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Measuring Social Capital in the Republic of Korea with Mixed Methods: Application of Factor Analysis and Fuzzy-Set Ideal Type Approach

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Abstract Variation in the concept of social capital casts difficulties in measurements; moreover, measuring social capital requires different methods because concepts can differ by countries, regions and also according to the conceptual attributes included in the concept. Discussion on social capital has been gaining much attention in also East Asia, where Confucianism and family oriented values are suggested to be an important cultural background. This study aims to first critically review research on social capital not only in Korea, but also elsewhere, with a focus on measurements and indicators. By highlighting the importance of developing measurement that can reflect the cultural context of social capital, we compose survey questionnaires, which include multiple aspects of social capital and conduct an investigation on Korean social capital. Then, we exploit factor analysis with these questions. Next, with results from the factor analysis above, we employ the method of fuzzy set ideal type approach in order to measure social capital in Korea according to different demographic groups. The results suggest that people with low education and low income have difficulties participating in the society through interactions, even when their trust toward the society and their consciousness regarding the norm are similar to those of the other groups in Korea.

Keywords Social capital · Republic of Korea · Mixed methods · Factor analysis · Fuzzy-set ideal type approach

1 Introduction

Recently, social capital in particular has received much attention in Korea. Although researchers differ in defining the concept of social capital, social capital is commonly

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understood as resources from relationships among people or society (Bourdieu 1986; Coleman 1988; Putnam 1993; Burt 2007). (Burt 2000) highlights the importance of networks within and between groups and suggests that networks do not simply imply the number of connections people have, but those that develop into social capital. That is, people who have well-connected networks have advantages in forming social capital. (Fukuyama 1995) also stresses that the increase of crime, family disorganization an outrage against public morality in Japan have been due to a decrease in social capital. Putnam (1993) also addresses that the vitality of community, volunteer activity and trust seems to have decreased due to growing individualism, suggesting the need for government intervention in forming social capital. Therefore, continuing social participation as well as establishing networks are important aspects of social capital for personal benefit and community prosperity (Chung et al. 2012).

However, not everyone has an identical level of social capital and an individual's social capital may differ depending on the time period of the life cycle in which he or she is in. This is because the degree and the characteristics of social capital are affected by different time periods even within one person's life cycle. Accordingly, social capital of different demographic groups, such as youth, mid-age adults and the elderly, can have different characteristics; hence, conceptual attributes of social capital can vary as well (Lewis 1976). For example, the possibility of a decrease in human capital or social capital is higher late in life due to the exclusion from education and training programs, retirement, death of spouse and friends, etc. (Chang 2011; Chung et al. 2012).

Measurements for social capital vary among countries, regions, organizations and researchers. Conceptual attributes in the measuring methods are also different, and whether to emphasize more on the conceptual importance or on the possible empirical measurement is a dilemma that scholars face in their social capital research (Hong et al. 2007). It is difficult to come to a consensus on the concept of social capital and accordingly, it is questionable as to whether there is consistency for which dimensions of social capital are considered important for measurement. Measuring social capital should consider the environmental context of social capital, reflecting the characteristics of the society and cultural factors.

Social capital in the Republic of Korea (Korea hereafter) has been investigated from multiple disciplinary as well. However, a number of studies examining social capital in Korea presents a limitation in fully representing the cultural characteristics of the Korean society; further, it also presents their limitations by measuring one aspect of social capital rather than measuring various dimensions (Hong et al. 2007; Kim 2004; Lee et al. 2011; Park 2002). In addition, the relationship between a person's life cycle and changes in social capital in Korea has not been studied fully; hence, there is a lack of research on Korean social capital according to different demographic groups.

Against this background, this study aims to first critically review the literature on social capital with a focus on measurements and indicators examining social capital. By highlighting the importance of developing measurement that can reflect the cultural context of social capital, we compose survey questionnaires which include multiple aspects of social capital and employ the questionnaire in order conduct an investigation on Korean social capital. Then, we exploit the factor analysis with these questions. In order to investigate the factor patterns of the selected dimensions of social capital, an exploratory factor analysis is further executed. Subsequently, with the results from the factor analysis above, we employ a fuzzy-set ideal type approach in order to measure social capital for different demographic groups in Korea.

2 Social Capital

2.1 Definitions and Perspectives

Capital is commonly divided into corporeal capital, human capital, social capital and cultural capital. The concept of social capital was first introduced by (Hanifan 1916), but a more academic investigation on the concept started from the late 1980s. Prominent scholars who discussed social capital include (Bourdieu 1986; Burt 2000, 2007; Coleman 1988; Putnam 1993), all of who made contributions for concreting the concept of social capital. More recently, social capital has been widely examined with different concepts and methods in various disciplines (Kim 2004; Knorringa and Van Staveren 2006; Park 2002; Portes 1998).

Social capital is defined as "the aggregate of the actual of potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition (Bourdieu 1986: 51)," whereas Putnam (1993: 167) refers social capital to "features of social organization, such as trust, norms, and networks." According to Coleman (1988: 98), social capital is defined by its function; he suggests that "it is not a single entity but a variety of different entities, its two elements in common: they all consist of some aspect of social structures, and they facilitate certain action of actors- whether persons of corporate actors-within the structure." Burt (2000) positioned the network structure of social capital as protection within closed networks and brokerage across structural holes. He emphasized that social capital is more of a function of brokerage than closure. Although scholars define social capital in various ways by emphasizing different aspects of social capital, we can suggest that social capital is a set of resource, which is created when individuals formulate social relationships and that this set of resource can enhance individuals' efficiency.

As shown in Table 1, there are two different views in explaining social capital. The first perspective focuses more on the structural aspects of social capital, highlighting the importance of objectivity (Van Deth 2003; Van Oorschot et al. 2006). The other perspective emphasizes the cultural aspect of social capital, which can be more subjective. The former perspectives are most famously suggested by Coleman (1988) and Bourdieu (1986). Social capital refers to connections or networks, and this perspective gives more attention to the micro-level. The second perspective is suggested by Putnam (1993) and Fukuyama (1995), who both focus more on the macro aspects, such as obligations or social norms and values and trust. The micro approach suggests that the level of social capital varies according to the size of the social network which an individual can utilize as well as by the amount of capital which the connected individuals possess (Bourdieu 1986). However, literatures with macro approaches highlight trust and civic cooperation, associational activity, and trust and norms of civic cooperation as important aspects of social capital (Knack and Keefer 1997). In sum, social capital should be examined not only by the characteristics of individuals and their relationships, but also as a property of region and society (Table 1).

Despite the given attention on social capital, the concept of social capital has not been sufficiently discussed in order to be investigated empirically with a quantitative analysis. Studies on social capital have been criticized for their limitation in generalization, suggesting that literature lacks rigorousness in their analysis (Van Oorschot et al. 2006). However, measuring social capital by abiding to its ontological meaning is challenging because the concept of social capital has multiple aspects, dimensions, characteristics and

Table 1 Perspectives on social capital

Perspectives	Focus	Scholars	Level of attention
Structural	Objectivity	Coleman (1988), Bourdieu (1986), Burt (2000)	Connection or network (micro)
Cultural	Subjective	Putnam (1993), (Fukuyama 1995)	Obligations or social norms and values and trust (macro)

associations with the embedded societal context, further leading to controversy regarding its applicability for empirical analysis.

2.2 Measurement Issues

The measuring method of social capital can vary according to different conceptual attributes included in the concept. The most common conceptual attributes, such as trust, norms, networks (Coleman 1988; Grootaert and Bastelare 2002; Putnam 1993, 2000) and participation at the regional level and political participation (Grootaert 1998; Putnam 2000; Rohe 2004) are included as conceptual attributes of social capital. However, most of the empirical analyses examine only a single aspect of these attributes separately rather than examining all attributes of social capital together.

Further, conceptual attributes of social capital can be categorized by many different levels of analysis, such as international, national, community and organizational levels. Comparative analyses on social capital have been conducted mostly by international organizations, such as the Organization for Economic Cooperation and Development (OECD) and the World Bank. (OECD 2001) includes 'trust and membership in associations' as one category of the World Value Survey. World Value Studies have been used to test the willingness of respondents to trust others; respondents are asked "Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?" (OECD 2001). The study suggests that trust and civil participation are related to each other. In addition, the World Bank developed 'The Integrated Questionnaire for the Measurement of Social Capital (SC-IQ)' and divided social capital into six sub categories; groups and networks, trust and solidarity, collective action and cooperation, information and communication, social cohesion and inclusion, and empowerment and political action. Social capital is calculated by combining the scores from all subcategories (Grootaert et al. 2004).

When examining the different measurements between countries, aspects, such as civil society participation, participation in voluntary work and political participation, are highlighted as important factors of social capital, particularly in the case of the United States; scholars studying the case in Europe focus more on the network (Hong et al. 2007). Putnam (2000) developed the 'Social Capital Community Benchmark Survey (SCCBS)' in the United States. SCCBS is a survey on social capital conducted with one of the largest sizes of American population with scientific measurements. It includes eight aspects when measuring social capital; trust, diversity of friends, political participation, citizen leadership and associational involvement, informal socializing, giving and volunteering, faith-based engagement, and equality of civic engagement across the community.

In Europe, the Office for National Statistics (ONS) in the United Kingdom developed a 'Harmonized Question Set'(Cote and Healy 2001), which includes five aspects, such as social participation, social networks and social support, reciprocity and trust, civic

participation and views of the local area. Among these five aspects, 'social participation' and 'social networks and social support' examine individual levels, while the remaining other aspects examine civil society dimensions (Harper and Kelly 2003).

In Korea, social capital has been studied by adopting the suggested aspects of social capital with reference to literature on social capital in the US or Europe. From the early 2000s, scholars from the discipline of public administration and sociology began to investigate social capital in Korea, which later expanded to the disciplines of education, social welfare and social policy, with many attempts to develop better measurement methods. (Choi 2004) develops an index which considers both Putnam's concept of social capital and the World Bank's social capital index to measure social capital in Korea. This index also attempts to reflect the country's regional and cultural characteristics of Korea. However, this study only investigates social capital among professionals, which reveals its limitation for not representing the general population. (Hong et al. 2007) investigate social capital by examining social participation and civil consciousness, trust, network and partnership. This study, which is from the discipline of education, is contributive to the literature as it examines social capital at the micro-level, meso-level and macro-level. It also includes categories from the OECD social capital measurement index, which makes the index employable for international comparative research on social capital. However, the measurement index does not successfully reflect Korea's contextual characteristics, as only parents of elementary school students who are between 30 and 40 are investigated. Due to the fact that the investigated population is confined to certain group of people, it does not provide information on the general public. (Choi et al. 2010) attempt to develop a measurement for social capital in order to understand how to facilitate community welfare; they include 'trust', 'norms' and 'network' as subcategories of social capital. This measurement is useful as it is one of the first social capital indexes in Korea which can be utilized for research on community welfare service and welfare policy. However, the study also has its limitation in not fully recognizing the organizational characteristics of communities and the characteristics of individuals participating in them (Moon 2011).

The literature reviewed above suggests that measuring social capital summarized in Table 2, can vary according to different countries and regions since social capital ideally should reflect the societal environment. Also, depending on how social capital is defined, the method of measuring social capital can be different. Social participation, trust, norm and network are most commonly suggested as conceptual attributes of social capital (Choi et al. 2010). This paper includes these four subcategories in social capital measurement and investigates the degree of social capital in Korea.

3 Methods

3.1 Mixed-Method Analysis: Factor Analysis and Fuzzy-Set Ideal Type Approach

Recognizing the limitations from previous literature as discussed above, this study constructed a survey questionnaire by selecting questions from previous studies measuring social capital as explained above. We selected questions that would reflect the context of the Korean society. In order to investigate the factor patterns of the dimensions of social capital (social participation, trust, norms and networks), the exploratory factor analysis is executed. The principal axis method is used to solve the factor analysis equations. The factors, which are derived through the principal axis method, are rotated by an orthogonal rotation algorithm in order to increase the clarity of interpretation on factor patterns. The

Table 2 Measuring attributes of social capital

Name of organization or country	Name of measurement and/or authors	Measuring attributes
OECD (2001)	World Value Survey	Trust, membership
World Bank (2003)	The Integrated Questionnaire for the Measurement of Social Capital ('SC-IQ')	Groups and networks, trust and solidarity, collective action and cooperation, information and communication, social cohesion and inclusion, empowerment and political action
United States	Social Capital Community Benchmark Survey (SCCBS) - Putnam (2000)	Trust, diversity of friends, political participation, citizen leadership and associational involvement, informal socializing, giving and volunteering, faith-based engagement, equality of civic engagement
United Kingdom	'Harmonized Question Set' Office for National Statistics (ONS)	Social participation, social networks and social support, reciprocity and trust, civic participation, and views of the local area
Korea	Choi (2004)	Developed Putnam's concept and World Bank's social capital index
	Hong et al. (2007)	Social participation and civil consciousness, trust, network and partnership, categories from the OECD social capital measurement index
	Choi et al. (2010)	Trust, norms, network

numbers of factor are determined based on the eigenvalue, cumulative percentage, the scree plot, and Tucker-Lewis Indication. Recognizing the limitation of both the eigenvalue and scree plot in determining the number of factors due to their subjective nature, Tucker-Lewis Indication is produced using the maximum likelihood method while fixing the number of factors, as it is selected from the previous stage. As an indication for the goodness of fit, TLI can successfully complement the limitations of eigenvalue and scree plot in determining the factor numbers.

Second, with the results from the factor analysis above, we employ the method of fuzzy-set ideal type approach in order to measure and compare social capital in Korea for different demographic groups. The ideal type approach exploits the notion of fuzzy sets, establishing a degree of membership (Kvist 1999). In the fuzzy logic, the fuzzy truth represents the membership in sets, which are defined by the researcher by establishing the qualitative breakpoints of 1 and 0. Between these break points, the cases are given a fuzzy membership score, which is determined by the researcher's qualitative knowledge on the case. Fuzzy-set ideal type approach permits the scaling of the membership score and allows partial membership; moreover, calibration itself is pertinent for this study as it allows us to measure the qualitative concepts quantitatively (Ragin 2007). A case can have a fuzzy membership value for the conceptual attributes of social capital that we are measuring. For example, a conceptual attribute, social participation, can be calibrated into 0 from 1 and we can examine and compare the fuzzy-set membership score of different demographic groups. When interpreting the membership scores, the fuzzy set ideal type approach is utilized. Membership score 1 indicates that a case is fully in the ideal type of that

dimension; membership score 0 indicates that a case is fully out of the ideal type, and 0.5 is the crossover point for a case to be fairly in or out of the type. That is, if the low income demographic group has a membership score of 0.2 for social participation, the score represents that the low income group in Korea is close to 'fully out' of the ideal type of social participation.

This paper combines the two methods explained above sequentially, factor analysis and fuzzy-set ideal type approach. We first conduct a factor analysis with the questions from the survey questionnaire and investigate how the questions are loaded in each four factors. With the result from the factor analysis, we return to the most associated questions and calibrate the conceptual attributes (dimensions) of social capital with a fuzzy-set ideal type approach.

3.2 Study Participants and Data Collection

A survey research method is used in order to collect the data for this study. Study participants are recruited using a multi-stage-quota sampling method. At the first stage, large administrative districts, such as the largest seven metropolitan cities, including Seoul, and eight provinces were selected. At the second stage, smaller administrative districts are randomly chosen. At the final stage, a total of 1,216 respondents (594 for men and 622 for women, 405 for each of three age groups of 20–44; 45–64; and older than 65) are selected for this study. Data are collected from Feb. to Mar. of 2012 by trained interviewers. Participants are categorized into different demographic groups. We included socio-demographic variables, such as gender (0 = male, 1 = female), age (0 = 20–44; 1 = 45–64; 2 = 65+), education (0 = primary education or less; 1 = secondary education; 2 = college graduate or more), income level (0 = < 1,500,000 won, 1 = 1,500,000 < 3,500,000 won, 2 = more than 3,500,000 won) and employment status (0 = unemployed; 1 = employed). Income level is divided based on the average income levels in Korea (average household income by quintiles in Korea in year 2012 is between approximately 1,200,000 won and 7,900,000 won) and income distribution (more of the populations are concentrated toward the lower end than the higher end of the income distribution) (KOSIS 2013).

3.3 Measures

3.3.1 Social Participation

Micro level social participation is investigated using questionnaires from the 'Korea Social Capital Report (Kim et al. 2009) and from the social exclusion study by (Kim et al. 2008). Based on the two studies, 10 questions were developed using the Likert scale with five levels. The higher the score is, the higher the level of social participation is. For example, we ask how many times participants participate in a holiday with family members, family anniversary or family events, shopping with family members, holidays with friends or neighbors and anniversary or events with friends or neighbors (see Table 3 for details on questionnaires).

Macro level social participation is measured by adopting nine questions from the World Value Survey (OECD 2001) and nine questions from the English Longitudinal Study of Aging (ELSA) on social exclusion. Questions are answered utilizing a Likert scale with five levels; a higher score represents a higher level of social participation (see Table 4 for details on questionnaires).

Table 3 Results of factor analysis for variables on micro-level social participation

	Social participation with friends or neighbors	Social participation with family members
Holiday with family members	0.17602	**0.74713**
Family Anniversary or family events	0.08941	**0.51420**
Shopping with family members	0.04308	**0.64709**
Religious activities with family members	0.07844	0.24978
Daily life with family members	0.34086	**0.44232**
Holiday with friends or neighbors	**0.40652**	0.32170
Anniversary or events with friends or neighbors	**0.42496**	0.29242
Routinely meetings with friends or neighbors	**0.85295**	0.15150
Phone conversation with friends or neighbors	**0.87147**	0.03329
General meeting with friends or neighbors	**0.75048**	0.15691

Values in bold indicate Factor Loading > 0.03

Table 4 Results of factor analysis for variables on macro-level social participation

	Factor 1	Factor 2	Factor 3
Hobbies • leisure organizations	−0.01849	**0.50581**	0.15273
Art, music, or education and cultural activities, organizations	0.11907	**0.52194**	0.16440
Religious body	0.02211	0.07529	0.04826
Labor organizations	−0.00889	0.09795	**0.54856**
Political Organizations	0.15189	−0.01929	**0.40356**
Environmental protection organizations	**0.73267**	0.06897	0.34438
Professional Association	0.42226	0.04118	**0.42426**
Human rights or charity organizations	**0.71728**	0.17549	0.16726
Interest groups andcivil society activities	**0.68855**	0.20095	0.06543
Profit organizations	**0.72833**	0.12555	0.18823
Consumer protection agency	**0.53070**	0.15353	0.11184
Fellowship meeting	0.03723	0.17970	−0.05018
Alumni meetings	0.05859	**0.30627**	0.00024
Online social gatherings	0.12057	0.17407	0.04569
Social gatherings	0.08511	**0.32580**	0.10392
Other types of organizations, clubs or social organizations	0.25358	**0.41071**	0.22281
Residents meetings, community night guards	0.14493	0.21088	−0.00959
Volunteering	0.31288	**0.32599**	−0.02466

Values in bold indicate Factor Loading > 0.03

3.3.2 Trust

Individual level trust is measured using seven questions from World Value Survey (OECD 2001), and the questions are answered using a Likert scale with five levels. A higher score represents a higher level of trust (see Table 5 for details on questionnaires).

Table 5 Results of factor analysis for variables on individual level trust

		Factor 1	Factor 2
1	Family	−0.1438	**0.57246**
2	Friend	0.07379	**0.69738**
3	Neighborhood	0.28605	**0.56807**
4	Coworkers	0.26851	0.26879
5	Acquaintance	**0.59834**	0.25887
6	Stranger (who are Korean)	**0.93861**	−0.00468
7	Stranger (who are foreign)	**0.84728**	−0.06761

Values in bold indicate Factor Loading > 0.03

Table 6 Results of factor analysis for variables on trust towards social institutions

		Factor 1
1	Economic institutions	**0.72526**
2	Judicial system	**0.68262**
3	Education system	**0.63356**
4	Political institutions	**0.72447**
5	Union	**0.66652**
6	Conglomerates	**0.66131**
7	Police	**0.59930**
8	School	**0.49440**
9	Congress	**0.73511**
10	Political party	**0.70303**
11	SNS	**0.38113**

Values in bold indicate Factor Loading > 0.03

Trust toward social institutions is also investigated based on the questions from World Value Survey (OECD 2001) investigates individuals' trust toward ten institutions, such as economic institutions, laws, labor unions, large companies, etc. We also include trust toward SNS (Social network service) and investigate trust forma total of eleven institutions. We include SNS in order to reflect Korea's socioeconomic context of strong IT infrastructure and high usage of SNS for social communication. Questions are answered using a Likert scale with five levels; a higher score represents a higher level of trust (see Table 6 for details on questionnaires).

3.3.3 Norms

Questions regarding norms are retrieved from the study on social capital index by Kim et al. (2009), which include six questions on public consciousness. We adopt these 6 questions and answer them using the Likert scale with five levels. A higher score represents a higher level of agreement. For example, we ask the participants how much they agree with the following statement: people obey the law, implementation of law is fair, people obey public regulations, etc. (see Table 7 for details on questionnaires).

3.3.4 Networks

The level of networks is investigated with nine questions including questions on how many individuals are considered as those who can help the respondents. Categories of different

Table 7 Results of factor analysis for variables on social norms

		Factor 1	Factor 2
1	People obey the law	**0.83452**	−0.03691
2	Implementation of law in Korea is fair	**0.55893**	−0.07835
3	People obey public regulations	**0.56346**	−0.10293
4	People frequently use public facilities or roads in unauthorized way	−0.07300	**0.55952**
5	People use of public facilities carelessly	−0.04337	**0.73472**
6	People's tax evasion is serious	−0.09561	**0.54537**

Values in bold indicate Factor Loading > 0.03

Table 8 Results of factor analysis for variables on network

	Factor 1
Family members	0.04559
Relatives	**0.57358**
Coworkers	0.17537
Groups/Churches	**0.42518**
Friend	**0.57180**
Neighborhood	**0.38038**
Professional help	0.04719
Online space	−0.00887
Etc.	0.00000

Values in bold indicate Factor Loading > 0.03

groups of people and kinds of networks are adopted from the Social network assessment list by (Chung 2005). Different groups include family, relatives, work colleagues, religious groups and neighbors. We ask for the number of people that the respondents consider either giving or receiving help (see Table 8 for details on questionnaires).

4 Results

4.1 Findings from the Factor Analysis

4.1.1 Social Participation

After exploiting the factor analysis with 10 selected questions inquiring about micro-level social participation, three common factors are suggested with the eigenvalue of above 1. The first factor's eigenvalue is 3.62, which explains 36 % of the micro-level social participation. The second factor has an eigenvalue of 0.64, which together with the first factor explains 52 % of the micro-level social participation. After analyzing the eigenvalue, accumulated explanatory variance and scree table, we suggest that micro-level social participation is composed of two factors. Then, TLI is produced using a maximum likelihood method by fixing the number of factors as being chosen.

A model with one factor had a rather low level of TIL values, 0.56; however, when we consider the two factors in the model, the TLI value increases to 0.76. Therefore, we conclude that there are two factors explaining micro-level social participation.

In order to investigate the factorial structure, we fix the number of factors to two and reemploy the factor analysis using the method of maximum likelihood. As summarized in Table 3, the factor loadings of 'holiday with family members', 'family anniversary or family events', 'shopping with family members' and 'daily life with family members' are 0.74, 0.51, 0.64 and 0.44 respectively. Factor loadings of 'holiday with friends or neighbors', 'anniversary or events with friends or neighbors', 'routinely meetings with friends or neighbors', 'phone conversation with friends or neighbors' and 'general meeting with friends or neighbors' are 0.40, 0.42, 0.85, 0.87 and 0.75, respectively, in the second factor. The factor loading 'religious activities with family members' is not loaded in any factor. The first factor is named as 'social participation with family members' and the second factor is named as 'social participation with friends or neighbors'. The first factor has a Cronbach's α value of 0.75, Mcdonald's ω value of 0.79; and the second factor's α value is 0.63 and the Mcdonald's ω value is 0.71, suggesting that both results are reliable.

We exploit the exploratory factor analysis with 18 selected questions investigating macro-level social participation; there are seven factors with an eigenvalue above 1. The first factor's eigenvalue is 4.11, which explains 22 % of micro-level social participation, and the second factor's eigenvalue is 1.58, explaining 31 % of such participation. The third factor has an eigenvalue of 1.32, and together with the first two factors explains 39 % of macro-level social participation. Considering the eigenvalue, accumulated explanatory variance and scree table, three factors are found to represent the macro-level social participation. Based on this, we examine the factors again using the method of maximum likelihood. The TLI value with one factor is 0.72, and that of the two factors is 0.79. Lastly, the TLI value is the highest, 0.82, when the number of factors is fixed to three factors. Therefore, we can suggest that 18 questions inquiring macro-level social participation are explained by the three factors.

The results from reemploying the factor analysis using the method of maximum likelihood by setting the number of factors to three factors are summarized in Table 4. Environmental protection group activities (0.73), human rights charities activities (0.71), interest groups and civil society activities (0.68), profit organizations activities (0.72) and consumer protection organizations activities (0.53) are loaded in the first factor; we name this first factor 'public interest group activities'. Five questions, which are loaded in the first factor, have a relatively high Cronbach's α value of 0.83 and Mcdonald's ω value of 0.85, suggesting this factor is reliable. 6 questions—hobbies leisure group activities (0.50), cultural organizations and activities (0.51), alumni association activities (0.30), social gathering activities (0.32), social group activities (0.40) and volunteering (0.32)—are loaded in the second factor. We name this factor 'fellowship and hobby activities'; however, Cronbach's α value is relatively low at 0.55 and Mcdonald's ω value at 0.61, suggesting this factor is relatively acceptable. Labor organization activities (0.54), political activity (0.40) and professional association activities (0.42) are loaded in the third factor, and we name this factor 'ideological group activities'. Cronbach's α value of questions regarding ideological group activities is 0.45 and Mcdonald's ω value is 0.55, which are low. Religious organizations activities and social gatherings activity are not loaded in any of the three factors. However, considering the low level of Cronbach's α value and Mcdonald's ω value, we disregard this factor.

4.1.2 Trust

After exploiting the factor analysis with 7 selected questions inquiring about individual level trust, two common factors are suggested with eigenvalues above 1. The two factors

together explain 61 % of the variance in 'Individual level trust'. Considering the eigenvalue, accumulated explanatory variance and scree table, two factors are found representing individual-level trust. The TLI value for the model with two factors is 0.94, suggesting high goodness of fit. Specifically, the seven questions on individual level trust have two factors that are suggested to be related.

Fixing the factors to two, we conduct the factor analysis again. Acquaintance, strangers who are Korean and strangers who are foreign are loaded in the first factor with factor loadings 0.59, 0.93 and 0.84, respectively. We name this first factor 'distant trust', and the reliability is relatively high with a Cronbach's α value of 0.82 and Mcdonald's ω value of 0.84. Family, friends and neighborhood are loaded in the second factor with factor loadings of 0.57, 0.69 and 0.56, respectively. We name this factor 'close trust' and its Cronbach's α value is 0.62 and Mcdonald's ω value is 0.64. We exclude trust toward 'coworkers' as it is not loaded in any of the two factors.

Two factors are suggested with eigenvalues above 1 from the 11 questions inquiring about trust toward social institutions. Two factors together explain 56 % of the variance in 'trust toward social institutions'. However, after examining the eigenvalues and scree table, we selected only one factor. With this one factor, we exploited the factor analysis again; the TLI value is 0.80, suggesting that questions regarding 'trust toward social institutions' are related to a single factor. The 11 questions are all successfully loaded, as shown in Table 6. Factor loadings are between 0.38 and 0.72. We name this factor 'institutional trust'; Cronbach's α value is 0.88 and Mcdonald's ω value is 0.91, which are relatively high.

4.1.3 Norms

Two factors are retrieved with eigenvalues above 1 from the 6 questions inquiring on norms; the two factors together explain 60 % of the variance in 'norms'. Based on the eigenvalue and scree table, the two factors are finally suggested. The model with two factors has a TLI value of 0.96, concluding that the 'norm' consists of two factors. Confining the number of factors to two, we conduct the factor analysis again with the method of maximum likelihood. Factor loadings of 'People obey the law', 'Implementation of law is fair' and 'People obey public regulations' are 0.83, 0.55 and 0.56, respectively. These three are loaded in the first factor, which we name as 'law abiding consciousness'; Cronbach's α value is 0.67 and Mcdonald's ω value is 0.72. 'Frequent unauthorized use of public facilities or roads', 'careless use of public facilities' and 'tax evasion is serious' are loaded in the second factor with factor loadings of 0.55, 0.73 and 0.54, respectively. We name this second factor 'civil consciousness'; Cronbach's α value is 0.64 and Mcdonald's ω value is 0.69, suggesting its reliability.

4.1.4 Network

Three factors with eigenvalues above 1 are suggested from the 9 questions inquiring about the network. Three factors explain 50 % of the variance in the network. However, considering the eigenvalues and scree table, we conclude that only one factor can be suggested from the network.

Conducting the factor analysis again with a single factor, we find that the factor loadings of 'Relatives', 'Groups/Churches' and 'Friends and Neighborhood' are 0.57, 0.42, 0.57 and 0.38, respectively. However, the reliability is low since Cronbach's α is 0.44 and Mcdonald's ω value is 0.48. 'Professional', 'coworkers' and 'Family members' are not

loaded (Table 8). Because both Cronbach's α value and Mcdonald's ω value are too low, we disregard this factor in the final analysis.

4.2 Findings from Fuzzy-Set Ideal Type Approach

As explained above, we combine the two methods, factor analysis and fuzzy-set ideal type approach, by calibrating the conceptual attributes of social capital, which the factor analysis above suggests. For example, two factors are suggested to represent the attribute of 'social participation' from the factor analysis. We select questions which are most related with the suggested latent factor, and return to the original questionnaire's survey question. Each selected question, which represents the factor suggested by the factor analysis, is considered to represent the conceptual attributes.

For the calibration, the 'fully in' is set as the maximum value from each question and the 'fully out' is the minimum value. For example, when examining the micro-level social participation, we return to the related question; 'how many participate in the following activities?'. This question has 10 sub categories which can be answered from a score of 1(very rarely) to 5 (very actively) (see Table 3 for the sub categories). Results from the factor analysis suggests that 'Holiday with family members', 'Family Anniversary or family events', 'Shopping with family members' and 'Daily life with family members' are included in the factor, which we named 'social participation with family members'. For macro-level social participation, we ask 'how often do you participate in the following society or organizations?' and the question also has 18 sub categories as in Table 4. Generation of the score and calibration method is the same as above.

Similarly, two factors, that is 'individual trust' and 'trust towards social institutions', are suggested to represent 'trust' from the factor analysis, and we return to the questions most related with the factor. For example, a question on 'individual trust' asks 'how much do you trust the following person/people?' and the question has seven subcategories, as in Table 5, using a scale of 1–5. For 'trust towards social institutions', we ask 'how much do you trust the following institutions?' and the questions has subcategories as Table 6. Respondents can answer on a scale from 1 to 5.

Regarding norms, we ask 'how much do you agree on the following statement on people's awareness on public norms?'. The respondents can reply that they agree or not on a scale from 1 to 5 in the statements listed on Table 7. The 5 subcategories were differently loaded into either 'law abiding consciousness' or 'civil consciousness'.

From the questions above, we generate fuzzy-set scores for each factor. The sum of the scores from all selected categories, which is the maximum value (for example, for 'micro level participation', respondents replying that they fully participate in each category), has a fuzzy-set score 1, and that of a minimum value 0 (respondents replying that they do not participate at all in all groups) has a fuzzy-set score 0. The crossover point 0.5 is set to be the average value. With this calibration standard, we examine each demographic group's fuzzy-set score to compare the level of social capital between groups. The fuzzy-set scores for all factors are presented in Table 9.

We examine different demographic groups by age, gender, education level and income level divided as explained in the early part of this paper. Each conceptual attribute—here each factor from the factor analysis- constructs a set with calibration from 0 to 1, and different demographic groups have fuzzy-set membership scores for each conceptual attribute. For example, the group of Koreans with primary education or lower have a fuzzy-set score 0.53 for law abiding consciousness, while the score is 0.05 for social participation in 'public interest group activities'.

Table 9 Fuzzy-set scores of social capital in Korea

	Social Participation				Trust			Norms	
	Micro-level social participation		Macro-levels social participation		Individual level trust		Trust towards social institute-ions	Law abiding consciousness	Civil consciousness'
	Social participa-tion with family members	Social participa-tion with friends or neighbors	Public interest group activities	Fellow-ship and hobby activities	Distant trust	Close trust			
Gender									
Male ($N = 580$)	0.49	0.47	0.5	0.51	0.5	0.49	0.48	0.49	0.49
Female ($N = 595$)	0.52	0.56	0.28	0.43	0.49	0.52	0.51	0.51	0.5
Age									
20–44 ($N = 392$)	0.6	0.61	0.5	0.53	0.5	0.5	0.49	0.49	0.5
45–64 ($N = 397$)	0.52	0.59	0.33	0.51	0.51	0.54	0.49	0.5	0.48
65 + ($N = 386$)	0.42	0.4	0.2	0.27	0.48	0.49	0.52	0.51	0.51
Education									
Primary or lower ($N = 194$)	0.39	0.35	0.05	0.15	0.48	0.5	0.54	0.53	0.52
Secondary ($N = 657$)	0.52	0.52	0.5	0.5	0.49	0.5	0.48	0.49	0.49
College and above (N = 324)	0.57	0.64	0.5	0.53	0.52	0.51	0.51	0.5	0.49
Income level									
Low ($N = 190$)	0.36	0.34	0.39	0.19	0.51	0.49	0.5	0.54	0.54
Middle ($N = 446$)	0.51	0.49	0.5	0.42	0.48	0.49	0.5	0.51	0.51

Table 9 continued

	Social Participation				Trust			Norms	
	Micro-level social participation		Macro-levels social participation		Individual level trust		Trust towards social institute-ions	Law abiding consciousness	Civil consciousness'
	Social participa-tion with family members	Social participa-tion with friends or neighbors	Public interest group activities	Fellow-ship and hobby activities	Distant trust	Close trust			
High ($N = 539$)	0.57	0.64	0.5	0.53	0.5	0.55	0.5	0.48	0.46
Employment									
Employed ($N = 663$)	0.5	0.52	0.5	0.51	0.51	0.51	0.49	0.49	0.5
Unemployed ($N = 512$)	0.5	0.49	0.39	0.41	0.47	0.5	0.51	0.51	0.5

As explained above, micro-level social participation and macro-level social participation, which are suggested to represent the conceptual attribute of 'social participation', are calibrated into fuzzy-set membership scores. More specifically, we can examine the degree of how much the selected demographic groups are 'fully in' or 'fully out' of the set of social participation ideal type. When examining the micro-level social participation, there are little differences among each demographic group mostly presenting fuzzy-set membership scores over 0.5 or close to the cross-over point. However, respondents with a primary or lower education level and those in the lower income group have membership scores lower than the cross-over point. The results regarding social participation is discussed further in the next section. For the macro-level social participation, people who are in a primary or lower education level and those in the lower income group have membership scores lower than the cross-over point. This result was similar in micro-level social participation. However, there are differences in gender and age variables. Female showed lower participation in public interest group activities and 65 and over groups have lower participation in both macro-level social participations.

Trust is divided into two subcategories of 'individual level trust' and 'trust towards social institutions'. Two factors are suggested for individual level trust, while one factor is found regarding 'trust towards social institutions'. Each factor is again calibrated into fuzzy-set scores; we then examine the membership score by different demographic groups. Koreans, in general, have an average level of 'trust' both in their private spheres and towards institutions. Also, we can examine that different demographic characteristics are not suggested to give an impact.

In the case of 'norms', two factors (law abiding consciousness and civil consciousness) are found and again, each factor is calibrated into fuzzy-set scores. Similar to 'trust', there are no significant differences between different demographic groups.

5 Discussion

This research measured social capital in Korea according to different demographic groups by employing the factor analysis and fuzzy-set ideal type approach. We particularly focused on certain aspects, such as 'social participation', 'trust', 'norms' and 'network'; moreover, questions inquiring each sub-concept were developed by considering the aspects of the Korean culture.

First, the results from the factor analysis suggest that micro-level social participation is composed of two factors; one is related to relations with family members and the other factor is social participation through friends and neighbors. In particular, the fact that family related participation is loaded in one factor separately from social participation with friends/neighbors suggests that the interactions with family members are active. This reflects the family oriented culture in Korea. Friends, family members and neighbors are usually composed together when social capital is examined in Western countries. Friends, family members and neighbors present a similar level of association with the suggested factor. However, the level of associations with 'family' and the suggested factor found in micro-level social participation can be different from other groups, such as friends and neighbor, when social capital is examined in different cultural backgrounds, as in this case, Korea.

Macro-level social participation is suggested to be related to two factors: public interest group activities, fellowship and hobby activities. It is noticeable that 'public interest group activities' is suggested separately as one factor of macro-level social participation,

considering the short history of civil society compared to other Western democratic countries. Also, 'ideological group activities' is not included as a factor for macro-level social participation. The short history has implications that ideological group activities may have not been institutionalized; yet, they have been constructed in order to be an important pathway for social participation in Korea compared to other western countries. For example, social capital measurement examining the United States includes political participation as an important factor. We can suggest that this result represents the societal context of the Korean people considering party participation as an area only for politicians.

Regarding individual level trust, distant trust and close trust are suggested to be reliable as associated factors. It is noticeable that trust toward coworkers is loaded in neither distant trust nor close trust. It can be suggested that although Korean workers spend the longest time with their coworkers, the relationship is different from those of 'individual level relationship'.

Trust toward social institutions is summarized with one factor. Considering that fact that Korea is one of the countries with the highest level of internet access and IT development; Korea ranks first in all OECD countries for fixed and wireless broadband subscription (OECD 2013), we included SNS as one of the institutions. The results regarding trust on institutions suggest that Koreans consider SNS as one of a social institution in the society.

The norm is suggested to be composed of 'law abiding consciousness' and 'civil consciousness'. The result suggests that Koreans recognize norms that are stated in the law separately from social norms, such as how individuals are expected to behave in the society.

Compared to the factor analysis, applying the fuzzy-set ideal type approach is found useful in examining how the characteristics of each demographic group may matter in explaining the social capital in Korea. Regarding the aspect of 'norm', we discovered that there are very little differences among different demographic groups both regarding law abiding consciousness and civil consciousness. Another aspect of social capital, trust, presents little difference among different demographic groups, which suggests that demographic characteristics have an effect on the level of people's trust neither at the individual level nor toward social institutions.

However, the degree of social participation varies according to different demographic groups. First of all, it is noticeable that the low level of macro-level social participation of females is different compared to males, whereas the degree of participation is similar for micro-level social participation. This indicates that Korean females are less engaged in public interest groups. Also, Koreans who are over the age of 65 have a very low fuzzy-set score for macro-level social participations when compared to the younger generation. The older the individuals are, the less the degree of macro-level social participation, such as participation in public interest group activities. Noticing that the degree of micro-level social participation shows very little difference between different age groups, we can suggest that females and the elderly in Korea participate less when it comes to a macro-level. In order to increase social capital of the elderly, some suggests that volunteer activities are found to be useful. Also, enhancing internet literacy of the elderly may be useful in the Korean context, where most information is provided as online sources.

Regarding the education level, both for micro- and macro-level social participation, we can examine that people with an education level lower than primary level do not actively participate. While fuzzy-set scores of groups with low education is low for most of the factors related to social participation, scores are especially lower in the case of macro-level social participation, being close to 0 in the case of public interest groups.

Furthermore, income level seems to have an association with the level of social participation. Middle income group and high income group both have a fuzzy-set score around

0.5 for both micro- and macro-level social participation; the low income group presents a low degree of participation for any kind of social participation. This result suggests that in Korea, it may be more likely for group of lower income people to stay socially excluded. Both micro-level participations, such as participation with family members, friends and neighbor, show as low participation in public interest groups, suggesting that once individuals are excluded for material reasons, it is difficult for them to gain help and resources through any social interactions, which may further confine them in poverty.

6 Conclusion

This paper developed a measure to examine the social capital in Korea by employing mixed methods. We first exploited the factor analysis and then the fuzzy-set ideal type approach to the outcomes with the factor analysis in order to better compare the difference between different demographic groups. We selected conceptual attributes of social capital, most commonly suggested from literature on social capital, and examined all subcategories instead of only examining the single aspects of social capital. Moreover, in order to reflect the cultural aspects of Korea, we deliberately added specific questions, such as inquiry related to SNS, which allowed us to better reflect the societal context of the Korean society. Investigating the common factor with the factor analysis, we found some factors which represent the unique characteristics of Korean social capital.

Fuzzy-set ideal type approach was found useful for its advantages in transforming information on the level of social capital of different demographic groups into a fuzzy-set score. Fuzzy-set scores of each factor (or sub conceptual attribute of social capital) by different demographic enhanced the comparability; we could examine the difference, similarity and characteristics of different demographic groups related to social capital. In Korea, age, income and education level are suggested to have more association with the level of social participation compared to other socioeconomic conditions such as gender and labor market participation. Most prominently, we found that the lower the income level and education level people have, the lower the social participation people have. The results suggest that people with low education and low income have difficulty in participating in the society through interactions, even when their trust toward the society and their consciousness regarding the norm is similar to those of the other groups. As suggested in most literature, this finding affirms that class barriers are the prominent divers of self-segregation and social participation in Korea.

This study contributes to the literature on social capital by developing measurements with a mixed method and by investing social capital in Korea with a large number of participants from various socioeconomic backgrounds. In future research, more specific components in the investigation of social capital in Korea should be discovered and included, which remains as the next avenue.

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