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## Dynamic Relationship between Trust and Formal Control in Chinese Construction Projects

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**Abstract:** The purpose of this research is to analyze the interaction between trust and formal control from a dynamic perspective. Based on the existing literature, the paper proposed a spiral development model of owners' trust, formal control, contractors' trust and reciprocation from the angle of trust reciprocity. The model tested by questionnaire survey, vis-à-vis interview, structural equation modeling and a case study in China. The empirical results suggested that the development between owners' trust, formal control, contractors' trust and reciprocation takes on a form of helix. The findings provide a new view and new way of thinking for construction firms to implement Customer Relationship Management (CRM).

**Key words:** Trust, formal control, dynamic, construction project, china, structural equation model

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### INTRODUCTION

In the field of inter-organizational relationship, trust and formal control rank as vital governance mechanisms that can safeguard transactions (Das and Teng 1998; Poppo and Zenger, 2002). Yet the relationship between trust and formal control remains almost mythological. One literature stream (Dyer, 1997; Gulati, 2007) suggests that trust and formal control reinforce each other and can apply simultaneously as a means to safeguard transactions. Another research argues that the two governance mechanisms are actually substitutes for, or even exclude each other (Mayer and Argyres, 2004; Ryall and Sampson, 2009). Recently, a new point of view considers that formal control and trust are both substitutes and complements (De Man and Rojiakkers, 2009; Istvan *et al.*, 2012). However, few researchers to our knowledge have explored the relationship between trust and formal control from a process perspective. We hope to shed some light on this subject.

### LITERATURE REVIEW

Regarding the interaction between trust and formal control, existing literature achieves three main conclusions: Substitutes, complements, substitutes and complements.

The substitution perspective on trust and formal control holds that trust and formal control are inversely related. Ghoshal and Moran (1996) argue that the excessive use of formal control leads to that one party's distrust breeds the other party's distrust. The other

party's distrust enhances their psychological reaction and thereby promotes inappropriate actions, such as opportunistic behaviors. Dyer and Singh (1998) insist that since the existence of trust may reduce transaction costs and lessen the need to monitor or safeguard exchange hazards, formal control may, beneficially, be replaced by trust.

The complementary perspective on trust and formal control holds that trust and formal control can be mutually reinforcing and both may contribute to the level of cooperation in a relationship. Gould and Quinn (1990) consider that appropriate mechanism of formal control can promote trust, as objective rules and clear measures can help to establish track records for the partners and then partners with excellent records are easier to access the trust. Cannon *et al.* (2000) think that because trust governs transactions mainly through informal manners and implicit norms, it fails to specify the safeguards contractually, which increases the risk of opportunism.

With the development of the discussion, many scholars begin to note that trust and formal control are both substitutes and complements. Das and Teng (2001) explore the joint effect of trust and formal control on confidence in partner cooperation. They find that the trust-control relationships vary depending on the type of trust and formal control involved. Following up on this perspective, Istvan *et al.* (2012) focus on contracts as a form of formal control and find that trust and contracts are both complements and alternatives.

Recently, researches find that the development of trust and formal control are all dynamic. e.g., Khodyakov (2007) argues that trust is a process performed constantly

by the actor. Wright and Ehnert (2010) even suggest replacing the word “trust” with the terms “trusting”, which better represents it as a process that is an emerging, ongoing, social accomplishment. Cardinal *et al.* (2004) also conclude that formal control should be seen as dynamic, multifaceted and emergent phenomenon by exploring the dynamic unfolding of formal control systems in the particular start-up company. However, the three views described above have not yet noticed that. In the following section, the paper would explore the dynamic development model of owners’ trust, formal control and contractors’ trust from an explicit process perspective, then attempt to provide new insights into the debate of the relationship between trust and formal control.

### CONCEPTUAL MODEL AND HYPOTHESES

**Definitions of variables:** The inter-organizational trust models applied by the previous studies are mostly established under western culture and enterprises (Pinto *et al.*, 2009; Ding and Ng, 2007). However, strong Confucian culture penetrates into every corner of the society in China. We argue that western trust models do not fit China’s situation. Hence, with the reliance on the classification of the trust proposed by Hartman (2002) and the structure of Chinese trust proposed by Li and Liang (2002), this paper defined the dimensions of the trust in Chinese construction supply chain as competence-based, Guanxi-based and intuitive-based trust on the basis of the vis-à-vis interview.

Formal control rely primarily (but not exclusively) on explicit contracts (Luo, 2002). Similarly, the basis of the formal control in construction supply chain is the contracts between owners and contractors. In essential, contracts are rules that regulate the continuous interaction and behaviour selection of owners and contractors (Kreps, 1990). Under such context, the destination of formal control in this article was contract control. Further, contracts in construction projects must provide an unambiguous definition of responsibility and obligation in law, finance, engineering, etc (Bubshait and Almohawis, 1994). Therefore, this paper defined the contract control as contract term control and contract implementation control.

Reciprocation originates in economics, which goes after the material return. The paper regards that reciprocation in management is one of the human decision behaviour, which is closely related to trust. And the good interaction between trust and reciprocation can effectively enhance the cooperation and promote the sustainable development of the relationship.

**Hypotheses:** We argue that owners’ trust reduces the level of formal control and that if owners frequently use formal control, contractors will feel distrust from owners, which consequently causes conflict, opportunistic behaviors. Meanwhile, if contractors feel the trust from owners, they will conduct reciprocation as the sense of duty. All of these excellent works will in turn heathen owners' confidence in contractors. Accordingly, we proposed the following hypotheses:

- **H1:** Owners’ trust is negatively related to formal control
- **H1a:** Owners’ competence-based trust is negatively related to contract term control
- **H1b:** Owners’ Guanxi-based trust is negatively related to contract term control
- **H1c:** Owners’ intuitive-based trust is negatively related to contract term control
- **H1d:** Owners’ competence-based trust is negatively related to contract implementation control
- **H1e:** Owners’ Guanxi-based trust is negatively related to contract implementation control
- **H1f:** Owners’ intuitive-based trust is negatively related to contract implementation control
- **H2:** Formal control is negatively related to contractors’ trust
- **H2a:** Contract term control is negatively related to contractors’ intuitive-based trust
- **H2b:** Contract implementation control is negatively related to contractors’ intuitive-based trust
- **H3:** Contractors’ trust is positively related to reciprocation
- **H3a:** Contractors’ intuitive-based trust is positively related to reciprocation
- **H4:** Reciprocation is positively related to owners’ trust
- **H4a:** Reciprocation is positively related to owners’ competence-based trust
- **H4b:** Reciprocation is positively related to owners’ Guanxi-based trust
- **H4c:** Reciprocation is positively related to owners’ intuitive-based trust

Based on the above assumptions, the conceptual model is as shown in Fig. 1. From Fig. 1, we can discover the process of dynamic development between owners’ trust, formal control, contractors’ trust and reciprocation.

### METHODOLOGIES

**Measure of variables:** The paper firstly designed a questionnaire about trust, formal control and

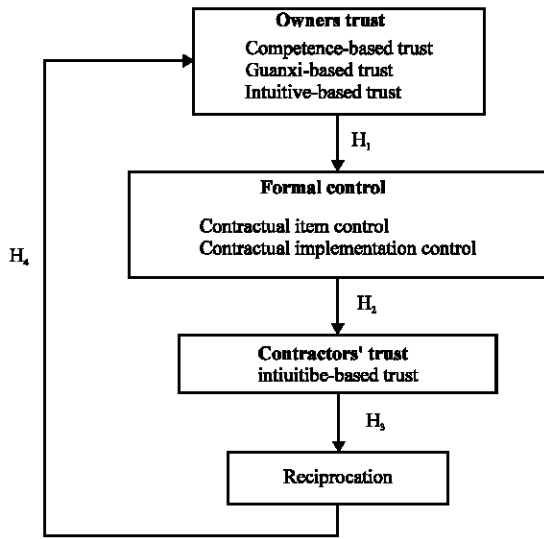


Fig. 1: Spiral model of trust, formal control and reciprocation

reciprocation in construction projects. Secondly, we invited 30 graduate students majoring in engineering project management to conduct a pre-test and then according to their feedback we revised the questionnaire by clarifying the ambiguous questions. Multi-term scales were used to operationalize all the variables except for contractors’ trust, which employed one term. All measures employed the five Likert terms. Terms were borrowed from past research (Berg *et al.*, 1995; Hartman, 2002; Li and Liang, 2002; Liang and Yuan, 2009), except the terms of Guanxi-based trust and reciprocation that were developed according to the definition, which ensured the content validity of the scale.

**Samples:** The paper took 36 construction firms in Beijing, Shanghai, Guangdong and Hubei provinces or municipalities in China as samples and sent questionnaires by email to the middle and senior managers of construction projects. A total of 480 questionnaires were handed out, of which 424 were completed for an 88.3% response rate (209 were from owners and 216 were from contractors). The basic characteristics of the samples were specified in Table 1.

**RESULTS**

The paper conducted the SEM analysis on data by AMOS17.0, which included the assessment of the scale, verification of the structural model and test of research hypotheses.

Table 1: Sample characteristics

Term	Frequency	Ratio (%)
<b>Project category</b>		
Industrial plants	58	13.6
Business buildings	45	10.5
Public buildings	172	40.5
Houses and apartments	117	27.6
Others	32	7.8
<b>Firm category</b>		
Government or agent companies	26	6.2
State-owned firms	168	39.7
Private firms	198	46.7
Overseas-funded firms	25	5.8
Others	7	1.6
<b>Enterprise size</b>		
<100	61	14.4
100-400	140	33.1
401-700	89	21.0
701-1000	51	12.1
>1000	143	18.7
<b>Service life</b>		
1-3 years	144	33.9
4-5 years	94	22.2
6-7 years	45	10.5
7-10 years	61	14.4
>10 years	80	19.1
<b>Representative stakeholders</b>		
Owners	209	49.2
Contractors	215	50.8

**Assessment of scale:** The first step involved reliability analysis of multiple terms of each construct. The squared multiple correlations (SME) of terms reached the acceptable level except two terms (Table 2). The factor loading of variables were all above 0.5 (Table 2), showing that all the factors are reliable. Then, the Composite Reliability (CR) ranged from 0.746 to 0.762 (Table 2), indicating acceptable levels of reliability for constructs. Next, convergent validity analysis was conducted. By analyzing the factor loading of every variable, we found that the factor loading of variables were above 0.5 except two terms (Table 2), indicating construct validity. Then we analyzed the Average Variance Extracted (AVE) of the constructs and the results showed that all AVE exceeded 0.5 (Table 2), indicating that the constructs reflect the information of the structure of original data.

Finally, we chose two constructs randomly and compared the change in chi-square to test the discriminate validity. The results showed a significant difference between the chi-square of the two constructs ( $p = 0.000 < 0.05$ ), indicating that the construct has good discriminate validity.

**Verification of the structural model:** The overall goodness-of-fit test of the model was shown in Table 3. From the results we could find out that of all the values of absolute, incremental and parsimony fitted indexes, all except NFI and RFI reached the acceptable levels. The Chi-square was 191.053 ( $p = 0.193 > 0.05$ ) as the degree of

Table 2: Result of the assessment of scale

Terms of measures	Factor loading	SMC	Measurement error	C.R.	AVE
<b>Owners' trust</b>					
Owners' Competence-based Trust (OCT)				0.758	0.514
OCT1: The contractor has high qualification level	0.699	0.678	0.322		
OCT2: The contractor is known in good faith	0.545	0.687	0.313		
OCT3: The project manager of the contractor has high level of management and communication skills	0.601	0.550	0.450		
Owners' Guanxi-based Trust (OGT)				0.746	0.501
OGT1: We have experience of cooperation with the contractor	0.782	0.616	0.384		
OGT2: We are relatives, friends, classmates and other familiar relationship with the project manager of the contractor	0.545	0.589	0.411		
OGT3: We have the same interests or way of behavior with the project manager of the contractor	0.645	0.474	0.526		
Owners' Intuitive-based Trust (OIT)				0.760	0.519
OIT1: I feel I can trust the contractor	0.624	0.491	0.509		
OIT2: I feel the contractor will not damage our interests for their own interests	0.812	0.663	0.337		
OIT3: The very first time I saw the project manager of the contractor, I feel he/she is trustworthy	0.585	0.557	0.443		
<b>Formal control</b>					
Contract term Control (CTC)				0.751	0.503
CTC1: The contract contains very detailed special terms	0.718	0.517	0.483		
CTC2: The contract contains the terms of schedule control that clearly define the beginning, stop and termination	0.596	0.553	0.447		
CTC3: The contract contains the terms of cost and quality control.	0.743	0.524	0.476		
CTC4: The contract contains the clear definitions of the specific response conducted by the two sides when unforeseen events occur	0.500	0.786	0.214		
Contract Implementation Control (CIC)				0.752	0.515
CIC1: Stern legal sanctions and financial penalties shall be taken against the breaching party according to the contract	0.504	0.602	0.398		
CIC2: There are many claims from the two sides in construction field	0.825	0.678	0.322		
CIC3: Matters unstipulated in the contract can be done after the two sides sign a contract	0.549	0.555	0.445		
<b>Contractors' trust</b>					
Contractors' Intuitive-based Trust (CIT)				0.762	0.516
CIT1: During the practical construction, you feel that the owner trust you					
Reciprocation (RI)				0.762	0.516
RI1: During the practical construction, you strictly implement the contract	0.571	0.753	0.247		
RI2: During the practical construction, you share information and experience with the owner	0.537	0.661	0.339		
RI3: During the practical construction, you actively communicate with the owner	0.561	0.716	0.284		

Table 3: Summary of the overall goodness-of-fit test

Measure	Levels of acceptable fit	Calculation	Conclusion
$\chi^2$	$p > 0.05$	191.053 ( $p = 0.193$ )	Fit
$\chi^2/df$	$< 2.00$	1.092	Fit
RMR	$< 0.05$	0.033	Fit
RMSEA	$< 0.08$	0.015	Fit
GFI	$> 0.90$	0.96	Fit
AGFI	$> 0.90$	0.947	Fit
NFI	$> 0.90$	0.603	Not fit
RFI	$> 0.90$	0.523	Not fit
IFI	$> 0.90$	0.948	Fit
TLI	$> 0.90$	0.929	Fit
CFI	$> 0.90$	0.941	Fit
PGFI	$> 0.50$	0.727	Fit
PNFI	$> 0.50$	0.502	Fit
CN	$> 200$	459	Fit
PCFI	$> 0.50$	0.784	Fit

freedom being 175, suggesting that the theoretical model proposed in this paper fitted with the data very well. As a whole, the goodness-of-fit of the second-order model was quite good.

**Test of research hypotheses:** By the method of Maximum Likelihood (ML), the paper tested the research hypotheses and the results were listed in Table 4.

Table 4: Estimation results

Path	Hypotheses	Sign	Estimate	Result
OT-FC	H1			
OCT-CITC	H1a	—	0.132 <sup>ns</sup>	Not supported
OGT-CITC	H1b	—	0.210 <sup>ns</sup>	Not supported
OIT-CITC	H1c	—	0.103 <sup>ns</sup>	Not supported
OCT-CIMC	H1d	—	0.736 <sup>***</sup>	Supported
OGT-CIMC	H1e	—	0.723 <sup>***</sup>	Supported
OIT-CIMC	H1f	—	0.423 <sup>***</sup>	Supported
FC-CT	H2			
CITC-CIT	H2a	—	0.321 <sup>ns</sup>	Not supported
CIMC-CIT	H2b	—	0.659 <sup>**</sup>	Supported
CT-RI	H3			
CIT-RI	H3a	+	0.557 <sup>**</sup>	Supported
RI-OT	H4			
RI-OCT	H4a	+	0.741 <sup>***</sup>	Supported
RI-OGT	H4b	+	0.407 <sup>*</sup>	Supported
RI-OIT	H4c	+	0.697 <sup>**</sup>	Supported

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ , ns:  $p > 0.1$

## CONCLUSION

This study empirically examined an integrated framework of owners' trust, formal control, contractors' trust and reciprocation in construction projects. The empirical results suggested that (1) owners' trust

influenced the strength of formal control; (2) the strength of formal control affected the perceived trust of contractors; (3) the perceived trust of contractors impacted on reciprocation; (4) reciprocation in turn aroused owners' trust.

This study contributed to the area of construction project management in the following senses. First, our approaches on trust were different from most former studies in construction projects. Namely, we discussed the trust from the viewpoint of owners and contractors separately. Since the trust has the nature of reciprocity, in another word, if one party pays trust, the other party shall return trust as well. It would be more natural to research on the interaction between owners' trust and contractors' trust. In so doing, we classified trust into three forms: competence-based trust, Guanxi-based trust and intuitive-based trust. The empirical data analysis showed that owners' trust had a significant influence on contractors' trust by way of formal control. Meanwhile, contractors' trust had a significant influence on owners' trust by way of reciprocation.

Second, we discovered the mechanism of dynamic interaction between owners' trust, formal control and contractors' trust in construction projects. The review of previous research on the interrelations of trust and formal control reveals that trust and formal control earlier has been conceptualized as two relatively static and isolated concepts, recently some research tends to conceptualize trust and formal control as two interactive processes. However, a few attempts have been made to present explicit dynamic models. Under such background, the paper proposed a spiral development model of owners' trust, formal control, contractors' trust and reciprocation.

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