Calculating Weights of Social Capital Index Using Analytic Hierarchy Process

Nguyen, Phuc Van and Nguyen, Phong Thanh and Nguyen, Quyen Le Hoang Thuy To and Huynh, Vy Dang Bich

Ho Chi Minh City Open University

9 October 2016

Calculating Weights of Social Capital Index Using Analytic Hierarchy Process

Phuc Van Nguyen[1], Phong Thanh Nguyen[2,3]*, Quyen Le Hoang Thuy To Nguyen[4], Vy Dang Bich Huynh[5]

[1]Ho Chi Minh City Open University, Vietnam, [2]Ho Chi Minh City Open University, Vietnam, [3]Chulalongkorn University (CU), Thailand, [4]Ho Chi Minh City Open University, Vietnam, [5]Ho Chi Minh City Open University, Vietnam. *Email: phong.nt@ou.edu.vn

ABSTRACT

This study aims at identifying and ranking social capital indicators in the measurement model for Vietnam context. The analytic hierarchy process is adopted to explore the relative importance of each dimension in the integrated social capital index. The opinions from the in-depth interviews with experts, scholars and practitioners in social capital theory in Vietnam are employed to calculate the indicators' weights in the model. The empirical findings indicate the superior impact of trust to network in the integrated index. Moreover, bridging and bridging-link are found to be more important than bonding and bonding-link. The result implies the potential of leveraging this resource for the development of individuals and community.

Keywords: Economics, Social Capital Index, Decision Making, Analytic Hierarchy Process
JEL Classifications: A1, C0, K0

1. INTRODUCTION

The term of social capital may originate in the previous centuries together with Tocqueville, JS Mill and Toennies (Adam and Roncevic, 2003; Salahuddin et al., 2015). This concept has been broadly used in various interdisciplinary researches (Grootaert, 1998). However, Hanifan's definition in 1916 was widely considered as the departure for social capital theory development (Putnam, 2000; Woolcock and Narayan, 2000).

Under the view of an economist, Loury (1992) described social capital as relational resources that are useful for individuals and community. Lin (1999) has confirmed this view when identifying two features of social capital: Investment into a relationship with expected return. It means that social capital is an effect, which is derived from the relationship investment based approach (Salahuddin, 2016; Razmi, Bazzazan, 2012) (Salahuddin, et al., 2016; Razmi, Bazzazan, 2012). Like other traditional resources such as natural, economic and human capital, social capital shall be decreased without investment. A common consensus on its role as an important resource for development has been found in many research papers (Coleman, 1988; Putnam et al., 1993; Granovetter,

1995; Narayan and Pritchett, 1997; Dan Lee, et al., 2011, , Doğan, 2013). However, social capital is a multidimensional construct with various components. According to Portes (2000), not all of its components are good. Therefore, the weights of different measured indicators in the integrated social capital index should be calculated for proper strategies of using this resource (Roy, et al, 2012).

Though the integrated index of social capital has been constructed in the previous researches, its components' weights are contextually dependent (Van Beuningen et al., 2013). As a consequence, these results cannot be generalized for the application in other nations. Therefore, it is essential to have empirical weights of the social capital index for the Vietnamese.

2. RESEARCH BACKGROUND

2.1. Social Capital Definition
Hanifan (1916) defined social capital as friendship, good will and attitude towards the network's members. When the network is connected, social capital accumulation shall occur, which may bring positive externality to the individual and the community.

Bourdieu (1986) has developed Hanifan's view when clarifying network by defining a structure of more or less institutionalized relationships. This view was shared by Portes (2000) when he specified the individuals' participation into organizations and groups of shared interest as a source of social capital. However, the network is necessary but not sufficient for social capital creation. According to Kilpatrick et al. (2003), networks should be guided by norms. They were known as philosophy, religious and professional standards, code of conducts and behaviors (Fukuyama, 1995). Finally, Coleman (1988) has added to the definition with the emphasis on trust, shared norms and networks which can drive the coordination actions in the society. Putnam (1993) has emphasized that shared norms were fostered by the trust. Trust expresses the beliefs about predicted actions. In short, a social capital concept with the composition of network and trust has got a broad consensus in the social capital research communities (van Beuningen et al., 2013) research communities (van Beuningen et al., 2013; Chen et al., 2009).

2.2. Social Capital Measurement

As a multidimensional construct, personal social capital is measured through the hierarchical model with two key components: Networks (structural) and trust (cognitive). Structural dimension is approached as an individual network based resource. The actual or potential network based resource (Narayan Cassidy, 2001) accessed by individual depend on his/her tie strength and social standing with the network members. Tie strength is a criterion to distinguish bonding and bridging while social standing is for linking (Woolcock and Narayan, 2000; Szreter and Woolcock, 2004). Bonding refers to strong ties such as kinship, neighborhood (Babaei et al., 2012). This is characterized by the horizontal link between those with the same demographic and socio-economic status (Dolfsma and Dannreuther, 2003). Wagner (2014) has added to the argument with its deep connection. In conclusion, this is a closed network with informal ties, focusing on homogeneous group identity (Putnam, 2000). On the contrary, bridging extends the link to different groups at similar financial position and power. It refers to weak ties with formal structure. This network is useful in approaching the outside resources. Though the resources derived from bridging networks are more diversified than bonding's, limitation still exists due to horizontal link in bridging. In order to leverage the resource, linking is an optimal solution because it deals with vertical ties, connecting each individual to the higher rank network's members (Szreter and Woolcock, 2004).

In short, bonding can enhance the consolidation within a closed network but it may, without bridging, derive the narrow interest and the consequence is outsiders' exclusion (Portes, 2000). The same philosophy is applied for linking. A strong linking may benefit the favoured groups by accessing to rich funding or less strict regulations, which is potential for corruption. Therefore, the combination of social standing with bonding and bridging to form bonding-link and bridging-link besides a traditional way of analyzing social capital as bonding, bridging, and linking is an innovative way (Quoc et al., 2012) innovative way (Quoc et al., 2012; Dinh et al., 2012). The calculation of social capital indicators' weights in the integrated index based on this new philosophy is desirable for policy recommendation on using this resource.

Trust has widely supported as cognitive social capital (Knack and Keefer, 1997; Newton, 2001; Baum and Ziersch, 2003). Based on the traditional classification of structural social capital as bonding, bridging and linking, the cognitive dimension can be categorized as particular, general and institutional trust. In fact, general trust relies on the institutional frame of the society and therefore, institutional trust is under the umbrella of general trust. Moreover, the two functions of bonding and bridging have lead to the popular classification of particular trust and general trust respectively (Stone et al., 2004). Particular trust resides in the closed network while general trust extends to the strangers in society (open networks).

Social capital theory also emphasized the importance of network participation quality because it predicts the potential resource. Active networks' membership, defined as a member who joins the network's activity at least once in the previous 12 months is an adequate measure to reflect this qualification. As indicated in Table 1, in this study, networks are categorized as bonding, bonding-link, bridging and bridging-link while particular trust and general trust are considered under the cognitive umbrella. According to Stone et al. (2004), bonding is defined as informal and closed ties such as family, friendship, and neighbors. Formal but closed ties which religion is an example, are considered as bonding-link. Bridging refers to general and community-based relationships, typically as sport/art/culture/entertainment clubs and groups. Bridging-link focuses on institutional aspect, including governmental, political, business, social groups, organizations, and associations. Particular trust and general trust are defined by asking a series of questions about the trustful and reciprocal perception the individual extends to his/her closed and open networks.

3. RESEARCH METHODOLOGY

The analytic hierarchy process (AHP), introduced by Saaty, was known as a multi-criteria decision-analysis method. It is widely applied in outstanding works of various fields relating to best option selection, conflict solution, resource allocation and optimization of the decision-making process (Saaty and Vargas, 2012). In this study, the AHP is employed to establish weights for social capital indicators in the hierarchical model for the Vietnamese.

The AHP is used as a theoretically based tool for decision makers to handle with the complex multi-factors decision. With this method, the decision maker is allowed to rank priorities and select the best option under a ratio scale by carrying out pairwise comparison rationally and intuitively. Therefore, intuitive judgments together with an efficient technique for consistency improvement are emphasized under this method (Saaty and Vargas, 2012).

The wide applications of the AHP in economic, social, political and technological fields have proved its power and flexibility in allowing the decision maker mobilize knowledge from involved experts, combine both qualitative and quantitative data in a logic hierarchy. Qualitative characteristic is reflected by structuring hierarchical model while the construction of pairwise

Table 1: Social capital measurement

Code	Description		Source
	Dimension	Questions	
Bond	Bonding	1. Rate the routine contact with closed network	Boase and Wellman (2004)
		2. Rate the emotional intimacy with closed network	Wang et al. (2014)
		3. Benefit received from closed network	
		4. Help provided to closed network	
Bolink	Bonding-link	1. Active member of religious group	Wang et al. (2014)
		2. Benefit received from the group	Putnam et al. (1993)
		3. Help provided to the group	Baum and Ziersch, (2003); Flap (2002)
Brid	Bridging	1. Active members of sport/art/culture/entertainment clubs, groups (country fellow, sport, art, etc.)	Wang et al. (2014) Flap (2002)
		2. Benefit received from them	Baum and Ziersch (2003)
		3. Help provided to them	
Bridlink	Bridging-link	1. Active members of governmental, political, business, social groups, organizations, associations (political party, women's groups, trade union, etc.)	Wang et al. (2014) Flap (2002) Baum and Ziersch
		2. Benefits received from them	(2003)
		3. Help provided to them	
Partrust	Particular trust	1. Rate the trust extended to closed network	Wang et al. (2014)
		2. Rate the importance of personal ties to reach the desired goal in life	Baum and Ziersch (2003)
		3. Rate the preference of personal ties to written contract	Chen and Lu (2007)
Gentrust	General trust	1. Rate the reciprocal possibility when dealing with difficulties	Chen and Lu (2007)
		2. Rate the trust extended to strangers	Naef and Schupp (2009)

comparison matrices is a quantitatively based approach (Nguyen, Nguyen 2015).

The following steps have been conducted for the AHP approach:

Step 1: Hierarchy construction

Hierarchy is established by breaking down the overall goal into basic elements. The review of literature and authors' critical judgments has lead to the suggestion of the hierarchical model including four levels of social capital indicators as presented in Figure 1.

Step 2: The performance of in-depth interviews with experts based on pairwise comparison questionnaire

In this step, the relative importance of each element at its level is evaluated. The philosophy of weights calculation behind the AHP is to compare pairwise with a scale of 1-9 as indicated in Table 2.

In this study, nine reciprocal matrices are used to conduct an interview with 31 participants who are experts, scholars, and practitioners in this field. Then, the data are input for calculating the weights of social capital indicators in the integrated index. A typical sample of pairwise comparison questionnaire is presented in Table 3.

Step 3: Estimation of priority vector for every factor and evaluation of consistency ratio (CR) of experts' judgments

The factor's priorities are acquired by averaging the row values of the normalized matrix. In practical problems, we are not always able to establish the bridging relation in pairwise comparisons. For example, alternative A may be at higher rank than alternative B; alternative B may be superior to alternative C, but this does not always mean that A is a better option than C. This shows the realistic characteristic of practical problems which is called

Table 2: The fundamental Saaty's scale of 1-9

Ranking scale	Description
1	Two activities are equally important to the goal
2	Two activities are equally to moderately important to the goal
3	One activity is moderately favoured to another
4	One activity is moderately to strongly favoured to another
5	One activity is strongly favoured to another
6	One activity is strongly to very strongly favoured to another
7	One activity is very strongly favoured to another
8	One activity is very to extremely strongly favoured to another
9	One activity is extremely favoured to another

inconsistency. Inconsistency is real, but its value should not be too high. Otherwise, the evaluation is not accurate. The CR is used to assess the inconsistency of each level. If it is equal or lower than 0.1, it means that the decision maker's evaluation is relatively consistent. Otherwise, re-evaluation of relevant level should be carried out. The CR was calculated as a ratio of consistency index (CI) divided by random index. Table 4 presents the random CI.

4. RESULT AND DISCUSSION

The study's results in Table 5 support the dominant role of cognitive aspect in the composition of social capital compared to structural dimension as implied by Van Beuningen et al. (2013) in their research for the Netherlands. Trust shares 60% of the index while the proportion of network is 40%. Particular and general trust are equally important in the experts' view.

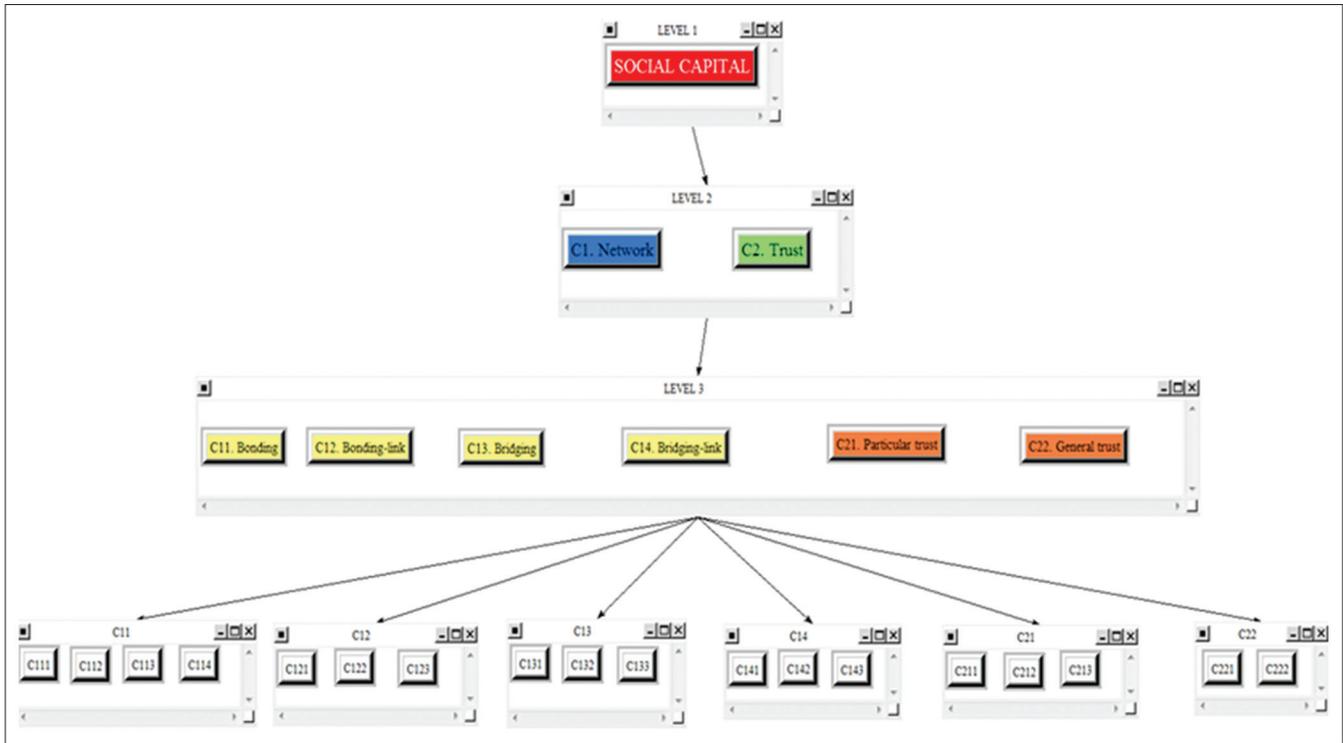**Figure 1:** Analytic hierarchy process modeling for social capital index

Table 3: Sample of pairwise comparison questionnaire

	C112 is equally to moderately more important than C111																	
1	C111	9	8	7	6	5	4	3	2	1	1/2	1/3	1/4	1/5	1/6	1/7	1/8	1/9	C112
2	C111	9	8	7	6	5	4	3	2	1	1/2	1/3	1/4	1/5	1/6	1/7	1/8	1/9	C113
3	C111	9	8	7	6	5	4	3	2	1	1/2	1/3	1/4	1/5	1/6	1/7	1/8	1/9	C114
4	C112	9	8	7	6	5	4	3	2	1	1/2	1/3	1/4	1/5	1/6	1/7	1/8	1/9	C113
5	C112	9	8	7	6	5	4	3	2	1	1/2	1/3	1/4	1/5	1/6	1/7	1/8	1/9	C114
6	C113	9	8	7	6	5	4	3	2	1	1/2	1/3	1/4	1/5	1/6	1/7	1/8	1/9	C114

Table 4: Random CI (Satty, 2012)

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49	1.51	1.54	1.56	1.57	1.58

CI: Consistency index

Table 5: Weight coefficients

GOAL	Component	Weight	Factor	Weight	Attribute	Score
Social capital index	Network (C1)	0.40	Bonding (C11)	0.0798	C111	0.1237
					C112	0.1732
					C113	0.6621
					C114	0.0409
			Bonding-link (C12)	0.0404	C121	0.7703
					C122	0.0679
					C123	0.1618
			Bridging (C13)	0.2253	C131	0.7085
					C132	0.2311
					C133	0.0604
			Bridging-link (C14)	0.6544	C141	0.0643
					C142	0.6986
					C143	0.2371
	Trust (C2)	Trust 0.60	Particular trust (C21)	0.500	C211	0.0603
					C212	0.7085
					C213	0.2312
			General trust (C22)	0.500	C221	0.500
					C222	0.500

Among the four dimensions of the network, the weight of bridging-link is the largest (0.65), followed by bridging (0.22). Bonding-link and bonding are less important with the weights of 0.04 and 0.07 respectively. The findings suggest mathematical values which can be a reference for social capital assessments in Vietnam context.

5. CONCLUSION

The AHP is the best tool for priorities ranking in multivariate environments. It can be served as a descriptive model for further testing. In Vietnam, not many studies have explored the measurement model of social capital. Hence, this study contributes to suggest the important level of social capital indicators after literature review and experts' consultation. This is a motivation for the further empirical test with other methodologies so that proper strategies can be recommended to effectively explore this resource for individual and community development.

REFERENCES

Adam, F., Rončević, B. (2003), Social capital: Recent debates and research trends. Social Science Information, 42(2), 155-183.

Putnam, R.D. (2000), Bowling Alone: The Collapse and Revival of American Community. New York: Simon and Schuster.

Loury, G. (1992), The economics of discrimination: Getting to the core of the problem. Harvard Journal for African American Public Policy, 1(1), 91-110.

Lin, N. (1999), Building a network theory of social capital. Connections, 22(1), 28-51.

Kilpatrick, S., Field, J., Falk, I. (2003), Social capital: An analytical tool for exploring lifelong learning and community development. British Educational Research Journal, 29(3), 417-433.

Fukuyama, F. (1995), Trust: The Social Virtues and the Creation of Prosperity. New York: Free Press.

Babaei, H., Ahmad, N., Gill, S.S. (2012), Bonding, bridging and linking social capital and empowerment among squatter settlements in Tehran, Iran. World Applied Sciences Journal, 17(1), 119-126.

Dolfsma, W., Dannreuther, C. (2003), Subjects and boundaries: Contesting social capital-based policies. Journal of Economic Issues, 37(2), 405-413.

Wagner, F. (2014), Trust: The secret to happiness? Exploring social capital and subjective well-being among immigrants. Applied Social Research Journal. Available from: http://paa2014.princeton.edu/papers/142867.

Quoc, D., Thomas, D., Gertrud, B. (2012), Do connection matter? Individual social capital constraints in Vietnam. European Journal of Development Research, 24, 337-358.