address the wicked problems present within a community [72]. Over time, a deeper discussion arose regarding the pros and cons of CI [29,73], a part of the history of which is summarized in Table 2. Cabaj and Weaver argued for the need to upgrade the design and implementation of the CI framework, proposing a shift to a movement-building leadership paradigm and updating the five conditions for CI success, ultimately proposing what they referred to as Collective Impact 3.0, which, despite their criticisms, still followed the fundamental propositions of the original CI framework [29]. Other studies have also identified weaknesses or areas for improvement in the CI framework, such as the inadequate top-down approach of the common agenda, the limitation of shared measurement system conditions, and the inability to accommodate policy or system change [74].

The CI framework has been the subject of ongoing debate and evolution, with scholars and practitioners arguing for revisions to ensure greater equity and community participation. For example, Ennis and Tofa’s review of 19 articles highlighted a “lack of analysis of the causes of social issues, and little critical thinking about the nature of ‘community’ or ‘collaboration’ as mechanisms through which to achieve large-scale change” [73]. What they argue is that it is crucial to understand a community’s status from a variety of perspectives,



including from the economic, political, and social perspectives. Kania et al. responded by clarifying that CI was never meant to be a rigid framework that guarantees success, but is instead an approach that must be adapted to the circumstances of each community and issue [75], although they did also update the framework by placing equity at the center of CI efforts and offered five additional strategies to work with in addition to the original five conditions [75] (Table 2). However, centering equity in this way means that solutions must be based on both the analysis of objective data and a deep understanding of the community context, which requires the development of a common understanding by closing the gap between the objective data and the subjective context and integrating the identification and assessment of community-scale value [30,75]. Indeed, Kania et al. have stated that appropriate data and context encourage a new and shared understanding of terminology, history, data, and personal stories [75].

**Table 2.** A summary of discussions on collective impact.

	Original Collective Impact Framework, as Proposed by Kania and Kramer (2011; [72])	Collective Impact 3.0, as by Proposed by Cabaj and Weaver (2016; [29])	Updated Collective Impact Centered on Equity, as Proposed by Kania and Kramer (2022; [75])
Definition	Commitment of a group of important actors from different sectors to a common agenda for solving a specific social problem	No definition, but emphasizing movement building rather than management	Network of community members, organizations, and institutions that advance equity by learning together, aligning, and integrating their actions to achieve population- and systems-level changes.
First condition	Common agenda	Community aspiration	<ol style="list-style-type: none"> <li>1. Ground the work in data and context, and target solutions.</li> <li>2. Focus on systems change, in addition to programs and services.</li> <li>3. Shift power within the collaborative.</li> <li>4. Listen to and act with the community.</li> <li>5. Build equity leadership and accountability.</li> </ol>
Second condition	Shared measurement system	Strategic learning	
Third condition	Mutually reinforcing activities	High-leverage activities	
Fourth condition	Continuous communication	Inclusive community engagement	
Fifth condition	Backbone organization	Containers for change	

### 2.3. Relationships among CI, SIA, and CC

As a methodology to support CI efforts, SIA provides the means to quantitatively and qualitatively measure the impacts and outcomes of a program or policy, which allows for greater understanding among stakeholders [76]. In contrast, the concept of CC can help clarify a community's circumstances and its resources and assets that can be leveraged for sustainable development [32,33]. Table 3 provides the original definitions of CI, SIA, and CC, as well as those of systems thinking and design thinking.

**Table 3.** Original definitions of the key terms used in present review.

Concept	Original Definition
Collective impact	"The commitment of a group of important actors from different sectors to a common agenda for solving a specific social problem" [72].
Social impact assessment	"The process of assessing or estimating, in advance, the social consequences that are likely to follow from specific policy actions or project development, particularly in the context of appropriate national, state, or provincial environmental policy legislation" [76].
Community capital framework	"A way to analyze community and economic development efforts from a systems perspective by identifying the assets in each capital (stock), the types of capital invested (flow), the interaction among the capitals, and the resulting impacts across capitals" [32].

A review of the literature with respect to the concepts of SIA and CC can potentially highlight the way to create a foundation of objective data and subjective context, unifying

the dimensions of the local community and mapping the relationships between different elements. While SIA has received critiques for its instrumental feature and potential subjectivity, the method strives to balance these subjective values into measurable outcomes and objectives [77]. Its strengths in outcome assessment are valuable when combined with the broader perspective offered by the concept of CC. The publications of CI itself obtained from our literature review indicate some of the limitations and provide some suggestions for potential improvements (Table 1). First, participants in CI programs tend to be biased, suggesting the need for broader representation. For example, the views of vulnerable members of society may not be well reflected, or if multiple communities are involved, rural and minority communities tend to be the least involved. In addition, it has been pointed out that it is difficult to be a collective when there are differences in values, such as between indigenous peoples and non-indigenous peoples.

The CI member's description of the indicators based on the analysis data and what they mean in the local context is a starting point for discussing specific initiatives and the overall trajectory of local development. In the course of discussion, it is also necessary to recognize that there are likely multiple visions for the initially stated common agenda and to be flexible in changing it. A nature of volunteerism in urban tree planting can be revisited [40]. Public programs tend to focus primarily on evaluating outcomes in a single year or at a single point in time, and tend to set rigid targets, but the importance of ongoing communication in CI initiatives, and the role of the backbone organization in ensuring this, is important. In this context, it is important to interpret data and context based on scientific evidence for resolving frictions and future agenda development. Therefore, by incorporating objective evaluation methods such as SIA and attempting to apply the concept of CC in interpreting the context, we aim to build a learning process based on empirical knowledge of the participants and feedback from survey-based effectiveness evaluations.

The use of CI in the energy and business sectors is currently limited. However, measures are being discussed to mitigate the tension between social and economic goals that arises when companies engage with communities [62]. When a company conducts an impact assessment, the focus is solely on the impact of the company's activities on the community. In addition, when companies are the main actors in impact assessments, the focus is on providing what is lacking in the community rather than on solving social problems [56]. However, engaging in CI initiatives requires active participation not by a single company, but by a number of stakeholders at both the micro- and macro-levels [78]. A prerequisite for this is to identify the needs and aspirations of the community itself, and the CC framework, with design thinking, can be useful for this purpose. In addition, SIA and ToC can be tools for companies to explain to their own management and stakeholders.

The relationship between CI and CC has been analyzed in a study focusing on the relationship between supply chain responsibility in agriculture and rural community development [58]. From a supply chain perspective, rural areas are either production or consumption areas, and in terms of the community engagement that takes place there, it is expected that the lessons of CI and CC can be used. An emphasis on local wealth is the fundamental basis of using CC to capture changes in local needs, and interests in the process of community building can also be discussed using CC. In particular, the importance of an emphasis on long-term community wealth [58], which is relevant to the common agenda setting, is suggested when focusing on positive transformation. Sector coupling is also an important element in terms of CI. In addition to industrial activities close to communities, such as agriculture, CCF-based assessments are also being conducted in the supply chain of mining development in Australia [66]. Reducing high environmental impact, the mining companies pay attention to its social impact on communities is also a driving force, beyond the classic corporate social responsibility, bonding capital, bridging capital community development, diversity off-set, cultural support, and long-term outcome [66]. The principles of CI and the perspective of the CCF can have an impact on improving the connectedness and prosperity of these communities, as the supply chains of corporate activities affect the urban and rural communities in which they operate.

Next, we explore community wealth and capital in relation to SIA. In a review, Panzarella et al. characterized 42 asset-based approaches used in the context of community capital and sustainability [61]. They found that, of these 42 approaches, few of them had a societal focus, although they do cite SIA as one that does. Panzarella et al. divided their identified asset-based approaches into five categories by underlying theory: resilience theory, Sen's theory capabilities, social capital, social-ecological systems, and sustainable livelihood and community capital. The majority of the identified approaches fell in the sustainable livelihood [79] and community capital category [80]. Panzarella et al. note that the approaches in this category are concerned with stocks and flows, with the overlap between regional capitals seen as a major problem [61]. They also point out that the integration of social dimensions is more difficult than the integration of economic and environmental dimensions with these approaches [61]. There is also an issue related to time, with many of the identified approaches focusing on a particular asset at a particular point in time, which makes it difficult to achieve long-term outcomes and a common agenda. Panzarella et al. also note the challenge of removing the subjectivity that is often present in community-based participation, as well as the limitations of standards-based objectivity in sustainability assessments. Panzarella et al. conclude that there is room for improvement through integration of the SIA and CI approaches.

The CI initiative's members' description of the indicators based on the analysis and what they mean in the local context is a starting point for discussing specific initiatives and the overall trajectory of local development [81]. In the course of the discussion, it is also necessary to recognize that there are multiple visions for the initially stated common agenda, and to be flexible in changing it. For example, the nature of volunteerism may be reviewed with regard to urban tree planting [40]. Public programs tend to focus primarily on evaluating outcomes in a single year or at a single point in time, and tend to set rigid goals, but neglect the importance of ongoing communication and practice. In CI initiatives and the role of the 'backbone organizations' will be important to ensure this. In this context, for frictions and future agenda development, it is important to interpret data and context based on scientific evidence. Therefore, by incorporating objective evaluation methods such as SIA and attempting to apply CCs in interpreting the context, the challenging issues is to build a learning process based on the empirical knowledge of the participants and the feedback from the survey-based effectiveness evaluation.

CI initiatives in the energy sectors are still nascent. However, measures to mitigate the tension between social and economic goals that arise when companies participate in communities are discussed [82]. When a company conducts an SIA, the focus is solely on the impact of the company's activities on the community. It is also pointed out that when companies are the main actors in SIAs, the focus is on providing what is lacking in the community rather than on solving social problems [83]. On the one hand, engaging in CI initiatives requires active participation, not within a single company, but by including multiple stakeholders at both micro and macro levels as a ecosystem of shared value [79]. On the other hand, some have reported that community engagement has had beneficial social and cultural outcomes, but has not worked as a viable business [9]. However, the community's influence on corporate governance can ease the tensions and move closer to the principles of CI [79]. As a prerequisite for this, it is essential to identify the needs and aspirations of the community itself, and the CCs framework can be useful for this purpose. In addition, SIA can be an auxiliary method for companies to explain to their own management departments and stakeholders.

### 3. Theory and Practice of SIA

#### 3.1. Overview of SIA

SIA is part of the cost-benefit analyses conducted in the public management field, where it is used to determine whether to implement programs and policies based on estimated benefits versus cost [84]. Epstein, Buhovac, and Yuthas define "social impact" as a change produced for stakeholders, including beneficiaries, as a result of project activi-



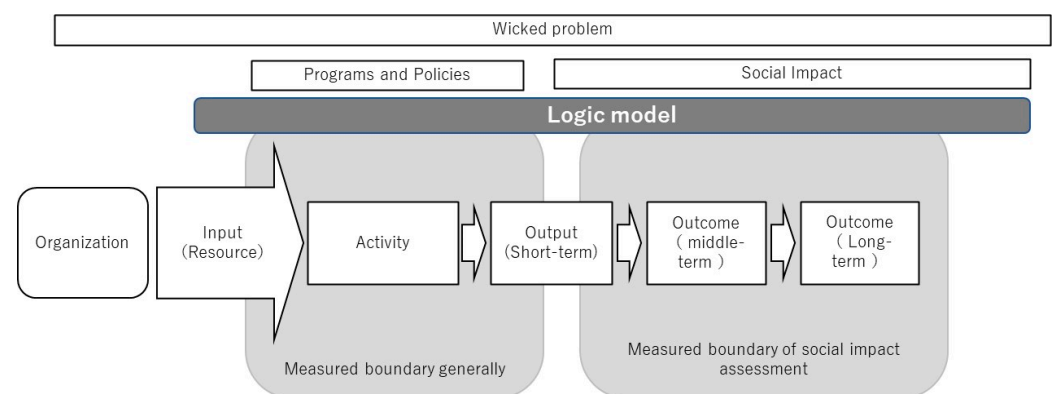
ties [85]. This definition emphasizes the differences between the status quo before and after implementation of an intervention based on stakeholders' interests. However, it is crucial to understand how to evaluate the changes. Weiss defines *evaluation* as "the systematic assessment of a program or policy implementation or outcomes against a set of explicit or implicit criteria as a means of contributing to their improvement" [86]. This definition provides a framework for conducting assessments, analyzing the data collected, and using the findings to improve programs or policies. Weiss's contributions theoretically support the use of SIA.

Over time, the use of SIA has spread to more specific topics and practical tools have been developed. Epstein, Buhovac, and Yuthas emphasized the importance of expanding the concept to social impact investment in policies and programs, describing social investment as the capital used as input, which includes time, expertise, material assets, network connections, reputation, and other valuable resources [85]. They also examined methodologies to measure whether policies and programs require assessments commensurate with the level of social investment [85].

### 3.2. Logic Models and the ToC

Creating a logic model is an indispensable part of conducting an SIA. Epstein, Buhovac, and Yuthas define a logic model as "the logical sequence of activities and events through which the resources invested are transformed into desired social and environmental impacts" [85]. Developing a logic model involves five steps: (1) collect relevant information; (2) clearly define the issue, including context resolution; (3) define and tabulate the elements of the issue; (4) construct a model that shows the issue's change theory; and (5) validate the logic of the issue and stakeholders [85]. The use of logic models as visual tools that stakeholders find easy to understand is becoming increasingly commonplace.

The theoretical development of logic models started in the 1970s with the publication of *Evaluation—promise and performance* by Joseph S. Wholey [87]. Initially, logic models were intended to be used to evaluate the performance of public sector investment; however, they subsequently developed in parallel with cost-benefit analysis. Logic models are beneficial for enabling the flows of inputs, activities, outputs, and outcomes to be organized into causal relationships in a way that allows stakeholders to efficiently allocate resources to the outcomes with the most value. Figure 2 provides a basic example flow used for SIA.



**Figure 2.** Basic flow of social impact assessment.

The ToC complements issues that serve as the bedrock of logic models in the field of system dynamics theory [88]. Strohm asserts that systemic ToC is superior to linear ToC, and emphasizes the importance of systems thinking [89]. There are two limitations to consider when using logic models in SIA. The first is that the assumption of causal relationships with flows between elements or indicators is not necessarily reasonable due to too simplification. The second is that the co-creation process needs governance because the stakeholders include a diverse range of individuals, companies, and organizations. Thus, incorporating systemic ToC features should result in a better SIA methodology.

CI initiative recognizes the usefulness of systems thinking [75]. Stroh defines *systems thinking* as “the ability to understand...interconnections in such a way as to achieve a desired purpose” [90]. While experts tend to focus on linear causal relationships, social events are often nonlinear and involve time delays, which is why conventional solutions only sometimes result in an optimal system. In addition, actions that are good for the system may not be continuous because they require time to take effect. These characteristics make systems thinking a useful approach for understanding how situations occur. With respect to wicked problems, systems thinking can help identify the core details of complex issues and to construct feedback loop diagrams between structural points and elements [5]. However, assessments of the program often overlook the interactions between elements, which makes it difficult to achieve the desired outcomes. Therefore, leaders and problem-solving teams must build their capacity to identify leverage points and develop feedback loops between elements to create effective logic models.

Creating flows and diagrams explaining the relationship among elements should involve dialogue and collaboration among stakeholders to deepen their understanding of systems thinking [91]. This process builds the team’s capacity to tackle wicked problems and becomes a foundation for the co-operative resolution of social issues. The application of ToC based on systems thinking should balance people’s need for complex insights, providing an environment in which a diverse range of perspectives and needs can be embraced. ToC provides a design with which to analyze the relationships between measured elements, and the logic models provide a visual representation of the program or policy systematically.

### 3.3. Challenges Related to SIA

There are four main challenges related to the implementation of SIA. The first is that it is difficult to measure monetary value when addressing the demands of financially invested stakeholders such as the participants of programs or policies and taxpayers. For example, evidence-based policymaking in the public sector requires objective validity as a source of accountability for public funding; however, it is often difficult to accurately translate indicators related to environmental and social factors into equivalent monetary values. Although the contingent valuation method or other suitable indicators can be used to help estimate social value to stakeholders, objective validity remains a critical issue. Thus, careful consideration is needed when selecting indicators and valuation methods for evaluating programs and policies.

Second, there is often uncertainty surrounding the outcomes of an SIA, particularly with regard to the long-term outcomes. For example, social discount rates, used to determine the present value of future benefits, need to be set appropriately based on the opportunity cost. The effective yields of government bonds with low long-term risk are often used to represent the social discount rate, but they are not always an appropriate choice. It can also be difficult to determine whether an expected outcome from a policy or program is potentially counterfactual or a deadweight loss. Other uncertainties arise from non-participating stakeholders or communities potentially displacing outcomes, and from the estimations of the degrees to which other related programs and policies affect the outcomes. Together, these methodological issues continue to prevent more widespread practical application of logic models.

Third, there are several issues related to the logic models used in SIAs. These logic models tend to reflect the subjectivity of the assessment participants, who are only a small subset of the total group of participants. Also, the logic model will differ depending on the social issue addressed, which, together with variation in the assessment methods applied to each policy or program depending on the participating stakeholders, makes comparisons between different policies or programs impossible. There is also the risk of logic model creation becoming a mere formality. Therefore, ideally, logic models and key performance measurements should be standardized as much as possible.

Fourth, when fixing a logic model, focusing too much on the outcome measures may result in overlooking real improvements. Indeed, Lowe and Wilson contend that an outcome-based approach promotes the game of pursuing performance measures at the expense of true improvements [91]. That is, especially in social impact bonds or performance-linked private-sector outsourcing, the need for parties pursuing the programs and policies to pay attention to short-term rewards and penalties may hinder the achievement of long-term outcomes.

To address these four issues, Becker advocates using outcome indicators to develop long-term partnerships for achieving the UN's Sustainable Development Goals and other movements related to providing an improved future, and to construct more comprehensive participatory and collaborative frameworks for governance [40]. Awareness of these four issues undoubtedly led also to the formulation of the strategies set out by Epstein, Buhovac, and Yuthas [85], and there is clearly a growing need to consider SIA frameworks focused more on achieving long-term outcomes.

#### 4. Concept of Community Capital

##### 4.1. Capital within a Community

We defined *community capital* as the governance capability of each sector when resolving community issues with limited resources. The targeted field of our review is on Community Capital Framework (CCF), The Inclusive Wealth Index (IWI), The International Integrated Reporting Framework for Companies (IIRC) and community development research as main research filed.

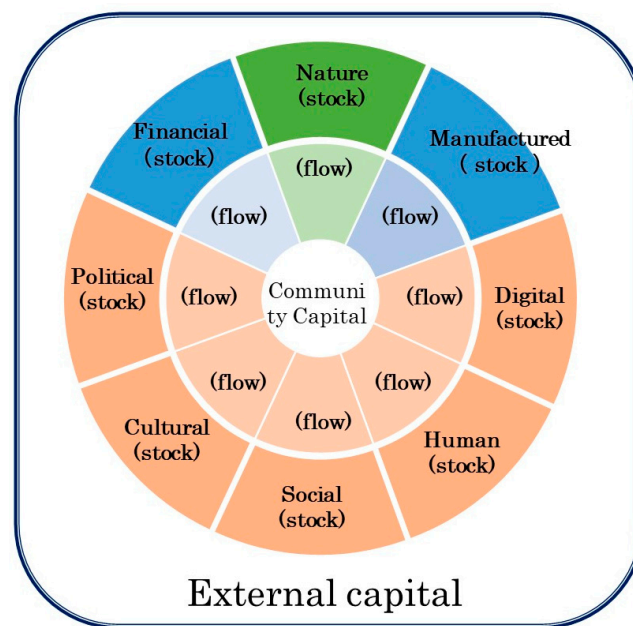
CCF [33] is one of the effective frameworks as Table 4 describes. It is a comprehensive framework combining tangible and intangible assets and resources within a community and includes natural, financial, built, human, social, cultural, political, and digital dimensions by Nogueira, Ashton, and Teixeira as CCF [33]. Eight types of capital form the basis for organizing dimensions and analyzing mechanisms for simply integrating value chains, as illustrated in Figure 3. The CCF allows for the explicit separation and description of the stocks and flows of each type of capital, enabling analysis of the strengths and weaknesses of the community and the potential for sustainable investment of CC. Nogueira, Ashton, and Teixeira used a question-based approach of “what” and “how” to uncover the perceptions of community stakeholders on stocks and flows [33].

IWI, an alternative index to gross domestic product (GDP), measures a country's inclusive wealth and has been applied at the municipality level [92]. The index is based on a stock and flow model that considers human, natural, and produced capital as stocks, and consumption, investment of production, inclusive wealth, and operating profits as flows. It is a metric for measuring intergenerational well-being and capital feedback as sustainability indicators. Other methods of measuring community circumstances include sustainability assessment, community quality of life, and local sustainable development goals.

**Table 4.** Types of capital aligned with the triple-bottom-line perspectives.

Community Capital Framework	Social Common Capital	Inclusive Wealth Index	International Integrated Reporting Framework for Companies
Nature	Nature	Manufactured	Financial
Financial	Manufactured	Human	Manufactured
Manufactured	Human	Nature	Intellectual
Human	Social		Human
Social			Social
Cultural			Nature
Political			
Digital			

Note: Green, environmental capital; blue, economic capital; and orange, social capital.



**Figure 3.** The eight types of capital and external capital in the community capital framework. In this figure, green represents the environment, blue represents the economy, and orange represents the society.

IIRC provides an assessment method that uses the six types of capital: financial, manufactured, intellectual, human, social and relationship, and natural [93]. This method is a corporate accounting; thus, the evaluation emphasizes quantification and standardization. Companies have traditionally disclosed their financial capital to stakeholders through accounting. However, with the spreading adoption of corporate social responsibility and now environmental, social, and governance investment reporting, the IIRC has been updated to report non-financial information on how the reporting company will be able to continue to create value over the medium to long term. Since corporate value is a quantitatively measurable index with the use of models such as that of Olson [94], many empirical analyses have reported using the six types of capital as explanatory variables, revealing the effects of non-financial capital on corporate values [95].

Community development research started with social common capital, which refers to the shared resources and relationships in a society that contribute to social well-being and include trust, social networks, and civic engagement, as discussed by Uzawa [96]. The overall concept of social common capital is the development of a natural environment and social infrastructure that are capable of sustaining a community and allowing the members of the daily life in the community and develop their culture. The literature currently contains case studies in which the social common capital concept has been applied in areas such as local industry, local production for local consumption, and tourism. These studies have been developed from concepts such as endogenous development and local autonomy that seek to rectify the bias of the central–regional structural dichotomy from a social capital perspective.

Table 4 summarizes the types of capital research based on our review related to community capital. CCF can be divided into three types of capital (environment, economy, and society) based on the triple-bottom-line approach, which can help analyze the relationship between CC. Sustainable development goals or other global initiatives can play a role in helping stakeholders understand the CC concept [31,97]. CCF is an appropriate framework for adequately dealing with issues at the community or municipality scale. For instance, community and local development prioritize natural capital, whereas IWI and IIRC consider economic activities. Financial information is more crucial for stakeholders sharing

stocks in the private sector than CCF, and non-financial information is used as a reference related to future corporate value.

The scope of this paper is policies and programs of concern to communities and stakeholders; thus, this paper adapts CCF to propose a framework. Specific programs and policies involving urban and space developments, such as city-center revitalization, construction of renewable energy facilities, waste management, and recycling facilities, can clarify CCF. That specification provides an opportunity to hold the promise of creating CI by measuring capital and analyzing the relationship between elements with the exact dimensions. Here, “community” refers to the administrative district where a policy or program is implemented, and includes the various stakeholders from the different sectors. As the descriptions provided by Nogueira, Ashton, and Teixeira of the eight types of CCF capital [37,48,49], we provide overviews of the CCF and each type of capital in the following sections.

#### 4.2. The CCF

Successfully implementing programs and policies requires the involvement of external stakeholders and their capital. CI identifies five conditions for achieving this. The latter three conditions involve bringing together core stakeholders to provide a foundation for supporting policies and programs by promoting trust and collaboration among stakeholders within and outside the community in a sustainable manner.

Figure 3 shows community co-creation-based governance with the aim to create a spiral of capital increase, accumulation, and reinvestment through the input of the community and external capital to achieve long-term outcomes aligned with the CI concepts, with stakeholders leading the effort. During this process, the framework must also provide measurement and assessment capabilities by using the concepts of CC and SIA.

##### 4.2.1. Natural Capital

Natural capital is natural resources, both renewable and nonrenewable, and including fauna and flora as well as their life-supporting systems [33]. The perceptions of stakeholders regarding it can be measured through questions asked about its composition and functions in CCF [33].

The research on natural capital has focused on using methods that employ statistical indicators and a macroeconomic perspective; one such example is the research on IWI [69]. Natural capital can be deconstructed into farmland capital, forest capital, and fishery capital. Some indicators can be converted into monetary values by using indirect multifaceted functions such as the contingent valuation method.

In contrast, the Natural Capital Protocol is a bottom-up approach to natural capital research that emphasizes measurement of impact and accountability for stakeholders in the corporate sector [98]. In the protocol, natural capital is defined as renewable and nonrenewable natural resources that generate and provide benefits or services to society and companies. These benefits are ecosystem flows that contribute to the overall value of companies and society.

##### 4.2.2. Financial Capital

Financial capital includes the resources and assets of individuals or entities translated in the form of a currency that can be accessed, owned, or traded [33]. Questions about the structures that enable credits and loans and the institutional structures defining value can reveal stakeholders’ perceptions of financial capital [33]. In addition, inquiries, cash flows, and expenditures help explain the dynamics of financial capital for building community co-creation-based governance of policies and programs.

The concept of financial capital was developed in the corporate sector, and its definition is unambiguous. It refers to the pool of funds available to an organization to produce goods or provide services; it is obtained through financing, such as debt, equity, or grants, or is generated through operations or investments. The IIRC recognizes the importance of



financial capital [93], and the corporate sector has extensive financial accounting knowledge. In the public sector, financial capital is the funds available for providing public services and includes general and special accounts involving local taxes, national grants to municipalities, local government bonds, and other funds. The funds obtained through loans, stocks, donations, subsidies, grants, and other sources, or generated by business activities or investments, are also included in the definition of financial capital in policies led by the national government and foundations.

#### 4.2.3. Manufactured Capital

Manufactured capital is material goods, including human-made items such as physical infrastructure [33]. Stakeholder perceptions regarding the use of manufactured capital stocks and flows are uncovered by asking for stocks, about the infrastructure available and its condition and the portfolio of offerings supporting activities; and for flows, about how and where infrastructure is being used, and how and where products and services are being produced and consumed [33].

In statistics, manufactured capital refers to the real capital stock in industry, and is estimated separately for the manufacturing and non-manufacturing sectors. Private sector capital stock, on which the Economic and Social Research Institute of the Cabinet Office in Japan reports statistics, is divided into tangible and intangible assets and reported accordingly.

In an OECD manual, the Cabinet Office defines public manufactured capital as the products provided by public institutions (general government and public corporations) in 18 key sectors (roads, ports, aviation, railways, public rental housing, sewerage, waste treatment, water supply, city parks, educational facilities, flood control, erosion control, coast, agriculture-forestry-fisheries, postal services, national forests, industrial water supply, and government buildings) [99]. It measures gross capital stock, net capital stock, and productive capital stock.

#### 4.2.4. Social Capital

Social capital is the professional and social connections present among actors. It includes partnerships and collaborations, as well as informal gatherings [33]. Stakeholder perceptions regarding the use of social capital stocks and flows are uncovered by asking, for stocks, about the portfolio of organizations, the value exchange, and the structures promoting community engagement; and for flows, about how and where partnerships and collaborations are being formed, and how and where events and activities supporting social gatherings are happening.

Discussions on social capital have taken place in many fields. For example, Woolcock has reported that social capital has been discussed in a wide range of academic fields, including economics, political science, sociology, social psychology, business administration, education, and social epidemiology (public health) [100]. However, Inaba notes that the value attributable to social capital, the measurement of social capital, and the causal relationships between social capital and policy measures have made the concept the subject of considerable criticism.

Social capital concerns are divided into research on networks between individuals and research organizational governance in public–private partnerships. Tanaka [78] has analyzed social capital as the networks between individuals. Tanaka also discusses how “place of accumulation” can build up in the community as social capital based on the work of Putnam [101,102]. Tanaka introduces the concepts of bridging and bonding of social capital and discusses relations within and outside a community. Furthermore, Tanaka proposes community autonomy, dependence, and utilization as three types of interaction, and suggests that outsiders can have effects on a community. The networks, norms of reciprocity, and trust that specific stakeholders promoting a particular policy or program can bring to the community are vital in community co-creation.

It is also essential to accurately understand stakeholder relationships from the perspectives of connection and accumulation. Backbone organizations must pursue measures to unify internal stakeholders and serve as a bridge for outsiders to enter and participate in the community. By exploring these perspectives, it is possible to promote community co-creation and build social capital that benefits everyone.

#### 4.2.5. Human Capital

Human capital is the ability and capability of individuals to produce and manage their well-being. It includes individual health, knowledge, skills, and motivation [49]. Stakeholder perceptions regarding the use of human capital stocks and flows are uncovered by asking, for stocks, about the institutional structures for knowledge creation and differentiation and the institutions maintaining the capacity of individuals to perform; and for flows, about how and where the engagements within these structures are happening, and how the capacity of individuals to perform is defined [33].

The concept of human capital has spread extensively throughout the fields of education, human resources, and economic growth. Inclusive wealth theory, which measures the increase in the present value of lifetime earnings that corresponds to earnings from education, is a practical means of accounting for human capital. Human capital is quantified by examining education levels and wage structures, with economic value serving as the objective variable.

As an alternative approach, the IIRC distinguishes between intellectual and human capital as a means of effectively governing a company's capital [93]. Intellectual capital refers to knowledge-based intangibles, such as intellectual property, procedures, protocols, systems, and tacit knowledge. In contrast, human capital refers to people's ability, experience, and willingness to innovate, including their alignment with an organization's governance framework and ethical values. Human capital also involves understanding, developing, and implementing an organization's strategy, as well as loyalties, motivations, and leadership skills.

The CCF focuses primarily on human capital, but recognizes the importance of utilizing existing intellectual capital or creating new intellectual value. Human capital, including intellectual capital, is relevant to social capital in that it can be built up through learning, and human capital and social capital can also strengthen one another.

#### 4.2.6. Cultural Capital

Cultural capital is the values and beliefs inherent in social practices or incorporated by communities. It includes ethnicity, spirituality, heritage, traditions, and daily practices [49]. Stakeholder perceptions regarding the use of cultural capital stocks and flows are uncovered by asking, for stocks, about traditions and cultural heritage and the values and beliefs that sustain them; and for flows, about ordinary practices and manifestations of values and beliefs and how and where individuals and organizations in the community are exposed to new global practices [33].

Cultural capital is defined by Bourdieu as the qualifications, abilities, and propensities that are acquired through long-term training and accumulating knowledge as a cultural value [103]. Scott et al. consider cultural capital to consist embodied cultural capital, which is knowledge accumulated by individuals through socialization; objectified cultural capital, which is material property owned by individuals; and institutionalized cultural capital, which is academic credentials or professional qualifications [104].

#### 4.2.7. Political Capital

Political capital is the structure within organizations that determines how decisions are made and power is distributed. It involves hierarchy, inclusion, equity, transparency, access, and participation [33]. Stakeholder perceptions regarding the use of political capital stocks and flows are uncovered by asking, for stocks, about the policies influencing decisions and

the power structure; and for flows, about how and where policies are being driven, and how and where decisions are being made [33].

In a review of the research on political capital, Schugurensky argues that political capital includes five main factors that promote citizenship education and participation in decision-making, as well as the capacity to influence public policy [105]. The first factor is knowledge, ranging from general information to legislation and research-based knowledge. The second factor is political skills, including political literacy, understanding of legal documents, and critical analysis skills. The third factor is attitudes, such as self-esteem, motivation, endurance to accept defeat, interest in politics, and trust in the political system. The fourth factor is closeness to power, which refers to the distance between the citizens and political power. The fifth factor is personal resources, including the time and financial capital people can devote to influencing political decision-making. These factors interact with each other in different ways and these interactions can vary from context to context. While there are also other political capital factors, the above factors are the most important from the perspective of citizenship education and participation.

The concept of political capital is also related to political entrepreneurship. Policy entrepreneurs, who pursue policy innovations through non-traditional means and work with others in and around policymaking venues, have been identified as significant actors in achieving desired policy outcomes [106]. They exhibit high social acuity, ambition, and tenacity, and they work tirelessly to establish trust within specific policy circles. Although similar to social and human capital, policy entrepreneurs focus on introducing and implementing new ideas in a particular context. Recent theoretical and empirical research on policy entrepreneurs has highlighted the importance of framing problems, building teams, expanding networks, and working with advocacy coalitions. By expanding the concept of innovation from the corporate sector to public-sector policymaking, the role of policy entrepreneurs can be better understood and clarified. The research indicates that policy entrepreneurs can play a crucial role in transforming society and can guide the community through knowledge, political skills, attitudes, closeness to power, and personal resources. Ultimately, policy entrepreneurs have the potential to drive positive change in society by promoting innovative policy solutions and building consensus around themselves [106].

#### 4.2.8. Digital Capital

Digital capital refers to digital infrastructure and data. It includes digital platforms, as well as the mechanisms of data collection, analysis, and storage [33]. Stakeholder perceptions regarding the use of digital capital stocks and flows are uncovered by asking, for stocks, about available digital infrastructures and mechanisms for data collection; and for flows, about how and where infrastructures are being used and data stored [33].

In defining digital capital, Ragnedda reviewed the discourse around cultural capital, including that by Weber and Bourdieu, and highlighted its role as a bridge between online and offline life chances [107]. Ragnedda defines digital capital in the light of recent technological advances as “a set of internalized ability and aptitude (digital competencies) as well as ‘externalized resources’ (digital technology) that can be historically accumulated and transferred from one arena to another” [107]. Ragnedda goes on to argue that as digital capital grows, it affects other forms of capital (economic, social, cultural, personal, and political) in the social sphere; Ragnedda discusses the impacts of these effects [84].

Researchers are increasingly reporting on both the theory and practice of concepts such as smart cities [108], Industry 4.0 [109], and open innovation [110], and any discussion of digital capital needs to consider this research.

## 5. Discussion

### 5.1. Our Proposed Framework

In this section, building upon the discussions in the previous sections, we propose a framework for analyzing co-creation within a community-based approach that incorporates the CI concept, SIA methodology, and the CC framework. At this point, it is important to

emphasize that our framework is intended to be used as a heuristic tool rather than as a rigid set of instructions. Given the complexities inherent in social change and community development, there are limitations as to what any single framework can do in addressing a given set of issues; therefore, we do not propose that communities can solve everything by simply applying this model. Rather, we intend for our framework to provide heuristic hints with ongoing discussion, adaptation, and continuous improvement based on context-specific realities.

Community-based approaches are important because they allow community members to have a say in decisions that affect them, which in turn helps ensure that initiatives are tailored to the specific needs and contexts of the community. We propose that a co-creation process that integrates CI, SIA, and CC can create effective value chains by ensuring that stakeholders work together. More specifically, CI emphasizes the importance of collaboration between stakeholders and aligning their efforts toward sharing; SIA provides a framework for evaluating the effectiveness of initiatives in achieving their intended outcomes; and CC helps define a community's assets, resources, and networks that can be leveraged for the most effective outcomes. This combination of concepts emphasizes the need to understand a community's collective assets and capabilities as well as for effective collaboration and inclusive decision-making.

Based on previous reviews, we propose a co-creation framework, the details of which are shown in Figure 4. In short, over a specified period of time,  $t$  (e.g., one year), the status of the community's CC is revealed, after which the public and private sectors work together to implement various programs and policies by using the SIA approach. The input and flow of capital is the resource investment from the CC stock in period  $t$ . Community stakeholders aim for a common agenda through dialogue and collaboration, and they implement activities toward engagement. The short-term output of each activity is measured and evaluated when the programs and policies reach period  $(t + 1)$ . If the CC changes and creates value, this is the medium-term outcome, which can be reinvested in the community, compounded, and increased to accumulate more CC. Achieving a common agenda over  $T$  periods is the long-term outcome in the context of SIA, as is achieving CC sustainability.

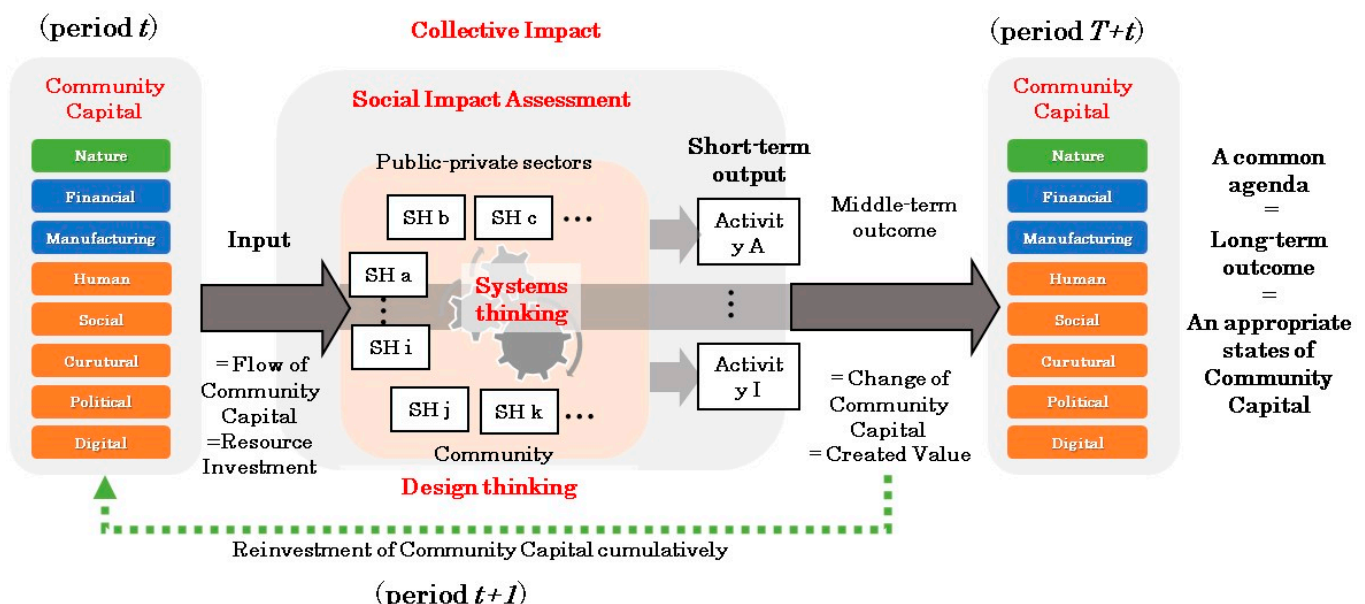


Figure 4. Proposed framework for analyzing co-creation.

Considering both CC stocks and flows allows for the construction of a model for inputting flows from the stocks represented by existing CC into policies and programs according to the prevailing circumstances [46]. This model can describe long-term policies and programs for sharing among stakeholders. For example, bringing about social impacts

will only be possible if CC stock is high, indicating that priority should be put first on securing external capital or restoring CC stocks. If, however, existing policies or programs are producing desirable outcomes, these outcomes affect the CC stock, creating a circular process that increases the flows that can be input. If this happens, CC based on existing stocks increases in value through policies and programs, enabling reinvestment of the increased amount in the next cycle. Introducing the CC concept in this way enables the proposal of a framework for analyzing mechanisms for collectively generating social impacts and creating value chains.

The framework bringing these concepts together helps to understand the mechanisms and governance of the co-creation value chains in a community-based approach. There are three points to consider. The first is the relationship between a common agenda of CI conditions and the long-term outcomes of the SIA. The common agenda must be strongly supportive of various organizations, including entities in the community from the public and private sectors. When assessing the social impact of a specific program or policy, participants set the long-term outcome as the common agenda. Each organization uses the input and output flows of the CC from the stocks of the CC over a specific period and measures the outputs after implementation. Thus, the impact of outputs on outcomes needs to be measured, analyzed, evaluated, and visualized by assembling the ToC using a logic model with systems thinking. The second point is that a collaborative framework based on design thinking must also ensure outcomes consistent with the community context. The third point is that creating a CCF that balances stakeholders' subjective concerns with objective measurements is a significant challenge.

Due to the widespread and sometimes unquestioned co-creation introduced by government agencies and foundations, several research groups have noted the need to evaluate and scrutinize the approach more critically and thoughtfully. Wolff's 10 questions on CI are useful for discussing the points needed to make our framework more straightforward and practical. The criticism for engaging those in the community most affected by Wolff's issues is valid [74]. Meaningful community engagement is crucial for successful community-based initiatives, and the co-creation process can ensure this occurs. SIA helps to involve stakeholders, including community members, by providing a framework for designing, implementing, and evaluating the effectiveness of initiatives in achieving their intended outcomes. SIA can also help to clarify the community's needs and perspectives for decision-making, and CC can provide leverage to support community-based initiatives driving sustainable social change. By incorporating SIA and CC, CI initiatives can involve a broader range of stakeholders, including those most affected by the issues, and create more equitable partnerships.

In our proposed framework, we emphasize the importance of collaboration and stakeholder engagement in designing and implementing community-based initiatives. However, we acknowledge that our framework may have limitations, including the potential to overlook the critical role of the backbone organization in building leadership, as discussed by Wolff and others [46,51,74]. The backbone organization is crucial in facilitating communication, coordinating efforts, and supporting stakeholders in achieving shared goals. It must also help to build leadership capacity within the community, enabling community members to take ownership of initiatives and sustain them beyond the project's life. The role of the backbone organization in building leadership is another critical issue that involves the development of strategies such as training and mentorship programs, networking opportunities, and capacity-building initiatives aimed at empowering community members to take on leadership roles within the project and beyond.

## 5.2. Roles of Each Sector

The participation of all sectors, including public, community, business sectors, and researchers, is essential for the proposed framework to work. The role of each sector is discussed in this section. The points put in considering potential social divisions, conflicts between different values, inequality of economic interests, and impaired communication be-



tween participants and non-participants to achieve to maintain governance. Therefore, our framework, in a heuristic way, works to help all the sectors to mitigate harm from excessive individual/corporate responsibility and competition, emphasizing community ownership, shared decision-making, and equitable resource allocation. Furthermore, listening to the community and lowering barriers to participation are crucial, as is clarifying roles for inclusivity, which has been emphasized in previous studies on impact assessment [57], CC [61], and CI [75]. The backbone organization's role is then that of a link between the sectors in place. The possibilities and limitations of this role are discussed in the next section.

**Public sector:** The public sector plays a vital role in reducing rigidity, mediating disputes, providing flexible budgets, and enabling policymaking participation [111]. Policymakers should join as equal actors. The focus of participatory impact assessment will be on decision-making and strategies for each participating organization, goal setting, exploration and innovation, and support tools to encourage coping with uncertainty. Policymakers have an important role to play in addressing this issue, both in terms of providing short-term support and in authorizing long-term efforts [45].

**Civil society sector:** The civil society sector emerges as a vital bridge between sectors with community ownership as paramount through collective governance [45]. However, challenges arise: potential social divisions, inequitable access, and unclear roles. The community sector fosters inclusive participation through capacity building, diverse dialogues, and identification of underutilized resources. It also acts as to spot inequities, advocating for marginalized groups and culturally appropriate programs. Indeed, the community sector is not merely a stakeholder; it is the key actor for inclusive actions, driving the framework towards equitable and long-term change [112]. However, abuses of power and ethical challenges can arise if the public sector pushes a role onto the community sector unilaterally. Therefore, it is important to have mechanisms in the public sector and backbone organizations to ensure that the responsibility in such cases is not necessarily borne by the community [113,114]. In this regard, it is also necessary to have a neutral venue for dialogue when issues arise outside of the target community with public sector's responsibility [75].

**Business sector:** The role of the business sector is to develop businesses that have a positive environmental and social impact, not just an economic one [28]. While it is natural for companies to look out for their own interests, it is becoming increasingly important to engage with communities throughout the supply chain [58]. The business sector is responsible and accountable to consumers, business partners, investors, employees, and the local community. They are expected to develop their business assessments through SIAs, understand their impacts on the communities in which they operate through CCs, and be proactive in their engagement. In addition, making business activities themselves a community-based co-creation (i.e., participating as an actor in CI) is a business opportunity that goes beyond accountability to the community. The CI framework is useful for clarifying this recognition, and the combination of more familiar SIAs and CCs that bring new perspectives will encourage greater participation and strengthen the mechanism of community co-creation [62]. The involvement of the industrial sector offers the potential for companies to go beyond accountability for business projects and to strike a balance between solving community problems and doing business.

**Researchers:** The role of researchers is important because they need to play dual roles of participant and expert including non-profit organization as well as develop an understanding of the difficulties. They must participate as actors in the CI approach to produce a collective agenda, mutually reinforce activities, ensure continuous communication, and support the backbone organization [75]. Also, with respect to any shared measurement systems, researchers must take a major leadership role in reconciling objective assessments with the subjective perceptions of stakeholders. Since engineering, economics, and management assessment methods generally only ensure objectivity within a specific range, participatory assessment methods must be incorporated to ensure the collective subjective perceptions of stakeholders [115]. In this respect, the SIA methodology is critical, and

researchers can use their CC knowledge as an integrating dimension. Thus, they become participants in CI by committing to promote stakeholder autonomy.

To conclude this section, even with these role assignments, there is no guarantee that governance of our framework will work with these activities. There needs to be a continuous effort to understand the relationships between the roles or each sector based on empirical data and through a series of concrete projects and actions. Also, it will be necessary to continuously strengthen the communication that guarantees each sector the opportunity for dialogue and trust to share their concerns and attitudes towards solutions. Specifically, it will be necessary to promote a system to continue consolidating opinions through activities such as dialogues, workshops, place-making, community learning, roundtables, social networking, and the financial and human resources to maintain it, and the need for the public sector to achieve this within the policy. The public sector will be responsible for creating ongoing opportunities by authorizing the policy.

### *5.3. Roles of the Backbone Organization*

The backbone organization evolved as a means to facilitate stakeholder coordination, learning, and dialogue, particularly with vulnerable or marginalized groups [75]. The backbone organization strengthens expert networks related to community issues and connects local challenges to global pressures like climate change. It also supports decision-making by providing data and context-driven insights [41,114]. Ongoing dialogue, internalization, and external knowledge gathering are crucial. Sharing community assets and capabilities helps understand strengths and weaknesses. Conflicts of interest are possible, but trust, transparency, and collaboration can enable arbitration [40]. Although human resource availability is a concern, ongoing research is expected to clarify the necessary competencies and leadership styles [116]. There is, of course, the question of whether human resources are currently available to carry out these functions. In response, the necessary competencies and leadership styles will become clearer as this theoretical research progresses and as empirical case studies accumulate.

Within our framework, the backbone organization is assigned the responsibility of ensuring stakeholder collaboration and fostering community governance. However, it should be emphasized that this role is complementary to community-driven decision-making. The backbone organization primarily supports collaboration among various stakeholders, including the community, public sector, private sector, and researchers. This collaborative approach addresses concerns about one organization wielding excessive power or dictating decisions. Furthermore, to foster legitimacy and ensure the backbone organization serves the community's needs, it ideally should be community owned. This addresses concerns about its external control or potential bias. Also, within the backbone organization there must be transparency and accountability to address potential concerns about its influence. With that said, the framework recognizes the need for context-specific adaptations to the backbone organization to address the various challenges across different regions. While not explicitly addressed in this review, further exploration is needed regarding the potential for bias within the backbone organization and strategies to mitigate it, such as ensuring diverse representation in its structure and decision-making processes. Lastly, our framework is intended to capture the diverse range of aspects of within CC, and the framework prioritizes balanced outcomes through ongoing communication. This ensures that the initiative is not solely driven by maximizing economic benefits, but focuses on all aspects of CC.

### *5.4. Limitations*

There are a number of limitations to the framework that are worthy of attention. First, the framework itself makes insufficient theoretical contributions to ensuring transparency and guaranteeing inclusiveness and social justice. The backbone organization and public sector cannot be relied on to provide sufficient leadership in this sense. In this context, the backbone organization and public sector do not provide practical information and empirical

support, even if they suggest the possibility of empowerment through application of the SIA and CC methodologies. The governance of multi-sectoral collaboration is an important issue, and therefore it is necessary to accumulate research on mechanisms that can balance a multi-layered governance system and flexible participation of multiple actors.

Second, co-creation is subjective in the sense that it reflects the values of the community. However, it is desirable to assess co-creation as objectively as possible in the logic model of SIA. Thus, the reflection of these values may be biased by the intentions of certain sectors or participants. A sufficiently ethical process is needed, as well as a mechanism to facilitate participation. In this context, attempts to lower the barriers to participation through digital technologies are very important. Nevertheless, community issues are also expected to undergo drastic changes in hard and soft infrastructure and lifestyle changes. We have not yet fully decided how to achieve participation by age groups. In the future, community-based co-creation methods need to be developed in a more practical and effective way.

Third, the scope of application of the framework needs to be clarified. As this paper does not deal with any specific policy issue, the scope of its application remains to be explored. In particular, the community context is extremely multifaceted, including global, national, and local governments, and the organizations and relationships to which they belong. In addition, the problems faced by different communities are diverse, and the scope and physical and spatial extents of the network will vary for each issue. The real usefulness of this framework will be demonstrated when the characteristics and challenges of communities are identified, the similarities and differences between CI, SIA, and CC are clarified, and the practical usefulness of CI, SIA, and CC have been explored.

Fourth, the present discussion of the theoretical basis of the framework is limited in terms of exploring the application of the framework to diverse types of community issues. The framework's effectiveness may vary depending on the characteristics of the community issue being addressed, including the scale and complexity of the issue as well as the types of stakeholder involvement that are involved. Future research should investigate the adaptability of the framework across different issue types to determine its generalizability and the potential adjustments required for successful implementation in various contexts. While the present discussion establishes the theoretical basis for the role and functions of our framework, it is crucial to acknowledge that the framework is currently still being developed and lacks empirical evidence of its application in real-world community settings.

Fifth, it is not enough consideration on community empowerment, stakeholder participation methods, inequalities and ethical challenges among stakeholders, and scenario analysis based on projections [57,59]. A field of research surrounding SIA has developed in response to the practical needs of impact assessments, but stakeholder involvement is becoming increasingly important. From this perspective, the co-creation frameworks developed based on CI have the function of better reflecting the will of stakeholders, and the results of both fields can complement one another. In particular, long-term outcomes predicted by SIA have marked similarities with the common agenda setting in CI. Conversely, common evaluation indicators in CI can draw on the contributions of SIA. The importance of support activities and ongoing communication is noted by both CI and SIA, but CI is more concerned with ensuring that these two things take place. SIA may have a slightly greater involvement of public organizations, while CI is more focused on going beyond their boundaries [75]. However, the requirements for this form of backbone organization are not always clear, so trends need to be studied by theme and by regional characteristics [74].

## 6. Conclusions

Here, we proposed a novel framework for analyzing and governing community co-creation value chains by integrating CI, SIA, and CC. In the 13 years since the CI concept was first framed, research has revealed not only the potential of the concept, but also the

most pressing issues that must be addressed. We propose integrating CI with SIA based on data from systems thinking, practical knowledge from design-based thinking, and the merits of using CC to objectively measure community capability. Together, science-based engineering, economics methodologies, and participatory community-based approaches can help integrate data and the community context. Sharing knowledge among stakeholders helps to sustain participation and prevent the framework from becoming a mere shell. By introducing the concept of CC and organizing elements under a unified dimension, we describe the possibilities for analyzing and sharing the subjective perceptions of stakeholders and objective paths of change.

However, further exploration is needed to ensure the framework's real-world impact and broader applicability. Tests of its real-world effectiveness across diverse contexts and practical tools for measuring community capital will be needed, as will research to determine how to balance the framework's adaptability with its potential for universal application. More specifically, practical implementations should be conducted to investigate the feasibility and effectiveness of the framework in real-world scenarios across diverse community contexts. The flexibility and universality of the framework should then be validated by exploring the balance between the framework's adaptability to various communities and its potential for broader, universal application. Since we do not specify measurable CCs, practical methods for measuring and integrating different aspects of CC within the framework will need to be developed. The interplay among CCs is still a challenge with regard to analyzing the dynamics and trade-offs between different types of CC and their interactions with systems and design thinking approaches. Also, empirical validation through case studies is needed to assess the framework's impact on achieving positive social change in different community co-creation initiatives.

In future studies, it will be necessary to examine the importance of stakeholder engagement for the development of strategies to ensure sustained participation and knowledge sharing among stakeholders involved in co-creation efforts. It will also be necessary, with respect to long-term impact measurement, to refine methodologies for capturing and evaluating the nuanced and long-term effects of community co-creation initiatives, and to develop robust and objective evaluation metrics to assess the performance and effectiveness of the proposed framework itself. Recognizing that the framework is only a heuristic tool, it will be necessary to study how to promote co-creation without too much intervention from certain sectors and without leading to marginalization to ensure inclusion. By addressing these research prospects, we intend to strengthen the proposed framework and contribute to the creation of more impactful and sustainable community co-creation processes that address complex challenges and build a better future for all.

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