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# PROJECT COMMUNICATION VARIABLES: A COMPARATIVE STUDY OF US AND UK CONSTRUCTION INDUSTRY PERCEPTIONS

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Research undertaken at the Construction Industry Institute (CII) in the USA has indicated the need for project managers to focus their attention on six 'Critical Communication Variables' as a means of ensuring the fulfilment of time cost and quality targets. These variables refer to the accuracy, timeliness and completeness of information presented to participants, as well as the level of understanding, barriers to and procedures for project based communication. The findings and tools generated by the CII study have been used as part of case study based research examining construction projects in the Central Belt region of Scotland. In addition to the CII data collection tools employed, the Scottish study included semi-structured interviews as a means of contextualising the communication and decision-making taking place. This paper presents the results of this benchmarking exercise, and highlights significant issues that project team members need to improve upon in order to achieve the timeliness quality and cost required in today's construction industry.

Keywords: communication, benchmarking, procurement system

## COMMUNICATION: WHY SO IMPORTANT?

One need only look at the UK tabloid press to see why communication is so important to project success. Although accepting a degree of sensationalisation, the headlines below typify problems in communication between project teams.

*'Misfire Station'*: Builders build new fire station 21 feet from where it should have been (Sunday Mail 06/06/99)

*'Beds don't fit hospital'*: New hospital ward has been kept closed because doors are too narrow for the beds (Sun 18/01/00)

*'Berkley builds in wrong place'*: House builder used old set of drawings, constructing houses in the wrong locations on a site plan.

*'Blame MPs says Portcullis House Audit'*: QS consultant recommends that improved communication between the construction team could improve performance on site (Building 19/03/99)

### An Age Old Problem!

Seminal work undertaken by Higgin and Jessop (1965) for the Tavistock Institute of Human Relations is perhaps the most detailed investigation into communications in the building process. Their pilot study resulted in a further report being published by

Tavistock Publications (Interdependence & Uncertainty: A Study of the Building Process, 1966). Although both reports can now be termed 'historic' research (given both the change in modern project environments and extensive use of 'hybrid' procurement routes) they do present several points of interest significant to the research presented in this paper. Communication difficulties were shown to exist at several levels within the building industry. The particular difficulties relevant to this paper were firstly, communications within the design team; secondly, communications related to the contract; and finally communications within the construction team.

The evidence presented above has been widely validated through recent academic and industry research. Boudjabeur and Skitmore (1996) provide details of untimely, inaccurate and insufficient information in Design and Build projects. Further communication problems are reported by the Contract Journal (1999a), relating the difficulties of communication on a Tarmac project in the UK, indicating a lack of learning from previous industry studies (Tavistock 1965, 1966). This project had a full design and construction team on site housed in an open plan office. Part of the team were involved in a team building exercise requiring all team members to name everyone else and what role they fulfilled on the project. Of the 30 personnel taking part, only 15 could supply all the names, of these 15 only 6 could also define their roles. Anecdotally, the managing director of Tarmac reported that following the exercise, everyone could put a face to a name and relationships were more informal and productive.

### **Formality vs Informality in Communications**

The report by the Tavistock Institute (1966) was the first study to document informal systems within the construction process. It suggests that informal procedures produce more realistic phasing of decisions and flexibility in the face of 'the inevitable uncertainties' in the construction process. The report is critical of the persistence of unreal assumptions attached to formal project control mechanisms, suggesting that they result in the 'inappropriate application of techniques of scientific management.' It also suggests that informal systems, deemed 'unscientific', enable most projects to be completed without major delay. The report further suggests that when selecting team members to work in this informal system, those with a 'crisis' type of personality are preferable, concluding:-

*'On our thesis, the informal system only exists because the formal system intrinsically has characteristics which are incapable of handling effectively the system of operations required for the building process. The informal system is not the lazy man's way out but a means of adaptation that is essential for the formal system to work at all.'*

Research conducted in the US (Hopper 1990) for the Construction Industry Institute (CII) suggests that construction projects depend on informal organisational behavior more than other organisational situations. Hopper refers to informal structure as a shadow or parallel structure, arguing that it is built around three legitimate needs:-

The need to maintain links of communication, coordination, problem solving and decision-making when the established structure isn't working properly.

The need to maintain these links when it is working properly, in order to interpret, translate and expedite the requirements of the established structure.

The need to form informal cabals (support groups) as a means to get things done, maintaining personal relationships and avoiding the maze of structure.

Other authors have also commented upon the relative effectiveness and importance of formal versus informal communications. Dulaimi and Dalziel (1994) found communication was more frequent and informal in design and build projects. Gorse et al (1999) re-inforce these findings through their investigation of interpersonal communication behaviours between designers and contractors in the construction phase of projects. Their results show that face to face informal communication was perceived to be most effective. Support for such informal communication methods can also be found in a recently completed project (Millennium Dome, London). Bernard Ainsworth, project director for the Laing-McAlpine joint venture explains that the open plan project offices, facilitated a binding process that brought the co-located team together. Moreover he expressed the following view: 'talk don't write, get people to communicate on a one to one basis' (Contract Journal 2, April 1999).

Boyd and Wild (1999) create the analogy of the 'organisational iceberg' in which the small amount of formal communications above the surface are underpinned and supported by a huge mass of informal or 'covert' communications 'below the water line'. Researching communications, Hill (1995) makes a comparison of formal and informal communication effectiveness. A subject in that study noted informal communication was what 'got the job done', which Hill took as being borrowed from a classical (or formal) understanding of organisational purpose. Ironically it seemed that informal operation of communication fulfilled the explicit objectives of the formal system - implying that the formal system was actually incapable fulfilling its purpose in the organisation. Hill concludes that there is a lack of understanding and research into informal communication practices; the issue addressed in this paper.

### **Inter-organisational Communications**

Research into inter-organisational communication in the USA by (Bodensteiner 1970 cited in Wofford *et al* 1977) suggest a preference for informal communication during times of stress and uncertainty. Figure 1 shows the frequency of utilisation of four types of interpersonal channels between two transacting organisations co-operating in Bodensteiner's study. Wofford *et al* refer to the diagram and conclude that it supports the view that when organisational problems occur, people rely on the informal channels (face to face and telephone) for needed information.

Bodensteiner's findings are pertinent to this paper in that the periods of uncertainty shown in Figure 1.1 are extremely common within construction project environments. Loosemore's (1998) research appears to develop a similar approach in that it examines communications around 'periods of uncertainty' (crises). Loosemore (1998) identified three ironies of crisis management in construction projects:-

When collective responsibility and teamwork are important they are less likely.

When effective communication is more important it is less likely.

When mutual sensitivity amongst team members is important it is less likely.

Loosemore's study indicated that contract documents became more important as a formal guide to responsibility patterns during a crisis, but differences in interpretation and understanding of contracts was common. Ambiguity about crisis and contract documents was used by participants to redefine terms in their own favour. Loosemore also found that there was a tendency for project participants to exhibit extremes of formal and informal behavior. These situations apparently led to projects moving towards a downward spiral of poor communication, tension, anxiety and stress.

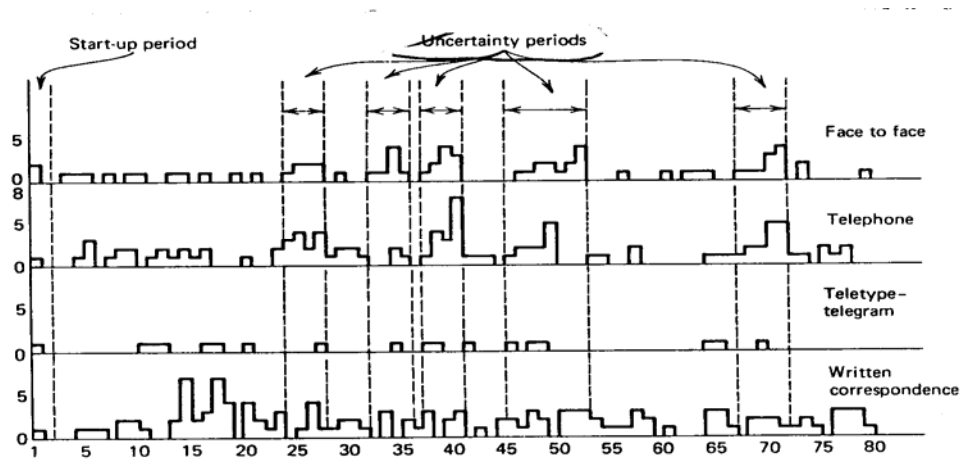


Figure 1: Frequency of Channel Utilisation of Transacting Organisations (Source: Bodensteiner (1970) cited in Wofford *et al* 1977))

### Critical Communication Variables

The Construction Industry Institute (CII) from the USA identified six categories of communications effective as a measure of project communication effectiveness. The remit for the CII research team was to develop a tool for measuring communication effectiveness, which resulted in a questionnaire requiring participants to supply their perceptions of communication effectiveness. The study incorporated 72 projects as a sample to establish a direct link between communication effectiveness and project success. Statistical analysis of the data revealed critical communication effectiveness variables, which are listed in Table 1. The weighting factor applied to each category was developed as a means to reflect the categories relative importance for effective communications (Tucker *et al* 1997). Thomas *et al* (1998) suggest that their study represents a milestone for engineering and construction projects in that it has identified and measured critical performance variables.

Table 1: Critical Categories of Communication (Source: Thomas *et al*, 1998)

Category	Description	Weight
Accuracy	The accuracy of information received as indicated by the frequency of conflicting instructions, poor communications, and lack of coordination	2.1
Procedures	The existence, use and effectiveness of formally defined procedures outlining scope, methods etc	1.9
Barriers	Presence of barriers (interpersonal, accessibility, logistics etc) impeding communications between supervisor or other groups	1.8
Understanding	Understanding information expectations with supervisors and other groups	1.6
Timeliness	Timeliness of information received including design and schedule changes	1.4
Completeness	The amount of relevant information received	1.2

### Benchmarking Through COMPASS

On gaining access to the selected case study projects, it was decided that the initial meeting with the interviewees would be used as a ‘bonding’ session. The need to facilitate an atmosphere of trust and security and confirm confidentiality proved to be an essential prerequisite to all concerned. A secondary purpose of this initial meeting was to facilitate an understanding of the interviewee’s role in the project. In addition, their perception of communication effectiveness was also sought. A diagnostic tool was selected which provided an excellent vehicle for gaining an insight into each participant’s satisfaction with the project thus far. The COMPASS tool, developed by

the Construction Industry Institute (CII) allowed for both closed and open ended questions to be presented to the interviewees. The closed questions allowed for a communication score concerning the previously detailed six critical communication variables. The open-ended questions facilitated the need for the research team to overcome a steep learning curve regarding overall knowledge concerning the project.

### **UK and US Benchmarking**

The literature reveals few studies comparing UK and US construction processes. The best known study is that of Nahapiet and Nahapiet (1985) comparing contractual arrangements on selected projects. Their research indicated that particular contract arrangements result in different patterns of responsibilities and relationships among the parties in construction projects. They suggest that contractual arrangements establish lines of communication, responsibility for information provision and pattern of co-ordination and control within construction project organisations. Nahapiet and Nahapiet conclude that a key decision for any client is that of selecting the mechanisms to manage inter-organisational relationships. Therefore their study regards the form of contract as synonymous with a formally adopted organisational structure, defining and co-ordinating contributions from the various bodies involved in construction project delivery.

The Nahapiet and Nahapiet study is useful in defining how organisational and inter-organisational structures develop, however it stops short of looking at the differences in the types, styles and effectiveness of communication between the US and UK. It is the intention of this paper to start the process of benchmarking communication effectiveness in UK construction organisations against a known control group in the form of the US projects researched by the CII.

### **Results**

The research presented here is a 'work in progress', incorporating the results from nine of the twelve case study projects. However, the research technique employed has proven most successful eliciting perceptions and insights from key players regarding communications in the construction process, also enabling the development of other novel research methods (Murray et al, 2000) using 'critical incidents' in the projects. The extracted highlights from the case studies demonstrate important communication issues raised by interviewees using the COMPASS questionnaire (open ended and closed questions) and during further 'critical incident' interviews.

The COMPASS software itself analyses the responses to a series of questions in several ways. Firstly, pre-designed questions are 'flagged' as pertinent to specific critical communication variables. The responses to these questions are then scored and these scores normalised to fit a 0 to 10 scale. The maximum and minimum values indicate the largest and smallest scores for the component questions respectively. These normalised scores are then averaged across the complete sample under investigation. Each of these averaged scores are then weighted to reflect the relative importance of the communication variable. It is these normalised and weighted scores which are then used to compare against expected scores from the 72 case studies that made up the original CII survey sample. Therefore the given CII average score within a communication variable category can be used as a simple benchmark figure for comparison. Very simply, a higher score in a category than the CII average indicates a better performance, a lower score than the CII figure indicates a poorer performance. The cumulative results from the study are summarised in table 2.

**Table 2:** Cummulative Results from Questionnaire by Procurement Route

		Traditional				Design & Build			Management	
Communication Variable	CII avg	1	2	3	4	5	6	7	8	9
Accuracy	5	5	5	6	5	5	5	4	5	3
Timeliness	9	10	10	9	9	9	8	10	9	10
Completeness	5	5	3	3	3	2	6	3	2	5
Understanding	9	9	8	8	10	7	9	9	7	7
Barriers	9	9	10	10	9	9	10	8	7	10
Procedures	8	5	3	1	4	7	8	6	0	4
<b>Description of case Study project</b>		Telecom offices	Sportshall	Retail conversion	Hotel extension	Leisure complex	Newspaper offices	New build hotel	Exhibition/conference	Airport extension

## CASE STUDY ANALYSIS

### Case study 1

The client for this project procures construction industry services on a regular basis and can be considered an 'expert' client. However, political manoeuvring within this large client body often resulted in confusion over role and responsibility definitions during the project. This would manifest itself in conflicting instructions issued to the project team. Of particular note, this was the only project where a communication 'protocol' was introduced (or organogram) in order to manage formal project communications. Unfortunately this protocol was itself circumvented by the client body due to their project manager being unable to commit enough time to the project – indicated by a low procedure score (5 for the project against 8 for the benchmark).

### Case study 2

Case study two involved a University client who commissioned a new sports hall as part of a continuing new build programme to its city centre campus. Whilst in the process of extensively developing its campus locations, the university may be categorised as an inexperienced client. The contractor's site manager on this project complained of a lack of design co-ordination, stating '[these] packages are [contractor] designed rather than architect designed' and therefore took a pragmatic approach to this problem by managing this interface. A further communication difficulty experienced in this case study, which was all too common within the other case study projects, concerned incomplete information. The original cladding contractor was unable to complete the necessary design detailing work imposed on them by the procurement system. The low procedures score (project scored 3 against 8 for the benchmark) and completeness score (3 to 5) tends to reinforce this perception.

### Case study 3

This project involved the conversion of an existing city centre hotel into various retail units. The property developer client was again a regular or 'expert' client of the construction industry and therefore had pre-existing approaches to the procurement and management of projects developed from experience. The client decided to use a

'ghost team' (a second QS, Structural and Service Engineers etc) on the project as means of monitoring what was perceived as being a 'too cosy' or closed shop situation in the Central Belt of Scotland – an area in which they had not operated in the past. The phrase 'Glasgow mafia' was used by the client to describe its fear of exploitation in this situation. Paradoxically, the ghost team both helped and hindered communications and project effectiveness. The largely informal communications taking place between the team in Scotland was a result of familiarity with one another from previous projects. This can be exemplified by looking at the barriers score (10 for the project against 9 for the benchmark). However, the low procedures score (1 against 8) would be likely to suggest a chaotic interpersonal environment. This was not evident in the project and can perhaps be best explained by comments made by the contractor who stated that '...roles and responsibilities were [very] well understood, but that [such] understanding was [implicit rather] than being defined by procedures'.

#### **Case study 4**

The most distinguishing feature of this 65 bedroom hotel extension was that the 'household name' hotel client (whose portfolio of hotels around the world would imply it being regarded as an 'expert' client), decided to procure the services of an architectural practice who later turned out to be a interior design practice. This difficulty first surfaced when building control expressed concerns surrounding the lack of building regulation compliance in drawings. The contractor and design team later forced the interior design practice to employ an architect who immediately took up residence on site to resolve the backlog of design problems. Another major factor which is perhaps represented in the completeness score (3 for the project against 5 as the benchmark) was the development of a model specification, particularly related to the bedrooms. The document had not been seen by several team members, with those who had a copy complaining that it was ambiguous, inaccurate and incomplete.

A further difficulty highlighted by the contractor's project manager was the compartmentalisation of the contractor organisation. Although the contractor had previously worked on other projects for the same client using the identical model bedroom specification, previously encountered and solved problems kept re-occurring. In essence no learning was taking place – solutions to problems were not being captured and incorporated into the model for the next time. The design therefore had re-evolve through the same problems every time that it was brought to site, which is a situation that the model bedroom was developed to overcome. Clearly this emphasises the importance of a culture of learning within the construction industry.

#### **Case study 5**

This project encompassed the design and construction of a leisure complex building consisting of indoor sports facilities, pub and restaurants and multi screen cinema. The client in this case was a temporary multi-organisation consisting of a property developer in conjunction with the owners of the land that was to be developed, and therefore could not overall be classified as an 'expert' client. The project also involved a multitude of clients representatives and financial backers which often made determining the actual client difficult. This project more than any other seemed to typify the organisational politics played out in the construction process. The 'politicking' manifested itself in communications between participants which frequently broke accepted industry protocols. For example, whilst novated to the contractor the architect would frequently communicate directly with the client without previous permission. The architect suggested that he was getting things done in spite



of the formal communication network not working, although arguably it could be said that this behaviour caused the formal communication network not to work.

### **Case study 6**

The construction of a new office building for a national 'broadsheet' newspaper, was characterised by a semi-expert client. The design itself incorporated in situ concrete casting for columns, beams and floors, with particularly complex geometrical features in the detailing. The complexity of this design detailing essentially pre-engineered the subsequent difficulties in communication into the process from day one of the project. The architect and structural engineer were both working novated to the contractor, but this did little to alleviate the fundamental communication problems which typically resulted in defective detailing which was only revealed once the concrete moulds were removed. Essentially, the close relationship which should result from an integrated design and construction team did not always occur, frequently communication during problem solving was therefore sub-optimal.

### **Case study 7**

This project was novel amongst the case studies investigated in that it featured both formal and informal team building sessions. The client body for this new build hotel was a consortium with one of its members also acting as Project Manager, but again this was not an expert client. The contractor for the project ran an introductory team building session which included using a psychological assessment tool (Myers-Briggs). Additionally, team members were asked to decide how and when they would communicate with each other through formal channels. Several participants reported that the Myers-Briggs test also contributed to a mutual understanding of each other and enhanced informal interpersonal communications. Notably, neither the project manager nor the planning supervisor (who was also fulfilling a *de facto* clerk of works role for the client) attended the original or follow up 'pub' teambuilding sessions, implying that they were not particularly interested in enhancing communications through teambuilding.

### **Case study 8**

Case study project eight involved the construction of an exhibition and conference centre procured under a management contracting method. The client in this project was a local and regional development organisation operating with funds raised from central government, industrial sponsorship and millenium funds. The client would therefore at best be described as 'inexpert', with no previous experience of significant construction projects. The architectural practice was selected as a 'high status' architect, as the client intended creating a landmark building. The architect was based in London with no local continuously available representative or proxy organisation. Since the , and therefore in the early stages of this contract the project suffered from

### **Case study 9**

The Client on this project could be considered to have a reputation for requiring 'best practice' from its contractors and consultants. The project involved several phased developments involving new build and refurbishment of an international airport. The project environment included a co-located design team on site which may be represented in benefits of timely communication (10 for the case study against 9 for the benchmark) and a lack of physical and geographic barriers (10 scored against 9 for the benchmark).

## **CONCLUSIONS AND OBSERVATIONS**

Generally the use of the COMPASS questionnaire and its accompanying software has been found to be very useful in exploring the nature and quality of communications within the project team. However this research tool, although originally intended to generate a quantitative data, was actually significantly more effective at generating more contextual information. The main benefit of the questionnaire was that it provided a structure for interviews such that the same topics were dealt with in the interview, but also that it permitted each team member the ability to, express at will his/her concerns over project performance. With regards to benchmarking UK against USA projects, the Compass tool has provided 'ball park' assistance. That is to say, the quantitative analysis (Table 2) data may be appropriate for a much wider UK sample size with questionnaires being delivered by post. What can also be said is that the UK and US results are largely comparable, although there are discrepancies as is to be expected in such a small sample. The study discussed in this paper should not be thought of as definitive. It is anticipated that further work will, and indeed should, be done looking at benchmarking both communications and procurement system effectiveness.

## **REFERENCES**

- Bodensteiner, W. D. (1970) Information Channel Utilisation under varying Research and Development Project Conditions: An Aspect of Inter-Organisational Communication Channel Usage. PhD Thesis, The University of Texas, Austin.
- Boudjabeur, S. and Skitmore, M. (1996) Factors affecting performance of design build projects. ARCOM 12<sup>th</sup> Conference, Sep 11-13, Sheffield UK, 101-109.
- Boyd, D. and Wild, A. (1999) Construction Projects as Organisation Development. ARCOM 15<sup>th</sup> Conference, John Moores University, Liverpool, 15-17 Sept, 1: 221-229.
- Contract Journal (1999) Is Co-location the Key ? CJ, 2 (Supplement April): 8.
- Contract Journal (1999) A Millennial Challenge. CJ, 2 (April, Supplement): 4-7.
- Dulami, M. F. and Dalziel, R. C. (1994) The Effects of the Procurement Method on the Level of Management Synergy in Construction Projects. CIB W92 'East Meets West' Procurement Symposium, Hong Kong, 4-7 Dec, 53-61.
- Gorse, C. A, Emmitt, S. and Lowis, M. (1999) Problem Solving and Appropriate Communication Medium. ARCOM 15<sup>th</sup> Conference, Liverpool John Moores University, 1: 511-517.
- Higgin, G. and Jessop, N. (1965) Communication in the Building Industry: The Report Of A Pilot Study. Tavistock Publications.
- Hill, C. J. (1995) Communication on Construction Sites. ARCOM 11<sup>th</sup> Conference, University of York, 18-20 Sept, 1: 232-240
- Hopper, J. R. (1990) Human Factors of Project Organisation,.Construction Industry Institute, Austin, Texas, USA, Source Document 58.
- Loosemore, M. (1998) The Three Ironies of Crisis Management in Construction Projects. International Journal of Project Management, 16(3): 139-144.
- Murray, M. D., Langford, D. A., Tookey, J. E. and Hardcastle, C. (2000) Communication and Decision-Making as a Means to Determine Organisational Structure. Proceedings of CIB W92 Procurement Systems Symposium, Santiago, Chile, 24-27 April, 29-47.

- Nahapiet, H. and Nahapiet, J. (1985) A Comparison of Contractual Arrangements for Building Projects'. *Construction Management and Economics*, .3: 217-231.
- Tavistock Publications (1966) *Interdependence and Uncertainty: A study of the Building Industry*.
- Thomas, S. R, Tucker, R. L and Kelly, R. (1998) Critical Communication Variables. *Journal of Construction Engineering and Management*, **124**(1): 58-66.
- Tucker, R. L, Kelly, W. R and Thomas, S. R. (1997) *An Assessment Tool for Improving Team Communications*. Construction Institute Report, 105-11 Austin, Texas, USA.
- Wofford, J. C., Gerloff, E. A. and Cummins, R. C. (1977) *Organisational Communication: The Keystone to Managerial Effectiveness*.