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Architects and contractors: a comparative study of organizational cultures

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Conflicts between project participants have been identified in various construction industry reports as being one of the principal causes of poor performance on construction projects. These conflicts occur at the interface level in one respect because participants have different objectives and different organizational cultures which define their approach to work and relationship with the other project participants. This research was therefore undertaken to investigate and identify the organizational cultures of two significant players in the project coalition – architects and contractors – on the premise that by revealing specific cultural characteristics and orientations, establishing significant areas of difference and initiating discussion on some of the implications for conflicts and project performance, the context would have been set for assessing and understanding the behaviour of these project participants. A questionnaire survey based on some specific indices of organizational culture conducted on these two groups of participants revealed that in terms of specific traits, significant differences exist in task organization, sources of power and influence, control and coordination, formality, people issues and nature of tasks. The implications are that conflicts are likely to occur within the project coalition at the interface level where human interaction elements occur and this could detract from achieving project objectives. Awareness of these differences, however, improves the chances of achieving the right balance when constructing the team and this could lead to the development of synergy and good 'project chemistry' with positive consequences for overall project performance.

Keywords: Architects, construction industry, contractors, organizational culture, project coalition

Introduction

UK construction industry reports since Simon (1944) have continued to berate the culture of the construction industry and in particular, the adversarial and antagonistic aspects that have persistently plagued the industry and affected performance, with project organizations being unable to exceed or even live up to the expectations of clients. A significant number of published research papers have done likewise, blaming many of the industry's ills on culture. The general consensus is that there is a need for cultural change within the construction industry, for conflicts to be reduced and for performance to be improved. Fundamental to such change is the need to fully investigate and understand the manifestations and effects of culture in the industry. However, relatively little by way of research has been conducted in this area, due mainly to the generally recognized complexity of the subject and its 'soft' and subjective nature. Research on project performance has so far focused mainly on the impact of strategic factors, such as procurement routes, construction methods and management techniques on performance (Kumaraswamy and Dissanayaka, 1998; Proverbs *et al.*, 1999; Xiao and Proverbs, 2003).

More recently however, softer issues such as 'project chemistry' (Nicolini, 2002) and organizational culture (Rameezdeen and Gunarathna, 2003) have begun to interest construction industry researchers, demonstrating the growing realization that these softer issues have

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tangible impacts with implications for the performance of organizations and project success. This study investigates the organizational cultures of the two principal participants in a client's project organization – architects and contractors. It seeks to highlight and deepen understanding of the cultural variability between organizations in the project coalition, the aim being to establish the specific cultural attributes and orientations of these project participants; moreover, to identify areas of difference and to set the contexts within which some of their behaviour, and the motives that drive such behaviour can be assessed and understood.

Organizational culture

The phenomenon of organizational culture is real and has a tangible impact, so an understanding of this phenomenon is fundamental to understanding what goes on in organizations, how to run them and how to improve them (Schein, 1985). Its evaluation, with particular reference to construction firms, requires insight into the concepts, key principles and frameworks that underpin its evaluation, and how these relate to the construction industry.

Although Hampden-Turner (1994) argues that it is describable, measurable if necessary and, within limits, alterable, organizational culture, much like the generic concept of culture, is one of those terms that are difficult to express distinctly, but everyone knows it when they sense it, similar to a feeling about someone's personality (McNamara, 1999).

Organizational culture has been loosely defined by many as the shared assumptions, beliefs and 'normal behaviours' (norms) of a group. More formally, organizational culture is defined as 'a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way you perceive, think, and feel in relation to those problems' (Schein, 1985).

McNamara (1999) also argued that organizational culture is comprised of 'the assumptions, values, norms and tangible signs (artefacts) of organization members and their behaviours. New members of an organization consciously or unconsciously soon come to sense the particular culture of an organization just as they would another person.' He further suggested that organizational culture may also be looked at as a system. Inputs included feedback from society, professions, laws, stories, values on competition or service, etc. The process was based on assumptions, values and norms, e.g. values on money, time, facilities and people and outputs were organizational behaviours, technologies, strategies, image, products, services and appearance *inter alia*.

Culture often explains the incomprehensible and the irrational. It defines appropriate behaviour, motivates individuals and asserts solutions where there is ambiguity. It governs the way a company processes information, its internal relations and its values. It functions at all levels from subconscious to visible (Hampden-Turner, 1994). Organizational culture influences the success or otherwise of strategy, mergers, acquisitions and diversifications, integration of new technologies, meetings and communications in face-to-face relationships and socialization. It also accounts for the existence of inter-group comparison, competition and conflict, and the productivity of the organization (Schein, 1985), and it helps explain why some companies are more successful than others (Smith, 2003).

An investigation of corporate cultures therefore involves looking at how people in an organization behave; what assumptions govern their behaviour and what bonds or glue hold the organization together.

Within the construction context, the concept of organizational culture is only now beginning to attract interest. There is limited construction management research in this genre (Hall, 1999) although it has been a popular part of general management thinking since the early 1980s, particularly with the contributions of Deal and Kennedy (1982) and Peters and Waterman (1982). With the growing awareness that the nature of the industry, with its project-based arrangements, contractural arrangements, joint-venturing, internationalization of procurement and requirements for the cooperation of a myriad of participants makes it even more susceptible to the influence of organizational culture and culture in general, there is currently increasing research within this domain in the construction context. As reported by Fellows and Seymour (2002), occupational and organizational differences, how they affect receptivity to new practices and technologies and inter-firm collaboration is one of the two main focuses of culture research in the construction industry.

Notable pieces of research undertaken in this regard include that of Maloney and Federle (1990), in which they sought 'to define organizational culture, develop the means of measuring organization culture, and validate the measurement technique for engineering and construction organizations'. Relying on Quinn's (1988) 'competing values framework' (CVF), they found significant differences between engineering firms and contractors. Serpell and Rodriguez (2002) also reported research investigating the critical cultural elements of construction firms and the strategic action areas that could potentially influence these elements.

Root (2002) applied Hofstede's (1984) 'value survey module' (VSM) to a range of occupations in a bid to raise awareness of the sensitivities and persuasions of the various participants of the construction industry and Rameezdeen and Gunarathna (2003) presented a similar research based on the CVF that sought to compare contractors and consultants. These studies revealed significant differences in approaches to work between the participants considered.

A number of studies into organizational culture have been conceptual in nature. Nicolini (2002) for instance developed the concept of 'project chemistry', and Liu (2002) explored 'harmony' within the context of construction projects. There have also been studies into such issues as prejudice and attitudes towards women (Dainty *et al.*, 2002; Duncan *et al.*, 2002; Loosemore, 2002).

Despite this gradually growing body of research, there is still relatively a great deal more to be done. As indicated by Tijhuis (2001), construction industry participants need to become more aware of the importance of this phenomenon and its manifestation and impact 'on the process and product of construction business'. This awareness must be stimulated through further systematic research based on the adaptation and improvement of existing frameworks and principles.

Measuring organizational culture

It is important to recognize that culture is an intangible concept observable only through its manifestations in verbal and behavioural forms (Hofstede, 2001). Such phenomena are typically described as constructs (Hofstede, 2001). Just as an assessment of forces will consider such aspects as magnitude and direction, and an assessment of fruits will focus on such aspects as weight, colour and nutritive value, an assessment of constructs of culture requires the identification of aspects important to culture. These aspects are referred to as dimensions of culture, and they represent the areas within which differences are seen to exist between the organizations being compared, and various researchers have emphasized different dimensions depending on what was considered important or seen to reveal significant points of difference.

Hofstede (1984), for instance, developed a 'value survey module' (VSM) based on the dimensions of power distance, uncertainty avoidance, masculinity/femininity and individualism/collectivism. Arguments made about the bias of these dimensions towards 'western' values led Hofstede to add a further dimension of long-term/short-term orientation also referred as the Confucian dynamism dimension (Barthorpe *et al.*, 2000), considered as very important within East Asian societies. Trompenaars (1994) focused on the dimensions of universalism/particularism, individualism/collectivism, affective/neutral relationships, specific/diffuse relationships and achievement/ascription, while Schein (1985) reported, among others, dimensions of the nature of time, space, human relationships, human activities and human nature. Table 1 gives a summary of the various contributions made by researchers on dimensions. While some of these dimensions have been determined empirically, as in the case of Hofstede, some have also been identified based on anecdotal evidence. Some of these dimensions have been identified in cross-national studies but even these dimensions have seen adaptation and application in studies of organizational and occupational culture (e.g. Root, 2002).

When dealing with a multitude of dimensions, typologies are employed as an alternative to provide a simplified means of assessing cultures. Typologies describe a number of ideal types of culture, each of them easy to imagine, against which the culture being assessed is compared (Hofstede, 2001). Typologies have been utilized mainly in studies of organizational culture. Notable contributors to the use of typologies include Handy (1993, 1995) who identified the club, role, task and person typologies based on those proposed by Roger Harrison (in Graves, 1986) and Quinn (1988) who identified the market, hierarchy, adhocracy and clan typologies of culture. A summary of the various typologies developed by other researchers is presented in Table 2.

The application of typologies in cultural studies is problematic, although they are easier to comprehend in comparison with numerous dimensions considered together. Hofstede (1997) pointed out the inability of real cases to correspond with any single typology to be the main flaw in its use. The tendency, then, has been for researchers to associate organizations with the dominant typological orientation (e.g. Ankrah, 2003; Rameezdeen and Gunarathna, 2003), although these organizations generally have hybrid orientations. Using dimensions, on the other hand, cases can be scored unambiguously and sorted into clusters with similar scores. These clusters could then form the basis of typologies (Hofstede, 1997).

Dimensions are therefore the preferable option in assessing organizational culture, although typologies may be applied to compliment the dimensions (Hofstede, 1997). Dimensions, on their part, are not altogether flawless. As demonstrated by the case of Hofstede, the weakness in the use of these dimensions for assessing culture has been the fact that they tend to be value-laden. However, as long as these values reflect the values of the people being assessed, dimensions are the most realistic way of undertaking cultural and cross-cultural studies.

Table 1 Dimensions of culture

Cottle (1967 in Abu Bakar, 1998)	Hofstede (1984)	Schein (1985)	Hall and Hall (1990)	Trompenaars (1994)	Gesteland (1999)
■ Past	■ Power distance	■ Humanity's relationship to nature	■ Monochronic/ polychronic	■ Universalism/ particularism	■ Deal/relationship focus
■ Present	■ Uncertainty avoidance	■ Nature of reality and truth		■ Collectivism/ individualism	
■ Future	■ Masculinity/ femininity	■ Nature of time		■ Neutral/affective relationships	
	■ Individualism/ collectivism	■ Nature of space		■ Diffuse/specific relationships	
		■ Nature of human nature		■ Achievement/ ascription	
		■ Nature of human activity			
		■ Nature of human relationships			
		■ Individual/groupism			
		■ Participation and involvement			
		■ Characteristics of role relationships			

Dimensions of organizational culture

A starting point for identifying dimensions of organizational culture is the evaluation of the typologies developed to illustrate organizational culture, as shown in Table 2.

Handy's (1993, 1995) framework and Harrison's framework (in Graves, 1986), on which it was based, were based on dimensions of the degree of centralization, degree of formalization, selection and succession, sources of power and influence, control and coordination, task organization and rewards and sanctions.

Quinn and Cameron's 'competing values framework' (CVF) emphasized the dimensions of leadership, dominant characteristics, organizational glue, organizational climate, criteria for success, and management style (Quinn, 1988). In more detailed form, these dimensions were expressed in terms of:

- insight, innovation and adaptation
- growth, external support and resource acquisition
- profit/impact, productivity and accomplishment
- decisiveness, direction and goal clarification
- continuity, stability and control
- measurement, documentation and information management
- discussion, participation and openness; and
- concern, commitment and morale (Quinn, 1988).

These dimensions have been applied successfully in studies of the organizational cultures of construction industry organizations by Maloney and Federle (1990) and Rameezdeen and Gunarathna (2003), thus providing useful precedents.

Table 2 Typologies of culture

Harrison (in Graves, 1986)	Quinn (1988)	Maccoby (in Handy, 1995)	Handy (1993; 1995)	Hofstede (1997)	Trompenaars and Hampden-Turner (1997)	Sonnenfield (in McNamara, 1999)
■ Power	■ Clan	■ Jungle	■ Club/Zeus	■ Families	■ Family	■ Club
■ Role	■ Hierarchy	■ Company man	■ Role/Apollo	■ Pyramids	■ Eiffel tower	■ Fortress
■ Task	■ Market	■ Gamesman	■ Task/Athena	■ Markets	■ Market	■ Academy
■ Atomistic	■ Adhocracy	■ Craftsman	■ Existential/ Dionysus	■ Machines	■ Adhocracy	■ Baseball team

Hofstede's (1997) typologies were based on the empirically determined dimensions of power-distance and uncertainty avoidance which he considered to be the dimensions of national culture (from an IBM survey) particularly critical to culture within organizations. Beyond these, Hofstede (1997) also identified the process/results orientated, employee/job orientated, parochial/professional, open/closed system, loose/tight control and normative/pragmatic dimensions of culture (Hofstede, 1997).

The dimensions utilized in the typologies proposed by (Trompenaars and Hampden-Turner, 1997) were equality/hierarchy and orientation to the person/orientation to the task, similar to Hofstede's dimensions, and Sonnenfield's characterization (in (McNamara, 1999) was based on the calibre of employees, stability of the business environment and mode of promotion.

Taylor and Bowers (1972) identified six indices of organizational culture as being the primacy of human resources, communication flow, motivational conditions, decision-making practices, technological readiness to change and the control or influence of lower levels, while Eldridge and Crombie (in Graves, 1986) in their study of organizational culture also provided clues about where it was seen to cause differences; these included technology, structure, roles and control.

Another perspective presented by Hagberg and Heifetz (2000) was that, in reality, what management paid attention to and rewarded was often the strongest indicator of the organization's culture.

Abukhder (2003) made reference to the market orientation or client focus of the organization as a relevant dimension of culture. This dimension. in particular, may be viewed as being highly relevant in the construction context considering the increasing emphasis on the need to be more client-focused (Latham 1994; Egan, 1998). The other dimensions proposed by Schein (1985) and others, as shown in Table 1, are also relevant and must thus be considered when choosing appropriate dimensions of culture.

Putting these various contributions together, an extensive list of dimensions can be compiled to reflect the various perspectives adopted by researchers. However, although these dimensions of organizational culture may all be essential to unravelling the cultural differences that exist in construction organizations, having too many dimensions in a measurement framework causes it to lose meaning by becoming difficult to comprehend as indicated by Hofstede (2001). It was therefore necessary in this study to identify a few but important dimensions to form the basis of the subsequent evaluation. This identification of dimensions can be made arbitrarily depending on what the research seeks to highlight, or it can be determined empirically as seen in Hofstede (1997, 2001). Alternatively, if the researcher adopts a particular framework such as the CVF the default dimensions will apply, as seen in Maloney and Federle (1990), Root (2002) and Rameezdeen and Gunarathna (2003). Within the constraints and limitations of this research, the dimensions were selected arbitrarily. The dimensions selected were as follows:

- Degree of formality which assesses the extent to which formal positions matter with the organization, the existence of formal procedures for maintaining coordination, the extent to which employees are told what to do, the degree of empathy that replaces formal communication and the level of standardization that exists in the organization (Harrison, in Graves, 1986; Handy, 1993).
- Degree of centralization – which assesses the extent to which the manager's role is dominant, the degree of participation and openness and the extent to which people who make decisions are aware of problems at lower levels in the organization and if support staff are included in information gathering (Taylor and Bowers, 1972; Harrison, in Graves, 1986; Quinn, 1988; Handy, 1993, 1995).
- Primacy of human resources – which assesses the extent to which the organization is really interested in the well-being of its employees in comparison with other goals such as growth and profit (Taylor and Bowers, 1972; Quinn, 1988; Handy, 1993; 1995; Hofstede, 1997).
- Calibre of employees – which assesses the skills of the employees and the extent to which these skills are critical to the business of this organization. It also assesses the need for job security within the organization (Handy, 1993, 1995; Sonnenfield, in McNamara, 1999).
- Tolerance of ambiguity – which assesses the level of need for instruction and the extent of personal freedom employees have to take initiative with their own time (Handy, 1993, 1995; Hofstede, 1997).
- Need for recognition – which assesses the need of employees to be recognized for their work and their desire to establish their identity in the organization (Handy, 1993, 1995).
- Nature of tasks – which assesses the extent to which tasks have been made routine or standardized within the organization (Handy, 1993, 1995).
- Organization of tasks within departments – which assesses the extent to which tasks within the organization are organized on a departmental basis (Handy, 1993, 1995).
- Organization of tasks on a team basis – which assesses the extent to which tasks within the

organization are organized on a team basis (Handy, 1993, 1995).

- Organization of tasks around individuals – which assesses the extent to which tasks within the organization are organized around personalities (Handy, 1993, 1995).
- Administrative task importance – which assesses the importance attached to administrative tasks in comparison with the professional tasks (Handy, 1993, 1995).
- Skill and expertise as a source of power, control and influence – which assesses the degree to which power and influence depend on the technical ability and skills possessed (Taylor and Bowers, 1972; Handy, 1993, 1995).
- Formal position as a source of power, control and influence – which assesses the degree to which power and influence depend on formal position within the hierarchy of the organization (Taylor and Bowers, 1972; Handy, 1993, 1995).
- Relationship with managers as a source of power, control and influence – which assesses the degree to which power and influence depend on the relationship with the manager (Taylor and Bowers, 1972; Handy, 1993, 1995).
- Methods for achieving control and coordination – which assesses the extent to which control and coordination are achieved through formal methods and mechanisms and the extent to which empathy with the manager and co-workers helps with coordination (Eldridge and Crombie, in Graves, 1986; Quinn, 1988; Hofstede, 1997).
- Readiness to adopt technology – which assesses the extent to which technology is applied and how quickly and readily the organization adopts improved technologies and work methods (Taylor and Bowers, 1972).

These indices formed the basis for the questionnaire survey undertaken in this study.

Methodology

The essence of the research was to gain a sense of the orientation of the respondents in respect of each dimension considered. To achieve this, a questionnaire survey which pooled together questions from various organizational survey frameworks was undertaken to obtain data on the orientation of respondents (see Ankrah, 2003). To ensure reliability of measurements, each principal dimension was covered by more than one question. A total of 30 architectural practices and 30 contractors were sampled. Five questionnaires were mailed to each firm. In many cases, not all questionnaires were received from each firm.

The sampling was limited to Scotland in other to ensure that macro-cultural factors, which have a significant bearing on organizational culture (Hampden-Turner, 1994), were kept the same for all the units of analysis.

The Likert scaling technique was adopted and applied to a majority of questions for ease and uniformity of response. Its application implied for the most part that analysis of data was based on a scoring system. In this scoring system, for each of the five response categories (strongly disagree, disagree, equivocal, agree, strongly agree), a score of 1–5 was assigned, with the highest score of 5 being assigned to 'strongly agree' for positive statements and 'strongly disagree' for negative statements. Babbie (1973) provides instructions on the construction of such an index.

Having scored the response to each item from each respondent, an overall average score for each organization was then calculated by finding the cumulative score of all the respondents from the organization and dividing this by the number of respondents from the firm. This score provided an indication of the cultural orientation of the organization with respect to each of the indices.

This process resulted in a distribution of scores of organizations from which sample means and standard deviations were calculated for the two samples of contractors and architectural practices as follows (Spiegel, 1972):

$$\bar{\mathbf{x}} = \sum \mathbf{x}/\mathbf{n} \quad \text{and} \quad \mathbf{s} = \sqrt{\left[\left(\sum \mathbf{x}^2 - (\sum \mathbf{x})^2 \Big/ \mathbf{n}\right) \Big/ (\mathbf{n}-1)\right]}$$

where $\bar{\mathbf{x}}$=mean, $\mathbf{x}$=score, $\mathbf{n}$=sample size, $\mathbf{s}$=standard deviation.

Results of survey

Of the 30 architectural practices surveyed, responses were received from 12 firms. Of the 30 contractors surveyed, responses were received from 10 firms. Overall response rate of the entire survey was therefore 36.67% (Table 3).

Having scored the responses and aggregated the scores for each organization, as described before, the means and standard deviations of each of the cultural indices are presented in Table 4.

Profile of architectural practices

Of the 12 respondents, six firms were established before 1990, three between 1990 and 2000 and three after 2000. Nine were incorporated as limited partnerships,

Table 3 Response rate

Respondents	Firms surveyed	Firms responding	Percentage response (%)
Architectural practices	30	12	40
Construction firms	30	10	33.3

one was a sole proprietorship, with the remaining two being limited liability companies. None of them was a family-owned firm. Again, none of the responding practices had ever been involved in an acquisition although two of the 12 had been involved in mergers. In terms of size, nine of the organizations were small enterprises with less than 13 employees and the remaining three were medium-sized enterprises with between 13 and 299 employees.

Overall cultural profile of architects

Architectural practices are largely informal organizations in which control and coordination are achieved through empathy between organizational members and through direct personal contact, and this is essentially because most of these practices are small. There is decentralization of decision-making with everyone encouraged to think and contribute to problem-solving, although the managing director (usually the founder or a founding partner) plays a pivotal role in coordination. These organizations employ highly trained and skilled individuals who have a high tolerance for ambiguity. Their sense of their own importance creates in them a need for recognition and a desire to impose their identities on the organization. The firms in this business recognize their employees' importance and, accordingly, acknowledge and reward their individual efforts and performance, although to some, not enough.

Tasks are organized predominantly around individuals and to a lesser extent around teams. Many of the tasks and operations are bespoke. Administrative tasks in these organizations are generally considered as being unimportant relative to the professional tasks. There is a proactive attitude towards technology and a readiness to adopt technologies that provide improved work methods.

Within such organizations, the degree of control and influence arises predominantly from the level of skill and expertise possessed by the individual, with formal position providing only a marginal amount of influence.

Profile of contractors

Nine firms were established before 1990 and 1 between 1990 and 2000. None was established after 2000. Three firms fell into the category of family-owned enterprises. One was a sole proprietorship, six were limited liability companies and the remaining three were public limited companies (plcs). Three firms, all plcs, had been involved in acquisitions and of these two had also been involved in mergers. The remaining firms had neither been involved in an acquisition nor a merger. In terms of size, two organizations were small enterprises with less than 13 employees and five were medium-sized, with between 13 and 299 employees. Three contractors had 300 or more employees.

Table 4 Mean scores and standard deviations

Indices of culture	Architects		Contractors	
	$\bar{x}$	s	$\bar{x}$	s
Formality	2.880	0.218	3.172	0.375
Centralization	2.520	0.296	2.599	0.395
Calibre of employees	4.079	0.167	3.802	0.323
Tolerance of ambiguity	3.271	0.216	2.808	0.539
Need for recognition	3.049	0.336	2.508	0.730
Primacy of employees	3.490	0.126	3.528	0.644
Task organization (departments)	2.060	0.425	3.858	0.846
Task organization (individuals)	3.901	0.670	2.960	1.014
Task organization (teams)	3.759	0.575	4.159	0.504
Nature of tasks	3.050	0.481	2.388	0.726
Administrative task importance	2.790	0.286	2.880	0.523
Source of power (relationships)	1.980	0.442	3.051	0.558
Source of power (skill)	3.731	0.254	3.520	0.453
Source of power (position)	2.970	0.477	3.340	0.440
Control and coordination	2.633	0.466	3.341	0.398
Technological readiness	3.399	0.196	3.417	0.612

Overall cultural profile of contractors

In general, contractors are largely formal organizations in which control and coordination are achieved through formal methods and procedures. This result is influenced by the profile of the respondents, most of which are medium- to large-sized organizations. There is decentralization of decision-making, openness and participation, with everyone encouraged to think and contribute to problem-solving although the managing director still plays a dominant role in the organization. These organizations employ reasonably well-trained and skilled individuals. However, despite these qualifications employees are still considered to have limited tolerance for ambiguity and as a result they are given a great deal of direction on what and what not to do. They generally have a 'low-key' sense of their own importance and therefore there is an absence of the desire to impose their identities on the organization, unlike the architects. These firms, however, recognize the importance of their workforce, possibly because of the workforce shortage in the industry, and accordingly acknowledge and reward their efforts and performance although here again, to some, not enough.

Tasks are organized predominantly around teams and also around departments with many of the tasks and operations being standardized and made routine. Administrative tasks in these organizations are generally considered as being less important than the professional tasks. There is a proactive attitude and a readiness to adopt technologies which provide improved work methods.

Within such organizations, the degree of control and influence arises from the level of skill and expertise possessed by the individual, the formal position in the hierarchy and also the relationship with the manager.

Comparison of cultures

Plotting the mean values together in a web chart (Figure 1) makes it possible to visualize the areas of convergence and divergence of architects and contractors.

To test the significance of apparent differences highlighted in this web chart, a sampling distribution of the difference of means was considered. For such a distribution, the mean and standard deviation were calculated respectively as follows (Spiegel, 1972):

$$\mu_{\bar{x}_1-\bar{x}_2} = \mathbf{x}_1 - \mathbf{x}_2 = \mu_1 - \mu_2; \text{ and}$$

$$\sigma_{\bar{x}_1-\bar{x}_2} = \sqrt{\left(\sigma_1^2/\mathbf{n}_1 - \sigma_2^2/\mathbf{n}_2\right)}$$

where $\bar{\mathbf{x}}_1$=sample mean for architectural practices, $\bar{\mathbf{x}}_2$=sample mean for contractors, $\bar{\mu}_1$=population mean for architectural practices, $\bar{\mu}_2$=population mean for contractors, $\mathbf{n}_1$=sample size for architectural practices, $\mathbf{n}_2$=sample size for contractors, σ_1=standard deviation for architectural practices, σ_2=standard deviation for

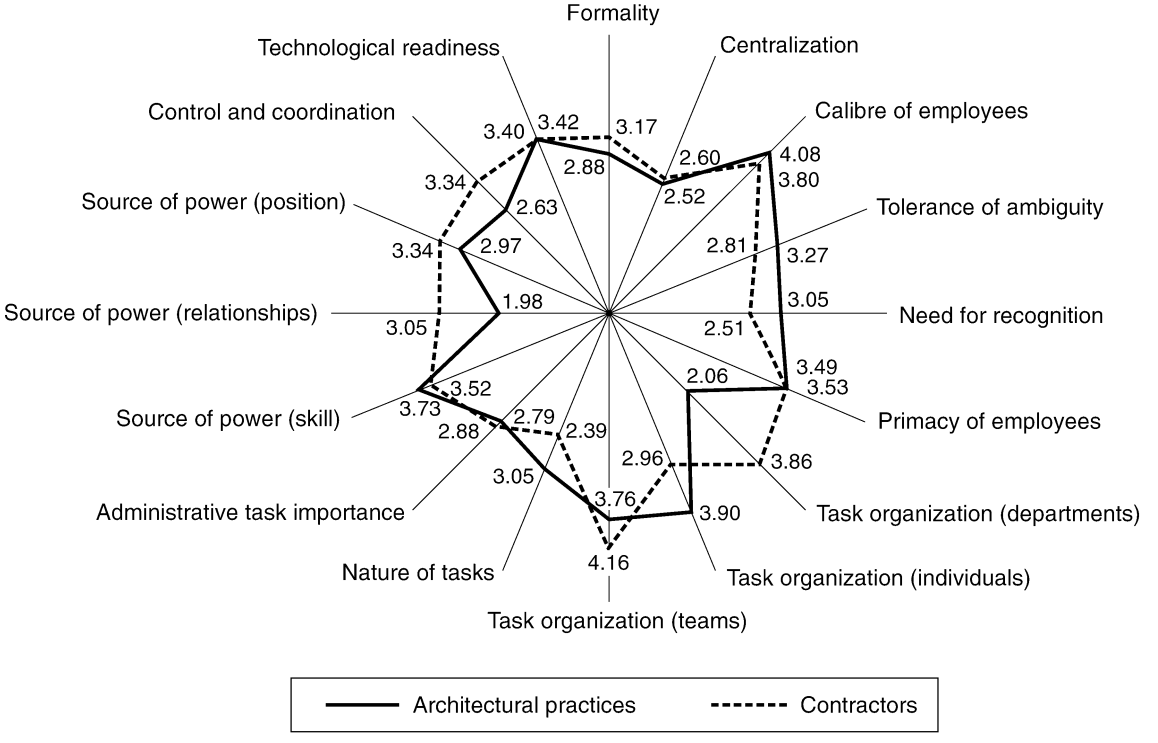

Figure 1 Comparison of orientations

contractors. Here, the sample standard deviations were used as estimates of σ_1 and σ_2, respectively.

Hypotheses were set up and levels of significance of 0.05 and 0.01 were assumed, representing 95% and 99% confidence levels, respectively. The hypotheses were as follows:

$H_0 : \mu_1 = \mu_2$, and the difference in cultures is due merely to chance.

$H_1 : \mu_1 \neq \mu_2$, and there is a significant difference between the two cultures.

Under the null hypothesis H_0, both samples invariably come from the same population with the difference of means $\mu_{\bar{x}_1 - \bar{x}_2} = 0$ for that particular indicator.

From Spiegel (1972), the critical values of the standardized variable (or z score) at 5% level of significance for a two-tailed test are -1.96 and 1.96. Therefore, the null hypothesis will be rejected if the z score of the difference of means lies outside the range -1.96 to 1.96, and accepted otherwise. Similarly, at 1% level of significance the critical values are -2.58 and 2.58. Therefore, the null hypothesis will be rejected if the z score lies outside the range -2.58 to 2.58, and accepted otherwise.

The z score was calculated from the formula (Spiegel, 1972):

$$z = (\bar{x}_1 - \bar{x}_2) / \sigma_{\bar{x}_1 - \bar{x}_2}$$

The results obtained are shown in Table 5.

Adopting the terminology that results significant at 0.01 level are highly significant, and results significant at the 0.05 level but not at the 0.01 level are probably significant (Spiegel, 1972), it can be seen from the table that at 99% confidence level, the difference in means is most significant on the indices of organization of tasks around departments, source of power based on relationship with manager, and control and coordination. For these indices, therefore, the null hypothesis is rejected at a 0.01 level of significance.

Additionally there is probable significance of differences at 95% confidence level on indices of formality, the calibre of employees, tolerance of ambiguity, need for recognition, organization of tasks around individuals and nature of tasks. For these indices also, the null hypothesis is rejected at the 0.05 level of significance.

However, there is no difference with regard to centralization, primacy of employees, organization of tasks around teams, administrative task importance, source of power based on skill and expertise, source of power based on position and technological readiness. For these indices, the null hypothesis is true and is therefore accepted.

From the above analysis it can be concluded that the principal attributes that distinguish architects and contractors are as summarized in Table 6.

Discussion

The aim of the research was to establish the orientation of the principal participants of the client's project organization in respect of specific dimensions identified through the literature survey, to identify areas of significant differences and to assess some of the possible implications for participants and projects.

Table 5 *Z* scores for difference of means

Indices of culture	$\bar{x}_1 - \bar{x}_2$	$\sqrt{(s_1^2/n_1 + s_2^2/n_2)}$	z
Formality	−0.29	0.13	−2.17
Centralization	−0.08	0.15	−0.52
Calibre of employees	0.28	0.11	2.45
Tolerance of ambiguity	0.46	0.18	2.55
Need for recognition	0.54	0.25	2.16
Primacy of employees	−0.04	0.21	−0.18
Task organization (departments)	−1.80	0.29	−6.11
Task organization (individuals)	0.94	0.37	2.51
Task organization (teams)	−0.40	0.23	−1.74
Nature of tasks	0.66	0.27	2.47
Administrative task importance	−0.09	0.18	−0.49
Source of power (skill)	0.21	0.16	1.31
Source of power (relationships)	−1.07	0.22	−4.92
Source of power (position)	−0.37	0.20	−1.89
Control and coordination	−0.71	0.18	−3.84
Technological readiness	−0.02	0.20	−0.09

Table 6 Main distinguishing characteristics

Architects	Contractors
Tasks are organized predominantly around teams and individuals.	Tasks are organized predominantly around teams and departments.
Relationship with the manager does not bring with it any influence and power in the organization.	Relationship with the manager represents an important source of power and influence in the organization.
Control and coordination are achieved by informal methods and mechanisms including empathy.	There are formal procedures for maintenance of control and coordination.
Very informal organization.	Quite formal organization.
Very high calibre employees with high tolerance of ambiguity.	Reasonably high calibre and skilled workforce but with less tolerance of ambiguity.
Employees feel a strong urge to impose and establish their identity on the organization.	There is deference to the collective and general objective of the organization.
Tasks are left largely bespoke.	Tasks are generally standardized and made more routine.

The results showed that in certain respects architects and contractors behave in the same way or in a similar manner. Specifically, both project participants tend to adopt marginally decentralized approaches to management and decision-making with employees being allowed to participate in problem-solving. Employees are considered important to organizations and there is reasonable interest in their well-being. Both groups organize tasks so as to be performed by teams of employees, and administrative tasks are not seen as being as important as the other professional tasks. Generally, although the position of an employee in the hierarchy of the organization is relied upon as a source of influence, this reliance is marginal. Rather, there is a greater tendency in both samples to base their authority on the level of skill and expertise possessed. There is also a general readiness in both samples to adopt new and innovative technologies.

In other respects, as already identified in Table 6, there is a distinct difference in the cultural attributes of architects and contractors.

While the study did not go to the extent of establishing the specific reasons for the relative orientations of architects and contractors and the differences that exist, the demographic data collected during the survey provided some clues as to some of the reasons for the perceived differences. Areas where the two groups in this study were significantly different included:

- Size – whereas the architectural practices were generally small, the contractors in the survey were medium- and large-sized.
- Ownership – whereas the architectural practices were mainly sole proprietorships and limited partnerships, the contractors were mainly limited liability companies (Ltd) and public limited companies (plc).
- Business environment – threats and dangers were more significant for contractors than for architectural practices, as demonstrated by a greater proportion of organizations involved in mergers and acquisitions.

Beyond these factors, a multitude of other factors influence the culture that develops in any organization and these include history, technology, goals and objectives, people, recruitment policies, job performance requirements, leadership style, life-cycles, work patterns and the macro-cultures of the nation or region *inter alia* (Graves, 1986; Handy, 1993; Hampden-Turner, 1994; Handy, 1995). A detailed study of these was, however, beyond the scope of this study, which was essentially an exploratory study of orientations.

Implications for project performance

The impact of culture on construction is profound. This assertion has been presented in various guises by various writers who have examined the impact of culture on construction (some based on anecdotal evidence). Maloney and Federle (1990), for instance, asserted that the culture of a construction organization was a primary determinant of performance within that organization. Construction industry reports such as Latham's (1994) and Egan's (1998) also made implicit assertions to the same effect. Low and Shi (2001) presented a study on cross-cultural working experience which showed *inter alia* that mismanaging cultural differences rendered otherwise successful managers and organizations ineffective and frustrated when working across cultures, and Ngowi (2000) showed that difficulties associated with the implementation of philosophies such as TQM were a result of differences in shared assumptions, frames of reference and understandings that organizations had developed. The case

of the rebuilding of the Croatian motorway from Zagreb to Split following years of war (Eaton Consulting Group Inc., 2002) also provided further evidence that besides institutional gaps, cultural gaps hampered the efficient execution of projects. Abukhder (2003) also uncovered evidence which suggested that inappropriate cultures in many small and medium-sized enterprises (SMEs) within the construction industry were hampering the implementation of such philosophies as 'partnering' and 'best value'.

Although some of these assertions have been made in a national context, they are also valid from the organizational perspective, not just because many construction organizations are working internationally, but also because they have to work with so many other organizations which also reflect various other cultures. On a construction project, the various participating organizations must function together as a team to deliver a high quality premium service and product to the client on time and within budget. Although there remains much in common, the various participants – and in this case architects and contractors – bring to this team different ways of thinking, different attitudes, practices and approaches to work and in some cases different and divergent objectives as seen in the results of the survey.

These differences imply a likelihood of conflict at the interface level where the human interaction elements come into play, and this has the potential to detract attention from either schedule or budget. For team-working to be achieved, for the right levels of formality and appropriate mechanisms for control and coordination to be developed, for adequate information and direction to be provided, and for the right amount of emphasis to be placed on the individual and on the collective, there is a need to strike a balance between the needs of the project participants. Although in reality what architects think, what they do and the material products they produce (their culture) may never converge with what contractors think, what they do and the material products they produce, finding the right balance for the various dilemmas becomes more likely knowing what the particular orientation of the different participants are. The right balance may lead to the development of synergy or 'chemistry' as referred to by Nicolini (2002), fewer conflicts in the project coalition and better project delivery overall.

Conclusion

There is a general awareness that organizational culture influences the processes and products of construction business, especially with the project-based arrangements and the myriad of participants required to cooperate on a project to deliver the construction product. It influences attitudes to work, conflicts and their management, the transfer and implementation of innovative management practices and philosophies and inter-firm collaboration *inter alia*. As a result, a deeper understanding of how this phenomenon manifests and the extent of its influence is required to enable project participants to harness the potential of culture and minimize or mitigate its adverse effects.

The research presented focused on the manifestation of organizational culture along specific dimensions for the two principal participants of the client's project coalition – architects and contractors. The results of a questionnaire survey showed that with regard to the degree of centralization, primacy of employees, organization of tasks around teams, administrative task importance, source of power based on skill, expertise and position and technological readiness, architects and contractors show similar orientations. In a number of other areas such as organization of tasks within departments and around individuals, sources of power based on relationships with managers, mechanisms for control and coordination, the degree of formality, the calibre of employees, tolerance of ambiguity, need for recognition and the rationalization and standardization of tasks, they are significantly different.

On a construction project where these groups have to work together, these differences may have implications for team-working, formality and how control and coordination are achieved and this creates a need to strike a balance which is acceptable to the contractor but not too regimented for the architect. It has implications for how much information and support is needed by the architect and the contractor whose employees generally demonstrate a lower tolerance of ambiguity, and it also has implications for finding the right balance between emphasis on the collective and emphasis on the individual.

The dilemmas arising out of this need to find a right balance increases the potential for conflict. Although, in reality, it is unlikely to find convergence of the organizational cultures of these participants, awareness of the likelihood of these differences existing when constructing the team may improve the chances of finding the right 'project chemistry' (Nicolini, 2002) and better overall project performance.

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