

INFORMATION RICHNESS IN CONSTRUCTION PROJECTS: A CRITICAL SOCIAL THEORY

A.M. Adriaanse¹ and H. Voordijk²

Department of Construction Process Management, University of Twente, POBox 217, 7500 AE Enschede, The Netherlands

Two important factors influencing the communication in construction projects are the interests of the people involved and the language spoken by the people involved. The objective of the paper is to analyse these factors by using recent insights in the information richness theory. The critical social theory is used to study the communication richness in computer mediated communication in construction projects. This perspective views people not as passive receptacles of whatever data or information that is transported to them, but as intelligent actors who assess the truth, rightness, adequacy, truthfulness, and comprehensibility of the message they receive. From the critical social theory perspective it is investigated which action types are used by actors and how actors in construction projects criticise the rightness of what is communicated to them by reproducing power relationships while trying to satisfy their own interests and achieve mutual understanding. The result of our study is a set of questions that will be answered in future empirical research..

Keywords: communication, information technology.

INTRODUCTION

In construction projects a large number of different activities has to be executed by many participants working simultaneously together. Communication in construction is therefore a matter of vital importance (Ahmad *et al.* 1995; Thorpe and Mead 2001). However, the construction industry is confronted with great difficulties in sharing information among its participants. Through rapid advancements in Information and Communication Technologies (ICT) opportunities arise to enhance communication between participants in construction projects and to enable effective and efficient communication (Egbu *et al.* 2001; Ahmad *et al.* 1995). Although sophisticated ICT can enhance communication in construction projects these technologies seems to be only beneficial under certain conditions (Bresnen and Marshall 2000; Egbu *et al.* 2001).

Many information systems researchers have recently argued that social and behavioural factors are more important aspects influencing information systems success than technical ones (e.g. Checkland and Holwell 1998; Claver *et al.* 2001; Fulk *et al.* 1990; Sauer 1994). Researchers argue for closer attention to the socio-political aspects of inter-organisational information and communication systems (Bensaou and Venkatraman 1996; Kumar and Van Dissel 1996; Reekers and Smithson 1996; Bensaou 1997). Therefore, the focus of this paper is on understanding

¹ a.m.adriaanse@sms.utwente.nl

² h.voordijk@sms.utwente.nl

the underlying communication processes in construction projects by using a socio-political perspective.

Two important factors influencing the communication in construction projects are the interests of the people involved and the language spoken by the people involved (Pietroforte 1997; Loosemore 1999; Bresnen and Marshall 2000; Loosemore *et al.* 2000). The objective of the paper is to analyse these factors by using recent insights in the information richness theory (Markus 1994; Lee 1994; Ngwenyama and Lee 1997). We use the critical social theory to study the communication richness in computer-mediated communication in construction projects (Habermas 1984, 1987).

The structure of the paper is as follows. In the first section, the concept of information richness is introduced. Critical social theories, particularly those of Habermas are discussed in the second section. In the next section, the focus is on the two factors influencing communication in construction projects: interests of the people involved and the language spoken by the people. These factors are related to Habermas' social action types. In the fourth part, information richness in construction projects is discussed. Part five presents the design of our empirical research.

THE CONCEPT OF INFORMATION RICHNESS

The information richness theory is originally introduced by Daft and Lengel (1984, 1986). They defined information richness as:

'... the ability of information to change understanding within a time interval. Communication transactions that can overcome different frames of reference or clarify ambiguous issues to change understanding in a timely manner are considered rich. Communications that require a long time to enable understanding or that cannot overcome different perspectives are lower in richness' (Daft and Lengel 1986: 560).

According to the information richness theory communication media (e.g., face-to-face, telephone, personal documents such as letters or memos, impersonal written documents, and numeric documents) vary in the capacity to process rich information. Media characteristics believed to be most relevant to the transmission of rich information are the medium's capability for immediate feedback, the number of cues and channels utilised, personalization, and language variety (Daft and Lengel 1986; Huber and Daft 1987). In the information richness framework provided by Daft and Lengel (1984, 1986) the ranking of media in the richness scale is fixed. In terms of the media richness theory face-to-face communication is believed to be the richest medium and formal numeric communication (e.g., computer output) the leanest (Daft and Lengel 1984). The selection of a medium that matches with the characteristics of the message results in the most effective outcome.

Recent empirical tests conducted on the information richness theory have failed to support, or at best only partially supported the information framework provided by Daft and Lengel (1984, 1986) (e.g., El-Shinnawy and Markus 1992; Kinney and Watson 1992; Lee 1994; Markus 1994). Markus (1994) proposed several social theories for the study of communication richness. In these social theories richness is not a medium characteristic but an outcome of social behaviour. In these theories a person is an intelligent being in a shared social context that can transform lean words and cues into an understanding of what the speaker or writer meant (Ngwenyama and Lee 1997). Ngwenyama and Lee (*ibid.*), however, criticised the argument that communication richness is gauged by how well a person recreates meaning that

another person intends. They introduce a new theory of richness in managerial communication that is mediated by information technology, based on a critical social theory. Therefore, basic principles of critical social theory and this new theory of richness will be discussed in the next section

CRITICAL SOCIAL THEORIES

Social action theories offer conceptual frameworks that clarify conditions, means, contents, constraints and objectives of socially organised human behaviour (Habermas 1984). Social action theories seek to understand the behaviour from the viewpoint of the involved actor (Hirschheim *et al.* 1996). In this research the critical social theory of Habermas (1984, 1987) is the starting point of analysis. Reasons for using Habermas' social action theory are the greater impact of his work on the IS discipline than any other critical social theory school of thought (Ngwenyama and Lee 1997), the existence of a theory about communication within his work (*ibid.*), the scope and depth of his treatment of social action (Hirschheim *et al.* 1996) and the possibility to analyse the socio-political aspects of communication.

In Habermas' social action theory several action types are presented. Although each action type has a specific focus and orientation, together they represent different aspects of human behaviour in social settings (Ngwenyama and Lee 1997). Habermas (1984) describes four categories of social action: teleological action, normatively regulated action, dramaturgical action, and communicative action.

Teleological action is defined as action undertaken by a single person who seeks to realise some goal. This type of action presupposes a relation between the actor and a world of existing "states of affairs", either presently existing or producible through actions. Teleological actions can be divided in instrumental actions and strategic actions.

Instrumental action is directed toward achieving personal goals in a non-social way. Such action is directed towards objects as through they were inanimate constraints, which can be manipulated in ways that will serve the actors' self interest.

In the concept of *strategic action* an actor tries to achieve one's goals by influencing other actors. Each of the other actors is oriented to his own success and behaves co-operatively only to the degree that this fits his own egocentric calculus of utility. Accordingly, an actor's strategic behaviour must be measured by taking into account the effects of his actions on situations: what serves the benefit of one actor may be harmful to the other. Thus, an actor must cope with both co-operative and conflicting interests situations and find the best strategy to pursue his self-interest.

Normatively regulated action is characterised as social actions in which the primary intention of the parties involved is to fulfil reciprocal expectations by conforming their behaviour to shared norms and values. Social duties may then override the pursuit of personal goals. In this type of action the actor can relate not only to an objective world but also to a social world. "A social world consists of a normative context that establishes which interactions belong to the body of justified interpersonal relations" (Habermas 1984:88). Insofar as actors share such a context, they share a social world. This normative context exists as a categorically distinct world only when it is recognised as valid by actors. The norms are accepted by the group and are consistent with shared values.

Dramaturgical action relates to when social actors consider themselves as an audience of each other. Here the focus is not on how an individual pursues a strategy or follows a set of normative expectations, but rather on how the performance of any action reveals something about the actor's subjectivity. More particularly, in this performance of actions, an individual represents his subjective world in a specific way to an audience of other actors.

In the concept of *communicative action* actors seek to reach an understanding about the action situation and their plans of action in order to co-ordinate their actions by way of agreement. Reaching understanding requires a co-operative process of interpretation aimed at attaining intersubjectively recognised definitions of situations. The context of the actor's pre-interpreted life-world plays an important role in reaching understanding. When the common life-world is no longer taken for granted, the actor tries to achieve or restore agreement.

When a speaker executes a specific social action type, he raises a validity claim implicitly or explicitly. In a given context the receiver has the choice of accepting or rejecting the claim. Five validity claims are distinguished: truth, rightness, adequacy, truthfulness, and comprehensibility (Habermas 1984).

Truth of the proposition or efficacy of teleological action (e.g. "His description is true/false" or "His action was efficient/inefficient"), grounded by establishing through the existence of states of affairs (e.g. "because it does/does not fit to the reality" or "because it succeeded/failed to achieve its goal.").

Rightness of norms of action (e.g. "His behaviour is right/wrong"), by establishing the acceptability of actions or norms (e.g. "because it is morally acceptable/unacceptable.").

Adequacy of standards of value (e.g. "His painting is rubbish"), by establishing the preferability of values (e.g. "because it does not show appropriate aesthetic understanding.").

Truthfulness or sincerity of expressions (e.g. "He is insincere"), by showing the transparency of self-presentations (e.g. "because his behaviour looks inconsistent.").

Comprehensibility or well-formedness of symbolic constructs (e.g. "The statement is intelligible/unintelligible"), by establishing that the symbolic expression is produced correctly (e.g. "because its grammar is right/wrong.").

In each action type one or several validity claims can be raised. In table 1 the validity claims are related to the action types (Habermas 1984).

The utterance in each argumentation is understandable only in connection with discursively redeemable validity claims, but it is the context that decides what kind of validity claim is involved in argumentation (Habermas 1984). The context helps to select a validity claim and the validity determines the type of argumentation. Habermas expects that in a given context, the soundness of the reasons (validity claims), which is able to convince the participants in a discourse, would give the argument strength. From the critical social perspective communication richness is not a function of channel capacity or only restricted to how well one person comes to understand what another person means, but also to the testing of validity claims associated with the action type enacted by the speaker or writer. The results of the testing of validity claims enable the listener or reader to detect and analyse distorted communication (Ngwenyama and Lee 1997).

Table 1: Action types and validity claims

	Truth	Rightness	Adequacy	Truthfulness	Comprehensibility
Teleological action	X				
Normative action		X			
Dramaturgical action			X	X	
Communicative action	X	X		X	X

ACTION TYPES AND COMMUNICATION IN CONSTRUCTION

The dominant factors affecting (the lack of) communication in construction can be analysed from the perspective of the social action types discussed above. Two important factors influencing the communication in construction projects are the interests of the people involved and the language spoken by the people involved (Adriaanse and Voordijk 2002).

The *interests* of the people involved influence the way they communicate. In construction projects intricately interdependent activities have to be carried out by distinct organisations with a diverse range of interests, which often are conflicting (Cheng *et al.* 2001; Loosemore 1999; Kornelius and Wamelink 1998). Conflicts of interests increase the importance of information as a source of power in negotiations and make people more secretive with it. Parties can manipulate information in their own favour (Loosemore 1999; Pietroforte 1997). The result can be a lack of open communication or sending unclear or uninformative messages.

The *language* used by the people involved is influenced by their frames of reference. It is desirable that the language used in the communication process is similarly understood by the various participants (Bowen and Edwards 1996). In building projects efficient communication is often made difficult by the different frames of reference of its participants (Pietroforte 1997). The different frames of reference are the result of the different professional background of the parties involved (Cheng *et al.* 2001; Moore *et al.* 2001). This can result in misunderstanding and misinterpretation.

Table 2: Action types and difficulties in communication in construction projects

Types of social action	
Strategic action	Communicative action
<ul style="list-style-type: none"> ▪ Information as a source of power. ▪ Sending unclear and uninformative messages. ▪ Misunderstanding and misinterpretation. 	<ul style="list-style-type: none"> ▪ Different frames of reference. ▪ Misunderstanding and misinterpretation.

These factors can be confronted with the social action types presented by Habermas (1984, 1987) (see table 2). Using information as a source of power is a result of strategic action. This can result in sending unclear and uninformative messages and manipulating information flow to influence other actors to achieve one's goals. Trying to achieve and maintain understanding among the actors involved is a result of communicative action. In construction projects difficulties may arise through different frames of reference of the participants.

CRITICAL SOCIAL THEORY AND INFORMATION RICHNESS IN CONSTRUCTION

In the theoretical framework developed the information richness of information and communication systems in construction projects will be analysed from the perspective of the framework of Habermas. By focusing on two action types, strategic and communicative action, the effectiveness of communication through information and

communication systems in construction projects will be analysed. In this section, the major questions to be answered in further research by using the theoretical framework developed will be discussed.

How do actors in construction projects use electronic media in formulating and engaging in strategic and communicative action?

Information and communication systems increase the ability to subject construction processes to continuous monitoring. Because of this the costs of inspection are lowered, which makes it easier to enforce contracts with other firms. New information and communication systems improve the methods of translating changes into design in changes in construction technology and production activities. These systems enhance feedback between parties when technical problems are encountered and reduce response times. These aspects of new information and communication system prevent explicit strategic types of action during construction because the transparency of this behaviour increases. To several parties involved in construction projects this transparency is not beneficial. These parties will act strategically during the developments of the standards or implementation of information systems. These parties will also try to sabotage the use of the information system when the implementation is completed.

In the longer run new information and communication systems may stimulate more communicative action during construction. This is especially the case when firms are involved in highly complex and uncertain construction projects. In that case, communicative action between designing and constructing parties economises on bounded rationality as a result of uncertainty and complexity. In other words, communicative action reduces organisational uncertainty. Continual feedback facilitates necessary adjustments and reduces complexity.

How do actors in construction projects criticise the truth, rightness, adequacy, truthfulness, and comprehensibility of what is communicated to them?

The sender or transmitter of data can use a particular action type. The receiver of information uses validity claims to analyse received information. The project context serves as a frame of reference that enables actors to act and to interpret the actions of others. For all actors this context defines the possibilities and potential for social action. In construction projects communication problems arise because of conflicting interests and differences in frames of reference of the people involved. The use of information and communication systems can have different consequences. Standardisation of communication results in more transparency and structure in communication. In that case the possibilities of strategic action and the differences in the frames of reference will decrease. Because of that it is easier for a receiver to criticise the rightness of what is communicated to him. Otherwise differences in frames of reference of the people involved can result in such differences in context that computer mediated communication will result in more distorted communication because of the difficulties in the testing of the validity claims.

What types of electronic media enable and constrain strategic and communicative action in construction projects?

Various types of information systems can be distinguished: a global system, an open community system and a closed community system. In a global system, there is a world-wide acceptance of general standards. Any firm can participate in this system. In a lot of industries standards are developed, which results in a standardised

communication between firms (of a part) of one industry. It is impossible for such firms to communicate electronically with firms outside the industry. This is called an 'open community system': communication is open to all members of one industry (or a part of it). Thirdly, closed community systems arise: only a few partners can communicate with each other by this system. This is the case when business partners make agreements on using information systems to strengthen their bilateral relationships. Instead of bounded rationality, know-how is transferred between firms for product development. It is expected that in closed information systems communicative action will dominate because parties can not behave anonymous.

METHODOLOGY FOR FUTURE RESEARCH

In this paper we outlined a theoretical framework and used it to state major questions that need to be answered in further research. To answer these questions we intend to conduct a multi-level empirical research. The research object is the communication and use of ICT in construction projects. The focus will also be on other levels than projects (i.e. sector and firms) in order to improve understanding of communication processes on the construction site.

So, the first level of analysis is the sector level. On this level ICT initiatives that offer possibilities for better communication between organisations in construction projects will be investigated. In this part of the empirical research a comparative analysis of the findings of different ICT initiatives will be carried out.

The second level is the firm level. This level focuses on firms involved in construction processes. This part consists of interviews with managers of contractors, clients and engineers.

Firms and ICT come together in construction projects. Therefore, the third level is the analysis of large-scale construction projects through case studies. There are two major reasons to use case studies. The first reason for doing case studies is the importance of studying communication in its real-life context (Yin, 1994). In the critical social theory the organisational context is an important issue. According to Ngwenyama and Lee (1997) social actions are embedded in an organisational context. The context defines for all organisational actors the possibilities and potential for social action and enables actors to interpret actions of others. The second reason for doing case studies is the number of variables influencing communication processes in construction. This case study method is well suited to capture the richness and complexity of these processes (Yin, 1994).

CONCLUSIONS

Information and communication systems can enhance communication in construction projects but these systems seem to be only beneficial under certain conditions. The focus of this paper was on understanding the underlying communication processes in construction projects by using a socio-political perspective.

In this research the critical social theory of Habermas is used to analyse the underlying communication processes in construction projects. In Habermas' social action theory four action types are presented: teleological action (i.e., instrumental action and strategic action), normative action, dramaturgical action, and communicative action. When an actor executes a specific action type, he or she must be ready to defend the validity claims associated with it. Five validity claims are distinguished: truth, rightness, adequacy, truthfulness, and comprehensibility. From the critical social

perspective communication richness is a function of the testing of validity claims associated with the action type enacted by the speaker or writer. The results of the testing of validity claims enable the listener or reader to detect and analyse distorted communication.

The two important factors influencing the communication in construction projects are the interests of the people involved and the language spoken by the people involved. These aspects can be analysed by the concepts of strategic action and communicative action.

In future research three major questions need to be answered.

How do actors in construction projects use electronic media in formulating and engaging in strategic and communicative action?

Increased transparency of behaviour by using information and communication systems may decrease strategic action. This transparency is not beneficial to all parties involved. These parties will act strategically by trying to avoid or sabotage the use of the information and communication system. In the longer run new information and communication systems may stimulate more communicative action during construction. This is especially the case when firms are involved in highly complex and uncertain construction projects.

How do actors in construction projects criticise the truth, rightness, adequacy, truthfulness, and comprehensibility of what is communicated to them?

In construction projects communication problems arise because of conflicting interests and differences in frames of reference of the people involved. The use of information and communication systems may have different consequences. First, it can result in more transparency and structure in communication, which will make it easier to criticise the rightness of what is communicated to a receiver. Second, the differences in the frames of reference of the people involved can result in more distorted communication because of the difficulties in the testing of the validity claims.

What types of electronic media enable and constrain strategic and communicative action in construction projects?

Various types of information systems can be distinguished: a global system, an open community system and a closed community system. It is expected that in closed information systems communicative action will dominate because parties can not behave anonymous.

To answer these questions a multi-level empirical research will be conducted.

REFERENCES

- Adriaanse, A M, Voordijk, H (2002), Preconditions for the use of ICT in construction projects. In: *7th International Symposium on Logistics & The 2nd International symposium on Operations Strategy*, 14-17 July, University of Nottingham (accepted).
- Ahmad, U A, Russel, J S and Abou-Zeid, A (1995) Information Technology (IT) and integration in the construction industry. *Construction Management and Economics*, **13** (2), 163-171.
- Bensaou, M and Venkatraman, N (1994) Interorganizational Relationships and Information Technology: A Conceptual Synthesis and a Research Framework. In: Baets, W R J (Ed.) *Second European Conference on Information Systems*, Neijenrode University Press, The Netherlands, Part III, 449-462.

- Bensaou, M (1997) Interorganizational cooperation: the role of information technology an empirical comparison of US and Japanese supplier relations. *Information Systems Research*, **8**, 107-124.
- Bowen, P A and Edwards, P J (1996) Interpersonal communication in cost planning during the building design phase. *Construction Management and Economics*, **14**(5), 395-404.
- Bresnen, M and Marshall, N (2000) Building partnerships: Case studies of client-contractor collaboration in the UK construction industry. *Construction Management and Economics*, **18** (7), 819-832.
- Checkland, P and Holwell, S (1998) *Information, Systems and Information Systems*. Chichester: Wiley & Sons.
- Cheng, E W L, Li, H, Love, P E D and Irani, Z (2001) Network communication in the construction industry. *Corporate Communications: An International Journal*, **6**(2), 61-70.
- Claver, E, Llopis, J, González, M R and Gascó, J L (2001) The performance of information systems through organizational culture. *Information Technology and People*, **14**(3), 247-260.
- Daft, R L and Lengel, R H (1984) Information richness: A new approach to managerial behavior and organizational design. *Research in Organizational Behavior*, **6**, 191-233.
- Daft, R L and Lengel, R H (1986) Organizational information requirements, media richness and structural design. *Management Science*, **32** (5), 554-571.
- Egbu, C, Gaskell, C and Howes J (2001) The role of organizational culture and motivation in the effective utilization of information technology for teamworking in construction. In: Akintoye, A (Ed.), *17th Annual ARCOM Conference*, 5-7 September 2001, University of Salford. Association of Researchers in Construction Management, 91-100.
- El-Shinnawy, M M and Markus, M L (1992) Media Richness Theory and New Electronic Communication Media: A Study of Voice Mail and Electronic Mail. In: DeGross, J L ,Becker J D, and Elam, J J (Eds.) *Thirteenth International Conference on Information Systems*, 91-105.
- Fulk, J, Schmitz, J and Steinfield, C W (1990) A Social Influence Model of Technology Use. In: Fulk J and Steinfield C W (Eds.), *Organizations and Communication Technology*. Newbury Park, CA: Sage, 117-140.
- Habermas, J (1984) *The theory of communication action: Reason and rationalization of society (1)*. Boston: Beacon Press.
- Habermas, J (1987) *The theory of communicative action: Lifeworld and Social System (2)*. Boston: Beacon Press.
- Hirschheim, R, Klein, H K and Lyytinen, K (1996) Exploring the intellectual structure of information systems development: a social action theoretic analysis. *Accounting, Management and Information Technologies*, **6**(1/2), 1-64.
- Huber, G P and Daft, R L (1987) The Information Environments of Organizations. In: Jablin, F M, Putnam, L L, Roberts, K H and Porter, L W (Eds.), *Handbook of Organizational Communications: An Interdisciplinary Perspective*. Newbury Park, CA: Sage Publications, 130-164.
- Kinney, S T and Watson, R T (1992) The Effect of Medium and Task on Dyadic Communication. In: DeGross, J L ,Becker J D, and Elam, J J (Eds.) *Thirteenth International Conference on Information Systems*, 107-117.

- Kornelius, L and Wamelink J W F (1998) The virtual corporation: learning from construction. *Supply Chain Management*, **3**(4), 193-202.
- Kumar, K and Van Dissel, H G (1996) Sustainable Collaboration: Managing Conflict and Cooperation in Interorganizational Systems. *MIS Quarterly*, **20**(3), 279-300.
- Lee, A S (1994) Electronic mail as a medium for rich communication: An empirical investigation using hermeneutic interpretations. *MIS Quarterly*, **18**(2), 143-157.
- Loosemore, M (1999) Responsibility, power and construction conflict. *Construction Management and Economics*, **17**(6), 699-709.
- Loosemore, M, Nguyen, T and Denis, N (2000) An investigation into the merits of encouraging conflict in the construction industry. *Construction Management and Economics*, **18**(4), 447-456.
- Markus, M L (1994) Electronic mail as the medium of managerial choice. *Organizational Science*, **5**(4), 502-527.
- Moore, R M and Dainty, A R J (2001) Intra-team boundaries as inhibitors of performance improvement in UK design and build projects: a call for change. *Construction Management and Economics*, **19**(6), 559-562.
- Ngwenyama, O K and Lee, A S (1997) Communication richness in electronic mail: Critical social theory and the contextuality of meaning. *MIS Quarterly*, **21**(2), 145-167.
- Pietroforte, R (1997) Communication and governance in the building process. *Construction Management and Economics*, **15**(1), 71-82.
- Reekers, N and Smithson, S (1996) The role of EDI in interorganizational coordination in the European automotive industry. *European Journal of Information Systems*, **5**, 120-130.
- Sauer, C (1994) *Why Information Systems Fail: a Case Study Approach*. Henley-on-Thames: Alfred Waller.
- Thorpe, A and Mead, S P (2001) Project-Specific Web Sites: Friend or Foe? *Journal of Construction Engineering and Management*, **127** (5), 406-413.
- Yin, R K (1994) *Case study research: Design and methods*. Newbury Park/London: SAGE-publications.