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# Network communication in the construction industry

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## Keywords

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## Abstract

Multiple parties are involved in completing a construction project. Such parties possess different skills and each sets out to be self-sufficient. However, it is accepted that communication between parties is critical to the success of an alliance. A supporting mechanism is developed, which determines the roles of inter- and intra-organisational communication, and helps to achieve efficient and effective communication. Communication between construction alliance parties consists of several aspects. First, inter-organisational communication should take place in the alliance team. Representatives from individual organisations take the role for communication in the team. Second, communication channels are created for either close contacts or distant connections. Finally, the choice of channels depends on the amount of information, how instant it needs to be, and the efficiency and effectiveness of communication.

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## Introduction

In recent years, the value of effective human and organisational communication has been recognised with more and more organisations establishing and maintaining alliance structures. According to Gayeski (1993), communication can be seen to be a professional practice, where appropriate rules and tools can enhance the utility of information. It is understood that communication falls into different zones of meaning that enable interaction between organisations (Heath, 1994). It is the people in the organisations that translate the meanings, and disseminate, comprehend, receive and utilise the information (Gayeski, 1993; Checkland and Holwell, 1998). Clearly, it is essential that organisations have established and proven business processes that can support effective and efficient inter- and intra-organisational communication alliance structure.

Information is a general term and embraces meanings such as knowledge, processed data, skills, technology, etc. Inter-organisational relationships are used to improve the flow of information, and share knowledge, learning and experience. Framing a knowledge network to improve communication within a corporate community has been attempted by Swan *et al.* (2000), who have the following perspectives:

- using the concepts “I-space” (information space) and “zones of meaning” that are raised by Boisot (1998) and Heath (1994) respectively to explain the nature of information and knowledge;
- adapting from Hakansson and Johansson (1992) to identify the key components (i.e. actors, activities and resources) of a network configuration; and
- introducing the knowledge-based value network of Wikström and Norman (1994) to emphasise that the flow of knowledge (i.e. the state of communication) is a value creating process.

While Swan *et al.* (2000) have extracted some relevant concepts to support the need for a knowledge network, they have not been prescriptive in identifying who should be the communicative actors, and how the information and knowledge should flow through the trading community. The former involves the identification of the

communication roles of the key executives, while the latter highlights the channels for communication.

Effective communication is a fundamental factor that construction alliances must implement for project success. There remains, however, a paucity of literature describing ways to improve communication within the construction industry. In contributing to the normative literature, this paper proposes a communication mechanism by considering two important aspects of communication, which are:

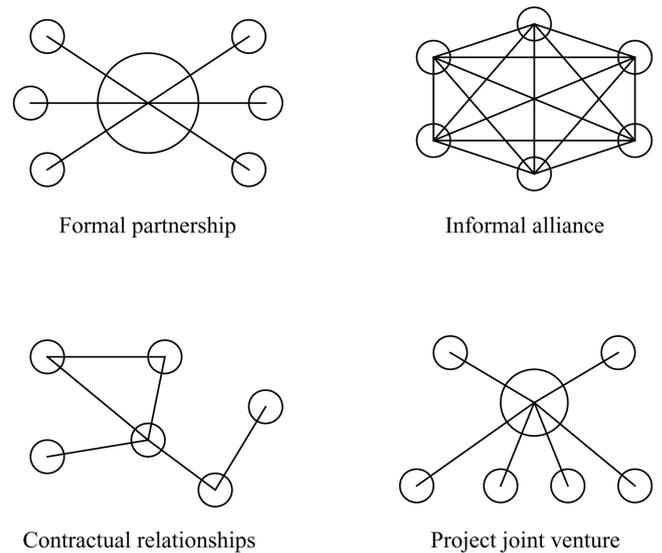
- (1) clarification of the roles of communication – identifying the pre-requisites of the communication process; and
- (2) improvement of the productiveness of communication – ensuring that an effective and efficient delivery mechanism is adopted.

### Alliances in construction

The construction industry is considered to be divisive and fragmented, where construction parties pay attention to conforming to contractual requirements. Since these parties represent different professions including architecture, structural engineering, quantity surveying, civil engineering, project management, building surveying, etc., their multidisciplinary skills limit the scope of co-operation between them. The significant reason for this lies with problems in communication. Some common examples are not having open lines of communication (protocols), inappropriate communication channels (inefficient and/or ineffective), and unexpected communication breakdown. Because of these factors, there has been a surge in the formation of construction networks. Such network structures support improvements in communication and interaction between project partners. This then results in the establishment of a web of communication, which in turn seeks to facilitate the operations of the construction parties.

After a review of the existing literature, this study proposes that there are four basic types of construction network (as shown in Figure 1). These network structures represent the links of organisations for different purposes. First, contractual relationships tie

Figure 1 Four basic types of construction network



the independent parties together through contracts that force them to contribute resources and organise activities.

Communication bridges the parties to undertake the activities for fulfilling the contract terms and conditions. Such relationships are considered impersonal and hierarchical, with information diffusion being restricted and flowing insufficiently.

Secondly, the key parties may form a joint venture specifically for the project. Once the project is completed, the joint venture will then be dissolved. This project joint venture is a central element, through which the key parties control the work of other parties by using the necessary communication conduits that attach to it. Clearly, the co-ordination structure remains hierarchical. Thirdly, the parties may establish a partnership, which is different from a joint venture. A partnership is expected to include more joint parties and may extend beyond a single project. The partnership organisation acts as a central operational unit to serve all project parties that create communication conduits with it. Finally, the parties may choose to form an informal alliance. While joint ventures and partnerships are “real” and legitimate organisations with a solid state structure, a construction alliance has a virtual and dynamic structure that facilitates the exchange and sharing of information, since all involved parties are co-ordinated horizontally and personally. This informal relationship supplements the formal contractual obligation. It is worth noting that these four

network structures are not mutually exclusive but may exist as a combination in a project.

The traditional mode of operation in construction, that is the fulfilment of contracts, has been criticised for its stagnation toward improvement. Such parties realised that they were self-sufficient and did not expect the pros of joint problem solving. Breakdowns in communication disturb a construction project, and as a result it has become very adversarial in nature (Cheng *et al.*, 2000). Although a construction alliance is an informal, voluntary body, it injects the parties with flexibility, responsiveness, and self-governance. To obtain such benefits, construction parties must form effective and open communication chains and links, which act as enablers for a construction alliance.

Suggesting the formation of alliance in construction can be traced back to almost a decade ago, when researchers raised the need for vertical integration within construction parties (Krippaehne *et al.*, 1992). Within the construction industry, the term “alliance” and “partnering” are used interchangeably. According to Holt *et al.* (2000), there are collaborative strategic alliance and co-operative strategic alliance. This classification is a progression of earlier work by Bronder and Pritzl (1992) and Hamel (1989). Instead of using collaborative and co-operative strategic alliance, the terms project partnering and strategic partnering have been adopted respectively (e.g. Barlow *et al.*, 1997). However, the most obvious distinction between the two kinds of alliance is whether the alliance is formed for a single project (i.e. short term) or more than one project (i.e. long term). The authors of this paper then refer to alliances as short term and long term.

Short-term alliances are collaborative and established between two or more parties, which strive for short-term project-related benefits. It is a method of transforming contractual relationships into a cohesive project team that complies with a common set of goals. It is important that clear procedures for resolving disputes in a timely and effective manner are laid down (Cowan *et al.*, 1992). Usually, parties of short-term alliances have clear alliance objectives, these being project- or business-specific. However, as these objectives may not be compatible (perhaps even conflicting) with each individual party's internal organisational objectives, mutual trust and commitment cannot be easily

developed. As the construction industry is dominated by one-off projects, Matthews *et al.* (1996) suggest that short-term alliances are likely to take the leading role in promoting a closer relationship in construction projects.

Long-term alliance refers to a co-operative relationship between at least two organisations, which is established for achieving long-term goals and objectives for the purpose of achieving a competitive advantage. More specifically, long-term alliances are a manifestation of inter-organisational co-operative strategies, and entail the pooling of skills through the co-operation of organisations aiming to achieve common goals (Love *et al.*, 1999). Ketelhom (1993) states that the co-operative nature of alliances can create a competitive advantage. According to Currie (2000), there are three major forces motivating organisations to form alliances in the supply chains: globalisation, deregulation and consolidation. Ellison and Miller (1995) used the term synergy to explain such a long-term intimate relationship that ultimately results from such alliances. A synergistic relationship is to develop core competence in pursuing corporate and business strategies.

Organisations that rely on co-operation have been found to obtain lower costs for as long as they maintain trust internally among employees, and externally among members of their network (Ketelholm, 1993).

Although the two terms described represent different types of alliance, they have a common premise that an inter-organisational relationship is enhanced to facilitate the exchange of resources and to solve problems and conflicts. With this in mind, Gunasekaran (1999) suggests that alliances are becoming an effective strategy to improve the production process. Especially in the case of construction, communication is crucial to integrate the parties in a design and construction process.

## Communication in construction alliances

Communication simply refers to the transmission of resources (e.g. information and other meanings including ideas, knowledge, specific skills and technology) from one party to another through the use of shared symbols and media. Resources have been regarded as a major component in a

network structure (Hakansson and Johansson, 1992; Swan *et al.*, 2000). Since resources are scarce and competitive, it is not common to share resources amongst organisations. Nevertheless, construction alliances enable communication to flow in a free manner. That is, the alliance parties have the right to use all resources that are allocated by individual parties shared amongst them. Crowley and Karim (1995) used the term permeable boundaries to describe the flow of appropriate resources from one organisation to another, and the restriction of the leakage of sensitive and confidential information. However, vertical flow of communication has been known to be associated with information loss. Bateman and Snell (1999) reported that only 20 per cent of the information passed down the hierarchy from the top management might reach the workers on the shop floor. They added that this might be due to problems including information overload, a lack of openness, and filtering.

An alliance intends to maximise the exchange of shared resources for specific purposes. In terms of a project, the main resources are expertise (including knowledge, technology, information, and specific skills) and capital (i.e. intellectual and financial). As mentioned previously, a construction project usually requires a variety of skills and technology, and so the involved parties belong to different professional backgrounds. It is common that a project consists of several phases, including planning, design, construction, and commissioning. The work done in one phase or by one party is normally the input for another phase or party. Ndekugri and McCaffer (1988) referred to this as the information generated by one party (i.e. the source of information) which delivers to another party. For example, the designers complete a design of a building and then pass on the design specifications to the contractor for construction. The variety of their expertise is always a source of conflict if communicated improperly. In contrast, complementary expertise can be used to strengthen the competitiveness and construction capability of a partnered relationship if managed effectively. Therefore, for enhancing the sharing of resources, mutual interaction should be emphasised (Devlin and Bleackley, 1988).

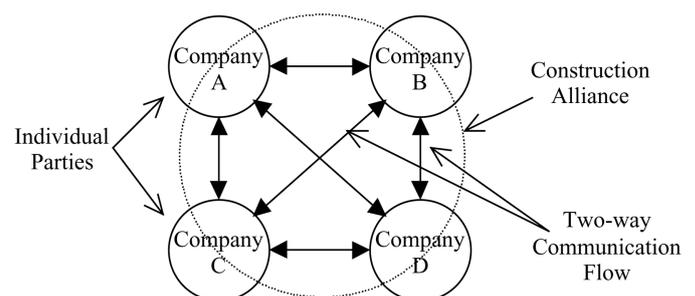
Other than sharing and exchange of resources, open and flexible communication promotes better understanding amongst

members. In addition to the importance of establishing open communication between client and other professional parties, such as project manager, consultant designers and surveyors, Love (1997) pinpointed that subcontractors rely heavily on the general contractor for developing open communication. It is therefore essential to create a web of open communication for all involved partnering parties.

Figure 2 illustrates a web of communication flowing within a construction alliance. The dotted circle shapes the boundary of the construction alliance, while the double arrows indicate that communication is two-way. The figure also indicates that each party has the right to communicate with all other alliance parties. To enhance communication flow, parties have to create different communication channels: for example, using workshops or meetings to enhance face-to-face discussion, and using computers to facilitate remote discussion. Using information technology (IT), such as e-mail or teleconferencing, to gather the geographically dispersed parties together, shortens parties' distance and even eliminates national borders.

Yet, it is important to clarify the roles of communication in order to maximise communication between parties. The following section therefore presents a communication mechanism, which specifies the roles to share opinions, exchange ideas, and discuss issues through appropriate channels. For organisations aiming at a long-term alliance, such a mechanism is useful for implementing strategies and operational initiatives that are effective in today's dynamic environment in order to gain and sustain a competitive advantage in the marketplace. It helps to convert critical threats to opportunities and is conducive to the success of alliance.

**Figure 2** Communication flow in a construction alliance



## Communication mechanism for construction alliance

A construction alliance is composed of several parties that join together for a construction project. Parties assign representatives to act on their behalf within the alliance. A charter is established and signed by all parties involved, which lists several goals to be achieved and assigns tasks. Some of these goals are related directly to project performance (such as cost, quality, time), while some others are more intangible (such as mutual trust, shared vision, continuous improvement). The alliance organises meetings to keep track of the attainment of these goals, to solve problems and conflicts, and to learn from each other. With these aspects in mind, this section presents a communication mechanism that can match the needs for a construction alliance.

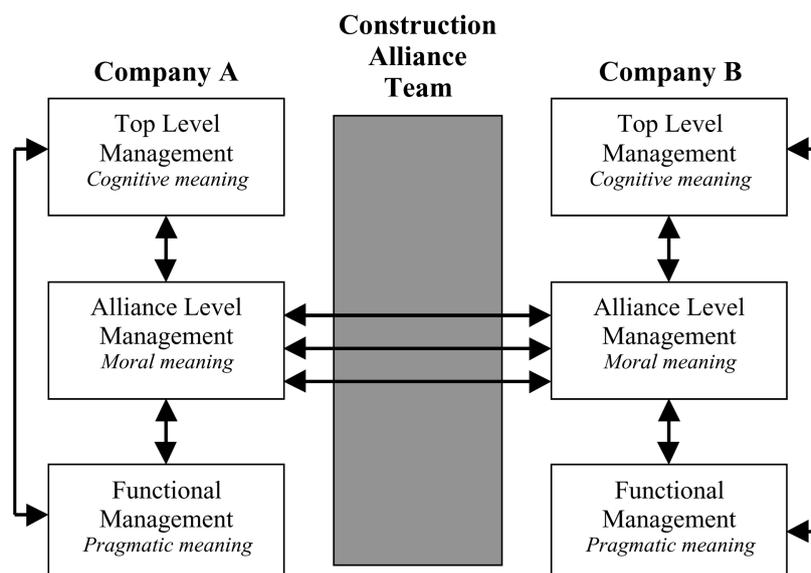
Figure 3 illustrates a communication mechanism for a construction alliance. It represents the intra-organisational as well as inter-organisational communication linkages existing among the partnering parties. More specifically, it implies that top level management is associated with cognitive meaning while partnering level is associated with moral meaning and functional level with pragmatic meaning. The three levels within each company are linked, and in particular the partnering levels of different companies are also linked. These linkages form the communication channels for intra-changing and inter-changing information so that

partnering team members can reason about their own and others' behaviour to ensure a coherent functioning of the team.

Intra-organisational linkages imply that organisational members deliver multiple meanings among themselves concerning various purposes and functions, while each meaning is associated with a specific form of legitimacy. According to Suchman (1995), there are three different forms of legitimacy – cognitive, moral and pragmatic. Cognitive legitimacy refers to the development of a logic or rationale that is meaningful to the stakeholders and comprehensible to all. Moral legitimacy refers to the appropriateness of actions undertaken by the different parties. Pragmatic legitimacy refers to the satisfaction of the interests of the different constituents. These three forms of legitimacy are based on three levels of meaning, namely the cognitive, moral and pragmatic. According to Kumar and Andersen (2000), these form a graded hierarchy from the apex to the bottom respectively.

Kumar and Andersen (2000) further proposed that there are three intra-organisational levels of management in an international strategic alliance. These focus on their associated levels of meaning. Although they argued that there should be interactions between the same level of management of different alliance partners, such argument was not appropriate here due to the view that the construction alliance team should take the role for inter-organisational communication. As shown in Figure 3, there

**Figure 3** Communication mechanism for construction alliance



are no interactions of the top and functional levels of management between organisations since the alliance team is formed for inter-organisational communication. Only the alliance representatives (i.e. partnering level management) are responsible for the overall running of the alliance team. They should be sensitive in communicating with other team members. Moreover, they should pay attention to the behaviour of other team members (i.e. conception of meaning), whether or not these members behave in a co-operative way and/or are putting in the necessary effort, and should provide appropriate action and feedback. Thus they are concerned with coding and decoding (i.e. producing and interpreting) moral meanings from other members, which form the inter-organisational communication.

On the other hand, the other two levels within the organisational hierarchy exert influence on the partnering representatives when the latter delivers their organisational meanings in the partnering team. Kumar and Andersen (2000) assumed that there is a process of reciprocal influence where the three levels may not be equally influential and the patterns of influence will vary across organisations. These postulates are important to outline the format for intra-organisational communication.

In summary, this communication mechanism has several major characteristics (as shown in Figure 4):

- The alliance team takes the role of communication between the alliance parties. Since the team members

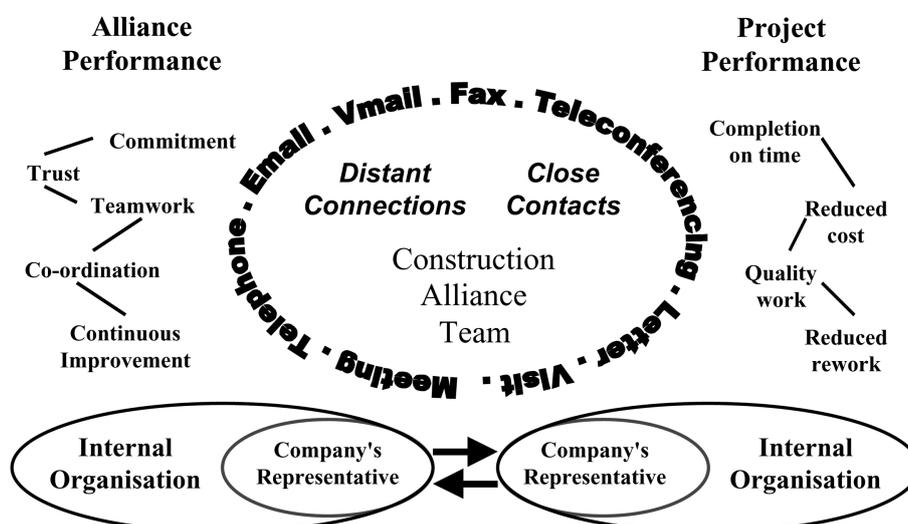
represent their own organisations to act in the alliance team, they are the one who express the organisation's standpoints to other members and receive others' points of view. In addition, a clear role for alliance's communication can reduce misunderstanding, misinterpretation, and misleading information when the communication parties are restricted to those alliance representatives.

- Communication can take place through different media. During the meetings of the alliance team, members are communicating with each other face to face. In other events, they can use e-mail, telephone, fax, letter, and personal visit to effect the communication. For sharing of intangible resources (such as vision, ideas, opinions), understanding of meanings is key to effective communication.
- To improve the speed of transmission, members should use more direct and instant communication such as face-to-face contact, telephone, instant e-mail message, etc. They can clarify meanings from others immediately, reducing the delay that may cause detrimental influence on the project or the relationship of the alliance team.

### Intra- and inter-organisational communication

Alliance parties have to communicate not only with other parties but also within the

Figure 4 Communication benefits for construction alliance



organisation. These are known as inter- and intra-organisational communication respectively.

Intra-organisational communication is required to carry out the normal practices of individual organisations. It is independent of the requirement for direct correspondence with members of the alliance. This system preserves all kinds of business and management activities within individual organisations. In terms of information, it helps to maintain the internal management information system, the planning and control system, and decision-making processes. Moreover, it supports the reiteration of the organisational information to the alliance team. Eastman and Jeng (1999) suggested the parallel mapping concept to ensure that communication (i.e. transmission of information) proceeds without distortion or loss.

Inter-organisational communication, on the other hand, takes place at the connection platform of the alliance parties and involves sending and receiving of meanings, as well as generation and interpretation of meanings. Communication can be enhanced by means of computers to activate other functions such as storing and retrieving, and presenting and deleting. For example, if several projects are operating simultaneously, computers not only support the running of them with a large storing capacity, but also restrict the dripping out of sensitive information to parties of other projects using security pass-code. Also, it speeds up the process for retrieving a piece of information from a large batch of electronic folders that, if in hard copy format, may occupy a large filing room. Successful implementation of computer-based communication has been reported (e.g. Kahn, 2000). However, as Boisot (1998) suggested, for a real sharing of meaning to take place, each party of the alliance should possess appropriate capacity for effective communication. In other words, their computer facilities, including the operating system, processing speed, and software programs, must be compatible. Figure 4 summarises the benefits of communication for a construction alliance.

### Communication channels for construction alliance

Inter-organisational communication involves both face-to-face and distant channels.

Meetings or workshops are set up to promote real and direct contact between parties, while computerisation would be the “panacea” to expand the interaction of parties at a distance. There is no single preferred communication style nor the use of one specific channel. A combination of several channels is appropriate in many circumstances, especially for important or complicated messages. In fact, the choice of channels depends on four major criteria:

- (1) *Amount of information required.* Different communication channels convey different amounts of information. This is what Bateman and Snell (1999) called media richness. For example, face-to-face communication (such as meeting and visit) is the richest medium because it offers a variety of cues including verbal and written words, tone of voice, facial expression, body language, and other non-verbal signals. Other media such as telephone, e-mail, and memos are less rich media.
- (2) *Instant information required.* In case that instant information has to be transmitted, the most accessible and promptly transmitted media are given the first priority. Telephone and fax affords the transmission of more instant information. E-mail is less instant, while meeting, teleconferencing, letter, and visit are the least instant media.
- (3) *Effective communication required.* Effective communication refers to the accuracy of the information transmitted. It is always associated with terms such as misleading, misinterpretation, and misunderstanding. Thus, face-to-face communication is the best as it allows more chances for the receiver to clarify meanings, reducing misleading, misinterpretation, and misunderstanding. Two-way communication has to be created for effective communication.
- (4) *Efficient communication required.* Efficient communication refers to the speed of transmission of messages. It is not to say that using computer to transmit the messages will be faster than using media for close contacts. It depends on the distance of transmission. In meetings and visits, the use of verbal words should be the fastest way of communication when the parties are just several inches away. At a distance, using telephone and computer are both efficient.

In consequence, the use of media cannot be determined based on one or two criteria. All four criteria have to be considered so that the most appropriate channels can be selected for the types of resource to be transmitted. Multiple channels are often needed.

### Communication channels for close contacts

Meetings or workshops are organised to establish a close and direct contact medium for exchanging information in a construction network. Other than data, facts and knowledge, information here includes skills, comments and ideas. In such a face-to-face environment, spontaneous “debates” can be raised. As the distance between members is much shorter, feedback will be more efficient. In strategic alliance, face-to-face discussion is one of the main criteria for facilitating the development of common goals and objectives. Thus, meetings provide the opportunities for the involved parties to collect more comments and ideas directly or make an agreement on something that might be discussed but not yet finalised in the electronic network.

Other than being familiar with the operation of a computerised network, alliance members should be well versed in some skills, such as interpersonal skills and problem solving skills, so that they are able to elicit new information based on discussions and comments on initial results. The meetings are organised for different purposes in different project phases. The following are some examples:

- In the planning phase, meetings help the client collect more information from the project manager to finalise the scope definition of the construction project.
- In the design phase, meetings allow the client, design consultants, project manager and quantity surveyor to meet together to develop a feasible construction plan, outlining the product design and specifications and related financial arrangement.
- In the procurement phase, meetings are crucial for the assessment team (i.e. the client, project manager, design consultants and quantity surveyor) to evaluate the tenders from potential contractors to select the most appropriate general contractor.

- In the construction phase, meetings provide opportunities for different construction specialists (e.g. design consultants, general contractor, subcontractors, suppliers, etc.) to co-ordinate to ensure that all construction activities and tasks work properly.
- In the commissioning phase, meetings monitor the final building tests to ensure that any defect is rectified by the contractor, thereby enhancing the final hand-over of the product.

### Communication channels for distant connections

One of the major problems for the alliance to exchange and share information is the “distance” between alliance partners. Line (1997) identified three key conditions of the “distance factor” – speed (or time) for the transmission of information, complexity of information and the quality of the communication channels, and suggested that the digital world is a dependable solution: information can be transmitted in digital formats by computers. This greatly increases the speed and reduces the time for delivery.

On the other hand, the complexity of information affects the feasibility of using digital transmission. The transmission of “high density” graphs or drawings requires a lot of time and a large memory in the computer to store the information. Since the speed and memory capacity of computers have been increased dramatically over the past years, the problems of transmitting a complex and massive volume of information can be solved. Nowadays, telecommunication becomes an essential part of business operation. E-mails have become a common and convenient way of communication, while services such as teleconferencing are increasingly used by aggressive enterprises.

Notwithstanding, organisations implementing computer-based communication must be aware that the process involves the enhancement as well as destruction of competence (Tushman and Nelson, 1990; Orlikowski and Robey, 1991). The former refers to the establishment of effective know-how that is embodied in the newly acquired technology, while the latter

refers to the abolishment of the old-fashioned expertise (Kahn, 2000). This final part will not go into details of how the “distant” information can be effectively transmitted. This involves the discussion of the development of a computerised information management system, which is beyond the scope of this paper.

## Conclusions

In the construction industry, contracts have been used to bind parties together for the purpose of joint pursuit of a construction project/contract. Due to its divisive and fragmented nature, the industry has to enhance inter-organisational co-operation, leading to stagnant performance and, in a worse situation, conflicts and disputes. Therefore, a construction alliance that is an informal, voluntary form of relationship has been raised as part of a supply chain management strategy to improve their organisational performance and that of projects they are involved with. It is well accepted that communication between parties is critical to the success of alliance. For improving communication, a supporting mechanism is developed, which determines the roles of inter- and intra-organisational communication, and helps to achieve efficient and effective communication. Communication between the parties of a construction alliance consists of several aspects. First, inter-organisational communication should take place in the alliance team. Representatives from individual organisations play the role of communicating with other team members. Secondly, communication channels can be created for either facial or distant contacts.

However, for maximising communication, multiple channels have to be used. Channels for close contacts can be meetings, workshops or visits for face-to-face or one-on-one or small group communication. This is especially good for parties to raise and solve problems together. Distant channels can be e-mails, telephones, teleconferencing, etc., which provide instant exchange of ideas, information, etc., between parties who are located at a distance.

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