



## Multidimensional Social Capital Index from the Perspective of Organization in China

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**Abstract:** This paper presents a framework to construct a multi-attributed social capital index by factor analysis based on data from 888 farmer households. The social capital index comprises of four dimensions: social network, social trust, social reputation and social participation. The findings illustrate that the index developed here is empirically and theoretically valid, which contributes to a further development of correct measurement of social capital in China. Using this index, this article describes the distribution of social capital by its aspects, among members in collective action (leaders, followers and free-riders). On the whole, social capital owned by leaders is the highest while those owned by free-riders are the lowest. In terms of different dimensions, the distribution of members has different characteristics.

**Keywords:** China, factor analysis, social capital index, organization

### 1 Introduction

Social capital is widely used in the study of economics, especially in recent years (Lu and Wang, 2012). In the context of rural areas in developing countries, social capital plays a vital role in farmers' behavior, especially in collective action of supplying public goods (Cox and Caldwell, 2000; Ostrom, 1998). Social capital has been shown to be a powerful variable in describing disparate economic outcomes and is deserving of greater attention (Putnam, 2001). Although many authors have discussed the concept of social capital, its definition has not yet obtained a consistent understanding (Van Beunigen and Schmeets, 2012; Bjørnskov, 2006; Lima et al., 2015) and indicators lack a unified standard. "Muddled empirical questions" are likely caused by failure to conceptualize social capital's dimensions in separate terms (Newton, 1997). Thus in

order to achieve a better understanding of the role of social capital in collective actions it is essential to make the concept of social capital clear and to achieve theoretical rigor in its measurement based on an empirical framework (Wendy, 2001).

Social capital plays significant role in farmer households, especially in China, where small-scale farmers cooperate frequently in recent years. In the literature, researchers have observed social capital from the perspectives of countries, individuals, and firms (Oorshot and Arts, 2005; Ahuja, 2000; Burt, 2000; Subramaniam and Youndt, 2005). However, the much of the recent social capital literature has focused primarily on individual level analysis in urban areas (Lewis, 2010). The social capital of farm households, as the largest share of the population in rural areas, has largely been ignored. Social capital varies under the various situations and subjects. Farmer households, with different assets and activities from urban persons, must show unique features in social capital. Therefore, the definition of social capital and its contents should be adjusted for conforming to the characteristics in rural areas. Besides, social capital has diversities during the realization of collective actions. Firstly an organizer calls for others with mutual aims to get together and coordinate their demands, and then, some farmers' response to the appealingness and follow the organizer to make efforts for their aims, which is called follower. However, small parts of farmers with egoism try to share the service or goods in organization without any payment, regarded as free-riders. In an organization in rural area, the characteristics of social capital vary with different roles and are far from homogeneous. There is a lack of assessment from perspective of organizations.

This paper contributes to the conceptualization of social capital from multidivisional perspectives and develops a measurement method for social capital in the context of farmers in rural communities. This is accomplished using a unique primary dataset of 900 farmers in Western China. Firstly, an analytic framework was constructed by combing social capital literatures. Second, we developed an index by illustrating explanatory indicators and weights determined by Factor Analysis via the Varimax method using the data collected from six villages in Northwestern China. Third,

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we tested the relationship among different dimensions to certify the index is correct and valid. Fourth, we describe the distribution of the different aspects of social capital by members in cooperatives.

## **2 Literature review and conceptual framework**

### **2.1 Literature review**

Social capital is a broad concept without agreements in the field of theory. Definitions of social capital are quite varied (see examples in Nieminen et al. 2008). Researchers give different definitions based on their goals and opinions. Hanifan (1916) defines social capital as a form of relationship which could be used by individuals to meet their market demands. Bourdieu (1986) defines social capital as “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”. In fact, these concepts emphasize network structure (similar to Lin Nan, 2002). Fukuyama (1995) broke away from the views about social networks, and emphasized that trust was the main manifestation of social capital (Neira et al., 2009). In fact, social capital is a multifaceted concept (Putnam, 2001). The core components of social capital is given by Newton (1997) are networks, trust and reciprocity, which is similar to the description given by Wu and Petty (2004). Paldam (2000) describes social capital as “the glue that holds societies together” and divides the theoretical approaches into three families of social capital, trust, cooperation, and networks. Winter (2000) illustrated that social capital consists of networks, norms, trust and reciprocity, which enable people to act for mutual benefit. Social capital also refers directly to trust, reciprocity, networks, and membership in an organization (Vollan, 2012). Social capital has also been divided into two parts: structural and cognitive social capital (Chou, 2006; Hjerpe, 2003). Structural social capital encompasses social networks and participation; cognitive social capital includes social reputation and social trust.

Typologies or dimensions of social capital developed the theories that are coherent and empirically different because of different understanding of social capital and researcher’s own experiences and objectives (Putnam, 2001). Social capital is a latent factor and can be accessed via the measurement of its observable proxies. Baum et al. (2000) use wide range networks of a person or household is engaged in to measure networks.

While much discussion has been offered as to the theoretical importance of social capital, there is no consensus on the most appropriate definition and measurement of social capital (Andrew David Mitchell and Thomas J. Bossert, 2007). Lewis (2010) argues that social capital is best conceived of at the individual level that benefits can both accrue to individuals and collectives and social capital should therefore be understood as a multilevel concept. Farmers, as a special

group, overlooked by the majority of literature and analysis of social capital measurement and its dimensions are less convergent on the appropriate unit (Portes, 2000). An analysis of the distribution of social capital needs a simple and cumulative index (Keming Yang, 2004; Paldam, 2000). And empirical analysis based on a parsimonious measure and valid data of social capital is of significance by the combination of four dimensions, social network, social trust, social reputation and social participation. At the same time, weighted indicators seem more prudent and make sense by factor analysis (Beuningen, 2012).

### **2.2 Conceptual framework**

Social capital is a latent variable, thus, its proxies can be easily measured and it makes sense for social capital (Paldam, 2000; Li et al., 2014) to be measured by selecting the indicators or proxies.

The main requirements for indicators are the avoidance of redundancy and comprehensiveness. In this study, the guidelines to choose indicators are as follows—the indicator. Firstly, all the indicators should reflect the whole definition of social capital, and represent farmers’ features. Secondly, selected indicators need be simple and independent (indicators are not crossed and repeated by the same meanings). Finally, the questions about indicators are easy to understand and convenient to acquire by survey. Based on our literature analysis, it is safe to say the definition of social capital in our study, that is, social capital is the combination of different dimensions. Social capital is divided into a four-fold classification: social networks, social trust, social reputation and social participation. In order to build up a reasonable index, and avoid the repeated expression of indicators, we select independent variables to represent four aspects. The definition and measurement will be mentioned below.

A social network relates to the interaction of persons in a single community. Brass (2000) notes, “Social network analysis assumes that actors are embedded, with other actors, in a complex web of relationships”. Bowling (1997) measures network characteristics of size, geographic dispersion, density, composition and member homogeneity, frequency of contact between members, and strength of ties. Putnam (1998) defines networks as those held between family, kin, friends and neighbors (similar to Narayan and Pritchett, 1999). Finch (1989) and Finch and Mason (1993) add friendships and other intimate relationships as well as bonds among neighbors to networks of kin beyond the household (Hofferth et al, 1995; Svenssona, 2015). Baum et al (2000) described formal networks of social relations as civic or institutional. “Conceptualizing social relations as networks enables us to identify the structure of social relations”, concentrating on the connections, group attachments and meetings with each other. Here, to measure the social network of farmers, we focus on network density weighted by the frequency of contacts with others. In rural areas in China, farmers live

in a small town or community, have habits to communicate with others and invite others to have seats in their houses. Network density maps farmers' connections and frequency of links with different groups (Reagans et al., 2004; Iyengar, 2012; Daniel et al., 2015).

Social trust is the degree of trust towards various targets. The main types of social trust are personalized trust (Hughes et al., 2000), generalized trust (Uslaner, 1999a) and institutional trust (Cox and Caldwell, 2000). Following these definitions, trust towards familiar people is understood as personalized trust (Cox and Caldwell, 2000). Generalized trust is a kind of trust extended to strangers. Institutional trust refers to the trust towards the community (Hogan and Owen, 2000), respected persons or development practitioners who boost economic development and empowerment (Warner, 2001). In reality, farmers in China will communicate with friends, relatives, village leaders, respected persons, family members, organizations or associations, common persons, and strangers. Different groups indicate the different forms of trust: general trust (trust towards strangers and common persons), institutional trust (trust towards the formal institutions of governance), and personalized trust (trust towards friends, family members, neighbors) (Stone, 2001).

Social reputation describes the extent to which an individual is respected in his/her community (Lu and Wang, 2012). In traditional Chinese villages, reputation plays significant roles, especially in collective actions. Reputation is from farmers' respects. When they show worship and respects towards to someone, it is easy to build up compliance in their consciousness. In general, the more one is respected, the more help and respect they will get from others.

Social participation represents the involvement of individuals in formal and informal collective issues of their communities (Putnam, 2000). Formal collective issues include election, and informal issues comprise of public goods service such as irrigation problems, and conflicts among farmers about the village's infrastructures. In Northwestern area in rural China, farmers typically participate in village issues. They generally attend elections and discuss problems about public goods organizing by village commits. Sometimes, they also were assembled by organizers.

Hence, we assume that social capital is consisted of social network (SN), social trust (ST), social reputation (SR) and social participation (SP). Social trust is consisted of personalized trust (PT), institutional trust (IT) and generalized trust (GT). The framework is shown in Fig.1.

### 3 Methodology

Factor analysis is used to find factors by weighted sums of the given variables, chosen to explain variance in terms of multiple correlation principles as a common tool to construct an index (Hjöllund and Svendsen, 2000). Factor analysis proposes an explicit underlying model

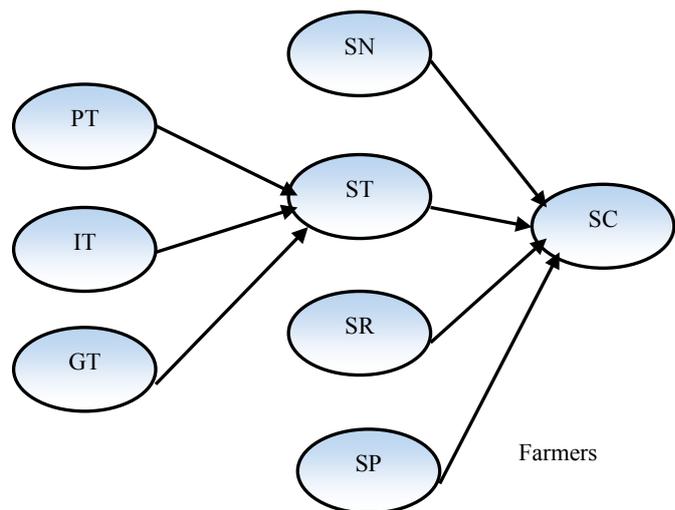


Fig.1 Conceptual model of social capital index including four dimensions

that attempts to interpret correlations among a set of  $n$  observed variables  $(X_1, X_2, \dots, X_n)$  through the linear combination of a few latent (unobserved) random factors (F). In the case of a single factor, F, the underlying model is defined as:

$$X_n = \lambda_n F + e_n \quad (1)$$

Where  $\lambda_n$  is the loading factor associated with the observed variable,  $X_n$  is a observed variable and  $e_n$  is the error with whose mean zero and variance one. The loading factors provide information on the correlation between each variable and a common factor; the higher the load, the more relevant the primary variable in defining the dimensionality of a factor (Clark et al., 2004). Factor analyses were conducted by principal factor extraction (Mitchell and Bossert, 2007) and the number of factors retained is based both on the theorized dimensions of social capital and stipulation that eigenvalues of retained factors exceed one. Here, we rotate extracted factors using oblique (promax) rotation for multiple factors (Mitchell and Bossert, 2007). All the data is normalized in order to provide no conceptual apparatus.

## 4 Data sources and descriptive statistics

### 4.1 Data collection

Our surveys were conducted in towns in Shaanxi Province, Northwestern China, namely, Fengxiang, Qishan, Meixian, Fufeng, Wugong and Zhouzhi, during summer holiday from July to September in 2011 by trained graduate students from Northwest A&F University. These towns represent a typical sample of social capital and irrigation supplies. We randomly selected 150 farmers' households from each town and conducted the questionnaires in face-to-face interviews with respondents. A broad range of questions were asked about farmers' basic social-economic information and social capital including social network, social trust,

social reputation, and social participation as aforementioned. 900 questionnaires were sent, 900 questionnaires were received and 888 copies of completed questionnaires were applied by omitting incomplete and unreasonable questionnaires. Response rate was 100%, questionnaires effective rate of 98.67%. The questionnaire required from one and a half to two hours to finish<sup>1</sup>. Considering the knowledge level of the rural area and their definition of social network, in this paper, we use “how often do you usually contact your friends, relatives, village leaders, respected persons, organizations or associations, neighbors and family members?” to measure the interaction density of a network. Information on this social trust by asking how much extent do you trust in friends, relatives, village leaders, respected persons, neighbors, family members, organizations or associations, common persons, and strangers. Social reputation includes these questions: “How many persons would help you if a wedding happened? How many persons would help you if you are busy in harvest? How many persons would help you if you want to build a house? How many persons could ask you for help if there is a domestic dispute at home? How many persons seek you out to help make decision? How many persons respect you?” These questions indicate the social reputation according to situation of village. We ask farmers questions to get the information of social participation such as “How often do you call for others to participate in public affairs? How often do you participate in village affairs? How often do you vote for election? How often do you put forward suggestions in public affairs? How often do you attend ‘one meeting, one issue discussed’(the popular style of meeting in China, when farmers face some issues such as irrigation, village leaders will organize a meeting for villagers to discuss with issues in order to find out the resolution that is beneficial for community and farmers)?” All the answers of questions are set “most often, often, medium, seldom, never”, which weighs from five to one. Higher level suggests higher extent of social participation. All responses are recorded using a Likert scale.

#### 4.2 Statistics

From the survey samples, males account for 53.6 % of respondents while females account for 46.4%. Samples comprised of 1.46% respondents aged between eighteen and thirty years old, 16.78% between thirty-one and forty years old, 40.65% between forty-one and fifty years old, 6.65% aged between fifty-one and sixty, and 0.11% of samples are over the age of sixty. The majority of the respondents were between the ages between forty-one and fifty, a group that provides the main source of agricultural labor and also has rich experiences in agricultural production due to long efforts in the rural areas. Of the samples, 42.9% have received secondary

school and have enough knowledge to understand our questionnaires. The majority of families have two or less persons in agricultural production and small-scale irrigated areas. The income of 51.7% of families is below 5,000 yuan per year.

**Tab.1 Statistics of social capital**

indicators	description	Mean	Std
sn1	frequency of communication with friends	4.01	0.89
sn2	frequency of communication with relatives	3.65	0.85
sn3	frequency of communication with village leaders	2.44	0.89
sn4	frequency of communication with respected persons	3.38	0.8
sn5	frequency of communication with organizations	2.57	0.84
sn6	frequency of communication with neighbors	2.23	0.93
sn7	frequency of communication with family members	4.31	0.73
st1	extent of trust in friends	3.68	1.06
st2	extent of trust in relatives	4.4	0.65
st3	extent of trust in village leaders	3.05	0.94
st4	extent of trust in respected persons	3.73	0.7
st5	extent of trust in neighbors	3.43	0.75
st6	extent of trust in family members	3.1	0.84
st7	extent of trust in organizations	4.68	0.6
st8	extent of trust in common persons	2.84	0.81
st9	extent of trust in strangers	1.97	0.88
sr1	frequency of persons helping you in a wedding	3.76	0.84
sr2	frequency of persons helping you in harvest	3.22	1.01
sr3	frequency of persons helping you in building a house?	2.7	1.09
sr4	frequency of persons asking you for help if there is a domestic dispute at home	2.85	0.97
sr5	frequency of persons seeking you out to help make decision	2.39	0.96
sr6	How many persons respect you	3.07	0.79
sp1	frequency that you call for others to participate in public affairs?	2.57	1.28
sp2	frequency of your participation in village affairs	2.82	1.1
sp3	frequency that you vote for election	2.19	1.47
sp4	frequency that you put forward suggestions in public affairs	2.54	1.12
sp5	frequency that you attend ‘one meeting, one issue discussed’	2.48	1.02

Note: All the data is processed by STATA 12.0. A Likert method is used from one to five.

Based on our framework and statistics, we demonstrate that there are differences among every indicator. The means of questions about social network

<sup>1</sup> In order to make the questionnaires understandable, we train the data collectors and ask them to explain every question for farmers to make sure farmers understand.

density of farmers with family members, friends, relatives, neighbors, leaders, respected farmers, agricultural organizations, are 4.01, 3.65, 2.44, 3.38, 2.57, 2.23, and 4.31 respectively. The results show that the overall interaction of farmers with various groups is low. Farmers have high contact frequencies with family members, friends, neighbors, and respected farmers, due to phylogenetic and geo-ideological characteristics; contact frequencies with agricultural organizations is low, which might be due to most of the region's farmers organizations that did not work well, and some areas with inadequate organization constructions. Social network heterogeneity is not obvious. The order of farmers trust in other persons (groups) from high to low is family members, relatives, neighbors, close friends, respected farmers, agricultural organizations, village leaders, common persons and strangers. Personalized trust is high and institutional trust is low, which suggests the decline of social trust in rural areas. Social reputation measurement is based on the assumption that higher interaction between farmers relates to higher respect of the farmers. As it shown in Tab.1, the mean of indicators to represent that farmers is respected by others is around 2.5, suggesting that the extents of respect of farmers are in the middle level . The mean of farmers' social participation is around two, illustrating lower enthusiasm of farmers to participate in official issues, especially in elections.

## 5 Index validity and construction

### 5.1 Indicator tests

The questionnaire is designed by the authors according to literature, so we need to test the quality of questionnaires to make sure our analysis is reliable using Harman's one-factor test, reliability test and validity test.

Our social capital construct is derived from many variables; therefore, the relationship between the different variables is of interest. Spearman's correlation can be used to evaluate a nonlinear relation between variables when the data is ordinal. The value of zero indicates no relation between the variables (Dendukuri and Reinhold, 2005). According to our analysis, all the variables are weakly relative, which verify our indicators are non collinear.

Because all data are collected from the same questionnaire during the same period of time, it may be susceptible to systematic measurement error which would bias the estimates of the true relationship among theoretical constructs. Common method variance, whose variance can affect observed relationships between constructs leading to both Type I and Type II errors is possible (Podsakoff, et al. 2003). Harman's one-factor test is conducted to test the presence of the common method effect. The first factor can explain 9.82%, seen from our result. As the conclusions saying that when the first factor explanation is lower than 40%, bias is not existing apparently (Fang and Wang, 2012). Therefore, there is no bias suggesting that the result is acceptable.

Cronbach's  $\alpha$  calculated by explanatory factor analysis is commonly used to determine the internal consistency of various factors. The larger the value of Cronbach's  $\alpha$  , the greater relationships exist among factors within the items, and the higher internal consistency the factors have. Generally speaking, when Cronbach's  $\alpha$  is greater than 0.5, it is reliable to constitute a composite measure (Winter *et al.*, 2005). Here Cronbach's  $\alpha$  of total indicators is 0.66, suggesting that all the results of our data are reliable and our questionnaire survey indicators are appropriate. Explanatory factor analysis is prudent to explain our results. All the variables were entered into an exploratory factor analysis. Principal components factor analysis with Varimax rotation was used to determine the numbers of factors that are necessary to account for the variance in the variables with eigenvalues above one, and the factors were considered to account for more variation in the original indicators. Finally, we obtain fifteen variables.

### 5.2 Social capital index construction

Loadings greater than 0.40 were considered to indicate a strong association among the original scores of indicators. By deleting the cross loading matrix and the loadings below 0.4, we obtain the results in Tab.2 and determine how many dimensions the concept of social capital encompasses. Factor1 is defined by sr3, sr4 and sr5, which comprise the social reputation factor; factor 2 includes st3, st5, st6, st8 and st9, which is defined as general and institutional trust; factor 3 contains sn2 and sn7, indicating social networks; factor 4 comprises st2, st5 and st7, defined as personal trust; factor 5 includes sp1 and sp2, defined as social participation. Here we construct a social capital index by five factors. The weights assigned to different factors were calculated using factor analysis based on the component method. The weight of factors is dependent on the indicators. For example, the weight of factor 1 depends on the indicators (sr3, sr4 and sr5). According to factor analysis, we

**Tab.2 Loadings matrix of rotated factor**

items	factor1	factor2	factor3	factor4	factor5
sn2			0.87		
sn7			0.69		
st2				0.54	
st3		0.48			
st4				0.6	
st5		0.46			
st6		0.42			
st7				0.75	
st8		0.67			
st9		0.79			
sr3	0.73				
sr4	0.78				
sr5	0.77				
sp1					0.87
sp2					0.49

Note: Factors have been rotated with the Varimax Orthogonal method with Kaiser Normalization, all the loading factor is above 0.4. The eigenvalues higher than one are to be retained.

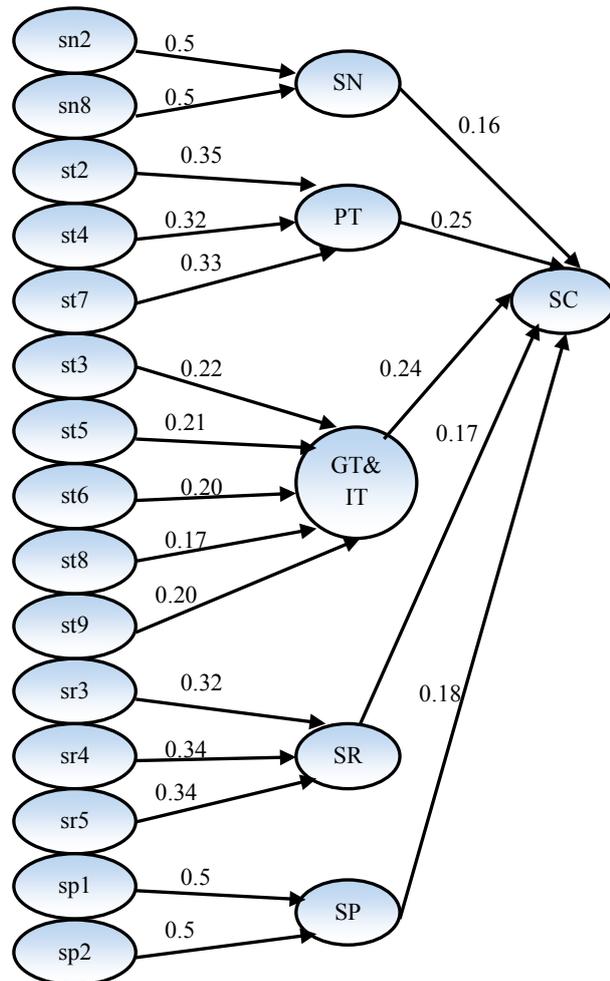
extract the first component with an eigenvalue larger than one without rotation, which explains 62% of the variance.

**Tab.3 Variance decomposition analysis of principal component extraction**

Factor 1	eigenvalue	difference	proportion	cumulative
Factor1 <sub>1</sub>	1.83	1.22	0.61	0.61
Factor1 <sub>2</sub>	0.62	0.06	0.21	0.82
Factor1 <sub>3</sub>	0.55		0.18	1.00

**Tab.4 Initial factor loadings matrix**

variable	factor1 <sub>1</sub>
sr3	0.76
sr4	0.80
sr5	0.78



**Fig.2 Structural model of the social capital index (standardized data)**

At the same time, we get the initial factor loading matrix and can calculate the weight as follows (Tab.4).

$$factor\ 1 = \frac{0.76 \cdot sr\ 3 + 0.80 \cdot sr\ 4 + 0.78 \cdot sr\ 5}{\sqrt{1.83}} = 0.56 \cdot sr\ 3 + 0.59 \cdot sr\ 4 + 0.58 \cdot sr\ 5$$

when we normalized the weights, we get  $factor1 = 0.32sr3 + 0.34sr4 + 0.34sr5$ , using the same

procedures, we could get the formulations of other factors as below:

$$factor2 = 0.22st3 + 0.21st5 + 0.20st6 + 0.17st8 + 0.20st9,$$

$$factor3 = 0.5sn2 + 0.5sn7,$$

$$factor4 = 0.35st2 + 0.32st4 + 0.33st7,$$

$$factor5 = 0.5sp1 + 0.5sp2.$$

Using the formulations mentioned before, the weight of dimensions of social capital can be calculated. The weight of each factor contributes to social capital index is shown in Fig.2, demonstrating the strength of different weights. The factors contributing to social capital index (SC) by order is personalized trust (PT), general and institutional trust (GT&IT), social participation (SP), social reputation (SR) and social network (SN).

### 5.3 Content validity

In order to verify the precision of the index, we compare the social capital index and its dimensions under the context of cooperatives in the areas where we conducted the survey. In cooperative practice, there are three main roles: organizers who organize the people together, followers who follow the leaders and participate in cooperatives, and free riders who will not participate but may also use irrigation systems by free-riding. Tab. 5 illustrates the distribution of social capital by these three classifications. In our samples, the amount of organizers are forty-two, followers account for 826, and other twenty samples are free-riders. The total score of social capital is for organizers is 0.611, higher than free-riders, and similar with followers. The distribution of social capital among these groups is logical and as such verifies our index from the perspective of its contents. When it comes to the different dimensions, organizers have the highest social trust but lowest social reputation; followers have the highest social network and social participation; free-riders have the highest of social reputation and lowest social network. As Bennis notes "Leadership is a function of knowing yourself, having a vision that is well communicated, building trust among colleagues, and taking effective action to realize your own leadership potential", and leaders are embedded within networks of relationships with others, thus, social capital is the causal forces of leadership. The findings of this analysis are outlined in the final section.

**Tab.5 Social capital score and its dimensions among different roles**

	social network	Personalized trust	Institutional and generalized trust	social reputation	social participation	social capital
Total	0.74	0.82	0.47	0.41	0.58	0.61
Organizers	0.74	0.84	0.48	0.39	0.57	0.61
Followers	0.75	0.82	0.47	0.41	0.59	0.61
Freeriders	0.72	0.82	0.42	0.43	0.56	0.60

## 5.4 Robust test

Using the different method to build up this index and we can see the similar results about social capital.

## 6 Discussion and conclusion

This paper illuminates the concept of social capital from multi-faceted perspectives and constructs a social capital index by factor analysis giving the weights of different factors using survey data. This index shows a big picture social capital index of farmers for researchers by empirical analysis, builds a conceptual framework for developing a social capital index for sub-populations, and “reduces the list of necessary indicators by focusing on the key components” (Saltelli, 2007). Verification of the social capital index tells us it is a stable and reliable instrument for measuring social capital of farmers. At the same time, we can distinguish the order of importance of dimensions by weight.

The index explains the relationship of different aspects of social capital and the characteristics of organizers, followers and free-riders. Social capital owned by followers is the highest and those owned by free-riders are the lowest. In terms of the content validity, it is safe to say our index construction is meaningful.

By constructing the social capital index, our aims have been achieved. We propose a conceptualized framework of social capital from farmers’ perspectives and organizations. Further study can focus on the relationship between social capital and collective action.

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