

## Development of A Theoretical Framework for the Study of Cluster Networked Agro-Based Processing in Indian Context using Literature Survey

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### ABSTRACT

*Role of clusters in value networks has increasingly been emphasized in that clusters can provide a conducive ecosystem for upgrading the elements of value chains. Defined as geographical concentrations of inter-linked firms and institutions in a particular field, clusters have been considered potential drivers of competitiveness and growth catalysts. The broad purpose of this study is to understand how social capital in clusters plays a role in knowledge spillovers and ultimately firm performance in case of agro-based clusters. Based of literature review, the study brings out that knowledge sharing plays a mediating role in relationship between social capital and innovation while absorptive capacity of a firm plays a moderating role. In the Indian context where agro-processing is carried out largely in the unorganised sector at micro, small and medium level having a limited internal absorptive capacity required for upgradation, knowledge sharing through networks can potentially increase the potential and realized absorptive capacity of the firms, thus leading to innovation in the agro-processing sector.*

**Keywords:** Cluster, Social Capital, Innovation, Network.

### INTRODUCTION:

Agro-processing industries have been recognised as less capital and more labour intensive ones for being high potential employment generators with lesser capital investment. Promotion of such industries, especially in rural areas can have a dual benefit of employment generation and decreased post-harvest losses with lesser investments. Also, they act as a vital link between the agriculture and non-agricultural sectors as well as a crucial factor in competitiveness of agriculture. Thus, development of value networks in agricultural sector has assumed a centre-stage among the strategic factors for development. Role of clusters in value networks has increasingly been emphasized in that clusters can provide a conducive ecosystem for upgrading the elements of value chains. Nogaes (2010) has brought out the benefits of clustering in agriculture and referred to such clusters as 'agro-based clusters'. In India, the idea of 'Cluster development' has found a substantial attention in the 10<sup>th</sup>, 11<sup>th</sup> and 12<sup>th</sup> five year plans floated by Government of India. The 12<sup>th</sup> five year plan, particularly, emphasizes the role clusters can play in fostering a dynamic manufacturing ecosystem. The plan gives an elaborative account of a dynamic manufacturing ecosystem which emphasizes on the depth (value addition) of manufacturing processes; a combination of four skills i.e. human resource, embodied technology in hardware, knowledge (intellectual property) and a large and demanding customer base and a range of different sized firms (Government of India, 2012). Humphrey & Schmitz (1995) argue that collective approach can enhance the leverage of public resources. Defined as geographical concentrations of inter-linked firms and institutions in a particular field, clusters have been considered potential drivers of competitiveness and growth catalysts (Porter,

1998). Literature elucidates two major benefits of clustering namely ‘cost reduction’ and ‘knowledge spillovers’ (Malmberg & Maskell, 2002). Due to the knowledge spillovers, clusters are often referred to as ‘learning regions’ and ‘innovation systems’. A number of cluster researchers have acknowledged the role of networks in generating the cluster externalities (Saxenian, 1996) (Youli & Huiwei, 2011). Thus, Becattini (1992) has rightly referred to clusters as ‘socio-territorial’ entities owing to their regional demarcations and dense social networks. Social Capital, a resource vested in relationships among the actors has attracted attention of academia lately. A number of authors have tried to elucidate the role of social capital in regional industrial dynamics (Pulles & Schiele, 2013) (Lorenzen, 2001) (Rutten & Boekema, 2007).

### OBJECTIVE OF THE STUDY:

Staber (2007) emphasizes on contextualizing the research in order to provide objectivity to its interpretation and enhance its applicability to specific businesses, institutions and regions. The broad purpose of this study is to understand how social capital in clusters plays a role in knowledge spillovers and ultimately firm performance in case of agro-based clusters. Specifically, we aim to devise a relationship between social capital and cluster innovation. In the following sections we start with description of social capital and innovation and subsequently, try to draw a link between the two based on empirical evidences provided by various authors.

### METHODOLOGY:

An extensive review of literature was done to understand the dimensions of the constructs. For this purpose relevant research papers on the themes of ‘innovation in industrial clusters’, ‘networks in industrial clusters’, ‘social capital in industrial clusters’, ‘social capital and firm performance’; were collected from different data source such as EBSCO, JSTOR, SAGE, Emerald, Google scholar etc.

#### *Social Capital:*

Social capital is believed to be a capital that resides in social ties of the entities, individuals or groups (Coleman, 1988) (Putnam, 2001) (Woolcock & Narayan, 2000) (Nahapiet & Ghoshal, 1998). Nahapiet and Ghoshal (1998) define ‘Social Capital’ as “resources embedded within, available through and derived from network of relationships possessed by an individual or social unit”. Adler and Kwon (2002) have provided an extensive review of various definitions and have come up with definition of Social Capital as:

“Social capital is the goodwill available to individuals or groups. Its source lies in the structure and content of the actor's social relations. Its effects flow from the information, influence, and solidarity it makes available to the actor.”

A number of scholars have tried to define social capital in terms of ‘networks’, ‘trust’ and ‘norms and values’. Coleman (1988) agrees that social capital comprises of distinct entities. Based on the previous work of various researchers, Nahapiet and Ghoshal (1998) have defined three distinct yet interrelated dimensions of social capital, namely, structural, relational and cognitive. The basic root of social capital lies in the relationships. Structural dimension deals with the impersonal configuration of relationships such as presence or absence of these relationships, i.e. ‘network ties’, density, connectivity and hierarchy of relationships, i.e. network configuration and change of membership i.e. network stability. Relational dimension on the other hand, addresses the behavioural aspect of networks such as trust and norms of reciprocity. Cognitive dimension incorporates ‘shared culture’ and ‘shared norms’ based on common understanding of the phenomena.

(Koka & Prescott, 2002) have tried to explain social capital in terms of three different dimensions namely, (i) information volume i.e. the quantity of information accessible to firm through its networks, the authors attribute it to network embeddedness of firm i.e. number of ties a firm has in network; (ii) information diversity i.e. variety of information accessible through the networks. This dimension focuses on characteristics of the partners and their relationships; (iii) information richness pertaining to quality and nature of information, this dimension focusses on the firm’s history and experience with its partners.

Comparing these two approaches, we may draw that though both these approaches define social capital from different perspectives namely, ‘network perspective’ (Nahapiet & Ghoshal, 1998) and ‘information perspective’ (Koka & Prescott, 2002), they have a number of things common among them. Both the perspectives draw on similar set of theories such as Granovetter’s theory of embeddedness (Granovetter, 1985) and Burt’s theory of structural holes and network closure (Burt, 2000). The three dimensions proposed by Koka and Prescott (2002) are contingent upon the network structure and quality which is essence of dimensions explained by Nahapiet and Ghoshal (1998).

**Social Capital and Innovation:**

Used in a number of studies, innovation is a broad term encompassing varied scope and domain (Damanpour, 1991) (Kimberly & Evanisko, 1981). Simply saying, it is anything perceived to be new. It might be a radical change or mere incremental changes in the product/process/organisation. Lundvall (1992) defines innovation as “an ongoing process of learning, searching and exploring which results in new products, techniques, organisations and/or markets.” Literature suggests that firm innovation takes place not in isolation but is contingent upon the environment firm operates in (Archibughi, Cesaratto, & Sirilli, 1991). Cooke *et al.* (2005) assert that innovative firms tend to make greater use of collaboration and information exchange, be involved in higher trust relationships, and make greater use of non-local networks. Tsai and Ghoshal (1998) contend that social capital facilitates inter-unit resource exchange and product innovation. A number of researchers have tried to study a relationship between innovation and social capital or a particular dimension of social capital as tabulated under:

Author	Results of the study	Relationship between social capital and innovation
Laursen, Masciarelli and Prencipe (2012)	Geographically localized social capital affects a firm’s ability to innovate through various external channels. Being located in a region characterized by a high level of social capital leads to a higher propensity to innovate.	Positive
Landry, Amara, & Lamari (2002)	Social capital influences the decisions of firm regarding innovation. Diverse forms of social capital determine the radicalness of innovation, and more importantly, that social capital taking the form of research network assets contributes more than any other explanatory variable to explain the radicalness of innovation.	Positive
Hauser, Tappeiner, & Walde (2007)	Social capital influences regional innovation processes significantly. However, not all dimensions of social capital exhibit the same explanatory power. ‘Associational Activity’ represents the strongest driving force for patenting activity.	Varied depending upon the dimension studied
Dakhli & de Clercq (2004)	Found strong support for the positive relationship between human capital and innovation and partial support for the positive effect of trust and associational activity on innovation. A negative relationship between norms of civic behaviour and innovation was found.	Positive for trust and associational activity Negative for norms
Molina-Morales & Martínez-Fernández (2010)	District affiliation, social capital and involvement of local institutions are positively associated with innovation	Positive
Akcomak & Weel (2009)	Social capital affects economic growth indirectly by fostering innovation.	Positive
Carmona-Lavado, Cuevas-Rodríguez, & Cabello-Medina (2010)	Social capital favours firms' product innovation, especially under radical innovations. Second, organizational capital has an indirect effect on product innovation through positive influence on social capital.	Positive
Kaasa (2009)	Social capital indeed influences innovative activity and furthermore, that different dimensions of social capital have dissimilar effects on innovation with ‘human capital’ playing a mediating role in this relationship.	Varied

Author	Results of the study	Relationship between social capital and innovation
Wu, Chang, & Chen (2008)	The findings suggest a mediating role of intellectual capital and the moderating roles of entrepreneurial orientation and social capital on innovation. Specifically, firms with higher levels of social capital and entrepreneurial orientation tend to magnify the effects of intellectual capital on innovation.	Positive
Zheng (2010)	The findings of the literature review found a significant effect of the structural components of social capital on innovation. However, contextual and intellectual factors, such as the nature and type of innovation, internal vs external ties, costs of maintaining the ties and existing intellectual capital were found to have a moderating effect on this relationship. The relational components of social capital was found to have a consistent positive relationship with innovation across contexts. The cognitive components of social capital have not sufficiently established their contribution to innovation.	Varied Contingent upon context
Pérez-Luño, Medina, Lavado, & Rodríguez (2011)	Social capital has a strong influence on innovation if it involves tacit knowledge. In case of codified knowledge social capital is considered waste of resources.	Varied depending upon degree of tacitness of knowledge

**Social capital, knowledge sharing and innovation:**

The studies present divergent results on role of social capital in innovation proposing these relationships to be contingent upon contextual factors. Filieri and Alguezaui (2014) have brought out ‘knowledge transfer’ as a mediating variable in the social capital-innovation relationship. They identify that most of the studies acknowledge social capital as an important antecedent of ‘knowledge transfer’. Dahl and Pederson (2004) found that informal contacts among employees of firms in cluster represent an important channel of knowledge diffusion. Social capital promotes close interaction between networking firms, which enhance knowledge (especially tacit knowledge) sharing and thus innovation. Also, knowledge flow based on social capital between networking firms is a mutual, continual, and iterative process (Mu, Peng, & Love, 2008). Yli-Renko *et al.* (2001) demonstrated a mediating role of ‘knowledge acquisition’ between social capital and innovation. The three dimensions of social capital affect knowledge acquisition in different degrees and manners. The extent of knowledge acquisition as a result of these interactions is the one that affects innovation in organisations meaning that it is the learning process which converts the social capital into innovation.

**Social Capital, Absorptive capacity and innovation:**

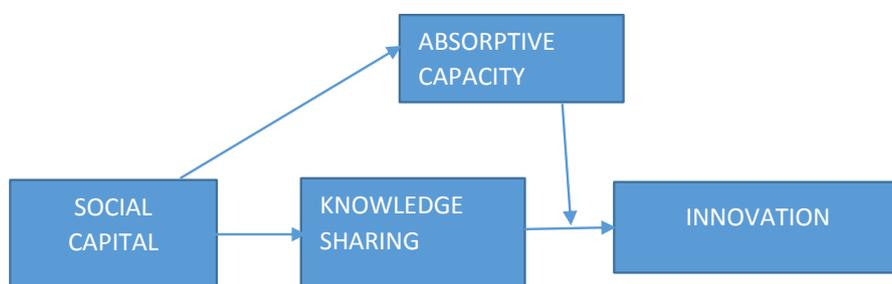
Cohen and Levinthal (1990) define absorptive capacity as ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends and contend it to be critical to its innovative capabilities. Zahra and George (2002) further explain absorptive capacity in terms of potential and realized absorptive capacities. Potential absorptive capacity deals with knowledge acquisition and assimilation capabilities while realized absorptive capacity pertains to knowledge transformation and exploitation capabilities. Literature depicts that absorptive capacity is an important antecedent of innovation effort of firm (Nieto & Quedo, 2005) (BierlyIII, Damanpour, & Sontoro, 2009). Theoretically, transformation of knowledge into innovation depends upon the absorptive capacity of a firm. So, it is argued to take into account the internal capabilities of the firms in order to assimilate and exploit knowledge (Bougrain & Haudeville, 2002). Further, these capabilities are built over time and the external and internal environment of a firm plays an important role in development of absorptive capacity of firm. Not all the knowledge is developed by a firm itself but a lot of it is acquired externally through firm’s relationships and networks. Upadhyayula (2004) has proposed social capital to be an important antecedent of absorptive capacity. Giuliani and Bell (2005) have shown that

knowledge generation and diffusion within a cluster is likely to be structured and differentiated according to the heterogeneity of firms' knowledge bases. Knowledge resides in tacit capabilities in firms' skilled knowledge workers and subsequently in the organizational memory of the firm (Giuliani, 2005) (Shmidt, 2010). Inter-firm flows of such knowledge tend to remain limited to cohesive subgroups of firms (Boschma & Ter-Wal, 2007). Further, knowledge application is also affected by nature of knowledge. Experience is more important in case of codified knowledge while technological capability is more important in case of tacit knowledge (BierlyIII, Damanpour, & Sontoro, 2009). Cummings and Teng (2003) have incorporated cognitive dimension of social capital under the term 'norm distance' in their study on knowledge transfer. They define 'norm distance' as extent to which the parties share similar understandings and ideas about the knowledge transfer project. The greater the norm distance, the harder this will be to transfer knowledge from one party to other and vice-versa. Also, a more deeply embedded knowledge is difficult to transfer than less deeply embedded knowledge.

**Interpretation:**

Firstly, the literature gives a multiplicity in defining the concept of social capital such as 'cognitive, relational and structural' dimensions propounded by Nahapiet & Ghoshal (1998) and 'information diversity, information volume and information richness' given by Koka & Prescott (2002) discussed in this paper. Empirical results from the studies on relationship between social capital and firm performance have largely been inconclusive. While some studies have shown positive relationship between social capital and firm performance (Molina-Morales & Martínez-Fernández, 2010), others have shown non-existent or even a negative relationship (Rowley, Behrens, & Crackhardt, 2000). This has led to research into some mediating variables such as knowledge acquisition (Yli-Renko, Autio, & Sapienza, 2001) and information sharing (Wu W.-p. , 2008). Kaasa (2009) has shown 'human capital' as a mediating variable between social capital and innovation. Also, literature emphasizes different levels of influence of different dimensions of social capital in different settings of firms (Freel, 2003) (Molina-Morales, García-Villaverde, & Parra-Requena, 2014) (Alguezaui & Filieri, 2010) (Hauser, Tappeiner, & Walde, 2007). For this reason, Staber (2007) emphasizes on contextualizing the research in order to provide objectivity to its interpretation and enhance its applicability to specific businesses, institutions and regions. This emphasizes the need to gain a better understanding of social capital in Indian agro-based clusters.

On the basis of above mentioned literature, we have tried to develop a primitive framework to be tested in a cluster of agro-based processed products in India. We have tried to draw parities and differences between two frameworks of social capital to prepare our construct of social capital. The innovation construct incorporates both radical and incremental innovations. The literature propounds most of the innovations in food industry to be incremental. Also, such incremental innovation has a significant contribution to firms' turnover (Avermaete, Viaene, Morgan, & Crawford, 2003) (Capitanio, Coppola, & Pascucci, 2009). We have introduced knowledge sharing as a mediating variable and absorptive capacity of the firm as a moderating variable. Absorptive capacity itself is affected by social capital (Upadhyayula, 2004). This is outlined in Fig 1 that follows.



**Figure 1: A Theoretical Framework for Cluster networked agro-based processing**

**CONCLUSION AND MANAGERIAL IMPLICATIONS:**

Based of literature review, the study brings out that knowledge sharing plays a mediating role in relationship between social capital and innovation while absorptive capacity of a firm plays a moderating role. Our endeavour is to analyse the role of external factors such as networks on the performance of firms in light of their internal capabilities. In the Indian context where agro-processing is carried out largely in the unorganised sector at micro, small and medium level (Ghosh, Bhandari, & Sharma, 2013) having a limited internal absorptive capacity required for upgradation, knowledge sharing through networks can potentially increase the potential and realized absorptive capacity of the firms, thus leading to innovation in the agro-processing sector.

Such an analysis can help the cluster development agencies in taking into account a holistic view of internal as well as external factors operating in clusters as well as individual firm level differences within the clusters.

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