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SOCIAL CAPITAL IN CONSTRUCTION PROJECTS: AN EXPLORATION

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Abstract: The concept and phenomenon of social capital has been identified as an organizing logic that can add value to project organizations. In this respect, social capital is conceptualized as both personal and impersonal linkages between individuals in project organization, the quality of these linkages, and the shared representations embedded within these linkages. Social capital provides a means of coordination and collaboration among project participants. However, given the novelty of the concept in construction settings and peculiarities of construction projects, key questions arise as to what represents and are the forms of social capital in project settings? We adopt a mixed methods approach to answer these questions. Data from a survey of 376 respondents and a case project converge into forming a coherent conceptualization of social capital in construction projects. The findings confirm the multi-faceted nature of social capital and reveal the mechanisms by which social capital facilitates project organizing. Social capital appears to be more acutely needed in construction projects. While structural capital provides the platform for information and influence transfer, relational capital provides psychological safety upon which cognitive capital is translated into task performance. We conclude by discussing both the theoretical and practical contributions of the study to the relational governance discourse in project management.

1 INTRODUCTION

There is an increased recognition of the importance of social context and relationships among participants in the management of construction projects (e.g. Anvuur et al. 2011; Bresnen 2009; Cheung et al. 2006; Fong and Lung 2007; Smyth and Pryke 2008). In the relational paradigm discourse, the learnt wisdom implies that relational issues are often the causes of breakdown in teams rather than the technical complexity of the project (Fong and Lung 2007). Under this backdrop, because construction projects are organized around a network of firms and individuals that are economically independent but technically interdependent (Rooke et al. 2003), and project participants relationships are embedded in those networks that are intertwined through social interactions, those relationships are important as they affect the level of cooperation among the participants. In this respect, the concept and phenomenon of social capital has been identified as a concept that can add value to the study of network-based organizations such as construction projects as it can be used to facilitate actions (Koh and Rowlinson 2012).However, given construction peculiarities, a key question that remains relatively unexplored is, *what represents social capital* and *what the forms of social capital are in project settings?* Adopting Nahapiet and Ghoshal's (1998) conception of social capital, another key question posed in this paper is, *what are the manifestations and effects* of structural, cognitive, and relational dimensions of social capital in project settings? We employed a mixed methods approach to answer these research questions.

2 PROJECT SOCIAL CAPITAL

2.1 Relevance of Social Capital in Construction Projects

For the purpose of our study, project social capital is defined as the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or a cluster of individuals that can be used to achieve the goals of a project (Brookes et al. 2006; Nahapiet and Ghoshal 1998).

A project organization is characterized by factors that are germane to the application of social capital. These factors include interdependence, intensive social interactions, and closure. While providing a condition for project operations, the high level of mutual interdependence also promotes social capital by increasing the opportunity of participants' interactions (Nahapiet and Ghoshal 1998). In this respect, project organization provides a community, a space to bring together project participants for the performance of tasks in terms of supervision, coordination, and mutual adjustment (Mintzberg 1979). The project operational features also render a need for social capital. Because a project organization is established for a specific purpose to be realized in a definite time, the intensity and dynamics of social interactions in project organization are much higher if compared with those in permanent organizations. As network type of organizations often lack a central authority (Poldony and Page 1998), the coalition formed by project participants requires social mechanisms such as trust and reciprocity to function effectively (Jones et al. 1997; Powell 1991). In terms of closure, although permeable to some extent, a project organization nevertheless has a social boundary that separates members from non-members (cf. Bourdieu 1986). This closure is conducive to the development of norms, identity, or even trust among participants. It is this feature of closure that leads especially to the development of cognitive and relational type of social capital (Coleman 1990; Nahapiet and Ghoshal 1998).

2.2 The Three Dimensions of Social Capital

The three dimensional conception of social capital propounded by Nahapiet and Ghoshal (1998) comprises the structural, cognitive and relational aspects. The *structural dimension* refers to the impersonal configuration of linkages between persons or social units. The main facets under this dimension are network ties among project participants and the existence of appropriable organization that is created for one purpose but can nevertheless be used for other purposes (Coleman 1988; Nahapiet and Ghoshal 1998). The *cognitive dimension* refers to those aspects that provide shared representations, interpretation, and system of meaning among group members (Nahapiet and Ghoshal 1998). It reflects the condition whereby project team members share a common understanding (Bolino et al. 2002) and the extent to which they have developed a shared cognitive scheme among themselves (Maurer and Ebers 2006). The *relational dimension* is characterized by the personal relationships actors develop among themselves through the history of interaction (no less in the construction project settings) (Granovetter 1992). Relational dimension involves emotional closeness and reciprocal services among actors (Granovetter 1973). This dimension concerns interpersonal connections that are affective in nature (Krackhardt 1992). It focuses on the quality of the relationships in terms of trust, intimacy, obligations, expectations, etc. (Bolino et al. 2002). The importance of relational dimension lies (with the cognitive dimension) in its ability to facilitate control on project participants.

3 METHODS

The research questions of the present study concerns the exploration of social capital in construction project settings. There is a need to employ both quantitative and qualitative approaches – triangulation (Jick 1979). With the use of the two approaches, we seek to complement the results obtained from one method with those from the other and, in some instances, expand the breadth and range of our inquiry on the phenomenon of social capital in projects (Greene et al. 1989). Questionnaire survey and case study were chosen as the research methods for the study. We employed mixed methods sampling which incorporated both probability (survey) and purposive (case study) samplings (Teddlie and Yu 2007). For the questionnaire survey, responses were solicited from industry practitioners who were either working on on-going construction projects or participated in recently completed projects. We targeted project

managers, site agents, architects, engineers, quantity surveyors, and supervisors/foremen in various capacities as respondents. Their names and contact details were randomly drawn from the membership of professional institutions, trade associations, and governmental departments. In all, 2,186 practitioners were identified and invited to participate in the survey. We received a total of 376 valid responses (17.2% response rate). Of the respondents, 90.2% are male. On the age bracket, 86.3% of the respondents are between 31-60-year old within which 41.7% of them are between 41-50 years old. More than 90% of them have at least 5 years of project experience. Slightly over half of the respondents (50.8%) worked on building projects. The remaining worked on civil engineering (47.6%) and process plant projects. We operationalized the structural dimension with network ties (NW) and informal grouping (IF), the cognitive dimension with shared understandings (SU), and the relational dimension with trust (TR) among project participants (see Fig. 1 for the scales). For the case study, we selected a building construction project known as *Project Eastern* for the study. Based on our preliminary observations, this project's procurement system, partnering arrangement, and organizational structure provide relevant settings for us to both investigate and illustrate the phenomenon of social capital. Table 1 provides further descriptions of the case project together with the informants selected for the case study.

Table 1: Overview of Project Eastern

Project Descriptions	Core Project Team Members Interviewed	
Client: Government department	Client organization:	No.
Contract sum: HK$434 million (US$1:HK$7.8)	Senior Architect (SA)	1
Contract period: 36 months	Project Architect (PA)	1
Contract type: Traditional design-bid-build, with six work packages under modified guaranteed maximum price (MGMP) arrangements with some contractor's design elements	Structural Engineer (SE)	1
Project features:	Building Services Engineer (BSE)	1
The Phase 4 (of six phases) of public rental housing project involving the construction of three 41-storey blocks of about 2,300 domestic flat units, with auxiliary civil and structural works	Resident Engineer (RE)	1
Publicly high visibility project with novel MGMP procurement arrangement	Project Clerk-of-Work (PCOW)	1
Full compliance of the Independent Checking Unit (ICU) with the contractor's designs	Contractor organization:	
Numerous new initiatives that render the project a "research project" – new designs, administrative procedures, etc.	Senior Project Manager (SPM)	1
Project management teams: Two primary teams: the client (as both designer and project manager), and the contractor	Site Agent (SAgt)	1
Data collection period: April 2007-May 2008	Quality Control Manager (QCM)	1
	Senior Project Quantity Surveyor (SPQS)	1
	Senior Building Services Engineer (SBSE)	1
	Project Supervisor	1
	Health, Safety and Environmental Officer (HSEO)	1
	Total	13

4 QUANTITATIVE DATA ANALYSES

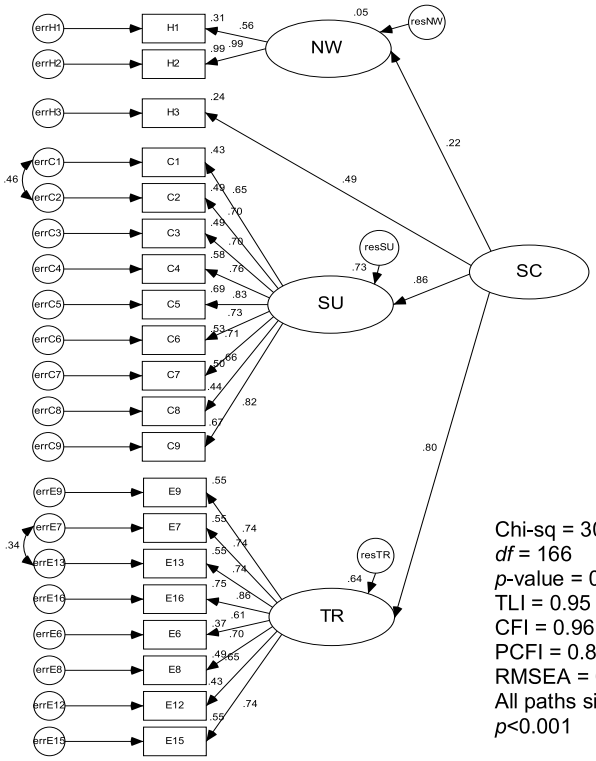
We used confirmatory factor analysis (CFA) to examine the dimensional structure of social capital (SC) and to test the convergent and discriminant validity through a measurement model using the proposed constructs of NW, IF, SU and TR. Preliminary model exploration suggests that IF is represented with only one item. The final measurement model indicated that all items have loading in excess of the minimum 0.5 (Hair et al. 2006: 777) at $p<0.001$. The model has also yielded adequate goodness of fit (chi-square = 274.14, degree-of-freedom = 163, p-value = 0.00, TLI = 0.96, CFI = 0.97, RMSEA = 0.04). Table 2 shows the validity measures, descriptive statistics, and the reliability measures. From Table 2, while most of the variance extracted (VE) for constructs are greater than the required 0.5, the VE for IF is lower at 0.30. Although the value is less than 0.5, but because informal grouping is an important facet of the structural

dimension of social capital, we decided to keep the construct in the model (cf. Hair et al. 2006). For discriminant validity, the VE for each construct is greater than the squared correlation between the focal construct and other construct in comparison. These results imply that, with the exception of IF, the requirements for both convergent and discriminant validity of the constructs are generally met.

Table 2: Descriptive statistics, reliability, convergent and discriminant validity of constructs

Construct	Number of items	Means	Cronbach's alpha	Squared correlation (VEs on diagonal) NW	IF	SU	TR
Network ties, NW	2	17.04	0.71	*0.55*			
Informal grouping, IF	1	2.84	n.a.	0.12	*0.30*		
Shared understanding, SU	9	4.21	0.91	0.02	0.14	*0.51*	
Trust, TR	8	4.01	0.86	0.04	0.08	0.45	*0.51*

We construct the higher level SC model from the measurement model by introducing the higher lever SC construct that link lower constructs of NW, IF, SU, and TR. The final SC model is shown in Fig. 1.



Chi-sq = 308.07
df = 166
p-value = 0.00
TLI = 0.95
CFI = 0.96
PCFI = 0.84
RMSEA = 0.05
All paths sig at *p*<0.001

The scales used (SPE in bracket):

Network ties, NW (Hatala 2006)
H1: Number of persons provide help at work (0.56)
H2: Number of persons provide social support at work (0.99)

Informal grouping, IF
(Nahapiet and Ghoshal 1998)
H3: Usefulness of informal grouping (0.49)

Shared understanding, SU (Pinto et al. 1993; Sarker et al. 1998; Tsai and Ghoshal 1998)
C1: Shared vision (0.65)
C2: Collective goals (0.70)
C3: Collective rules (0.70)
C4: Shared understanding of project requirements (0.76)
C5: Shared culture (0.83)
C6: Shared understanding of others' requirements (0.73)
C7: Common understanding emerged (0.71)
C8: Shared technical knowledge (0.66)
C9: Common thinking emerged (0.82)

Trust, TR (Chen and Huang 2007; Cummings and Bromiley 1996; Nyhan and Marlowe 1997)
E9: Meet obligations (0.74)
E7: Confident of abilities to perform (0.74)
E13: Well thought out decision (0.74)
E16: Members are reliable (0.86)
E6: Fair treatment (0.61)
E8: Tell truth in negotiations (0.70)
E12: Not misleading (0.65)
E15: Negotiate expectations fairly (0.74)

Figure 1: Second-order social capital (SC) model with standardized parameters estimates (SPE)

In the SC model shown in Fig. 1, although all the estimates are statistically significant, the two constructs that represent structural dimension yielded estimates that are lower than 0.5 – 0.22 for the path SC-NW, and 0.49 for SC-H3. While the slightly lower 0.49 path H3 is acceptable, the 0.22 NW path is less desirable. However, Hair et al.'s (2006: 798) have cautioned, because NW (and IF) represents the mainstay of structural dimension of SC, and that it demonstrates adequate internal consistency and convergent validity (0.71 and 0.55, respectively, see Table 2), NW and IF are retained in the model.

5 QUALITATIVE DATA ANALYSES

We used interview data as the main source of information complemented other data types. We used broad-base questioning topic guide to solicit project informants' views on the manifestation and formation of social capital, and its impacts on team interactions. We performed thematic analysis for the data

collected. In Project Eastern, the client team assumed dual role of project manager and designer. They were responsible for design-related issues - design management and getting approval - and contract administration. With the novel modified guaranteed maximum price (MGMP) system which incorporated the contractor's design, there was a need for full compliance of Independent Checking Unit's (ICU) requirements. Contractor's designs must be approved by the more stringent ICU prior to site works. The contractor's design had to be submitted through the client's structural engineering division. Handling the ICU submissions and approvals had become significant affairs. To manage design-related issues, the project architect (PA) had convened frequent design meetings dubbed "working sessions."

5.1 Manifestation of Structural Dimension and Position

Structural dimension serves both explicit and implicit functions. The *positions* of participants and *bridging* are the explicit function. The internal network interweaved both the client and contractor project personnel into the core team for the project. Multi-connections were present forming a closed network that facilitated information transfer both laterally and vertically across hierarchies. Bridging involved connecting the actor's team to other networks that were related to the activities of the focal team. In the project the SAgt had attempted to match and link his own contractor's key staffs to those from the client organization. This network was established with reference to the communication matrix set up during partnering sessions. Both the client's and contractor's key staff were encouraged to communicate directly among themselves with reference to their positions and areas of responsibilities in the matrix thereby enabling faster, timely, and more accurate communication through the re-configured network.

Implicit functions are associated with the indirect effects that can be derived from an actors' position in the network. In Project Eastern, the project clerk-of-work (PCOW) had demonstrated leadership to his frontline junior COWs. The latter were initially insistent on the contractor to deliver highest quality standard of works resulting in slow work progress. Sensing the issue and in the bid to improve progress, the PCOW attempted to convince his sub-ordinates to adopt a more practical stance. With his "imposed" leadership and the contractor's improved work quality, progress slowly picked up. Here, leadership leverage to improve outcome was effected through and contingent upon personnel occupying strategic positions in the projects. Another implicit function is that of legitimacy. In the project, when some of the contractor's designs of the MGMP packages were disapproved by the ICU, the client team led by the PA helped the contractor to convince the ICU of the adequacy of the designs.

An intriguing effect of structural dimension is the existence and effects of *informal grouping* and *ties*. In Project Eastern, the emergent grouping comprised the client and contractor teams, and the subcontractors. As numerous discussions were needed for the design, frequent and intensive design meetings – "working sessions" - were organized among a wide range of participants occupying different hierarchical levels in the project. This resulted in speedier issues resolution as the arrangement "helps to reduce unnecessary corresponding work" (PA). The intensity of the interactions of all parties also helped foster group cohesion and trust building. The PA proclaimed: "We sit down together once a week or twice a month to resolve design issues, and by doing that, actually we build up trust very efficiently."

5.2 Manifestation of Cognitive Dimension and Shared Understanding

The first kind of shared understanding is the *common goals* for all parties. Generally, for Project Eastern the common goals for the core teams were timely completion and meeting project budget. Because of the need to achieve common goals, coupled with the need to face the uncertainty and increased workloads for all parties inherent in the string of new initiatives, a sense of solidarity within the core team emerged (more on solidarity later). The PCOW expressed it this way: "The shared goal is just the same. . . . Actually we are the same, we are on the same boat." This atmosphere instilled a sense of team cohesion and willingness to *share responsibilities* among team members in the project. Relatedly, the understanding and appreciation of each *other's constraints* among the participants are other kinds of shared understanding. This phenomenon is illustrated by the late issuance of structural drawings from the client's organization resulting from the sudden surge in the number of projects and a shortage of design personnel at the beginning stage of the project. The late issuance affected the contractor's work planning. The client's structural design team admitted their inability to produce the drawings on time. They hence

entertained the contractor's requests for design-related information on urgent basis to mitigate further delay in the contractor's program. By appreciating and accommodating other's difficulties, the core team became more cooperative. These shared understandings of technical and contractual requirements among the parties minimized the number of disputes while improving operational efficiency of the project.

5.3 Manifestation of Relational Dimension and Trust

The forms of relational social capital include *team spirit*, *solidarity*, *commitment*, and *trust* among the core team members. Collegial *team spirit* was highly evident in Project Eastern. In the project, one form of project governance was the business-as-usual approach. The traditional contract-based interactions among members characterized this approach. However, alongside this mechanistic arrangement was a more humanistic approach. This phenomenon evolved from the initial socialization period of the core team members. After experiencing intensive interactions for some time, a less contractual approach emerged. The client SA recalled: "For a certain period of time, they [referring to the core team] still get some kind of human relationships, and this is important and, under normal situations, we welcome this sort of arrangement because you are not only client-contractor relationships." It is this emergent relationship that laid the foundation for further collaboration among parties in the project. In addition, *solidarity* resulted from the need to deal with uncertainty and the increased workloads in relation to the novel procurement system and the string of new initiatives. A catalyst for the formation of a common rapport was the various episodes of contractor's submissions of design packages to the ICU which had become common target for both teams. Both sides recognized the need to work together for timely ICU's approval. Within the atmosphere of solidarity both sides showed increased *commitment*.

The level of *trust* – a sense of *generalized trust* - among Project Eastern core team members appeared to be high. The team worked on "a trust system" (PA). This sentiment was echoed by the contractor's SPM. The manifestation of the trust system in the project lied in large part on the prevalence of the informal arrangement in project organizing. Often, based on the trust among the team members, design amendments that had been agreed upon in design meetings would be acted upon without the need to wait for written (formal) instruction. On the part of the contractor, in the context of ICU's submission and approval, the impression was that the client team was always willing to assist in their submission. The next type is *contractual trust*. As contract administrator, contractual trust was more emphasized by the client's team. In discharging their contractual obligations the client and contractor reciprocated to each other informal agreements to foster contractual trust. This *reciprocity* facilitated quicker processes as site works were conducted in parallel with the issuance of formal instructions.

5.4 Manifestation of Personal Dimension

The personal dimension is an emergent theme from the analyses. The project informants converged on their views on the importance of individual's personality and *positive characters* in project organizing. *Willingness to be consultative* is one manifestation of personality as evident from the project. The PCOW adopted a more collaborative approach when dealing with the contractor instead of the traditional "command and control" approach. When a problem was encountered, the PCOW discussed and worked with contractor team on the possible solutions instead of issuing a site direction. This approach helped in bringing the two sides closer. The contractor's QCM affirmed that this approach "helped build the relationship among the two teams." The second manifestation of positive personality is the project participants' *willingness to exercise flexibility*. The manifestation of this intention was most evident in the dealing of the new initiatives. The PA acknowledged the existence of some "tough grey areas" with the trials of those initiatives. Notwithstanding the need to comply with contract and specification, the client's team was willing to be flexible to "allow some room for them to "maneuver" (PA).

6 DISCUSSIONS

6.1 Structural Dimension

In the quantitative approach of the study, structural dimension was conceptualized as getting one's works done with the help of network members and getting social support. Although the quantitative evidence

shows support to these two measures, their formations are not strong. It appears project participants generally do not consider obtaining work-related help and social support as constituting social capital. These phenomena suggest that project participants rely on the project organizational control and role-based coordination for task performance, and the reliance on social support is trivial. The qualitative aspect points to the phenomena of bridging and bonding. In the project, bridging had been effectuated among the contractor's team through the SAgt. And, bonding social capital was highly evident in the project in that the project core team had demonstrated a spirit of camaraderie. This team cohesion improved the team resilience and ability to absorb the shocks related to the uncertainty and complexity brought about by the new initiatives in the project. Due to the high emotional content and psychological closeness in the relationships (Walker et al. 1997), high bonding team confers flexibility and member supportiveness in the management of group affairs. In a highly dynamic environment as in the project, flexibility is highly instrumental in coping with the flow of opportunities that are typically more complex, ambiguous, and less predictable (Davis et al. 2009; Eisenhardt and Martin 2000).

However, the structural features observed in the project had facilitated project organizing. In the project "working sessions" the core team members were also the central figures in their respective extended individual networks (e.g. SAgt with his subcontractor teams). These core team members not only occupied positions of high centrality in the project organization's technical advice network, they also occupied central positions in the project formal structure performing the technical coordinating functions. The consistency among the personnel's roles, responsibilities, behaviors and their formal and prescribed roles had led to structural stability and, to some extent, predictability of the project organizational affairs.

6.2 Cognitive Dimension

The quantitative analyses indicate that shared understanding of project requirement, other's requirements, technical knowledge, shared culture, common thinking, and collective goals represent the cognitive dimension. These items are similar with those derived from the qualitative analyses. Shared understanding of project and technical requirements provide the basic knowledge domain of works and project organizing among participants. Because these aspects mainly concern the physical construction and contractual provisions of the project, they facilitate the discussion and exploration of alternatives and trouble-shooting. Shared understanding on other's difficulties and constraints help improves relationships among parties. As participants developed fine-grained knowledge of each other's processes and operational needs, resources, and abilities, such knowledge improves the appreciation of other's behaviors and needs (Ritter and Gemunden 2003) that results in adaptation of parties' work processes.

Shared culture and common thinking convey a sense of identity for the members of a collectivity, enhance the social system stability, and serve as a sense-making device that guide and shape members' behaviors (Smircich 1983). Within the core teams of the case project, the network of cognition that is characterized and represented by the various type of shared understanding intertwined with the structural features of the project organization. To the extent that network members' expectations affect their perceptions, the reciprocity and transitivity (Kilduff and Brass 2010) of the cognitive perceptions percolated throughout the core team networks. That is, network ties provide informational indications of the general approach of handling the group affairs (cf. Borgatti and Halgin 2011).

6.3 Relational Dimension

The quantitative data reveals that trust is characterized as parties meeting their obligations, the confidence and obligations to perform, the ability of members to make well thought out decisions, the reliability of members, and the expectations that members negotiate project affairs in a fair manner. The qualitative analyses reveal a more varied and dynamic nature of relational dimension. In the project, the time of interactions was short but crucial, and the interactions were intensive, the teams relied on the development of swift trust of the competent and contractual nature in project organizing. Swift trust entails the reliance of judgment on the other project participant's professionalism, and it depends on *doing* rather than relating (Meyerson et al. 1996). In the project, trust was formed through the trustee's performance of specific tasks to the expected standard. Project informants also stressed the importance of reciprocity in the course of relationships development. In the developmental view, the use of contractual trust was

relatively more prevalent than trust with relational content in the beginning. However, over time, with both competent and contractual trusts slowly institutionalized, coupled with performance and reciprocity, a trust with relational content started to emerge. This observation is in line with the view that control mechanisms embodied in contract and its administration can actually serve as a springboard for the inducement of trust (Rousseau et al. 1998). If trust is taken in a wide sense that includes trust that is based on the contract, then trust and contract go together (Woolthuis et al. 2005).

Team spirit and solidarity are other aspects of relational dimension. These also facilitates the recognition that task completion leads to collective good rather than self-interest (Smith 2009). More importantly, it enables a broader set of values to be instilled among group members. This higher level values enable the group to shift size and focus rather easily. As such, solidarity tends to confer the flexibility in both structural form and cognitive framework of reference of the group thereby adaptation among group members. This increased capacity had enabled speedier decision making among the group members.

6.4 Personal Dimension

In project organization, participants constantly operate in the environments that are fluid, fast pace, emergent, and ever changing where each is vying for favorable position. Consequently, involvement in project can be stressful (Bryman et al. 1987). In this environment, it is essential to maintain relationships that are characterized by vitality, mutuality, and positive regards. This can only be achieved by project participants having positive attitudes and personality as observed in the project. The working relationships that stem from individual characteristics which in turn extend to multi-party interactions, together with their cognitive and relational embeddedness, lead to high quality connections among them. In this respect, personal dimension is an important addition of individual attributes in the discourse of social capital in project settings (cf. Kilduff and Brass 2010) and this is a key finding of our study.

Table 3 presents the integrative results of the two approaches. The analyses facilitate the convergence and corroborations of results on social capital in project settings. The analyses confirm and extend the dimensionality, provides the processual aspects and dynamic scheme of social capital. In this respect, the mixed methods approach provide greater confidence in improving our understanding of the phenomenon of social capital. While contributing to the understanding of relational governance in project management in general, our study and research approach also contributes to team effectiveness in temporary (project) settings in that our study has provided a more nuanced and detailed understanding of the combined effects of team processes, motivational, and cognitive effects (Mathieu et al. 2008) on team working. Further, our key finding of the new personal dimension has added to the recent recognition of individual attributes in the network discourse. Because actor's properties matter for a group to extract network values, our identification of this new dimension has contributed to the social capital literature (c.f. Kilduff and Brass 2010).

Table 3: Corroboration of results ("Quan" and "Qual": quantitative and qualitative approach, respectively)

Aspects	Quan	Qual	Integrative results
Multi-dimensionality	Confirmed	Confirmed	Methods mutually supportive
Additional dimension	None	Yes	Additional *Personal Dimension* identified in Qual
Contextual factors	Yes but not significant	Yes	Factors (e.g. high visibility) provide boundary conditions on the emergence and application of capital
Processes	None	Yes	Processes and mechanisms identified in Qual

7 CONCLUSION

In this study, we set out to explore the manifestations and effects of social capital in construction project organizations by employing a mixed methods approach. Both research approaches show the dimensional correlation nature of social capital and the identification of a new dimension. In project settings, the simultaneous congregation of the members with both strong and weak ties, positive personalities, the creation of common understanding among members, and the closely knitted relations that emerge in the course of interactions all interact in flux to sustain the social capital in project teams. Through facilitating information, communication, and transfer of influence, the structural dimension provides a forum through

which project members can evaluate the trustworthiness, reputations, quality, and affiliation of other members. While this dimension provides a platform for interactions, relational dimension provides a normative structure that helps generate a common set of convention, climate, rules and routines (Granovetter 1992) in project organizations. Relational dimension provides underlying psychological security among members through trust, commitment, and reciprocity. These two dimensions, in turn, constitute a means by which cognitive dimension is translated into members' task performance by facilitating the alignment of disparate project parties. Viewed this way, social capital, as a means of relational governance, is more pertinent to project operation if compared with other more permanent organization. For these reasons, it is important for project organizers to promote socialization among project participants and devise mutually supporting network structures that allow consistent application of roles, responsibilities, and authorities of those participants.

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