

Social Capital in Participatory Forest Management:

a study on its application and evaluation

参加型森林管理におけるソーシャル・キャピタルの適用と評価に関する研究

Ayako Toko

Department of Natural Environmental Studies,

Institute of Environmental Studies,

Graduate School of Frontier Science,



THE UNIVERSITY OF TOKYO

東京大学大学院新領域創成科学研究科
自然環境学専攻生物圏情報学分野

藤稿 亜矢子

提出日：2008 年 12 月 12 日

Table of contents

I. Introduction.....	3
1.1 Background of the study.....	3
1.2 Objectives of the study.....	8
1.3 Flow of the study: structure of the thesis	8
1.4 Methods of the study.....	11
II. Participatory approaches in natural resource management.....	15
2.1 Institutional transition of natural resrouce management (NRM)	15
2.2 The relation between social capital and PA approaches in NRM.....	20
2.3 Parcitipatory forest management (PAFM)	24
III. Social capital Theory	27
3.1 Social capital (SC) concept.....	29
3.2 Current problems of SC application	40
3.3 Development of a conceptual framework of SC.....	48
IV. Literature analysis by the developed framework.....	61
4.1 Application of the developed conceptual framework	61
4.2 Review and analysis of previous empirical studies	62
4.3 Discussion.....	66
V. Pilot study: a case of PAFM by voluntary citizens in Japan.....	69
5.1 Significance and background of the case study.....	69
5.2 Target and methods of a pilot study	70
5.3 Results	74
5.4 Discussion.....	88
VI. Comparative case Study	91
6.1 Background of the comparative case study	91
6.2 Flow and methods	91
6.3 Pre-research for selecting the target... ..	98
6.4 Results of the final comparative study	119
VII. Conclusion.....	141
7.1 Relations between SC and PAFM.....	141
7.2 Recommendation.....	141
7.3 Validity of the developed conceptual framework.....	143
References.....	144
List of figures and tables	
Acknowledgment	
Appendix	

I. Introduction

1.1 Background of the study

It seems evident around the world that many traditional practices for regulating nature have eroded as a consequence of expanding markets, industrialization, urbanization, state power, economic globalization, and profound alterations in property rights, life-styles, and consumption patterns (Burch 1986; Goodland *et al.* 1990; Miller *et al.* 1991; Worster 1993; Kellert *et al.* 2000). As we see all the examples above induced by social dimension, natural environment today is severely altered by humans. Crutzen & Stoermer (2000) called the era we live as *Anthropocene*¹ in which earth system processes from local to global scales are strongly shaped by humanity. As a result, the perspective of the human system as a dominant subsystem on the earth, so-called *social-ecological system*², has expanded and become a high-priority system issue in the research literature on natural resource management (NRM) (Folke *et al.* 1998; Olsson *et al.* 2004; Folke 2007; Folke *et al.* 2007). Hence, the ecosystem-based approach recognizes the role of the human dimension (Dale *et al.* 2000; Waltner & Kay 2005). Human dimension reflects properties of complex adaptive systems, such as a diverse set of institutions and behaviours, local interactions between actors and selective processes (Holland *et al.* 1986; Arthur 1999; Janssen & Jager 2001; Lansing 2003).

¹ Crutzen & Stoermer (2000) coined the term, which means the influence of human behaviour on the earth in recent centuries as so significant as to constitute a new geological era.

² According to Folke (2005:P443), *scholars have used concepts like coupled human-environment systems (Turner et al. 2003), ecosocial systems (Waltner et al. 2003) and socioecological systems (Holmes 2001) to illustrate the interplay between social and ecological systems, but treating the social or ecological dimension as a prefix may give it less weight during the analysis. Consequently, Berkes & Folke (1998) started to use the term "social-ecological" system to emphasize the integrated concept of humans in nature and to stress that the delineation between social and ecological systems is artificial and arbitrary.*

At the same time, there is increasing consensus that the cause of resource degradation is institutional (Acheson 2006). Studies of the governance for common-pool resources revealed the importance of self-organized resource governance system, which is expected to be effective for NRM. Self-organized system should be based on local communities and consequently, the participatory (PA) approach³ has been broadly focused as one of the important alternative institutions for NRM to tackle the past failing policies and institutional failures. Hence, public participation in NRM has proliferated during the past decade (Diduck 2004; Parkins & Mitchell 2005; Plummer & Fennell 2007). These new policy trends are based on the recognition that the fiscal capacity of the state to undertake coercive conservation is limited and that communities can often manage their resources better than either private actors negotiating through market-based exchanges or state actors regulating through command and control policies (Agrawal 2003).

PA approach relies on the collaboration of a diverse set of stakeholders, operating at different levels, often through networks from local users to municipalities, to regional and national organizations, and also to international bodies (Folke *et al.* 2005). Walters (1997) indicates that a reason for failure of collaborative management of natural resources lies in management stakeholders; this is why it is important to address the social dimension and contexts. In fact, as Saglie (2006) stresses, the management of natural resource is most often a question of collective management involving many actors even in countries with well-developed regulatory regimes. The paramount question raised here is: what can lead collaboration or collective action to be successful.

³ Terminology associated with participatory approaches often results in obfuscation as various terms: e.g., collaboration, co-operative, co-management, community-based (Plummer & Fennell 2007). In this study, *participatory* includes all of those meanings; in summary, the approaches that promote participation of as many as stakeholders with a central focus on local community.

Rydin & Falleth (2006) seek to discuss the institutional innovation in pursuit of sustainable NRM, which includes organizations at many different levels, tiers and scales combined in more or less complex network. The complex network bridging those different levels, tiers and scales is expected to solve the problem of institutional fragmentation which often results in mismatches and misunderstanding among stakeholders; it is therefore crucial to develop networks and strategies in order to overcome the fragmentation and to promote mutual understanding among stakeholders.

Accordingly, many scholars point out that social capital (SC) can play an important role in participatory natural resource management (PANRM) with combining multi-level institutions and promoting reciprocity. (see Ostrom 1990; Ostrom *et al.* 1992; Ostrom 1999; Gibson *et al.* 2000; Pretty 2003). SC is generally regarded as networks, norms, trust and reciprocity in the social structure that facilitate mutually beneficial collective action⁴. A new paradigm views the natural environment as a form of capital asset, *natural capital*; for conserving natural capital, SC as well as human capital and intellectual capital is supposed to be influential (Heal 2007). In fact, there has been remarkable progress in understanding roles of SC in PANRM (Ostrom & Ahn 2003; Adger 2003; Pretty 2003).

Ostrom, who has been a pioneer of the research of SC effects in PANRM, focuses on the role of SC for governing the commons (Ostrom & Gardner 1993; Ostrom 1999; Ostrom 2000a). She points out that SC generates mutual monitoring and collaboration in the local community, which results in the well-organized community-based NRM. Besides, Pretty stresses that SC plays an important role for sustainable PANRM with enhancing and expanding human capital, which induces reciprocity, norms and

⁴ This is a general agreement of what SC is. Yet, definitions of SC vary depending on scholars and studies. It is discussed later in the chapter III.

sanctions in the community (Pretty & Ward 2001; Pretty & Buck 2002; Pretty 2003; Pretty & Smith 2004). Furthermore, Folke stresses that SC is prerequisite in social-ecological system with strengthening communication and promoting knowledge sharing that are crucial for self-organized NRM (Folke *et al.* 2005; Folke 2006). In addition, Rydin and Falleth focus on SC as network which contributes to solve the problem of institutional fragmentations. (Rydin 2006; Rydin & Falleth 2006; Saglie 2006).

Considering that SC roles in PANRM are observed and discussed in substantial previous studies, applying SC concept for the analysis of trends and challenges of PA approaches is significant. However, it seems that SC concept itself has a theoretical weakness and problem regarding its application into empirical studies. The broader SC concept is applied in various spheres, the vaguer what this concept captures. Alarming the tendency of too broad application of SC concept, its operation with a coherent framework is strongly recommended (Putnam 2001; Adam & Rončević 2003). Accepting that *“there is no single form of SC that we need to think about the multiple dimensions of SC”* (Putnam 2001), a reasonable framework how to apply this concept into actual researches with respect to clear definitions and to multi-dimensional aspects is needed. Lacking of a coherent framework of SC application in PANRM context also results in disagreements on what accounts for SC effects on NRM. Since there are few analyses with a compelling framework, systematically test findings and comparing postulated causal connections across different contexts have been difficult.

Hence, this study seeks to develop a conceptual framework for applying SC in PANRM researches, especially focusing on the participatory forest management (PAFM) context. Given that there are substantial previous studies of SC that contributed to the development of this concept, it is significant for further empirical researches to

condense the existing arguments from previous studies in a conceptual framework. Subsequently, the study applies a developed framework in case studies for verifying its validity as well as for contributing to develop SC theory in PA approaches. In addition, empirical part of the study reveals the actual challenges in PAFM cases of the suburb area in Japan. In the following section, objectives of the study are presented and flow and methods are briefly explained.

1.2 Objectives of the study

In order to contribute to further researches of SC as well as policies of PA approaches, this study aims to:

- i) Develop a conceptual framework and methods for applying SC concept comprehensively in PAFM,
- ii) Analyse cases from previous empirical studies of PAFM with applying the developed framework in order to verify the framework, and
- iii) Conclusively, the framework and methods of application of SC concept in PAFM is developed and recommendation for policies is suggested.

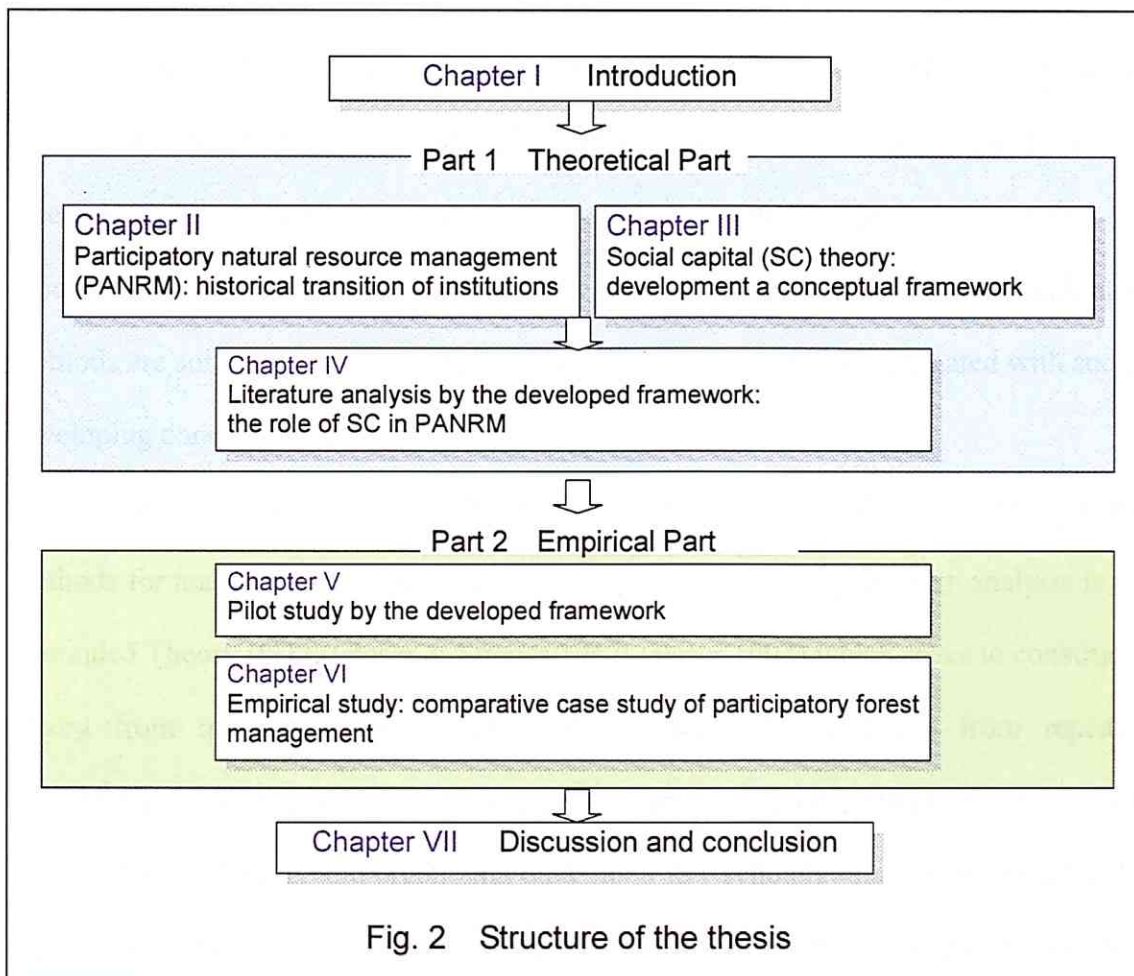
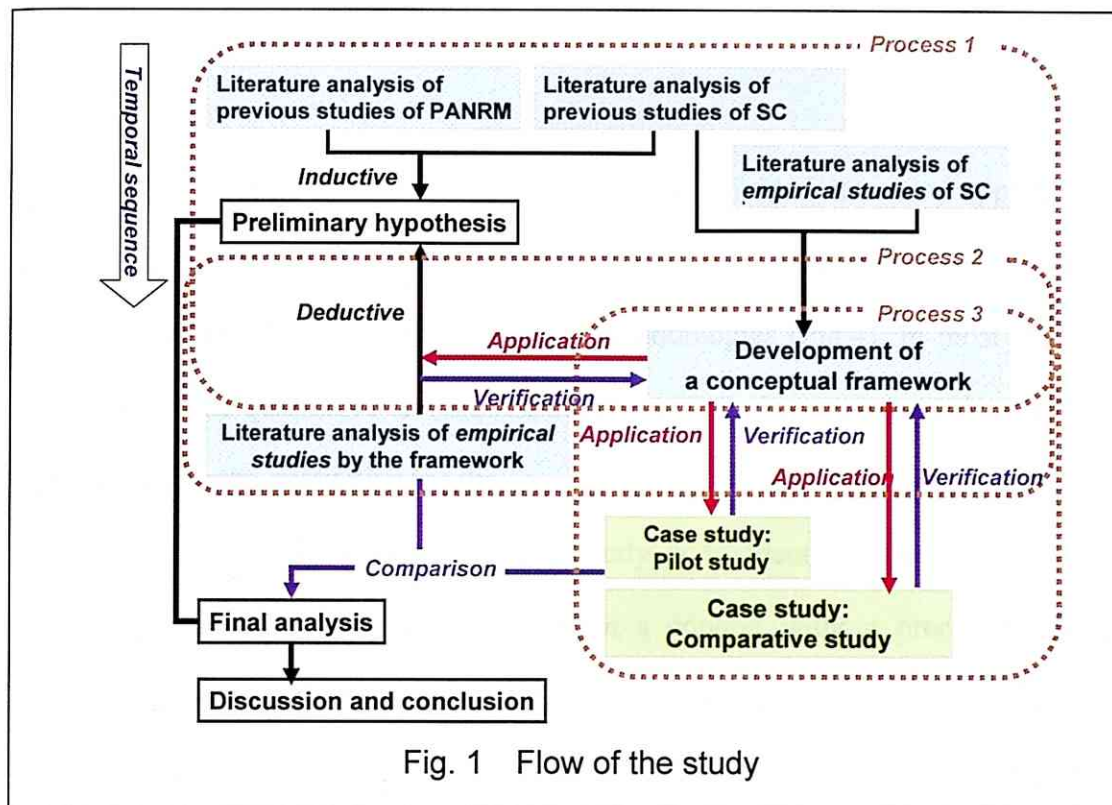
For the first objective i), reviews and analysis of literature from previous theoretical studies of SC as well as previous empirical studies of SC were conducted, which also construct a preliminary hypothesis inductively. Secondly, for the objective ii), literature analysis of previous empirical studies of SC and PAFM was conducted in order to verify the conceptual framework and to examine the preliminary hypothesis. Finally, for the objective iii), case studies of PAFM including a pilot study and a comparative study were implemented in the suburb area in Tokyo, Japan.

1.3 Flow of the study: structure of the thesis

The whole process of the study is shown as flow in Figure 1. There are three processes according to three objectives explained above. After developing a conceptual framework by literature analysis, application and verification of the framework were repeated in different approaches. Thus, the framework becomes more and more generalized and steady. Two major results obtained in the study are: a conceptual

framework of SC from the process 1, and an outlook of relations between SC and PAFM from the process 2 and 3.

The thesis consists of two parts (Fig.2): i.e., the theoretical part for developing a conceptual framework and the empirical part for analysing case studies. Here in chapter I, background, objectives and methods of the study are presented as introduction. In the following chapter II, institutional transition and the significance of PA approaches in NRM are discussed with referring previous studies. Next, the chapter III explains a depth analysis of previous literature of SC studies and develop a conceptual framework. In the chapter IV, results of analysis of previous empirical studies (i.e., case studies) of SC and PAFM with the developed framework are explained. In the empirical part, the chapter V and VI shows detailed methods and results from case studies applied the framework, and subsequently in the final chapter VII, conclusion and recommendation is demonstrated.



1.4 Methods of the study

The methods applied in the study are principally divided into two approaches: i) literature review and analysis for developing a conceptual framework (Fig.3), and ii) a case study approach with interdisciplinary methodologies (Fig.4). In most part of the study rely on the qualitative techniques, but the quantitative ones were also applied for complementing the qualitative results.

A major strength of the qualitative study is to identify actual conditions and underlying challenges of research targets in a context without precedent biases if compared to the quantitative methods that are often conducted by ready-made surveys with a researcher's intention. Hence, even for a quantitative survey, questionnaires are expected to be structured from the preliminary results of qualitative researches. In the current study, all the questions for quantitative research were derived from the preliminary qualitative researches. Furthermore, qualitative study is effective if a research target is lacking of an established theory since qualitative researches are proceeded by identifying and verifying hypothesis repeatedly. Therefore, qualitative methods are suitable for the current study which is needed to be investigated with such a developing concept as SC.

However, the qualitative study also has a weakness that there are not decisive methods for analysis. One of the most developed methods for qualitative analysis is the Grounded Theory (GT) (Glaser & Strauss 1967; Glaser 1992) which seeks to construct a theory from qualitative results. In short, GT develops a theory from repeated categorization of collected data from interviews or observation. Although GT seems to be useful for collecting and organizing data, not a few scholars raise questions critically (e.g., Allan 2003): i.e., if a theory developed by GT is really a theory and if a

cause-effect analysis derived from GT is reliable. Considering these critics reasonable, the current study apply GT mainly for organizing and categorizing data in order to extract keywords and hypothesis for the researches, but does not apply for developing theory neither for cause-effect analysis. Instead, the study seeks to summarize the existing theory from previous literature, and subsequently the theory is tested by the case study.

The case study is used neither as an example that can be generalized to all similar situations, nor as a case that refutes or confirms a general hypothesis. Rather, the case study is used to improve good theories (Burawoy 1991: cited by Danks 2000) *by discovering how a case departs from expectations of existing theory and then using that contextualized case to “reconstruct” theory – making theory stronger and more generalisable.* Danks 2000: P329). Following these perspectives, the current study conducted a few case studies to *improve* and *reconstruct* SC theory in PAFM context.

Additionally, network analysis was applied in the final stage of the case study in order to complement qualitative results, which is expected to contribute to more objective interpretation. The materials and methods are summarized in Table 1 with explaining what each methods is applied for. More detailed explanation how the research was proceeded with those methods will be explained in the empirical chapters V and VI.

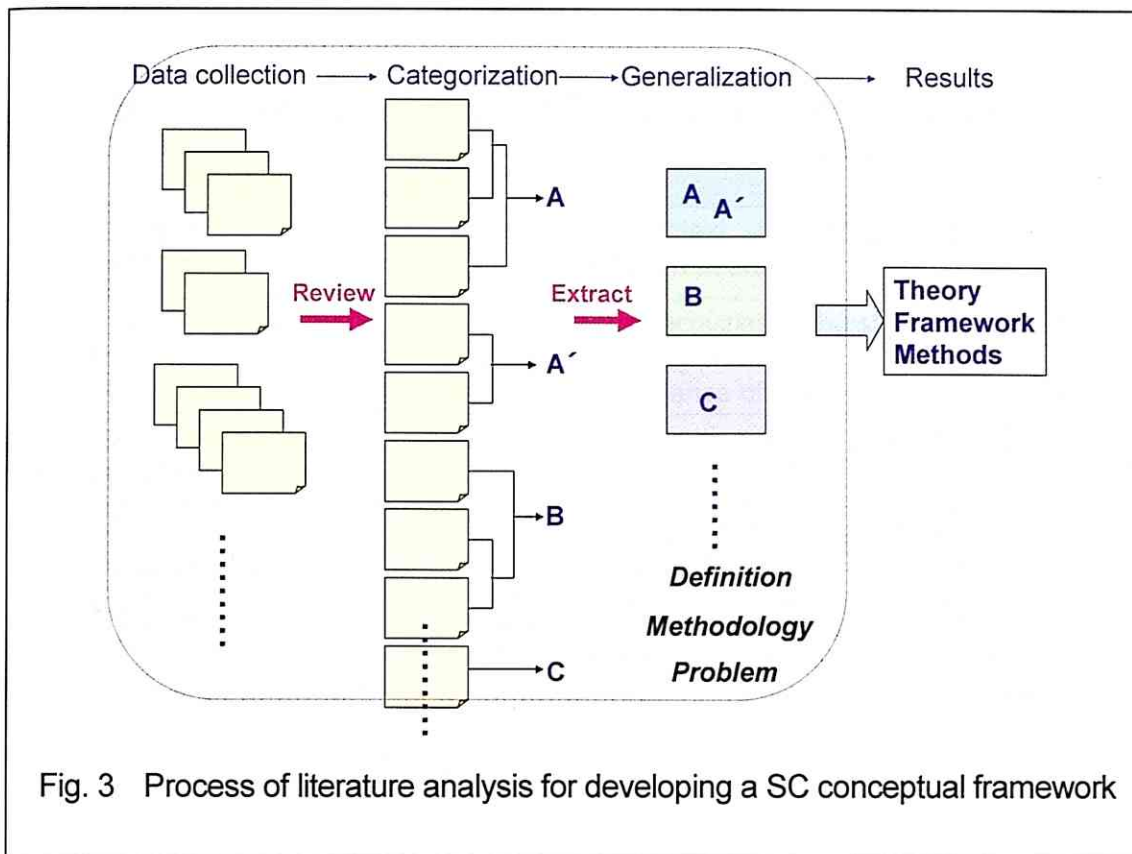


Fig. 3 Process of literature analysis for developing a SC conceptual framework

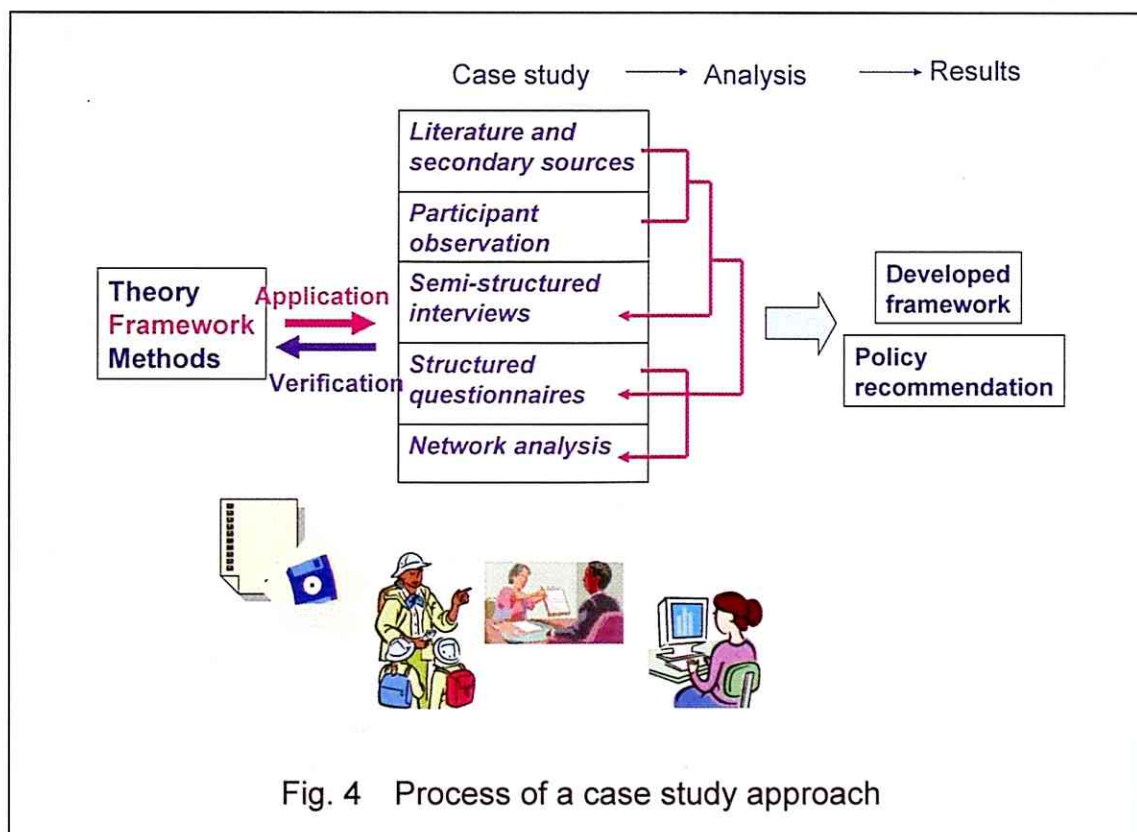


Fig. 4 Process of a case study approach

Table 1 Materials and methods according to research objectives

Materials and methods	Objectives
Literature and secondary sources	Identifying the context, stakeholders and institutions of the research targets
Participant observation	Clarifying actual activities in the study site: interactions among participants, institutional settings and existence of SC
Semi-structured interviews	Pre-research for setting proxy indicators of SC and contents of questionnaires
Structured questionnaires	Qualitative and quantitative measurement of SC and its relations between other factors
Network analysis	Supporting the qualitative results of structural SC by visualizing and quantifying the network

II. Participatory approaches in natural resource management

2.1 Institutional transition of natural resource management (NRM)

Participatory natural resource management (PANRM) initially gained attention during the early seventies when the results of large-scale, capital-intensive, and centrally planned conservation and development projects discouraged further expectation on those former approaches for natural conservation (Horowitz & Painter 1986, Kellert *et al.* 2000). In this section, the institutional transition of NRM is overlooked briefly, in order to get acquaintance of the background of “*participatory*” approaches.

Figure 5 shows the summary of institutional transition of NRM and its arguments. Each period had its own challenges that are recognized afterward, which became the trigger for a new institutional approach.

From the late fifties to the seventies, many scholars and politician, particularly economists worked on what became known as the common property problem and concluded that the primary cause of the destruction and inefficient use of natural resources was the absence of property right. Thus, private-property regimes to put resources in private hands or to simulate private-property right gained relevance as a solution (Gordon 1954; Scott 1955; Cheung 1970; Johnson 1972; Posner 1977). However, it is revealed that not all NRM can be realized under private-property regimes since substantial natural resources cannot be privatized; as a result, many natural resources out of private property continue to degrade. Moreover, private-property regimes often generate market failure, which also results in overuse of natural resources.

Hardin (1968) raised an influential argument on these problems: i.e., he analyses the problem over-use of natural resources as ‘The Tragedy of the Commons’, and

asserts the importance of governmental management to tackle these challenges. Hardin's perspective affects on a considerable number of governments and environmentalists, which leads enacting natural conservation laws especially in USA⁵. Yet, the government-lead conservation leads other problems such as: the governmental institutional failure, bureaucrat failure, ignorance of local needs and disvalue of local knowledge. The governmental institutional failure means that the institution operated by the government itself is not appropriate and it often leads massive degradation of natural resources: e.g., in national forests, fishery and in land use (see more details in Baland & Platteau 1996). In addition, the bureaucrat failure tends to happen mostly in developing countries, where the behaviours of politicians and government officials that opt to serve their own interests results in inappropriate use of natural resources (Cook & Levi 1990; Moberg 1994; Acheson 2006). Furthermore, ignorance of local needs and disvalue of local knowledge in top-down schemes that based only on expertise of science and engineering frequently cause natural degradation and unsustainable use of natural resources in local area. This also leads critical situation of local people's livelihood.

Accordingly, past failures of highly centralized government bureaucracies to incorporate the concerns of local communities in NRM are being increasingly recognized, and the perception that local people can collectively manage these resources in a sustainable manner is growing (Berkes 1989; Ostrom 1990; 1992; Pinkerton & Weinstein 1995; Baland & Platteau 1996). This trend occurred from the eighties attributed to state management and market-oriented policies have made community attractive to many policy makers as an alternative actor to govern forests, pastures, water and fisheries (Agrawal 2003). Consequently, many governments all over the

⁵ Number of important conservation laws that were enacted in this period include: the Clean Air Act, the Clean Water Act, the Environmental Protection, and the Endangered Species Act (Acheson 2006).

world start decentralizing environmental management and promoting community-based conservation (Li 1996; Conroy *et al.* 2002; Matta & Alavalapati 2006), which generally termed as *community-based* natural resource management or *local level* management. However, substantial researches revealed that too decentralized schemes caused problems as well; e.g., communities fail to make appropriate rules to manage natural resources or rules settled finally end in failure after they are established (Gibson & Becker 2000; Acheson 2006); the lack of human or financial resources in local communities; and effect of international markets from globalization (Rose 2002). Even though communities succeed to make an appropriate rule for sustainable use of natural resources, such external factors often break the operation of the rule. Thus, only local people or local communities are not enough actors for achieving sustainable NRM.

According to these challenges of *community-based* schemes for governing the commons, a new paradigm, which advanced decentralized approaches to more collaborative ones, emerged in the beginning of nineties. The new schemes defined as *collaborative management* or *co-management* stresses the importance of the deliberative and inclusive process that includes all stakeholders in different position for natural resource uses. Scholars have also noted the increase in public participation in decision-making of NRM (e.g., Wondolleck *et al.* 1996; Harshaw & Tidndall 2005). Hence, *community-based* approaches that just allow community involvement in NRM advanced to *participatory* management that requires participation of different stakeholders in NRM.

On the other hand, also in the beginning of nineties, the perspective that ecological system and social system are inextricably linked each other gained relevance in the academic sphere, which was termed as *social-ecological system* (Berkes & Folke 1998; Olsson *et al.* 2004; Folke *et al.* 2007). The *social-ecological system* regards that

ecosystem with social dimensions is an integrated system which suddenly changes in unpredictable way. It is termed as an *adaptive complex system* and many scholars stress that *community-based* approaches with participation of various stakeholders is prerequisite to manage resources *adaptively* to the change. In order to *adapt* to uncertainties of *social ecological system*, the user and the manager of natural resources need to learn the change continuously and collaboratively, of which the process is called *self-organized*. Thus, the management by local community based on collaboration with stakeholders to *adapt* to the change of *social-ecological system* is defined as *adaptive co-management*, which stresses the importance of sharing of decision making and knowledge with all stakeholders: e.g., resource users, governments, academics, and NGOs.

Hence, there are mainly two streams from commons theory as well as from social-ecological theory that *participatory* (PA) approaches including *collaborative management* and *co-management*, or *adaptive co-management* become increasingly acknowledged today in NRM. However, the collaborations among different stakeholders are often found difficult since individuals may have divergent opinions and perceptions; moreover, each has different self-interests. Furthermore, institutions for NRM today are various and fragmented (see Rydin and Falleth 2006 for more details), which leads misunderstanding and disagreement among stakeholders. Substantial scholars stress the role of *social capital* in such contexts where something promotes collective actions beyond self-interests and information sharing is critically needed.

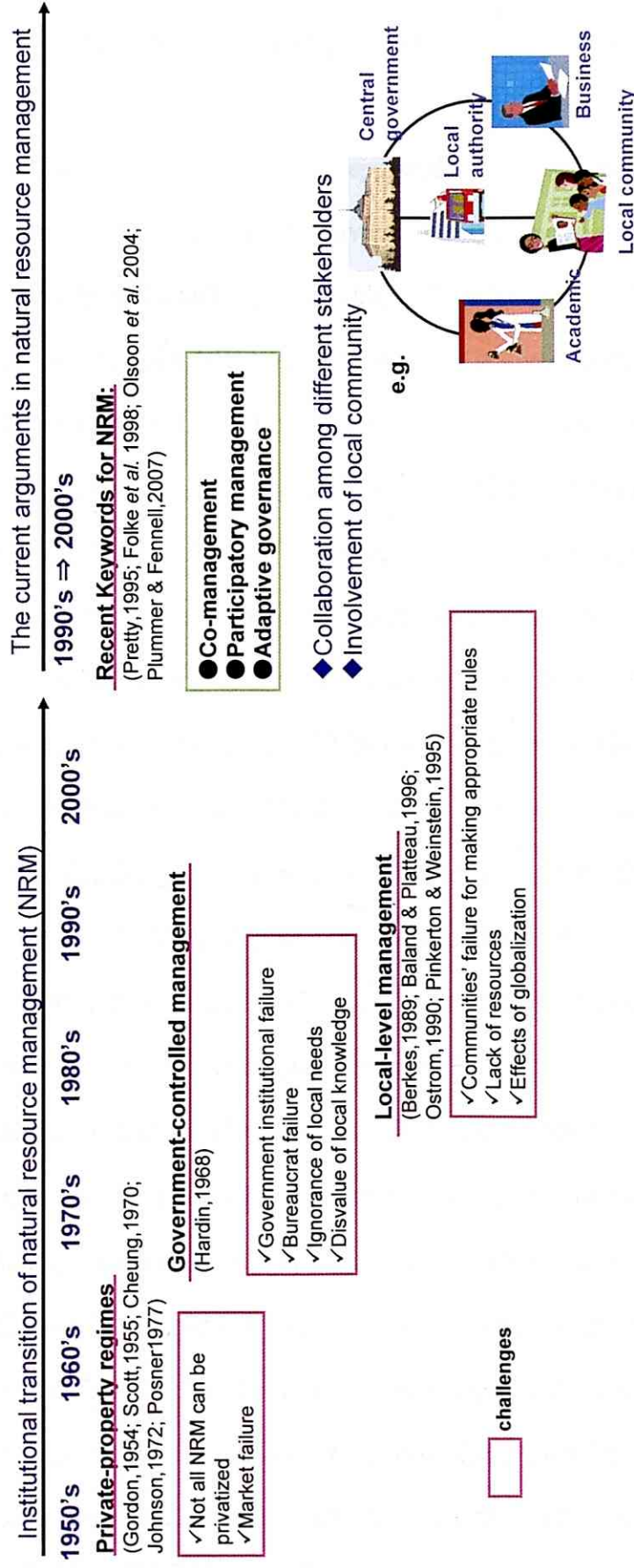


Fig. 5 Institutional transition of natural resource management: its arguments and challenges

2.2 The relation between social capital and PA approaches in NRM

As explained in the former section, PA approaches now becomes a major alternative for NRM. No single actor, public or private, has the knowledge, the instruments, the resource capacity or the authority to tackle various failures in NRM; thus, collaboration is essential for successful NRM. A lot of attention is given to multilevel governance and cross-scale interactions in relation to collaborative management of natural resources. (e.g., Costanza *et al.* 2001; Young 2002; Berkes 2002; Gibson *et al.* 2001; Svedin *et al.* 2001; Dolsak & Ostrom 2003). The public role is, in this perspective, not to direct and control in a traditional sense, like traditional government, but rather to coordinate and create partnerships to achieve a common purpose. In this context, many scholars point out the effects of *social capital* (SC) in PANRM (Ostrom, 1990; 1999; Ostrom *et al.* 1992; Evans 1999; Parghal 1999; Danks 2000; Haight *et al.* 2000; Pretty, 2001; 2004; Barthel 2004; Fabricius, 2004; Inoue, 2004; Folke *et al.* 2005; Toko *et al.* 2005; Glover 2005; Rydin *et al.* 2006; Saglie, 2006; Olsson, 2007). SC is generally regarded as networks, norms, trust and reciprocity that facilitate collective action, although there are various definitions depending on each research⁶.

According to Ostrom (2000), extensive fieldwork has established that individuals all parts of the world voluntarily organize themselves so as to create and enforce rules in the community that protect natural resources and the collective action is largely based on mutual *trust*. In this context, mutual *trust* generates norms as well as sanctions such as mutual monitoring. On the other hand, entirely independent, local NRM by a community can sometimes cause conflict with others; therefore, an interactive *network* of decentralized organizations is necessary for larger-scale sustainability (Folke *et al.*

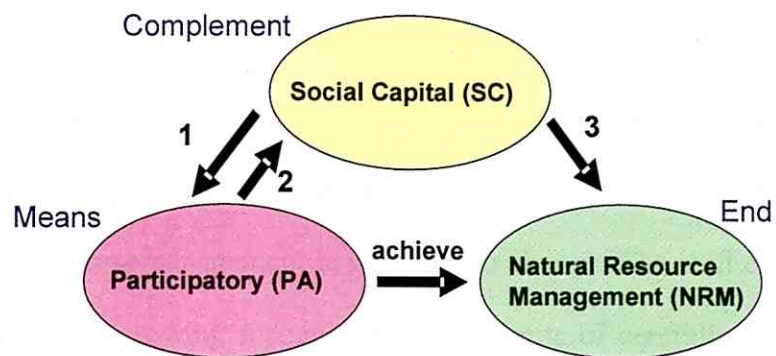
⁶ See footnote 4, and see more details of various definition of SC in the chapter III.

1998). In addition, *reciprocity* is important element in *network* relations, not competition as in the market or hierarchy as in government (Rhodes 1998). Also some *trust* structure in which communities or local governments over a common region participate is necessary for sustainable NRM (Levin 1999). Moreover, public participation builds *trust*, and *trust* and shared understanding are built up through repeated interactions of stakeholders and enable social learning (Lebel *et al.* 2006). Those findings are all related to the roles of SC in PANRM. Other authors have also regarded SC as the glue for collaboration and well-adaptive governance (Pretty & Ward 2001; Adger 2003; Olsson *et al.* 2004). Folke *et al.* (2005) mentions that social systems are structured not only by rules, positions, and resources but also by meaning and by the entire *network* of communicating individuals and organizations at different levels of interaction, representing the social system involved in governance of ecosystem; they also stress that good *social links* and *trust* with fellow stakeholders may mobilize several interest groups at several levels and start a self-organizing process of learning and SC generation for management of complex adaptive ecosystems. In addition, Schneider *et al.* (2003) state that formal lines of authority are blurred in these self-organized network-based management systems in which diverse policy actors are knitted together to focus on common problems. Thus, the loosely connected *horizontal and vertical networks* based on voluntary participation with *trust* mobilize NRM by different stakeholders (Hahn *et al.* 2006). The emergence of *informal networks*, orchestrated by key individuals helps to facilitate information flows (Folke *et al.* 2005) and the role of such shadow networks as incubators of new approaches for collaboration has been emphasized (Gunderson *et al.* 1999). Moreover, those networks can work effectively to tie up the fragmented institutions at many different levels, tiers and scales in modern NRM policies (Rydin & Falleth 2006). An important factor in this context is

organizations that emerge to bridge local actors and communities with other scales of organizations. Such bridging organizations provide opportunities by bringing in resources, knowledge, and other incentives for ecosystem management with their *networks* (Westley 1995; Cash & Moser 2000; Folke *et al.* 2003), which sustains PA approaches. Thus, *networks* and *trust*, generally defined as SC, seems prerequisite for PANRM. In fact, investments in *social network* contribute to *trust* building among actors and groups across scales (Westley 1995; Folke *et al.* 2005), which seems essential for PANRM policies.

Summarizing substantial remarks from previous studies explained above, if PA approach is regarded as a ‘means’ to achieve NRM as an ‘end’, SC can be considered as a ‘complement’, which is shown in Figure 6. This is a preliminary hypothesis in this study: i.e., SC has positive effects on PA with promoting vertical and horizontal collaboration as well as tying fragmented institutions; on the other hand, PA approach can generate and preserve networks and trust that are accumulated as SC; thus, SC and PA has a relation of positive feedback loop. In addition, SC can affect positively on NRM as well with generating norms and mutual monitoring that restrict ‘free-ride’ actions.

Hence, this study stresses that SC is not a means or a direct solution for NRM but that it definitely work on PA approaches and affects on NRM complementarily in various contexts. The preliminary hypothesis is verified in the context of participatory forest management (PAFM) in the following section, which is a targeted policy in this study as one of PANRM schemes. In the next section, PAFM is briefly explained with a view of SC.



1. SC has positive effects on PA as it promotes vertical and horizontal collaboration and ties fragmented institutions
2. PA has positive effects on SC as it generates and preserves networks and trust by collaborative works
3. SC has positive effects on NRM as it generates norms and mutual monitoring to avoid 'free-ride'

Fig. 6 Preliminary hypothesis: the relation between SC, PA and NRM

2.3 Participatory forest management (PAFM)

Forest management has been mostly an activity of the national government and its various agencies, established through constitutions and regulations that reject local claims to forest users (Means *et al.* 2002; Toko 2005). However, over the past few decades, fundamental perceptions regarding the role, rights and responsibility of local communities in forest management have begun to change. The shift emerged from past failing policies and growing recognition of the limits of centralized decision-making systems, with following the main stream of PANRM since the eighties. There have been several milestones in the world-wide forest management congress (Table 2) that promote participation of local people. Thus, forest management is gradually handed to local community in the same direction of other NRM. Moreover, it seems that local community itself started to realize their potential roles in forestry in recent years. Buchy & Hoverman (2000) point out from their extensive review of public participation of forestry that wider community recognizes that various sections of the society can play complementary roles in forest management, although separate individuals may have divergent opinions about what forestry is. As a result, in the last decade or so, various countries have tried out different models of participatory forestry. Although there is a basic aim to contribute to biodiversity by preventing forest degradation, there are other objectives in participatory forest management (PAFM) as well.

In the context of developing countries, PAFM is related to the daily subsistence for local communities; therefore, the goals of PAFM are mainly how to build the schemes for sustainable use of forest resources for community's livelihood with empowerment and entitlements (see Chambers 1989; Baland & Platteau 1996; Gibson *et al.* 2000; Inoue 2004). Thus, PAFM in developing countries is directly related to and affect on local communities' welfare and sustainability.

Table 2 Events affecting the role and performance of forest management

Year	Event	Key Statement
1978	World Forestry Congress	Forest for people <i>"Forest must be managed for people and by people"</i>
1987	World Commission on Environment and Development (WCED)	Sustainable development <i>"Forest is sustained for not only ourselves but also for the future generation"</i>
1992	United Nations Conference on Environment and Development (UNCED)	Intergovernmental Panel on Forest <i>"Every country have to exchange information about forest condition in order to achieve international association for conserving forest"</i>
2002	World Summit on Sustainable Development (WSSD)	Community Forest Management Caucus <i>"Recognize and support indigenous and community-based forest management systems to ensure their full and effective participation in sustainable forest management"</i>

Source: Toko 2005

On the other hand, there has been also a shift in forestry in developed countries toward the management of multiple values and recognition of the important role of non-timber values in sustainable forest management including ecological, aesthetic, and recreation values (Kimmins, 1991; Carrow, 1994; Robinson *et al.* 2001: cited by Harshaw & Tindall 2005), particularly since the nineties. This trend stems from forest degradation and increase of abandoned forest all over the world because of many external factors such as industrialization, globalization, and alterations of life-style. In order to reconstruct alternative institutions for forest management, the role of community as well as collaboration with different stakeholders becomes increasingly focused. In this context, PAFM is mostly related to seek for a new institution with combining various objectives; e.g., community development, cost-cuttings of the governments, recreational values, environmental education, and revitalization of the abandoned forest.

In either context, the trigger and promoter for collaboration is imperative in PAFM. Buchy & Hoverman (2000) mentioned one of positive aspect of engaging in a PA

management approach as it improves rapport between the community as well as respective government agencies. As different people get involved in a consultation, discussion or negotiation, different parties start to know and understand each other; sometimes even start trusting each other. Moreover, In order to enhance those complementary roles of each stakeholder, most of all the challenges will be to foster the collaborative practice to support the emerging recognition of participatory forestry. In such context, SC roles as complements, as explained in the former section, is expected to be effective in PAFM.

In developing countries, it is often observed that historically existing *reciprocity* in a community promotes collective action and sanctions that works on PAFM effectively (e.g., Gibson *et al.* 2000; Woodcock 2002). Alternatively, in developed countries, *networks* play an important role for connecting stakeholders and promoting communication (e.g., Robson 2004; Glover *et al.* 2005; Rydin & Falleth 2006). Those perceptions indicate that SC plays an important role in PAFM as well as in PANRM. Gough *et al.* (2007) stresses the importance of SC as one of indicators for sustainable forest management. In fact, Forest Ecosystem Management Assessment Team (FEMAT) in the United States include SC as an indicator of forest ecosystem assessment, with defining SC as “*the ability and willingness of resident to work together for community goals*” (Donoghue & Sturtevant 2007). Given that forest management takes time over decades, the accumulation of SC for long time is supposed to be effective or even necessary to achieve sustainable PAFM. Thus, it is significant to introduce SC concept into PAFM context: not only for the policy itself but also for evaluating PAFM approaches.

Now in the following chapter, theoretical background of SC is deeply examined in order to develop a conceptual framework to apply SC concept appropriately.

III. Social capital Theory

The concept of social capital (SC) became so popular since the nineties that we can find this word in different academic spheres as well as in political claims. The SC boom reflects a heightened awareness in policy and academic circles of real people's values (Bowles & Gintis 2002). However, the concept has a danger of vagueness just as another fashionable word 'sustainability' because too broad application of this concept leads the confusion of its definition recently. As Turner (1994) stresses, all scientific theories are essentially comprised of concepts, variables and relational propositions; and concepts are constructed from definitions. If a definition is wrongly applied, *proxy indicators*⁷ for measuring SC can be incorrect ones. Consequently, the cause-effect analysis of SC becomes logically weak and wrong results even broaden SC interpretation. This is crucial for empirical studies and leads many critics or cautions (see Portes 1998; Lynch *et al.* 2000; Englebert & College 2001; Sobel 2002; Matějů 2002; Durlauf 2002; Quibria 2003; Ponthieux 2004). Since there exist problems of its definition, operationalization and measurement as well as of its ontological status in the recent use of SC, Putnam (2001) and Adam & Rončević (2003) strongly recommend that SC concept has to be applied in a coherent methodological framework. This study therefore seeks to develop a conceptual framework for applying SC by literature analysis.

The data for literature analysis, including both theoretical previous studies and empirical previous studies of SC, was collected from different academic spheres such as

⁷ Proxy indicator is what is measured instead of SC itself because SC forms cannot be measured directly as well as human capital. Grootaert *et al.* (2001) mentions: in case of human capital "educational years" or "career track" is traditionally used as a proxy indicator, of which the validity is already proved by substantial empirical studies; however, the proxy indicators of SC are still developing and there is no consensus yet.

sociology, economics, development studies, public policy, agriculture and environmental studies since SC is interdisciplinary concept. Firstly, collected data that consists of books, scientific papers, reports and internet sources was reviewed to categorized into analogical theories; next, these analogical theories were extracted and grouped for inductive generalization of previous studies (Fig. 3 in page 13). This process was repeated in each objective: i.e., clarifying SC definitions, summarizing methodologies for SC measurement, and identifying the current problems of SC theory. Subsequently, theoretical backgrounds of application of SC concept became concrete and a conceptual framework was developed. In the following section, results of literature analysis are explained.

3.1 Social capital (SC) concept

Over the course of the last decade, the concept of social capital (SC) has become common within academic and non-academic spheres. In large part, the growing interest in SC stems from the fact that this concept is perceived as a theoretical means of analyzing, and developing plausible solutions for, a number of social issues since it sheds light on an overlooked dimension of social relations: the *value* of social interactions and bonds. This chapter seeks to enhance our understanding of SC by identifying the transformation of this concept and current conditions confronting its application through an extensive examination of the literature.

Quantitative transition of SC concept

Before starting the depth reviews of previous studies of SC, the actual condition of its application was examined. In order to identify quantitative transition of SC application in academic spheres, the number of SC related papers from representative scientific journal data bases was calculated by the process: i) searching and collecting papers with key words explained in Table 3, ii) deleting the papers overlapped in different data bases. Figure 7 shows the results of aggregate calculation of SC related papers from scientific journals⁸, of which the details and searching key words are shown in Table 3. As it is identified here, the application of SC concept rapidly increased since the nineties, particularly, since Putnam (1993). Thus, the quantitative results support the general position that Putnam (1993) was the trigger for SC arguments today. Moreover, Social

⁸ The aggregate calculation aims to comprehend a picture of the quantitative transition of SC application, with identifying when the arguments started to boom and how broad the concept is applied. It is significant to grasp such a quantitative transition in order to acquire the background of theoretical development process.

Capital Initiative (SCI)⁹ by the World Bank that provided various experimental studies seems to accelerate further expansion of SC studies. It is astonishing to see how studies that employ 'social capital' concept have rapidly increased since the end of nineties. As a result, the concept is widely applied in different fields. Table 4 briefly shows the top ten fields that include SC related papers searched and collected by *Web of Science* database. The broad application of SC proves how this concept is indispensable in modern age; yet, it also poses a question if the concept can really be applied in such different contexts to explain any social dimensions, or if it is just used in fashion. Hence, the deep qualitative transitions of the definition of SC concept are examined in the following section.

⁹ The Social Capital Initiative arranged by the World Bank started in 1996 and ended in 2001. 24 papers regarding SC in total were published as a result of successive researches by many scholars.

Table 3 Database employed for journal search:
its characteristics and searching key words

Database	Included data	Characteristics	Searching key words
Web of Science	1945~	Database that selectively includes high-quality science journals valued by scholars of natural science, social science, and cultural science	"social capital" (TS: Topics) * * Including <i>social capital</i> in abstract, title, keywords, or references
EBSCO Host	1985~	Integrated database that includes Business Source Elite, EconLit, MEDLINE specialized in economics and business administration	"social capital" (AB: Abstract)* * Including <i>social capital</i> in abstract
JSTOR	1838~	Database that includes 1,046 major journals of social science and cultural science from their first issues	"social capital" (Full text)* * Including <i>social capital</i> in abstract, title, author, title of figures and tables, or text
Science Direct	1826~	The biggest full-text database in the world operated by Elsevier. It includes more than 2,000 electronic journals and books published by Elsevier	"social capital" (Title, Abstract, Keywords)* * Including <i>social capital</i> in title, abstract, keywords
ProQuest Agricola Plus Text	1970~	Integrated database that includes AGRICOLA which has broad documents of agriculture since 1970 and ProQuest Agriculture Journals which has full-text from 200 journals of agriculture since 1988	"social capital" (TS: Topics)* * Including <i>social capital</i> in topics, names of person or company, region or geographic name

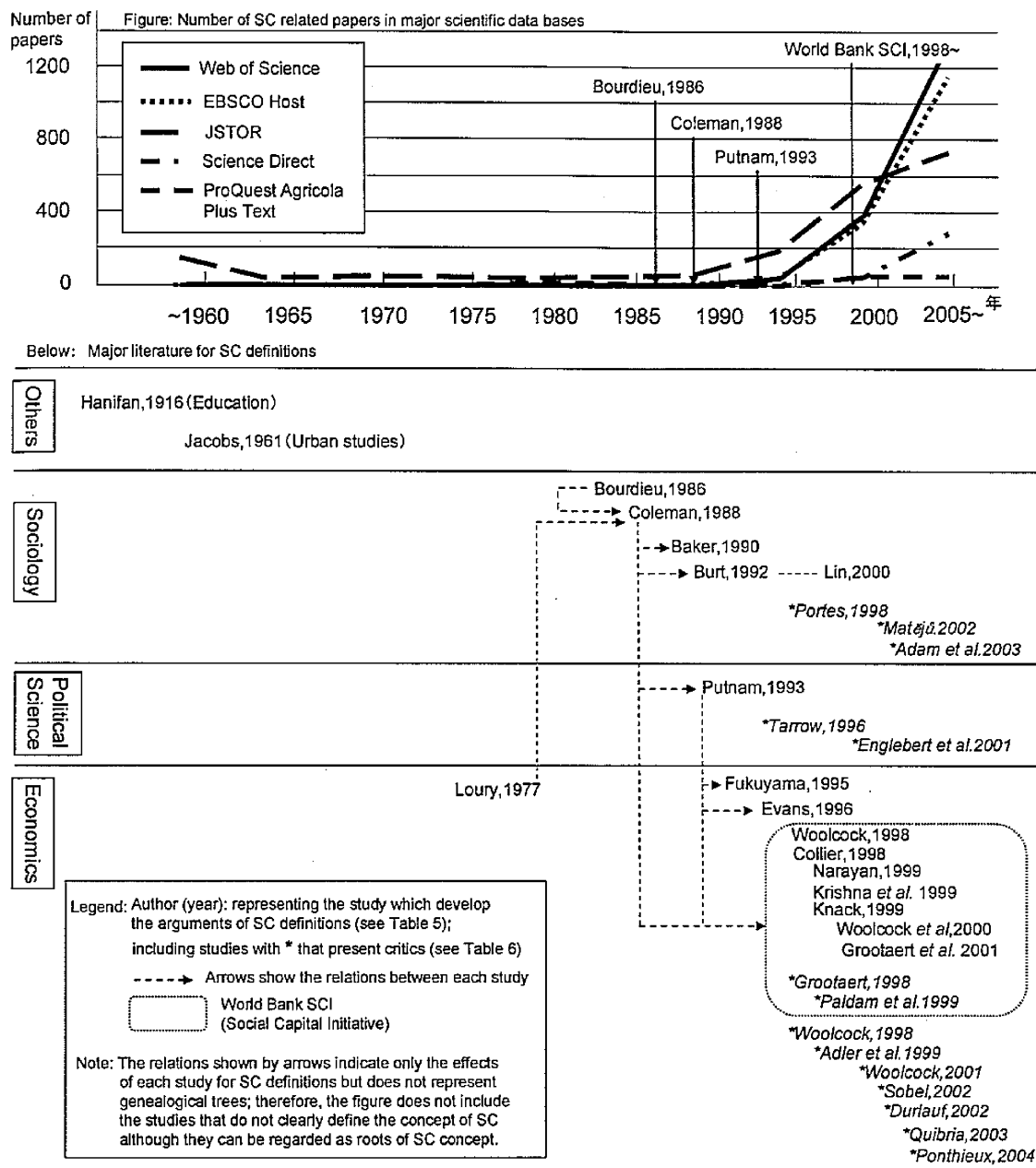


Fig. 7 Quantitative transitions of SC related papers: results of aggregate calculation from scientific journal data bases and studies that developed SC definitions

Table 4 Top 10 fields that include SC related papers:
results from *Web of Science*

	Field	Number
1	Sociology	495
2	Public health and environment	306
3	Economics	279
4	Planning and development	225
5	Politics	204
6	Management	201
7	Business	161
8	Interdisciplinary sociology	161
9	Environmental studies	129
10	Urban studies	129

*The term of fields follows the usage of *Web of Science*

Qualitative transition of SC concept

SC is now generally regarded as networks, norms, trust and reciprocity in the social structure that facilitate mutually beneficial collective action. However, the depth reviews revealed that there are various interpretations of SC depending on each researcher, which results in the vagueness of SC definition.

The transition of SC definition which was identified from literature analysis is summarized in Table 5. It was revealed that there are two main streams in SC definition: one is the studies that perceive SC as an attribute of individuals (Loury 1977; Bourdieu 1986; Coleman 1988; Baker 1990; Burt 1992; Lin 2000); the other regards SC as an attribute of the public (Hanifan 1916; Putnam 1993; Fukuyama 1995; Evans 1996; Woolcock 1998; Collier 1998; Narayan 1999; Krishna & Uphoff 1999; Knack 1999; Woolcock & Narayan 2000; Grootaert & Bastelaer 2001).

Table 5 Representative SC definitions from previous theoretical studies

Author (Year)	Definition of SC (Summary)
Hanifan (1916)	Something that in life which tends to make the tangible substances count for most in the daily lives of a people
Loury (1977)	The consequences of social position in facilitating acquisition of the standard human capital characteristics, which is caused by durable social interactions
Bourdieu (1986)	The aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition
Coleman (1988)	SC is defined by several functions and it support actions of individuals in social structure
Baker (1990)	Capital which is used by individuals for their own interests. It is gained from social structure
Burt (1992)	Networks that are possessed and used by individuals for the opportunities of using financial and human capital
Putnam (1993)	Characteristics of social organization such as network, norms, or social trust that support collaboration and cooperation for mutual benefit
Fukuyama (1995)	Social ability or values and norms shared by a group, which is generated by broad distribution of trust
Evans (1996)	Complementarity to bridge social divide between public and private, or government and citizen
Woolcock (1998)*	Norms and network that promote mutually beneficial collective action, existing intra-community and extra-community
Collier (1998)*	Durable social interaction and its effect led by its function. There are two types: government and civil
Narayan (1999)*	Social relations and norms that promote collaboration to achieve a goal, which exist in social structure. There are two functions: bonding and bridging
Krishna <i>et al.</i> (1999)*	Networks, roles, institutions, or rules that promotes mutually beneficial collective actions (structural SC) and trust, reciprocity, participation, norms, collaboration, information, value or beliefs that lead people to such actions (cognitive SC)
Knack (1999)*	From government (nation) to civil society (household), something that promotes mutually beneficial collective action for that group
Lin (2000)	Capital embedded in social relations that are invested and used by individuals for expected benefits
Woolcock <i>et al.</i> (2000)	Norms and network that promote collaborative action. There are three functions: bonding, bridging, and linking
Grootaert <i>et al.</i> (2001)*	The institutions, the relationships, the attitudes and values that govern interactions among people and contribute to economic and social development

Hanifan (1916) is regarded as the first literature which clearly mentions SC¹⁰. Hanifan, who was a state supervisor of rural schools, asserts that *in the use of the phrase social capital, I do not refer to real estate, or to personal property or to cold cash but rather to that in life which tends to make these tangible substances count for most in the daily lives of a people, namely, good will, fellowship, mutual sympathy and social intercourse among a group of individuals and families who make up a social unit, the rural community, whose logical centre is the school.* (Hanifan 1916: P130). His perspective already includes the major definition of the current SC arguments, which means: SC works positively for the community with promoting mutuality.

After Hanifan, there is no significant reference about SC¹¹, until the economist Loury applied this concept for explaining the income gap from racial divide. Loury points out that *it may be useful to employ a concept of "social capital" to represent the consequences of social position in facilitating acquisition of the standard human capital characteristics. While measurement problems abound, this idea does have the advantage of forcing the analyst to consider the extent to which individual earnings are accounted for by social forces outside an individual's control.* (Loury 1977: P176). His focus on the social position among 'social relations' as an economist indicates the interdisciplinary characteristics of SC.

After Loury's work, Bourdieu discusses the SC concept and explains its sources and effects in social structure. Bourdieu defines SC as: *social capital is the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition*

¹⁰ Grootaert & Bustelaer (2001) point out that the words social capital were once used with a different meaning by Alfred Marshall in 1890. Woolcock (1998) identifies L. Hanifan (1920) and J. Jacobs (1961) as the first proponents of the modern concept of social capital.

¹¹ In the sixties, American journalist Jane Jacobs uses the term social capital to refer to networks of neighbours that generate mutually monitoring and reciprocity; however, she does not clearly define SC.

(Bourdieu 1986: P248). His perspective that distinctions of SC stabilize social stratification is close to Loury's argument. These perspectives that SC is an attribute of individuals which determines individual sociability are mainly developed in sociology later (see Bourdieu 1986; Coleman 1988; Baker 1990; Burt 1992). These SC studies in sociology regards: social networks, social relations, and social structure generate SC and SC is accumulated in those networks and social structure. Their main targets of research are individuals in families, in organizations or in local communities, which is rather micro scale's study.

Coleman developed further the arguments of SC, whose work (Coleman 1988) is the first one which refers to *forms* of SC, such as *obligation, expectation, trustworthiness of structures, information channel, norms, and effective sanctions*. He claims that *social capital is defined by its function. It is not a single entity but a variety of different entities, with two elements in common* (Coleman 1988: P98). He also mentions: *the value of the concept of social capital lies first in the fact that it identifies certain aspects of social structure by their functions, just as the concept "chair" identifies certain physical objects by their function, despite differences in form, appearance, and construction* (Coleman 1988: P101).

Coleman's research which explains SC more concretely and applies the concept into an empirical study was followed by Putnam whose work triggered the growth of SC arguments. He applies the concept into political science with various but coherent methods for a long-term empirical study, which shows the measurement of SC comprehensively for the first time (Putnam 1993). Putnam explains SC that it consists of norms, trust and networks in a group in social structure and SC leads the success of economic development and institutional implementation. The significant difference of SC definition by Putnam is: he explains SC as an attribute of public which works

positively for public goods. This perspective, close to Hanifan's, now became a main stream of SC interpretation, but it contradicts sociological perspective by Loury and Bourdieu; thus, SC is theoretically divided into two perspectives since Putnam. Putnam's attempt to apply SC concept for large-scale, qualitative and quantitative research has a strong impact on academic fields as well as on policy makers. His research, based on the 'regional' site can be regarded as a meso scale study.

After the systematic, larger-scaled research of Putnam, SC concept is also started to apply into macro scale studies which target nations. Fukuyama (1995) defines SC as an aggregate of *trust* and he analyzes the relation between economic efficiency and SC.

At the same period, Evans (1996) discusses an important role of SC to bridge public-private divide, which leads *state-society synergy*. He argues that SC is not only embedded in civil society but also in the relations between public and private: i.e., the relations between national or local government and local community. This theoretical definition seems to explain one of important dimensions of SC characteristics.

Subsequently, the World Bank came to involve in SC researches since the end of the nineties, and substantial studies from the Social Capital Initiative (SCI) were released (marked* in Table 5). The successive publications from SCI developed new interpretations of SC. In the beginning of SCI, norms, trust and network that promote collective actions are defined as SC (Woolcock 1998; Narayan 1999) following Putnam's interpretation. Yet, each scholar adds his own perspectives of SC on former definitions; thus, SC concept was developing rapidly. Collier (1998) includes *social interaction* into SC definitions; he called the generalized SC such as norms, trust and networks in the civic scale as *civil social capital* and coins *government social capital* for SC in the national scale (e.g., governmental institution). In addition, Knack (1999) supports Collier's theory with explaining that it is necessary to measure these two

scaled SC comprehensively for the analysis of collective action in a nation.

Furthermore, Woolcock (1998) differentiates *strong intra-community ties* that exist in a community from more *broaden extra-community ties* that exist outside the community. Woolcock stresses that the former is required to transform into the latter for the economic development. Subsequently, Narayan (1999) developed Woolcock's interpretation with clearly defining SC between individuals in a group as *bonding SC* and more socialized SC between groups beyond a group as *bridging SC*¹². Thus, the theoretical divide of individual and public SC is integrated here into a theory by different definitions of each function. Woolcock & Narayan (2000) additionally define *linking SC* that represents social relations between a group and a formal institution in another social hierarchy. They stress that the difference of the combination of those *bonding*, *bridging* and *linking SC* shape the degree of benefit from SC effects. Importantly, *linking SC* is the same functional SC as what Evans (1996) defines: i.e., SC which exists in the relations between local community and governments to bridge public-private divide.

On the other hand, Krishna & Uphoff (1999) classifies SC forms into two categories: one is the *structural SC* which includes networks, roles and regulations and the other is the *cognitive SC* which includes norms, trust, value, and attitude.

Here, the most generalized definitions are all demonstrated: i.e., SC has two forms such as *structural* and *cognitive* and three functions as *bonding*, *bridging* and *linking*¹³.

Grootaert & Bastelaer sum up the whole arguments into a definition of SC such as:
The social capital of a society includes the institutions, the relationships, the attitudes

¹² For defining bonding and bridging SC, Narayan refers Warren *et al.* (1999) and Gittel & Vidal (1998) where the difference between social relations of intra and extra-community is discussed.

¹³ It deserve referring Krishna & Uphoff (1999) where they define and explain the classification about structural and cognitive forms of SC with various examples as well as Woolcock (2001) and Côté & Healy (2001) that discuss about functions of bonding, bridging and linking SC.

and values that govern interactions among people and contribute to economic and social development (Grootaert & Bastelaer 2001: P4).

Another stream of SC study stemming from sociology does not broaden definitions: e.g., Burt (1992) as well as Lin (2000) follow the SC definition of Bourdieu or Coleman, which regards SC as the individual social relations embedded in social structure.

3.2 Current problems of SC application

As explained in the former section 3.1., SC definitions vary depending on each scholar. Putnam (2001) indicates that there are some marginal differences in terms of exactly how we would define as SC. Adam & Rončević also claim the tendency that most authors about SC *adopt one of the schools of thought and sometimes contribute their own definition to the general framework of this school..... as a result, we now have a substantial stock of definition at our disposal* (Adam & Rončević 2003: P158). Additionally, the significant caution of Portes represents the current condition of SC concept: *Like other sociological concepts that have travelled a similar path, the original meaning of the term and its heuristic value are being put to severe tests by these increasingly diverse applications. As in the case of those earlier concepts, the point is approaching at which social capital comes to be applied to so many events and in so many different contexts as to lose any distinct meaning*" (Portes 1998: P2).

Indeed, as the concept of SC has come to apply in different fields broadly, the definition of this term tends to be 'suitably-modified' in some researches. For example, there exists a study which uses 'the freedom rate of the press for a year' as a proxy indicator of SC for the analysis of the coefficients between life satisfaction and human, social, build and natural capital (Vemuri & Costanza 2006). Their indicator, 'the freedom rate of the press' includes the laws, political factors, economic factors, and degree of actual violations. This seems too broad to use as a proxy indicator of SC¹⁴ since it already includes political and economic factors as well as other social issues that

¹⁴ Although another study of SC (Knack 1999) also applies 'media freedom rate' as an indicator, he does not use this indicator as SC itself but one of factors of SC index, which includes many other complex dimensions related to SC.

can be consequences¹⁵ of SC effect. Another example uses ‘a country’s literacy rate’ as a SC proxy to analyze the cause why countries certify their forest resources (Van Kooten *et al.* 2005). They explain this indicator as a form of SC which shows empowerment in a country. However, ‘literacy rate’ can generally be a proxy indicator of human capital and it seems even better to use term ‘empowerment’ itself instead of restate it as SC in this case.

As explained above, SC concept is now on the critical stage for further application. Therefore, the arguments and critics from previous theoretical studies of SC are summarized and discussed in next part, in order to clarify the current problems of SC concept; subsequently, a framework to tackle these challenges is developed in the next section.

Table 6 show the summary of existing arguments and critics of SC definition. The current problems of SC definition are typified into two categories as i) broaden definition and interpretation, and ii) confusion of sources and consequences of SC.

¹⁵ In this study, the author aims to differentiate ‘sources’, ‘forms’ and ‘consequences’ of SC in order to avoid logical circularity. A source of SC is what generates and develops SC and a form is one of characteristics of SC itself; whereas a consequence is one of results emerged from SC effect. Therefore, a source generates a SC form, which results in a consequence theoretically.

Table 6 Critics and arguments of SC concept in previous theoretical studies

Note	Author (Year)	Critics and arguments of SC concept (Summary)
Broaden definition	Grootaert (1998)	There is little disagreement about the relevance of social capital; however, there is no consensus about which aspects of interaction and organization merit the label of social capital
	Paldam <i>et al.</i> (1999)	Related, though different, concepts have the same name, and also different names, which leads confusion what SC is
	Elglebert <i>et al.</i> (2001)	The definition by World Bank is responsible for amplifying the tautological weakness of this concept with further broadening what the concept captures
	Matějů (2002)	Studies of sociology mostly treat SC as an attribute of an individual whereas that of economics treat SC as an attribute of a society; thus, definition is different and divided
Confusion of sources and consequences	Tarrow (1996)	The difference of institutional performance which Putnam (1993) explains by correlations between SC can be explained by other factors
	Portes (1998)	Inclusion of a consequence into SC definition results in explanation of cause and effect by a same word, which leads the logical circularity
	Woolcock (1998)	Consequences may be one indicator of the types and combinations of social capital that are present, but they are not to be confused with social capital itself
	Adler <i>et al.</i> (1999)	Studies of sociology tend to regard structure of social ties as sources of SC whereas that of economics tend to regard content of social ties as source of SC; yet, taking only one of those into account is not sufficient
	Woolcock (2001)	any definition of social capital focus on its sources rather than consequences, i.e., on what social capital is rather than what it does
	Sobel (2002)	Although Putnam's SC study is based on substantial researches, its explanation often confuse cause and effect, which results in logical weakness
	Durlauf (2002)	There are various definitions mixing functional and causal conceptions of SC. It is necessary to differentiate them particularly for applying in empirical studies.
	Adam <i>et al.</i> (2003)	In order to avoid tautological explanation which is a major weakness of SC concept, the differentiation of sources, effects and SC itself is necessary
	Quibria (2003)	Most of SC definition have logical circularity as well as exaggerate benefits of SC
	Ponthieux (2004)	SC can only be observed by its consequences when the actors use it, and then its consequences are its proof, which ends in a risk of circularity

Broaden definition and interpretation

Grootaert mentions that *at the broad level of conceptualization there is little disagreement about the relevance of social capital. There is, however, no consensus about which aspects of interaction and organization merit the label of social capital* (Grootaert 1998: P1). Paldam & Svendsen also states about SC concept that *related, though different, concepts have the same name, and also different names*. (Paldam & Svendsen 1999: P4) In addition, Matějů claims about two streams of different definitions, i.e., SC as an attribute of individual and SC as an attribute of public, that: *Woolcock's view of social capital offers a plausible theoretical solution*¹⁶. However, the *problem of different approaches to the measurement remains* (Matějů 2002: P4).

Furthermore, Englebert & College (2001) stress that the current situation that SC definition becomes too broad since the end of nineties stems from the influence of the World Bank which led SC studies systematically. They claim that the World Bank's definition such as *SC is institutions, relationships, attitudes, and values that govern interactions among people and contribute to economic and social development* (World Bank 1999: P122) is responsible for amplifying the tautological weakness of this concept. According to Englebert & College, the World Bank's broad definition has critical problems as: *i) its equation of social capital with institutions, which makes all but impossible any analysis of the effects of the former on the latter, and ii) its belief that social capital only includes those institutions, relations, attitudes and values that effectively contribute to economic development, guaranteeing thereby the effects from the cause* (Englebert & College 2001: P5)

This perspective indicates another problem of SC concept which is pointed out by

¹⁶ Matějů (2002) mentions here about Woolcock (1998)'s definition of bonding and bridging SC, which theoretically combined the two different interpretation of SC (i.e., an attribute of individuals or of the public).

several scholars. It is discussed in the next section.

Confusion of sources and consequences of SC

Substantial scholars indicate that the definition of SC concept often includes *consequences* from SC effects; they stress that including *consequences* of SC in the definition weaken the theoretical background for cause-effect analysis because of the circularity of the argument. Tarrow (1996), Portes (1998), Sobel (2002), Quibria (2003) point out that the confusion of *consequences* with SC itself is already seen in Coleman (1998) and Putnam (1993) that are the pioneering studies of current SC arguments: e.g., Putnam defines SC as network, norms and social trust that promote and support the collaboration for mutual benefit; however, ‘the collaboration for mutual benefit’ can be a *consequence* from SC effect depending on a context; thus, this definition already includes the *consequences* before it is analysed, which results in the weakness of cause-effect analysis. Portes stresses that inclusion of a *consequence* from SC effect into its definition can only lead the tautology, which results in the logical circularity: i.e., *cities where everyone cooperates in maintaining good government are well governed* (Portes 1998: P20). In order to avoid such tautological arguments, he recommended that the researcher should be careful for *separating the definition of the concept, theoretically and empirically, from its alleged effects* (Portes 1998: P21)

Additionally, Woolcock claims that *consequences may be one indicator of the types and combinations of social capital that are present, but they are not to be confused with social capital itself* (Woolcock 1998: P185) and that *any definition of social capital focus on its sources rather than consequences, i.e., on what social capital is rather than what it does* (Woolcock 2001: P13). Adam & Rončević (2003) show the same opinion stressing that the differentiation of sources, forms and consequences of SC is necessary

in order to avoid the tautological explanation which is the weakness of SC concept. Englebert & College also mention that *adding the capacity of collective action to the definition further broadens the concept and adds its expected benefits to its very definition, in such a manner that any society that can successfully confront issues of collective action becomes ipso facto endowed with social capital, which considerably reduces the analytical strength of the theory and its claim of a causality between social capital and collective action* (Englebert & College 2001:P4).

Figure 8 shows the variation of the argument scales of targeted SC in previous studies. As it is pointed out by substantial scholars, sociological studies mostly develop SC theory as individual attributes (Upper column in Fig.8) whereas economical and political studies perceive SC as public attributes (Lower column in Fig.8). The former does not broaden the definition but develop the social network theory which analyse SC by individual network and social relations. However, in the latter, definition became too broad as explained the former part: e.g., one includes roles, rules, values and beliefs (Krishna & Uphoff 1999 in Table 5) and another includes national institutions (Grootaert & Bastelaer 2001 in Table 5). These too broad interpretations as if SC include almost everything should be reviewed and revised. It is revealed from the literature analysis that defining various concepts or institutions in the social structure as SC only results in no significant conclusion. SC concept is multi-dimensional, it is therefore useful to apply it broadly in various contexts; however, this advantage can be also the weakness that the concept tends to be interpreted subjectively by a researcher. In order to avoid the danger of suitably-modified interpretations, it is necessary for a coherent SC definition to examine: i) in what kind of context the argument of SC proceeds, ii) in what scale the targeted SC is, and iii) which aspects the definition of SC includes in that context, when we apply SC concept for analysing social phenomena.

In addition, considering key assertions from previous studies that stresses the differentiation of consequences from SC itself, the functional process of SC is reviewed with the basic idea of *capital* which consists of stock and flow¹⁷. As shown in Figure 9, SC function can be regarded to include multi-strata causal association (showing as arrows ①,②,③). If the objective of a research is “to investigate in what process and how SC was generated”, the analysis of arrow ① is needed; whereas if “to investigate what effects or what kind of consequences the accumulated SC creates”, the analysis of arrow ② is needed; and “to clarify how SC affect on society”, the analysis of arrow ③ is required. Thus, it is also important in empirical studies of SC to identify which causal relation is targetted.

In the next section, a conceptual framework for applying SC concept is developed with respecting these cautions.

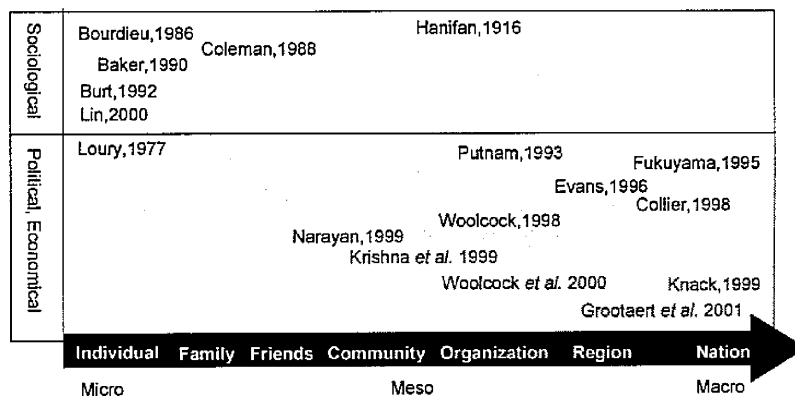


Fig. 8 Scales of targets of SC arguments in previous studies

¹⁷ SC accumulated in social structure as *stock* creates *flow* of benefit, which will be input into SC *stock* again: i.e., trust, norms and networks create collective action; but again, collective action creates trust, norms and networks. SC theory has this circularity, which often makes difficult to avoid logical circularity.

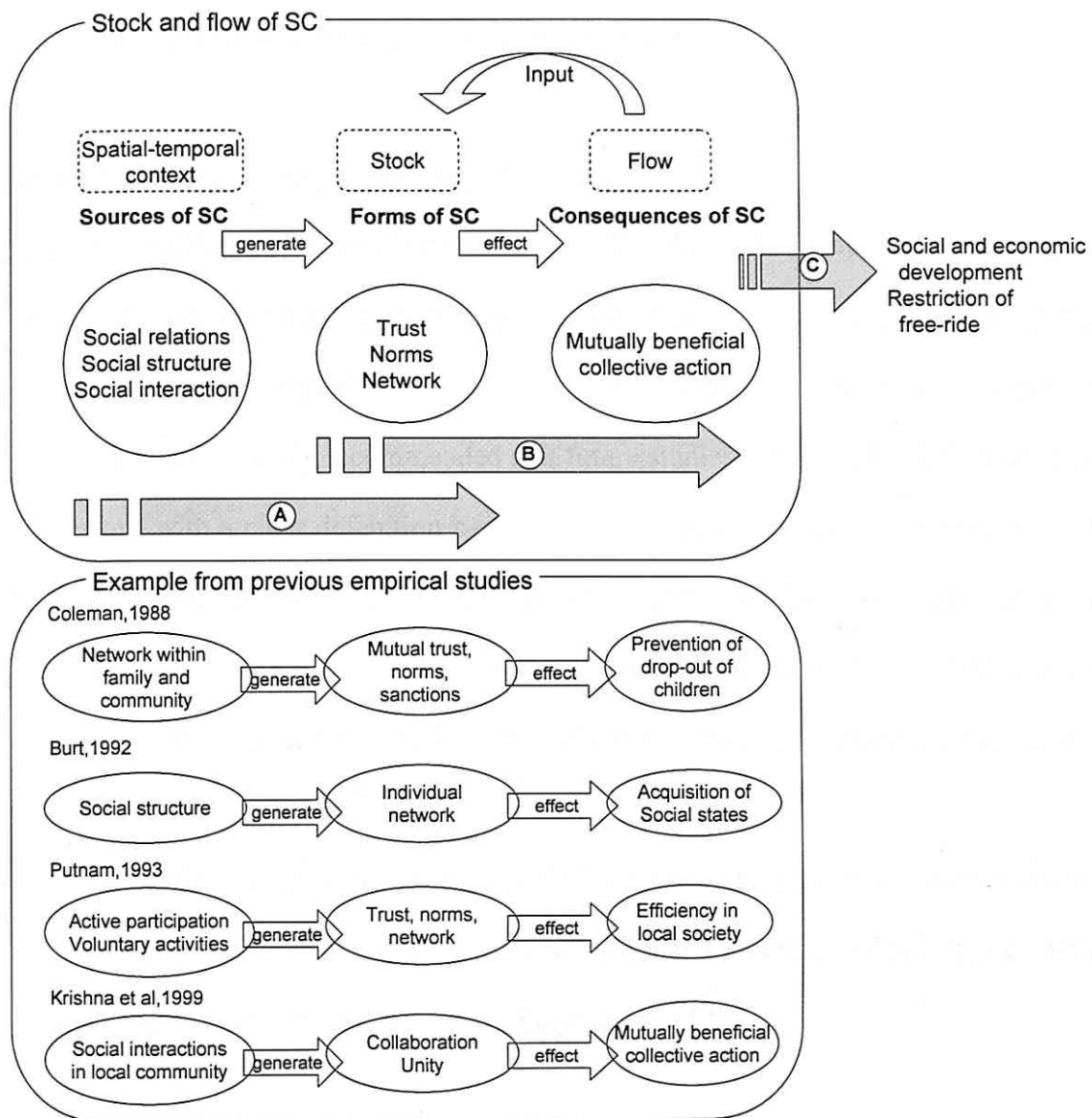


Fig. 9 Stock and flow of SC

3.3 Development of a conceptual framework of SC

3.3.1 Theoretical background of a framework

While the multi-dimensional characteristics of SC allow it to be applied in an array of social analyses, its resultant ambiguity is problematic because researchers apply this concept in a highly subjective manner. Given that the concept of SC is valuable but still developing, it is strongly recommended that future studies i) apply SC within a coherent framework with a clear definition based on each research context, and ii) differentiate between sources and forms of SC and its consequences. At the same time, there is no single definition of SC that can be used universally; therefore, this section seeks to develop a reasonable framework how to apply this concept into actual researches with respect to multi-dimensional aspects.

Considering the current challenges of SC concept discussed in the former section, factors that are suggested to include in a conceptual framework of SC application is discussed in this section with theoretical background of SC.

① Contextual concept

Grootaert & Bastelaer (2001) claim that SC is a contextual concept of which the proxy indicators should differ geographically and historically. It indicates that sources and forms of SC are different depending on each context. Krishna & Uphoff (1999) also mentions that what is SC in one context can be unsocial capital in another. They stress that SC forms privileged by each study are specific to a particular cultural domain and may have little or no value outside that domain. Measurement for SC requires local investigation into context specific questions: therefore it is assumed that SC can only be defined in a context (Franke 2005; Gough *et al.* 2007). Although there exists a general

agreement what SC is, it is therefore important to clarify spatial and temporal context for each SC study so that the clear definition for the context can be identified.

② SC definition

As shown in the former section 3.3, not a few studies point out that SC concept has tautological weakness for its definition (see Portes 1998; Woolcock 1998; Englebert & College 2001; Durlauf 2002), which often results in too broad and incoherent interpretation of SC. Woolcock (1998) cautions that SC in the form of trust is created as a by-product of other collective endeavours such as participation of civic association and that these civic activities are also identified as SC. This makes it difficult to distinguish between what SC is from and what SC does. Collier (1998)¹⁸ and Krishna & Shrader (1999)¹⁹ properly explain about SC definition without this confusion applying economic theory 'stock' and 'flow' (see Fig. 9); e.g. a stock of trust or norms yields a flow of benefits such as mutually beneficial collective action or as durable social interaction, which accordingly generates inputs again into the production of stocks such as trust or norms. This is a circulation which continuously creates SC (as capital), and constituent factors of the circulation must be different depending on a context. According to Woolcock (1998), capital represents a stock and valued by a flow but it should not be equated with the latter.

Subsequently, SC definition should not include consequences of SC, but should focus primarily on its sources, because the confusion of SC itself with consequences would weaken the theoretical background for cause-effect analysis.

¹⁸ Collier (1998) tests SC definition with a question whether trust is on the lefthand side or righthand side variable of any equation of economics. He cites examples as: Fukuyama (1995) treats trust as a righthand side variable explaining transactions costs, whereas Putnam (1993) treats it as a lefthand side one explained by social interaction.

¹⁹ Krishna & Shrader (1999) explains that capital represents a stock of assets that yield a flow of benefit, such as income streams. He stresses that it is essential not to confuse these two categories.

③ Social interaction scale

One dimension which matters SC creation is how actors interact with each other in what scale, which this study coins as social interaction scale (SIS). It is also a matter of a framework if a study focuses on individuals or rather on society. As shown in the former section, Woolcock (1998) differentiates the “strong intra-community ties” that deeply exist among individuals in a group, from the “extra-community ties” that extend weakly but broadly out of a group. Gittel & Vidal (1998), Warren *et al.* (1999) and Narayan (1999) advance this theory with defining “bonding SC” and “bridging SC”. Bonding refers the SC possessed by individuals in a group and bridging refers the SC existing between groups, and both are horizontal social interaction. In addition, Woolcock (2001) and Côté & Healy (2001) broaden the definition, with asserting “linking SC” that vertically links a group to a formal institution in higher social hierarchy. Figure 10 illustrates those three types of SC that function in different ways and in different scales. Woolcock (2001) mentions that the different combination of bonding, bridging and linking SC is responsible for the range of consequences of SC. Stone (2001) also stresses the importance of both the horizontal (bonding and bridging) and the vertical (linking) SC.

Thus, there are three different functions of SC according to SIS as shown in Figure 10; however, SIS of bonding, bridging and linking SC changes depending on the context. For example, as shown in Table 7, if a research focuses on SC effect of an individual actor, SIS of bonding can be a family; whereas that of bridging can be a local community(e.g., Coleman 1988). On the other hand, if SC of a local community is focused in a research, the bonding indicates SC in the community and the bridging does between communities in a region (e.g., Sobels *et al.* 2001). Linking SC is also different

depending on the research context for scaling SC.

Therefore, it is prerequisite to clarify what SISs are targeted in a research context. Moreover, each SIS consists of the structure and the content of social ties as shown in Figure 11. Next section will explain about it.

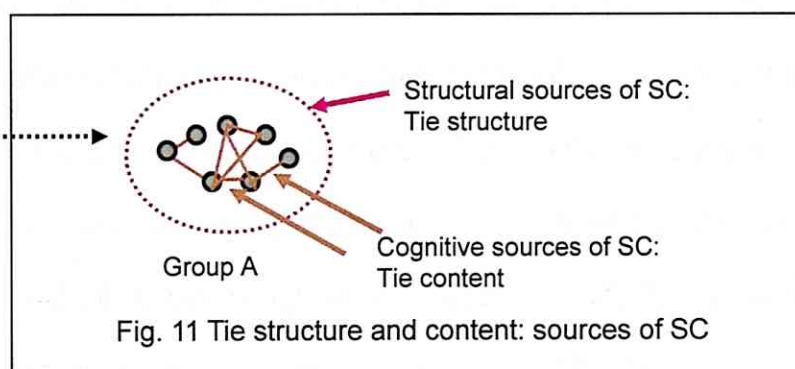
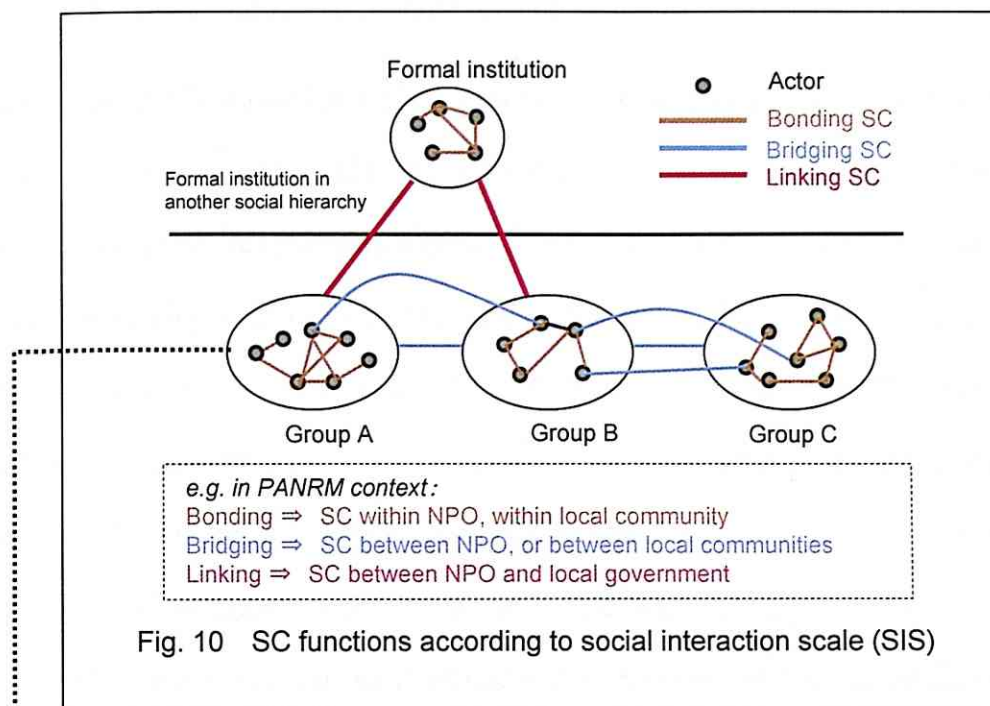


Table 7 Examples of SIS differences in previous studies

Previous Studies \ SIS	Bonding Within a group	Bridging Between groups	Linking Between different social hierarchies
Coleman (1988)	Bonds within a family	Bridge within a local community	—
Putnam (1993)	Bonds within a club, or an association	Bridge within a local community	Linkage to regional government
Narayan (1999)	Bonds within a village	Bridge between ethnic groups	—
Knack (1999)	—	Bridge between citizens	Linkage to central government
Stone (2001)	Bonds within a family friends	Bridge within a local community	Linkage to regional government
Sobels et al. (2001)	Bonds in a local landcare community	Bridge between local landcare communities	Linkage to central government

④ The structure and the content of social ties

Another important dimension which generates SC characteristics is the structure and the content of social ties (Fig. 11). It shows that each individual actor has social ties to interact others and the aggregation of these social ties constitutes social structure, where SC can be developed. However, some of the existence studies consider ‘the structure’ of ties as a source of SC (see Bourdieu 1986; Coleman 1988; Burt 1992; Lin 1999) on the other hand, some regard that ‘the content’ of ties is also a prerequisite source of SC (see Putnam 1993; Fukuyama 1995; Narayan 1999; Woolcock 2001). Adler & Kwon (1999) properly mentions about these two streams in SC studies; i.e. Studies mostly focus on the formal structure of the network of social ties and ones focus rather on shared norms, trust and beliefs that are the content of ties. The former regards that the structure of ties can have significant SC consequences entirely independent on their content, whereas the latter stresses the importance of the content. The tendency to focus only on the tie structure often results in ignoring the effects and value of the content of ties. In fact, Burt (1997) finds that, depending on the content of ties, the tie structure has very different effects on an actor; moreover, Putnam (1993), Portes (1998) and Adler & Kwon (1999) indicate that the content of ties is not merely a contingency of the structure of ties but it can be an influential factor on the structure. Adler & Kwon state that *much of the social capital research can be divided into a branch which focuses on the formal structure of the ties that make up the social network and another branch which focuses on the content of those ties. While both sets of factors appear important, we lack a solid theoretical foundation for their integration* (Adler & Kwon 1999: P6). Those assertions point out that SC emerges not only from the tie structure such as networks, but also from the tie content as norms or trust.

As most scholars agree, both of factors, the structure of ties and the content of ties are important sources of SC. Therefore, a theoretical foundation to integrate these factors are essential for the research of SC. Uphoff (1999) and Krishna & Uphoff (1999) attempt to synthesize those two factors in a framework distinguishing ‘structural SC’ such as captured by network-structure and ‘cognitive SC’ that shape motivations in the form of norms, values, attitudes and beliefs. Adler & Kwon (1999) developed this theory, which explains that ‘structural SC’ emerged from tie structures gives an actor ‘opportunity’ and ‘cognitive SC’ emerged from tie contents shapes ‘motivation’ and ‘ability’ of an actor. These theoretical integrations make it possible to focus on both the structure and the content of social ties in researches of SC, which is helpful to identify SC characteristics. Krishna & Uphoff (1999) also stresses that neither an exclusively networks-based nor an entirely norms-dependent method suffices for measuring SC and that it is important to consider both of factors.

⑤ The form of SC and proxy indicators

As it is explained in the former part, forms of SC are generated by the tie structure and the tie content. Coleman illustrates SC forms with examples as obligation, expectation, trustworthiness, information channels, norms and sanctions; however, these forms vary depending on a context (Coleman 1988). As well as Coleman, Krishna & Uphoff (1999) describes a variety of forms of SC with such examples; rules, social networks, roles, procedures and precedents as ‘structural’ forms and norms, values, attitudes and beliefs as ‘cognitive’ ones.

Generally, a variety of forms of SC are represented by proxy indicators because SC forms cannot be measured directly as well as human capital. As Grootaert & Bastelaer (2001) mentions, in case of human capital “educational years” or “career track” is

traditionally used as a proxy indicator, of which the validity is already proved by substantial empirical studies; however, the proxy indicators of SC are still developing and there is no consensus yet. Hence, setting appropriate proxy indicators of SC forms is crucial for each empirical study since it directly affects the result of cause-effect analysis; therefore, it is necessary to set them objectively according to each research context instead of applying easily inappropriate proxies that are used in other context.

3.3.2 SC verification matrix: capturing SC characteristics

As explained in the former section, SC functions in different ‘SIS’ from individual level to social and consists of ‘the tie structure’ and ‘the tie content’. The matrix developed in Table 8 identifies six categories of SC with integrating these multi-dimensional aspects. The vertical column classifies the structural and the cognitive sources of SC and the horizontal column classifies the SC functions in three different SISs; hence, each category explains characteristics that constitute forms of SC. SBo and CBo exist within a group and SBr and CBr do between groups, whereas SLi and CLi exist between a group and a formal institution in higher social hierarchy. All of these SC characteristics are generated by both structural and cognitive sources. Depending on a research context, what kinds of aspects of SC matter is different. Thus, SC verification matrix helps to clarify which characteristics of SC should be targeted and consequently, setting proxy indicators of each category can be more objectively.

Table 9 shows the examples of proxy indicators in previous empirical studies classified by SC verification matrix (Table 8). As we see in Table 9, SC proxies vary depending on the research context, but more proxy indicators of bonding SC can be found in the previous empirical studies if compared to other categories. It is because many of existent empirical studies of SC focus on a community performance and its

sustainability with respect to individual networks and trust within a community, where bonding SC matters.

What is important is to clarify which category would matter in the research context. It is related to what SIS is targeted and what sources of SC should be focused in the research. However, considering the theoretical background that SC constitutes of the tie structure as well as the tie content (as explained), it seems essential to focus on both structural and cognitive categories in each SIS. Krishna & Uphoff (1999) explains the separate importance of network and norms, with stressing that structural aspects and cognitive ones of SC must be focused on simultaneously but be assessed separately.

3.3.3 A conceptual framework for defining and measuring SC

Considering the theoretical background of SC explained in the former sections, SC is a contextual concept (①) and it should be defined contextually with differentiating the consequences of SC effect (②). Furthermore, SC functions differently according to SISs (③) and constitute of the structure and the content of social ties; the former appears as the structural sources of SC and the latter appears as the cognitive ones (④). These multi-dimensional aspects generate SC forms that are represented by proxy indicators of SC (⑤). Hence, a conceptual framework for measurement of SC is developed as shown in Figure 12. First of all, it is important for SC measurement to clarify; 1) a context of a research target, which is related to its spatial-temporal dimensions, 2) a clear contextual definition of SC, which should be differentiate from consequences of SC but rather focus on its sources, 3) what kinds of SIS matter in the context, 4) both structural and cognitive characteristics generated by the tie structure and the tie content, 5) SC forms represented by proxy indicators. Finally, 6) consequences of SC effect are analysed by quantitative or qualitative method. Integrating the existing conceptual arguments, SC

verification matrix (Table 8) helps to consider both scale and sources of SC; consequently, the matrix make it possible to define what should be measured as SC in a research context in order to set appropriate proxy indicators in the context.

Table 8 SC verification matrix:
classification of SC characteristics according to its sources and SIS

Source \ SIS	SC characteristics		
	Bonding Within a group	Bridging Between groups	Linking Between different social hierarchies
Structural Tie structure giving opportunities to an actor	SBo. (Structural Bonding characteristics) generated by tie structure in a group, which bonds actors in the group	SBr. (Structural Bridging characteristics) generated by tie structure between groups, which bridges actors between groups	SLi. (Structural Linking characteristics) generated by tie structure between a group and a formal institution in higher social hierarchy, which links them
Cognitive Tie content giving motivation and ability to an actor	CBo. (Cognitive Bonding characteristics) shaped by tie content in a group, which bonds actors in the group	CBr. (Cognitive Bridging characteristics) shaped by tie content between groups, which bridges actors between groups	CLi. (Cognitive Linking characteristics) shaped by tie content between a group and a formal institution in higher social hierarchy, which links them

Developed referring to the theory from: Uphoff (1992); Krishna *et al.* (1999); Woolcock (1998,2001); Gittel *et al.* (1998); Warren *et al.* (1999); Narayan (1999); Cote & Healy (2001); Adler *et al.* (2003)

Table 9 Variation of proxy indicators in the previous empirical studies:
classified by SC verification matrix

SC Category	Examples of proxy indicators in the previous studies
SBo. (Structural Bonding SC)	<ul style="list-style-type: none"> • Number of voluntary associations and of sports clubs in local community, frequency of participation in activities in local community (Putnam, 1993) • Number of rural cooperative association (Mollinas, 1998) • Number of members in the community network (Krishna <i>et al.</i> 1999) • Frequency of participation in the meeting of irrigation association, number of collaborative labors in the village (Isham <i>et al.</i> 1999) • Membership in any organization, size of information source, frequency of usage of informal network (Rose, 1999) • Density of network within the catchment area conservation organization (Sobels <i>et al.</i> 2001) • Density of informal friendship in local community, frequency of participation in formal activities (Liu <i>et al.</i> 2003) • Frequency of collaborative labors in local community, existence of informal agreement of financial support (Gibson <i>et al.</i> 2005) • Diversity of individual network (Harshaw <i>et al.</i> 2005) • Number of core members in local environmental activities (Savage <i>et al.</i> 2005)
CBo. (Cognitive Bonding SC)	<ul style="list-style-type: none"> • Degree of trust between neighbors, deepness of informal exchange between neighbors (Isham <i>et al.</i> 1999) • Degree of trust between neighbors, strength of reciprocity between neighbors, strength of motivation for sharing between neighbors (Pargal <i>et al.</i> 1999) • Degree of trust for friends, frequency of participation in church activities (Rose, 1999) • Degree of trust between community members (Liu <i>et al.</i> 2003) • Degree of trust between village farmers (Reid <i>et al.</i> 2000) • Frequency of participation in collaborative garden management (Glover <i>et al.</i> 2005)
SBr. (Structural Bridging SC)	<ul style="list-style-type: none"> • Number of acquaintances among agricultural traders (Fafchamps <i>et al.</i> 1999) • Frequency of usage of market network (Rose, 1999) • Density of network between the catchment area conservation organizations (Sobels <i>et al.</i> 2001)
CBr. (Cognitive Bridging SC)	<ul style="list-style-type: none"> • Number of people who would be helpful among agricultural traders (Fafchamps <i>et al.</i> 1999) • Degree of general trust for others (Rose, 1999)
SLi. (Structural Linking SC)	<ul style="list-style-type: none"> • Relation to local community and regional, central authorities (Putnam, 1993) • Strength of law and of order tradition (Knack <i>et al.</i> 1997) • Frequency of communication with central authorities (Sobels <i>et al.</i> 2001)
CLi. (Cognitive Linking SC)	<ul style="list-style-type: none"> • Impression for regional council and for regional government (Putnam, 1993) • Degree of trust for extension agent of local government (Reid <i>et al.</i> 2000) • Degree of trust for the government (Rose, 1999)

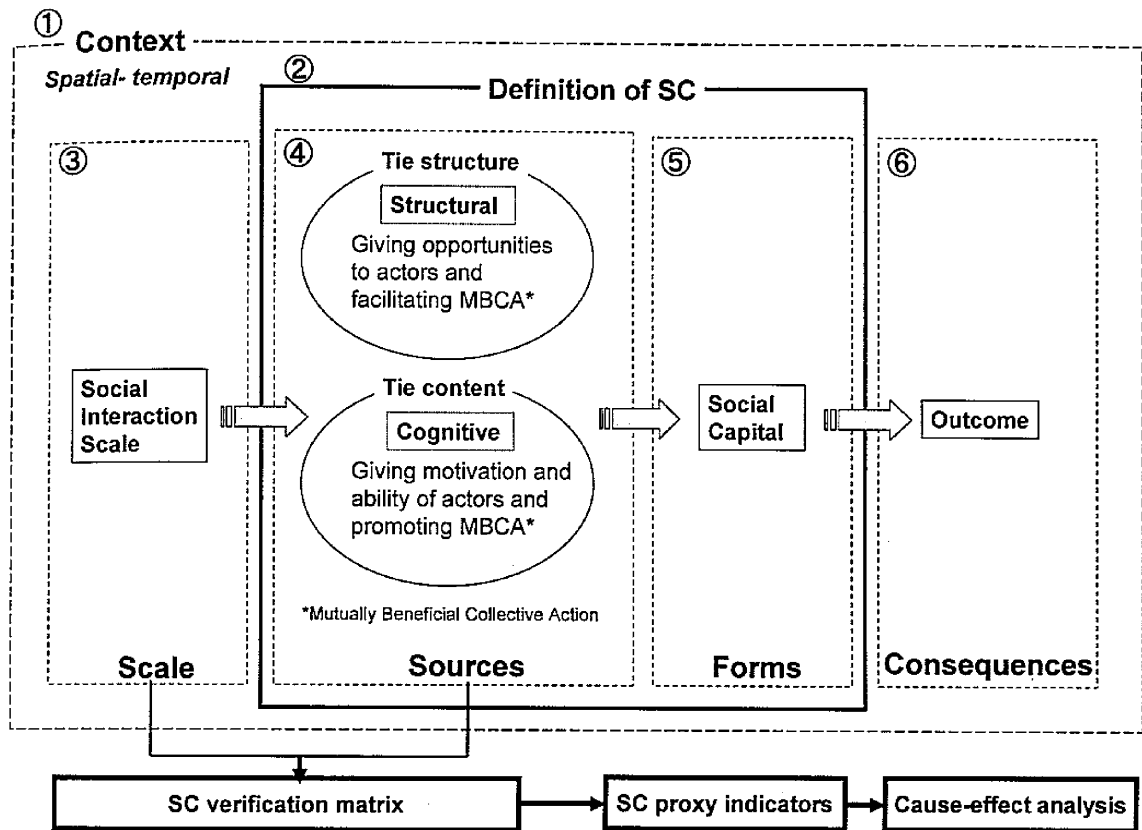


Fig. 12 A conceptual framework for measuring SC

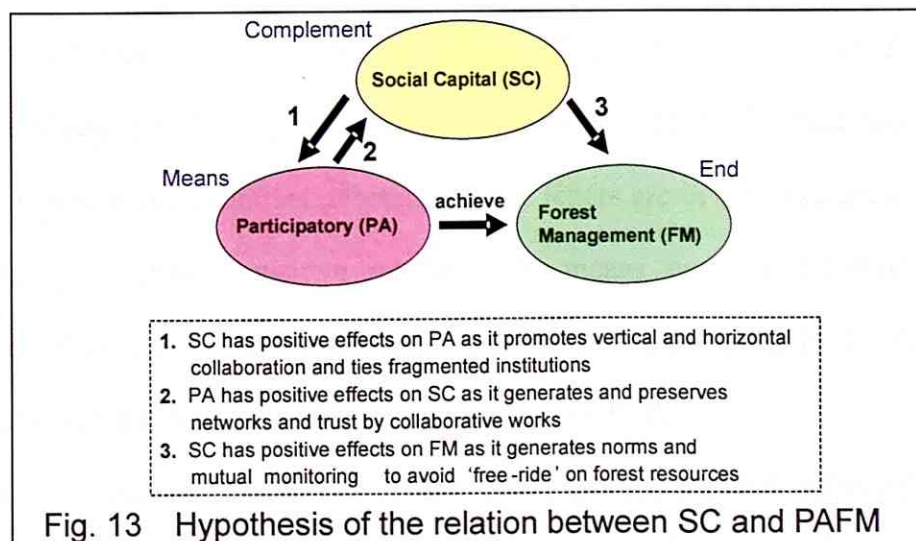
IV. Literature analysis by the developed framework

4.1 Application of the developed conceptual framework

In this chapter, previous empirical studies of SC in PAFM context are analyzed with applying the developed conceptual framework. The objectives of literature analysis are:

- i) investigating the relations between SC, PA and FM (Fig. 13) in order to obtain general understanding of SC roles, following the preliminary hypothesis (see Fig. 6)
- ii) verifying the validity of the developed framework for further application

Firstly, the content of each case study was reviewed by the conceptual framework. Since each study does not apply the developed framework, SC definition (② in Fig.12) is mostly vague. The whole process relied mainly on interpretation of social interaction scale (SIS) and sources of SC (③④ in Fig.12) in a research context (① in Fig.12). SC verification matrix was used for the interpretation of ③ and ④. All of these processes clarify structural or cognitive sources of SC, i.e., what SC is from in the context; consequently, what SC is (⑤ in Fig.12) becomes clearer. Finally, the outcome (⑥ in Fig.12) was analyzed.



4.2 Review and analysis of previous empirical studies

Data collection

In order to analyze the relation between SC and PAFM, previous empirical studies that include SC concept in PAFM context were targeted. Materials are collected by scientific journal data bases: i.e., *Web of Science* and *Science Direct* that broadly cover the studies from natural and social science, and *ProQuest Agricola plus Text* which is specialized for natural science and agriculture²⁰. Key words used for searching are: social capital, forest management, natural resource management, participatory, community-based, forestry, and community. Those key words are used separately as well as by different combination (e.g., participatory forest management, community-based forest management, community forestry.) Collected literature data was reviewed and selected by screening of the context that can be regarded as “participatory” forest management.

Results

Summary of findings from targeted previous empirical studies is shown in Table 10. The findings indicate that each SC characteristic is related to PA, and to FM; however, it is also revealed that there is no case study which investigates the SC effects comprehensively including all six characteristics. Explanations in black letters are in the context of developing countries, whereas in blue letters are in the developed countries. Additionally, ○ means positive relations, × means negative relations, and △ means no relation is found. All the negative effects are observed in the developing countries where political institutions are not well-organized.

The results from literature analysis are shown in Table 11. Each effect (①SC⇒PA;

²⁰ See Table 3 for detailed characteristics of each scientific journal database.

② $PA \Rightarrow SC$; ③ $SC \Rightarrow FM$) was examined according to six characteristics of SC. No negative effect of SC on PA was observed, which indicates that SC works positively on PA approaches. However, it is identified that PA approaches sometimes effect negatively on SC, and that SC also work negatively on forest resources. It is revealed that SC, PA and FM have not always positive effects on each other; thus, preliminary hypothesis was disproved in some part.

Table 10 Summary of findings from previous empirical studies of SC and PAFM
(Black letter: cases in developing countries; Blue letter: in developed countries)

Correlation trend between SC and PAFM (Findings from previous empirical studies)		
SBo	Existing (E)	<ul style="list-style-type: none"> ○ The well fitting between traditional network system in the villages and a new policy leads substantial successful forest management by local communities (Bray,2003) △ There is no correlation between the condition of forest by PAFM and strength of SC in the villages (Gibson et al.2005) × Persistent social stratification and network in the class generate relative merits for accessing forest resources (Vasan,2007) × Strong ties and information network among villagers based on blood relationship promotes forest clearance (Rodoriguez et al.2004) ○ Individual network of participants in green area management promotes other participation which sustains the activity (Glover et al.2005)
	Generated (G)	<ul style="list-style-type: none"> ○ Frequency of gathering in the village increased by PA forest monitoring, which results in better relationship between villagers (Van Rijsoort et al.2005) × Strong ties between participants of a newPAFM scheme exclude other villagers (Nath et al.2006, Toko <i>et al.</i> 2005) ○ Forest depending local community structures a new civic culture, which generates a new SC in the local area (Donoghue,2007)
CBo	E	<ul style="list-style-type: none"> ○ Norms in the village based on leadership prevent forest from self-interested deforestation (Weyerhaeuser,2006)
	G	<ul style="list-style-type: none"> × Strong ties between participants of a new PAFM scheme generate mistrust from other villagers (Nath et al.2006, Toko <i>et al.</i> 2005)
SBr	Existing	<ul style="list-style-type: none"> ○ Horizontal network in the local area contributes to regional improvement based on forest resources (Vennesland,2004) ○ Transformation of bonding SC between villagers into broader bridging SC according to economical-social changes becomes positive factor for natural conservation in the whole area (Savage et al.2005)
	Generated	<ul style="list-style-type: none"> ○ PA forest monitoring promotes interactions and develops network between stakeholder, which results in sharing and exchange between scientific knowledge and local knowledge (Van Rijsoort et al.2005) ○ Regular gatherings by PAFM promote communication between villagers and government officers, which lead activation of local community (Rosyadi et al.2003) × Broad network within the village as well as outside of villages generated by PAFM promotes and sustains illegal loggings (Rosyadi et al.2003) ○ Broad network within and beyond the organization promotes knowledge sharing as well as sustains the conservation activity (Sobels et al.2001) ○ New networks generated between land owners and managers promote information exchange, which contributes to natural conservation activities in the whole region (Fitzsimons et al. 2007) ○ Networks of each participant organization in PAFM in the national forest contribute to sustain and improve the activities (Danks,2000)
CBr	E	No case-based finding
	G	<ul style="list-style-type: none"> ○ PA forest monitoring generates trust between stakeholders, which leads the improvement of recognition and attitude of each stakeholder (Van Rijsoort et al.2005) ○ Open process for decision-making in the forest committee of PAFM including practical planning or selection of committee members generates motivations and trust (Haight et al.2000)
SLi	E	<ul style="list-style-type: none"> ○ Vertical network between local government and national government contribute to regional improvement based on forest resources (Vennesland,2004)
	Generated	<ul style="list-style-type: none"> ○ Regular gatherings between villagers and governmental officers promote communication among them (Van Rijsoort et al.2005) ○ Workshops of PAFM with NGO and government promote lobby activity of villagers, which results in transferring the forest management rights to the village (Rosyadi et al.2003) × Network with the government generated by PAFM promotes and sustains illegal loggings (Rosyadi et al.2003) ○ Regular meeting and lectures organized by the government in PAFM activity in catchment area generate network between local community and the government, which promotes collaboration in the activity (Nikolic et al.2007) ○ Regular supports from the government contribute to sustain natural conservation activities (Sobels et al.2001)
CLi	E	No case-based finding
	Generated	<ul style="list-style-type: none"> ○ Regular gatherings by PA forest monitoring deepen mutual understanding between villagers and governmental officers (Van Rijsoort et al.2005) ○ Collaboration and supports from regional government in PAFM generate mutual trust between local community and the government, which promotes further communication (Robson et al.2007) ○ Regular meeting and lectures organized by the government in PAFM activity in catchment area generate mutual trust between local community and the government, which promotes motivation for participation in the activity (Nikolic et al.2007)

Table 11 Relations between SC, PA and FM
results from literature analysis of previous empirical studies of SC and PAFM

(○ positive relations; × negative relations; △ no relations)

	①SC⇒PA	②PA⇒SC	③SC⇒FM
SBo.	○ Existing SBo promotes PA (Bray <i>et al.</i> 2003) (Glover <i>et al.</i> 2005)	○ PA generates SBo (Donoghue <i>et al.</i> 2007) × Generated SBo by PA harms existing SBo (Vasan,2007) (Toko <i>et al.</i> 2005)	△ No correlation is verified between existing SBo and FM (Gibson <i>et al.</i> 2005) × Existing SBo promotes land clearing (Rodoriguez <i>et al.</i> 2004)
CBo.	○ Generated CBo by PA promotes PA (Van Rijsoort <i>et al.</i> 2005)	× Generated SBo by PA harms existing CBo (Nath <i>et al.</i> 2006)	○ Existing CBo prevents egocentric exploitation of forest (Weyerhaeuser <i>et al.</i> 2006)
SBr.	○ Existing SBr promotes and sustains PA (Sobels <i>et al.</i> 2001) ○ Generated SBr by PA promotes information sharing that reforms PA (Van Rijsoort <i>et al.</i> 2005) (Sobels <i>et al.</i> 2001)	○ PA generates SBr (Rosyadi <i>et al.</i> 2003) ○ PA strengthens and broadens SBr (Danks,2000)	○ Transition from existing SBo to SBr sustains FM (Vennesland,2004) (Savage <i>et al.</i> 2005) ○ Generated SBr by PA sustains FM (Savage <i>et al.</i> 2005) (Fitzsimons <i>et al.</i> 2007) × Generated SBr by PA promotes exploitation of forest (Rosyadi <i>et al.</i> 2003)
CBR.	No case-based example	○ PA policy and approaches generates CBr (Van Rijsoort <i>et al.</i> 2005) ○ Generated SBr by PA generates CBr (Haight <i>et al.</i> 2000)	No case-based example
SLi.	○ Generated SLi by PA broadens and sustains PA (Rosyadi <i>et al.</i> 2003) (Nikolic <i>et al.</i> 2007)	○ PA generates SLi (Van Rijsoort <i>et al.</i> 2005)	○ Existing SLi activates FM (Vennesland,2004) (Sobels <i>et al.</i> 2001) × Generated SLi by PA sustains exploitation of forest (Rosyadi <i>et al.</i> 2003)
CLi.	○ Generated CLi by PA reforms and sustains PA (Robson <i>et al.</i> 2007) (Nikolic <i>et al.</i> 2007)	○ Generated SLi by PA generates CLi (Van Rijsoort <i>et al.</i> 2005)	No case-based example

4.3 Discussion

Relations between SC and PAFM

The findings from the analysis of previous empirical studies (Table 11) indicate: i) SC has positive effects on PA, ii) PA generates SC, iii) SC promotes and sustains FM, but at the same time iv) PA can harm SC, v) SC can damage FM. Thus, there are specific relations between SC, PA and FM but the effects on each other are not always positive as the preliminary hypothesis.

SBo and CBo, which are the strong intra-community ties promote PA in most cases (Bray *et al.* 2003; Glover *et al.* 2005; Weyerhaeuser *et al.* 2006). The findings indicate that SBo transforms into more broaden ties SBr by PA approaches (Vennesland 2004; Savage *et al.* 2005); and generated SBr sustains FM (Savage *et al.* 2005; Fitzsmons & Wescott 2007). It can be said that PA generates SC and again the generated SC promotes and sustains PA (Donoghue & Sturtecant 2007; Rosyadi *et al.* 2003; Danks 2000; Van Rijsoort & Jinfeng 2005; Haight & Ginger 2000; Sobels *et al.* 2001; Nikolic & Koontz 2007; Robson & Kant 2007). However, generated SC by PA sometimes harms existing SC (Toko *et al.* 2005; Vasan 2007; Nath & Inoue 2006). Both cases are related to strong intra-community ties (SBo and SBr), which indicates that bonding SC can lead negative effects on PA and vice versa. Another finding from a case study also clarifies that bonding SC promotes negative acts on FM (Rodri'guez & Pascual 2004).

In general, concerning broader weak ties among different stakeholders that are developed as SBr, CBr, SLi, and CLi, the effects seem positive to activate and to sustain FM. In most cases, structural SC (e.g., coordination, communication and network) generates cognitive SC (e.g., trust, confidence, understanding and responsibility). Yet, negative effects of SBr and SLi are also found exceptionally in a case study (Rosyadi *et*

al. 2003): i.e., broader network generated by PA promotes broader exploitation of FM. This is the case where political institutions are rotten.

Results indicate that SC has both positive and negative impacts on PA and on FM depending on the context. However, positive impacts are more observed; hence positive relations identified in various empirical studies here show that SC is effective in PAFM if it is used correctly. In summary, SC can promote and support PA, and PA can generate SC, which becomes a positive feedback loop. However, it is revealed that PA approaches also harm existing SC; therefore implementation of PA approaches without a perspective of SC can lead negative consequences not only for FM but also for the community. On the other hand, no negative effect of SC on PA was found in this study, which indicates SC works positively on PA approaches. Yet, PA approaches can harm SC if underlying conditions of SC are not paid much attention to. Therefore, it is recommended that PAFM policy should carefully take existing and generated SC into account. The results indicate that it deserves considering SC for sustainability of PAFM.

Validity of the developed framework

The literature analysis applying the developed conceptual framework revealed that the framework is useful to organize and to compare various findings from different case studies. On the other hand, what is discussed as SC in each study is various; it hinders developing general arguments of the relation between SC and PAFM.

Hence, the results show:

i) the developed framework makes it possible to analyze and discuss SC roles in different PAFM cases under the same criteria and definitions of SC; it is significant for developing arguments of SC roles because comparison of SC effects in each case can only be possible under the same criteria.

ii) it is also clarified that the developed framework is useful for applying in further researches in order to analyze SC roles comprehensively, including all six characteristics (SBo, CBo, SBr, CBr, SLi, CLi). Results indicate that each characteristics of SC is related to forest policy; therefore comprehensive analysis of SC with the developed framework is effective.

The following chapters are the empirical part of the thesis where case studies with application of the developed framework are demonstrated.

V. Pilot study: a case of PAFM by voluntary citizens in Japan

5.1 Significance and background of the case study

Case studies in the empirical part of the thesis were designed aiming to examine the application of the developed conceptual framework into actual cases. The target selected with the main objective is: PAFM activities by voluntary citizens in the urban area in Japan. The targeted activities are in the *Satoyama*²¹ or wooded area in Tokyo, where patchy copses are left close to the residential area. The significances of the selected target are:

i) The PAFM activities by voluntary citizens are one of important participatory approaches that need the involvement of different stakeholders in developed country context.

ii) Therefore, it is supposed to be strongly related to different functions of SC: i.e., as shown in examples in Figure 10 (in page 52), all bonding, bridging and linking SC is necessary

iii) Thus, investigating cases from PAFM activities by voluntary citizens with the developed framework is significant for further studies since it is not only effective for verifying the framework but also contributive for clarifying how SC affects on such voluntary activities.

PAFM activities by voluntary citizens have increasingly acknowledged in Japan

²¹ *Satoyama* is a Japanese term that defines the traditional agricultural landscape consists of a mixture of forests, wet rice paddy fields, grasslands, and villages. It is the forests managed by local agricultural communities. Today, these forests are located in suburban and rural areas throughout Japan, but most of them are abandoned due to the drastic shift in use of natural resources from charcoal and firewood to oil and the change from compost to chemical fertilizer. *Satoyama* are not wild forests, but are the result of human intervention in natural systems over the centuries; therefore, continuous maintenance by human is essential to sustain the landscape. (See more details in Takeuchi *et al.* 2003; Kobori & Primack 2003)

since the seventies. Particularly, such activities so-called “*green volunteers*” have widely spread in the urban and the suburb area since the end of eighties in order to conserve and maintain the natural environment marginally left in the residential area. Yamamoto (2003) stresses that PAFM activities by volunteers have a significant potential for generating new institutions of forest management with as many as stakeholders, because most of forest in Japan are abandoned today without appropriate system for management based on the market or on the governmental control²². The Japanese government has promoted the participation of citizens in forest management, which is stressed as “forest reconstruction by the whole society” in the forest white paper (Forestry Agency 2006). In addition, SC and voluntary activities are supposed to have positive spiral effect, which is also expected to work beneficially for conservation activities. Thus, PAFM by voluntary citizens is one of the critical challenges in Japan.

5.2 Target and methods of a pilot study

The pilot study was conducted in almost one year from June 2006 to August 2007. The main objective of the pilot study is to test the validity and application of the developed conceptual framework as well as to investigate appropriate methods for further empirical studies with using the framework; therefore, the research target and items were narrowly focused on. Thus, the research was designed to identify if voluntary green activities generate SC and what effects can be induced by the generated SC. In this case, it is desirable to eliminate the effects of existing SC that are accumulated in a

²² Japan is one of most forested countries, of which 67 % of the land is covered by forests; however, self-supply ratio of timbers is less than 20% today and the life-style depending heavily on forests had drastically changed since the fifties. Thus, a large part of the forest is abandoned and new institutions that fit actual condition have been seeking.

locality with long history. Accordingly, pre-research for selecting the study site that are suitable for verifying the framework as well as investigating SC generation in short period. As a result, a case of voluntary PAFM by local residents in Hachioji city in Tokyo where SC index is the lowest in Japan²³ was selected as a pilot study target.

Several methods from a case study approach were employed; including data collection from secondary sources, participant observation, open-ended interviews, semi-structured interviews and structured interviews and questionnaires. The details of the research methods, targets are shown in Table 12. Pre-research was conducted for clarifying the context and inducing assumptions regarding PA activities and SC in the study target. Particularly, results from pre-research were prerequisite for setting proxy indicators of SC. As explained in the former chapter III, SC is a contextual concept of which the proxies differs from each case; therefore, it is required that SC proxies and related questions for measuring SC should be constructed from contextual pre-research.²⁴

Each method shown in Table 12 was employed with following the developed conceptual framework: i.e.,

① Identifying the context:

Firstly, the context of the research target was identified in order to examine if the target is suitable for the research objective; once the target was fixed, more details of the context of the study site was investigated.

② Defining SC in the context:

The SC definition in the research context is: network and trust between stakeholders in

²³ The research of SC in Japan which was done by the Cabinet Office in 2003 revealed that SC index was the lowest in Tokyo. (The Cabinet Office 2003)

²⁴ SC forms privileged by each study are specific to a particular cultural domain and may have little or no value outside that domain. Measurement for SC requires local investigation into context specific questions.

the social structure.

③④⑤ Identifying SIS & SC sources and setting proxy indicators:

Applying SC verification matrix, SC characteristics according to social interaction scale (SIS) and sources are identified. Subsequently, proxy indicators of SC in the context were set. From the pre-research shown in Table 12, sources of SC depending on SIS were identified for setting proxy indicators that are shown in Table 14 (in page81).

⑥ Clarifying consequences of SC effects:

With identifying SC in the context by proxy indicators, other factors that were supposed to be related to SC were included in the structured questionnaires in order to examine SC effects.

Table 12 Methods applied in a pilot study

Research methods		Targets	Results
Pre Research	Literature and secondary sources collection	Data related to the study site	Identifying context: characteristics of the study site,
	Participant observation in the activities of the targeted organization	<i>Shiroyamate</i> forest lovers activities	Clarifying actual conditions of the activities and interactions among participants: available for SC proxy indicator setting and designing qualitative questionnaire
	Semi-structured interview with the representative of the organization	1 <i>Shiroyamate</i> forest lovers chairman	Clarifying transition of the organization, as well as actual conditions and challenges of the organization: available for SC proxy indicator setting and designing qualitative questionnaire
	Secondary data collection	Documents from <i>Shiroyamate</i> forest lovers and city government	Supporting the results from interviews
	Open-ended interview with members of the organization	10 members from <i>Shiroyamate</i> forest lovers	Clarifying members' perception and feelings during activities as well as their challenges: available for SC proxy indicator setting and designing qualitative questionnaire
	Open-ended interview with officers from city government	2 officers in Park management dept. 1 officer in Collaboration promotion dept.	Clarifying governmental intentions as well as their operations: available for designing qualitative questionnaire
	Semi-structured interview for activities transition	Representative and 5 members from <i>Shiroyamate</i> forest lovers	Clarifying the transition of detailed activities: available for designing qualitative questionnaire
	Qualitative questionnaires to members of the organization	12 members from <i>Shiroyamate</i> forest lovers	Clarifying SC in the study target as well as other related factors
	Qualitative questionnaires to the representative of the organization	<i>Shiroyamate</i> forest lovers chairman	Supporting the results from interviews
Main Research			

Temporal sequence

5.3 Results

5.3.1 Description of study target

The targeted site, *Shiroyamate* in Hachioji, Tokyo, is a new residential area opened in 1994, where all the residents were moved from other area; thus, existing or accumulated SC is scarce although 572 households are now living. The targeted PAFM is green conservation activities by volunteers in the wooded area (73,919m²) next to the residential area (Fig.14 & 15). The wooded area is mixed up with the conservation area designated by Tokyo Metropolitan government²⁵ and the green park area under the jurisdiction of Hachioji City government. The targeted PA activities are operated under the 'Park Adopt institution' of the city government. The activities led by a local voluntary group named *Shiroyamate* forest lovers started in 2002. The members consist of only residents in the area; the age-group is between 50 to 75 years old and the average age is 61.8 years old²⁶. The pre-research with participant observation and semi-structured interviews with members revealed that their activities are ongoing regularly. The semi-structured interview with the representative of the organization revealed that the trigger for the foundation was the passion of residents for conserving rich natural environment in their backyard. When the area became one of green conservation area in Tokyo in 1996, the passion and motivation for maintaining the forest had grown; as a result, they started the activities.

²⁵ This conservation area, named *Nagafusa green conservation area*, was designated in 1996 as one of Tokyo green conservation areas by the Metropolitan government. Now in 2008, all the conservation areas in Tokyo are 46 in total: 37 green conservation areas, 1 natural environment conservation area, 1 forest environment conservation area, and 1 *Satoyama* conservation area.

²⁶ From the secondary data of the organization



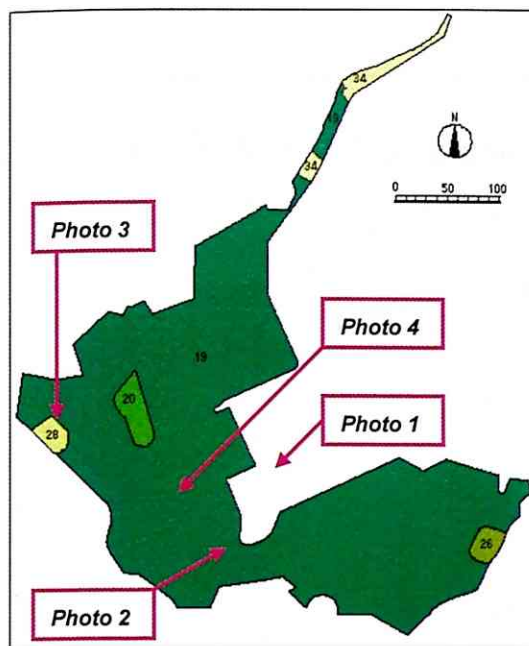
Source: Google earth

Fig. 14 Aerial photo of Nagafusa green conservation area (GCA)



Base Map: Hachioji Agricultural Map (1994)

Fig. 15 Map of Nagafusa GCA:
the activity area of the study target is framed by red line



Vegetation legend on the map:

19. *Quercus serrata*, *Quercus acutissima* is dominant

20. *Pinus densiflora*

26. Plantation of *Cryptomeria japonica*, *Chamaecyparis obtusa*

28. *Phyllostachys heterocycla* f. *pubescens*

34. Community of *Pueraria lobata*

Source: Nagafusa green conservation area map (Tokyo Metropolitan government 2000)



Photo 1: View of Nagafusa GCA



Photo 2: Storage in the entrance



Photo 3: *Phyllostachys heterocycla* f. *pubescens* forest



Photo 4: Dominant species:
Quercus serrata, *Quercus acutissima*

Fig. 16 Landscapes and vegetations of Nagafusa GCA: the activity area:
where the targeted organization works

General forest conditions before the activities \Rightarrow After the activities



Fig. 17 Exemplar photos of before and after of the activities:

The photos before the activities were taken at the points where the voluntary organization had not conducted their maintenance activities yet; whereas the photos after the activities were taken at the point where they finished their maintenance within a week ago.

Table 13 Transition of activities by *Shiroyamate* forest lovers

year act.	2002	2003	2004	2005	2006	2007
Member	20 members	29 members	31 members	25 members	25 members	24 members
Frequency	2-3 times/month 1 st & 3 rd Saturday	2-3 times/month 1 st & 3 rd Saturday	2-3 times/month 1 st & 3 rd Saturday	2-3 times/month 1 st & 3 rd Saturday	2-3 times/month 1 st & 3 rd Saturday	2-3 times/month 1 st & 3 rd Saturday
Participant	15 members	25 members	23 members	20 members	20 members	20 members
Management of copse	<ul style="list-style-type: none"> •Scything •Maintenance of : bamboo grove, nature trails, wooded area •Planning of conservation schemes 	<ul style="list-style-type: none"> •Scything •Maintenance of : bamboo grove, nature trails, wooded area •Planning of conservation schemes 	<ul style="list-style-type: none"> •Scything •Maintenance of : bamboo grove, nature trails, wooded area •Planning of conservation schemes 	<ul style="list-style-type: none"> •Scything •Maintenance of : bamboo grove, nature trails, wooded area •Planning of conservation schemes 	<ul style="list-style-type: none"> •Scything •Maintenance of : bamboo grove, nature trails, wooded area •Planning of conservation schemes 	<ul style="list-style-type: none"> •Scything •Maintenance of : bamboo grove, nature trails, wooded area •Planning of conservation schemes
Management of green park	<ul style="list-style-type: none"> •Scything •Maintenance of trails •Disposal of dead & fallen trees •Mowing of bamboos •Pruning 	<ul style="list-style-type: none"> •Scything •Maintenance of trails •Disposal of dead & fallen trees •Mowing of bamboos •Pruning 	<ul style="list-style-type: none"> •Scything •Maintenance of trails •Disposal of dead & fallen trees •Mowing of bamboos •Pruning 	<ul style="list-style-type: none"> •Scything •Maintenance of trails •Disposal of dead & fallen trees •Mowing of bamboos •Pruning 	<ul style="list-style-type: none"> •Scything •Maintenance of trails •Disposal of dead & fallen trees •Mowing of bamboos •Pruning 	<ul style="list-style-type: none"> •Scything •Maintenance of trails •Disposal of dead & fallen trees •Mowing of bamboos •Pruning
Other trial or findings: related to biodiversity			<ul style="list-style-type: none"> •Finding a community of <i>Lycoris sanguinea</i> •Cultivating Shiitake mashroom 	<ul style="list-style-type: none"> •Finding a nest of <i>Accipiter gentilis</i> (Goshawk) 	<ul style="list-style-type: none"> •Releasing larvae of <i>Luciola cruciata</i> (Firefly) •Finding 2 <i>Sus scrofa</i> (Wild boar), 1 <i>Nyctereutes procyonoides</i> (Raccoon dog) •Searching endangered species of plants in the forest 	<ul style="list-style-type: none"> •Finding 2-30 <i>Luciola cruciata</i> (Firefly), several times •Observing rare butterflies •Searching endangered species of plants in the forest •Conserving and observing of <i>Calanthe discolor</i> •Finding many <i>Cephalanthera falcata</i> & <i>Cephalanthera erecta</i> •Observing rare species of insects •Finding a nest of <i>Accipiter gentilis</i> (Goshawk)
Local community activities			<ul style="list-style-type: none"> •BBQ party in the green park •Cooking party with Dutch oven •Trial of Shiitake cultivation 	<ul style="list-style-type: none"> •Flower-viewing party •Mini-hiking to enjoy Katakuri (<i>Erythronium japonicum</i> Decne.) •Cooking party with Dutch oven 	<ul style="list-style-type: none"> •Flower-viewing party •Mini-hiking to enjoy Katakuri (<i>Erythronium japonicum</i> Decne.) 	<ul style="list-style-type: none"> •Flower-viewing party •Mini-hiking to enjoy Katakuri (<i>Erythronium japonicum</i> Decne.) •Interpretive tour in the forest
Non-member participant			20-30 residents in the area	20-30 residents in the area	20-30 residents in the area	20-30 residents in the area

Figure 16 shows the major vegetations and landscapes of *Nagafusa* GCA, where the targeted organization works. Most of part is dominant by *Quercus serrata* and *Quercus acutissima* (Photo 4 in Fig.16). *Phyllostachys heterocycla* f. *pubescens* is also dominant where there is no maintenance; but there is also ‘bomboo forest’ which the members of the organization have left and are beautifully maintaining little community of *Phyllostachys heterocycla* f. *pubescens* (Photo 3 in Fig.16). Figure 17 gives an idea how their activities make changes in the forest; before their activities, the forest was all covered by *Pleioblastus chino* var. *chino* or *Phyllostachys heterocycla* f. *pubescens*. The members mentioned during the interview that it was even difficult to enter the forest when they started the activities. To think about such former condition, how their activities contribute to open the forest. The members also mentioned that a variety of rare plants such as *Lycoris sanguinea* Maxim., *Cephalanthera falcate*, *Cephalanthera erecta* started to bloom after their regular scything, which made them so happy and motivated. Thus, observing the activation of natural environment after the activities is one of major triggers to sustain their activities.

Table 13 shows the transition of the activities²⁷ revealed from semi-structured interview with members. In the beginning years, the activities are only focus on the management of forest and green parks; but as years passed by, their awareness of natural environment has been increased: as a result, it generates interests and conservation activities for endangered species in the forest. In the 6th year, the findings related biodiversity in the area is dramatically increased; accordingly, the members tried to share their findings and knowledge obtained from the activities with local residents with organizing an interpretive tour in the forest.

²⁷ See appendix A to refer semi-structured interview for activity transition.

Regarding the opinions from governmental side, the open-ended interview with officers in the city government revealed that they have no capacity (time and cost) for caring and promoting voluntary green activities. However, they put value on the activities by citizens not because it contributes to cost-cutting²⁸ but because it revives community which generate safe environment in the city. Although the members of the organization mostly feel that the government just leave the operation only for the purpose of cost-cutting, the fact and intention of the government is different.

5.3.2 Qualitative analysis of SC

From the pre-research including secondary sources, interviews and participant observation, SC characteristics in the context was identified; subsequently, SC proxy indicators were settled as shown in Table 14 applying the developed framework with SC verification matrix (Table 8 in page 58). Those proxies were converted into structured questionnaires with other related factors that were also induced from the pre-research. The content of the questionnaires is shown in Table 15²⁹. The questions are designed to investigate six SC characteristics comprehensively; however, it was presumed from the pre-research that linking SC (SLi and CLi) are scarce in this case; therefore, totally open-ended questions to ask how the member perceive the relations between the government for extracting the actual condition of linking SC were applied.

²⁸ Actually, the officer from the park management dept. of the city government told that maintenance of park and forest by volunteers does not really cut the cost although they did not show any financial proofs to the interviewer.

²⁹ See appendix B to refer structured qualitative questionnaire.

Table 14 SC Proxy indicators in the research context:
designed by SC verification matrix (Table 8)

SIS Source	Bonding	Bridging	Linking
Structural	SBo. <ul style="list-style-type: none"> • Frequency of participation in the green activities • Existence of participation in other group activities • Interactions between members except the green activities • Communication way between members 	SBr. <ul style="list-style-type: none"> • Frequency of interactions with other organization • Existence of network between other organization • Communication way to the public • Interactions with local residents 	SLi. <ul style="list-style-type: none"> • Frequency of interactions with governments • Frequency of collaboration with governments • Communication way with governments
Cognitive	CBo. <ul style="list-style-type: none"> • Trust between members • Sympathy between members • Motivation of members 	CBr. <ul style="list-style-type: none"> • Trust between other organization • Sympathy between other organization • Understanding from local residents 	CLi. <ul style="list-style-type: none"> • Trust for governments • Trust from governments

Table 15 Summary of contents of qualitative questionnaire

Summary of questions		Answer
Basic information	• Motivations for participating in this organization	Open-ended
	• Motivation for participating in the activities	Open-ended
	• Most enjoyable matter in the activities	Open-ended
	• Most struggling matter in the activities	Open-ended
	• Will for continuing the activities	Multiple-choice
	• Reasons for continuing or not continuing the activities	Open-ended
	• Things you'd like to do in the activities	Open-ended
	• Vision or future dream of your organization	Open-ended
SC related questions	SBo. • Existence of interaction between members except the activities. If yes, in what opportunities.	Open-ended
	• Ways for communication between members	Multiple-choice
	CBo. • Any change of feeling of trust between members through the activities	Multiple-choice
	SBr. • Any change of interaction depth between local residents through the activities	Multiple-choice
	• Tools for communicating to the public	Multiple-choice
	• Existence of interaction with other organizations that involve in the same kind of activities. If so, how frequent.	Open-ended
	CBr. • Feeling of understanding from local residents about the activities	Multiple-choice
	SLi. • Any claims, recommendation, suggestion or request to the city government or to the metropolitan government	Open-ended
	CLi. regarding institutions for the voluntary conservation activities	
Other factors	• Any change of interests on natural environment (e.g. forest, <i>Satoyama</i> , and its ecosystem)	Multiple-choice
	• Any change of knowledge of natural environment (e.g. forest, <i>Satoyama</i> , and its ecosystem)	Multiple-choice
	• If knowledge increased, how to obtain that knowledge	Open-ended

The summary of results from the structured questionnaires is shown in Table 16. In the targeted organization, interactions between members (SBo) are frequent and dense not only in the activities but also in other opportunities. Thus, trust between members (CBo) is generated as well. Communications between members are promoted by IT tools as well as by face-to-face interactions. Moreover, not a few members perceive that interactions between local residents (SBr) are deepened through the activities in the forest; besides, the members feel that their activities acquire expectation and understanding (CBr) from local residents. On the other hand, there is little interaction with other voluntary organizations (SBr) that involve in same kinds of conservation activities; as a results, cognitive aspects (CBr) between organizations does not exist either. Regarding interactions and communications with the governmental members (SLi), it is few and members feel that the government just left all the decision making and operation to the organization without appropriate support. This situation cannot create mutual trust and understanding between the organization and the government (CLi).

5.3.3 Awareness and knowledge of natural environment

During the process of the research, all the approaches including participant observation, semi-structured interview and structured questionnaires indicate that members accumulated their knowledge about natural environment. Firstly, they came to be interested in natural environment in the activity site because they see obvious changes of the environment in the forest from their activities; secondly they became aware of more detailed information of natural environment, e.g., endangered plant species in their activity site as well as rare animal species; and subsequently, members started to study more about and seek to observe mechanism of natural environment and biodiversity.

The results also clarified that knowledge obtained some members are transformed to other members by interactions and communications (SBo). Of course, most of members are found of nature from the beginning; yet, all the respondents answer that their interests and knowledge of natural environment are increased through the activities. This fact is pragmatized as their activities; i.e., the more their knowledge increased, the more their activities started caring of biodiversity. Besides, knowledge among members also started to share with local residents during some opportunities of interpretive tour in the forest (SBr).

Table 16 The summary of answers of structured questionnaires

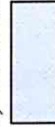
Questions	Summary of answers	Key words
Motivations for participating in this organization	<ul style="list-style-type: none"> -Sympathy for other members' will and passion for activating a new town -Already get acquainted with members in community association activities -Good personalities of the members -From the information of homepage of the organization -Participation in local community's activities -Contribution to local community with the same objective -Aware of the existing green conservation area next to our residents -Aware of importance of 'green' and its conservation around the area 	Sympathy Personality Contribution Awareness
Motivation for participating in the activities	<ul style="list-style-type: none"> -Childhood memory of forest, plants and birds -Social contribution, voluntary spirits -Personalities of the members -Own interest in forest -Green conservation as well as communication among residents 	Interests Contribution Personality
Most enjoyable matter in the activities	<ul style="list-style-type: none"> -Satisfaction to see the forest becomes more and more beautiful after the activities -Gathering and reunion with members after the activities -Invite local resident in the forest where we work and show them beautiful flowers coming out after our activities -Preparing events with residents -Concentration on green conservation activities 	Satisfaction Interaction Collaboration
Most struggling matter in the activities	<ul style="list-style-type: none"> -Nothing -Restriction of schedule of the activities -Hard duty in the hot summer time -A few residents' aspersion -The area we should care is too broad 	Restriction

Will for continuing the activities	Would like to continue (100%)	Communication Satisfaction
Reasons for continuing or not continuing the activities	<ul style="list-style-type: none"> -Communications with members are fun -Communications with local residents are important -For my own health -Something to live for -Make more friends from the activities -Broaden the activities in the whole residents -Build a beautiful town surrounded by greens -Get more young member -Broaden the activities for welfare issues in the residential area 	Friend
Things you'd like to do in the activities		Community Broadening
Vision or future dream of your organization		
Existence of interaction between members except the activities. If yes, in what opportunities	<p>Yes (100%)</p> <ul style="list-style-type: none"> -Pruning in the house garden -IT related support -Other recreation (e.g. travel, party,) 	
Ways for communication between members	<ul style="list-style-type: none"> -Emails -To meet 	
Any change of feeling of trust between members through the activities	<ul style="list-style-type: none"> -Trust more than before the activity participation -Same as before the participation of the activities (only 1 answer) 	Trust
Any change of interaction depth between local residents through the activities	<ul style="list-style-type: none"> -Interaction becomes deeper than before the activities (100%) 	Interaction
Tools for communicating to the public	<ul style="list-style-type: none"> -Home page 	
Existence of interaction with other organizations that involve in the same kind of activities. If so, how frequent.	<ul style="list-style-type: none"> -Yes, but a few, not regularly -Yes, once a year -Yes, only once 	Collaboration
Feeling of understanding from local residents about the activities	<ul style="list-style-type: none"> -The activities obtain understanding from local residents -Do not know 	Understanding
Any claims, recommendation, suggestion or request to the city government or to the metropolitan government regarding institutions for the voluntary conservation activities	<ul style="list-style-type: none"> -It seems that the operation left to the voluntary group only for budget cut -Need more information about conservation plan in the area including detailed plan for rare species -Need more discussion in the activity area to see the condition of forest -Need more disclosure of information they have, need more PR -Need more detailed advice about our activities 	Information Planning Discussion Practical approach

	-Almost no support from the city government -No comments or detailed advice about conservation plan from the government; therefore we always work with ambiguity -Interests increased (100%)	
Any change of interests on natural environment (e.g. forest, <i>Satoyama</i> , and its ecosystem)		Interest
Any change of knowledge of natural environment (e.g. forest, <i>Satoyama</i> , and its ecosystem)	-Knowledge increased (100%)	Knowledge
If knowledge increased, how to obtain that knowledge	-From other members who are more familiar with plants, insects, etc -From communications with other members -Go to the library, or by internet	Knowledge sharing

Note:

i) The colour column is SC related questions as shown below:



: related to bonding SC (SBo., CBo.)



: related to bridging SC (SBr., CBr.)



: related to linking SC (SLi., CLi.)

ii) Most of the question are open-ended; therefore, the answers are read carefully and summarized with combining the same answers as 'summary' of the answers in the table. Subsequently, summary of answers are categorized into some 'key words' shown in the right column. The process of summarizing and categorizing are proceeded by GT approach³⁰.

iii) The structured questionnaire was conducted with twelve members who are the main actors of the voluntary green conservation activities in the area. Since almost half of the members of the organization are not actively nor regularly participating in the activities, which means they are just on the list but not in the activities. The questionnaire is strongly related to the activities; therefore, twelve members were selected from the pre-research (including participant observation and interviews) who regularly work on the activities.

iv) The response rate was 100% since the questionnaire was passed and collected face-to-face by the author.

³⁰ Regarding GT approach, see I.1.4 Methods of the study (Chapter I: page 11-12)

5.4 Discussion

5.4.1 Relations between SC and PAFM in the study site

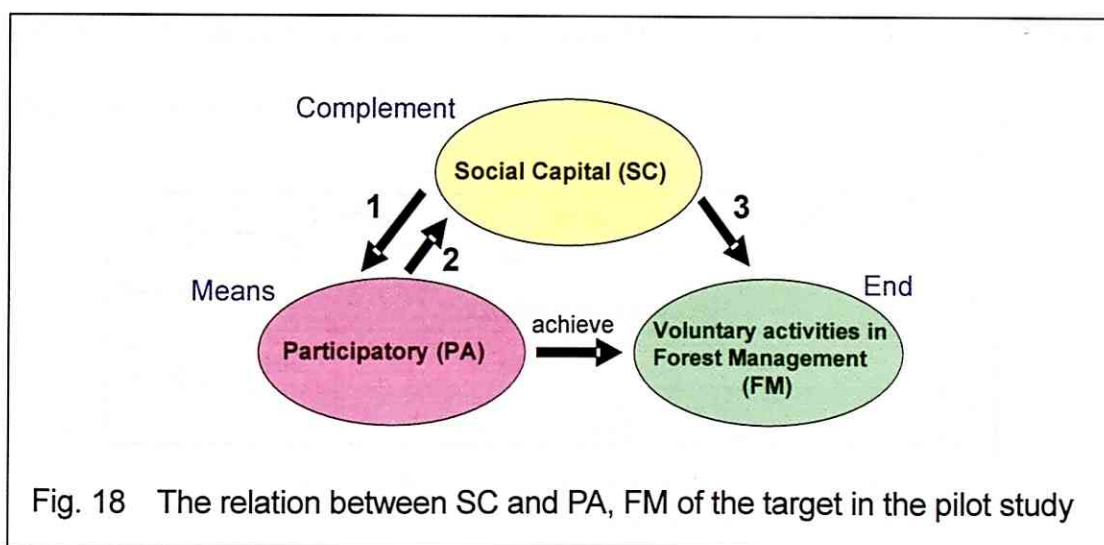
Regarding the case of study target, bonding SC seems well-developed; particularly SBo and CBo are both strong in the voluntary organization. As shown in Table 16, networks, and trust exist between members, which is the major reason that they participate and continue the activities: i.e., there are substantial comments on the interaction and the sympathetic feelings among members for the reason why they participated in the organization as well as why they would like to continue the activities. Thus, in this case, the relation 1 in Figure 18 is supposed to positively work since SC contributes to PA for its sustainability with promoting participation. In addition, PA approaches contributes to SC as well since all the members answer that trust among members increased after the activities. Moreover, SBo between members is broadened to SBr among local residents through the PA activities such as community events (as shown in Table 16); subsequently, CBr between members and residents is gradually developing³¹. It is therefore supposed that the relation 2 in Figure 18 also works positively. Hence, there is a positive feedback loop between SC and PA in this case. Furthermore, results indicate that developed SBo between members promotes knowledge sharing, which started to share with local residents as well; it is therefore the positive effect of the relation 3 in Figure 18 is also observed.

However, there are only a few interactions with other organizations, which means SBr beyond the community is not enough in this case. Considering well-developed SBr promotes information and knowledge sharing, this is the challenge for the organization

³¹ The limitation of this statement is: investigations on local residents were not conducted in the pilot study; therefore, more detailed relations between members and residents are not analysed.

to actively work for generating SBr in the future.

Moreover, linking SC is scarce in this case, which seems to hinder the achievement of more organized conservation activities. As shown in Table 16 (in the orange-coloured column), members are disappointed that they can rarely obtain concrete advice for conservation plan from the governmental side, which results in their anxiety to do the activities with ambiguity. During the interviews, members often comments that they wonder if and how their activities can contribute to the conservation of the wooded area. Since members do not know well if their activities are specifically good approaches for the conservation plan of the area, they sometimes feel that their activities can be efforts without effects. Lacking of SLi is obviously heightening distrust on the government and its institutions; it is therefore necessary to develop SLi in order to generate CLi between the organization and the government.



5.4.2 Validity of the developed framework

The major aim of the pilot study was to investigate the application of the developed conceptual framework into actual case study how it is useful. From the process of the pilot study, it is indicated that the developed conceptual framework is effective to settle proxy indicators comprehensively in a context. In addition, applying the framework, the process of the whole research becomes concrete and practical, which support to decide approaches to carry on in each stage of the research. Importantly, with using the developed framework, SC definitions become *context-restricted*; thus, the research is able to avoid just borrowing definitions from another study in totally different context. Following the framework, a research can target SC more comprehensively and coherently. Yet, only the qualitative research was conducted in the pilot study, which can lead explanatory analysis but still lack of an objective support for the explanation. Therefore, the following case study tries to include quantitative network analysis as one of approaches in the whole process (see Fig. 19).

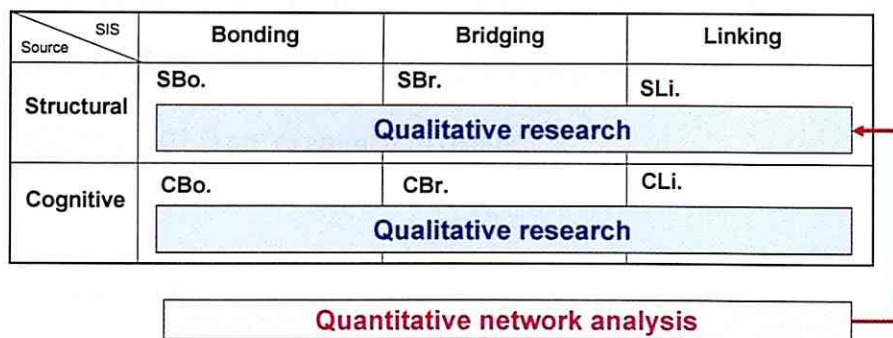


Fig. 19 Application of network analysis for analysing structural dimension of SC