

CULTURE OF QUALITY AND THE AUSTRALIAN CONSTRUCTION INDUSTRY

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ABSTRACT

The importance of quality control has long been recognised by Australian business. This is particularly true in the construction industry, where regulators are requiring quality assurance (QA) implementation for almost all capital works. Recently doubts have arisen as to whether quality systems are actually achieving positive results in Australia. Much of the existing literature suggests that any reported failure is due to cultural misalignment. The aim of this research is to test by questionnaire the degree of compatibility between prevailing attitudes and the cultural values required for the successful implementation of quality systems in Australian construction. The results show some cultural trends that support the introduction of QA to the building industry, however, it was also found that, while the industry will sometimes accept such theories, their introduction may result in cultural consequences that were not anticipated. QA has sometimes been found to generate a low level of worker commitment and participation, and may actually reduce the degree of pride in workmanship and increase the level of fear on building sites. The message for lean construction advocates is that they should seek to anticipate potential cultural misalignments between their theory and current industry practice in order to implement their principles holistically.

KEY WORDS

Culture of quality, Quality, Quality assurance, Total quality management, Australian construction industry.

BACKGROUND

Increasing concern with quality is evident both from within and from without construction-based organisations. Such concerns are felt by designers, constructors, regulators and client bodies. Attention has tended to focus on Quality Assurance (QA) under the ISO 9000/BS 5750 provisions, despite acknowledgment by many that QA does not, of itself, raise, provide or ensure good quality (Ogunluna et al. 1998, Tam and Tong 1996). It does, however, ensure realisation of the specification in the finished product, in other words it provides confidence. Marosszeky (1996) notes that despite government requirements for quality assurance throughout the construction industry, claims that building standards are declining are on the increase. A study by Jaafari et al. (1994) identified many QA practices in con-

struction that are ineffective and ill-conceived, and suggested that for QA systems to work effectively in construction, considerable attention must be paid to the human factor and empowerment of the workforce to be its own quality inspector. This idea finds a clear echo in lean construction principles (Alarcon 1997). Although lean construction principles have been implemented in many countries with considerably varied cultural influences, it may nevertheless be the case that the most efficient mode of implementation is one that takes account of local cultural nuances.

Deming (1986) discussed aspects of quality provision as a philosophy that, to achieve success, should pervade the entire supply process. The elements of Deming's approach include involvement of the entire workforce from a position of security, in order to aid in continuous improvement of supply. This can be summarised as "getting it

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right first time". This, of course, is also a lean construction precept. As a result checking is reduced, as is reworking, by virtual elimination of defects and, complementarily, Just-in-Time (JIT) cost-saving, inventory management is encouraged. Strong commitment from each member of the supply chain coupled with long term planning, traditional security of employment and the consensus view of striking a bargain have been reported as providing fertile ground for rapid advances in outputs and quality (Fellows 1992).

Culture, as it manifests itself in widely-held beliefs and behavioural norms within a society, constitutes the base from which changes to enhance quality and value provision must be examined. This applies however bounded culture is occupationally, racially, or geographically. The coupling of Value Engineering and Risk Management approaches with Quality Requirements appears to have potential for gains in the efficiency and effectiveness. Japanese philosophy, society and organisational structures have generally encouraged its industries to operate cohesively rather than take the market-capitalist approach of ubiquitous price-oriented competition., (Hutton 1991). Worldwide, however, the fact that construction projects are normally "bespoke" or project-based, in design, execution and personnel tends to act counter to an environment conducive to both feedback loops and development of quality provision. Cherus and Bryant (1984) discuss the Temporary Multi-Organisation (TMO) nature of construction projects and the potential, desirable consequences of greater permanence of relationships and commonality of objectives. It appears that compromise has failed to secure optimality or that it is inappropriate to the current capital price oriented competition of construction. Love et al. (2004) suggests that a strategic shift and organisational transformation are necessary to achieve the desired aims.

To secure high and continuous improvements in quality, a "culture" conducive to such provision is necessary (Fellows 2003). Not only does such culture require security of employment to operate but also education to foster awareness of the gains achievable, including an environment of mutual trust between the organisations participating in the supply-demand chain and within the individual. In order to provide good quality the traditional approach to management has to change (Hall 1992). This includes attitudes throughout the organisation and the organisational structure. The research presented in this paper reports on a study of the current situation in several large Australian construction and engineering firms, where the prevailing attitude was investigated through interview and questionnaire to determine compat-

ibility with a "culture of quality" as described in the academic literature.

CULTURE OF QUALITY

Much of the literature on TQM discusses the need to introduce such a "culture of quality" if an organisation's quality goals are to be achieved (Jaafari 1996; Love et al. 2000; Walker and Keniger 2002). Despite this, no comprehensive definition of the perceived culture of quality was found. It is therefore, necessary to define the type of cultural influences that are being investigated in this paper. A culture of quality can be described as one that:

- Promotes leadership rather than supervision;
- Inspires commitment on the part of staff to the chosen quality activities;
- Uses teams as main style of management;
- Allows staff at all levels to participate in work related decisions;
- Promotes pride in workmanship;
- Eliminates fear; and
- Inspires people to seek continuous improvements.

This type of culture cannot be ordered by management, it must instead be an integral part of how the organisation carries out its business. As defined by Gravenor (1998): "The culture of an organisation is the partem of artefacts, behaviours, values, beliefs and assumptions that a group develops as it learns to cope with internal and external problems of survival and prosperity."

HOFSTEDE'S RESEARCH ON ORGANISATIONAL CULTURE

Comparisons between differing cultures have been researched by Hofstede (1997) who identified five main values associated with organisational culture. These values were then applied over fifty countries and three regions including Australia, Germany, Great Britain, Japan, Korea, Sweden and the USA. The results appear in Table 1. A correlation matrix of the seven countries shown in Table 1 was undertaken by Napier (1996). The author found that the cultures of Australia, Great Britain and the USA were very similar (scoring about 0.96 in the correlation matrix). However, there appear to be few points of similarity between the Australian and the Japanese cultures.

Individualism is a personal trait, and refers to a person's ability to work better either individually or collectively. The Australian culture was rated as being highly individualistic, coming second only to the USA. Long term orientation refers to the ability to persevere with a purpose that will

Table 1: Cultural values of the sample countries (Adapted from Hofstede 1997)

	Individualism	Long Term Orientation*	Masculinity	Uncertainty Avoidance	Power Distance
Australia	90	31	61	51	36
Germany (FR)	67	31	66	65	35
Great Britain	89	25	66	35	35
Japan	46	80	95	92	54
Korea (S)	18	75	39	85	60
Sweden	71	33	5	29	31
USA	91	29	62	46	40
Average (7 countries)	67	43	56	58	42
Average (53 countries in study)	51	45	51	64	51

* The scores for long term orientation were determined over twenty countries and three regions.

only show results over a long time span. It reflects people's needs for quick results to maintain motivation. Australia, like most western countries, was found to be relatively short term orientated, with the eastern cultures performing noticeably better under this criterion. The value of masculinity is not based upon the actual gender of the individual, but is rather a reflection of the personality traits that are often attributed to either sex. Some masculine traits include confrontational behaviour, assertiveness and competitiveness, while feminine traits are compromise, negotiation and equality of work life. It was found that Australia has a higher than average score for masculinity. Uncertainty avoidance reflects the need for stability, control and direction. Australia had a below average score for this value, meaning that Australians find uncertainty relatively acceptable and are tolerant of deviation to set goals. Power distance refers to the emotional distance between the manager (or decision maker) and his or her subordinates. Australia scored lower than average for this value, meaning that we tend to foster a fairly egalitarian workplace culture with a tendency to flat organisational structures.

RESEARCH METHOD

The study reported on in this paper follows on from Hofstede's work. While it may be difficult to establish a direct connection between industry culture and the uptake of management ideas, and although successful examples of cross cultural implementation certainly exist, Hofstede's research indicates that cultural differences are likely to have at least some impact on the practical application of management theory. A review of the current literature relating to Australian culture appears to indicate a national identity that is

largely incompatible with the basic principles of total quality management and quality assurance. (Krosliid 1998; Krosliid and Napier 1997) Despite this Australian organisations have wholeheartedly embraced the systematic approach promised by quality assurance, and currently have one of the highest rates of ISO 9000 accreditation in the world. This is particularly true in the construction industry, where the search for quality has been fuelled by the state and federal government's insistence upon accreditation for virtually all capital works projects. As a result of this apparent contradiction it was therefore proposed to carry out a survey style research project, to apply the findings of the literature review to the culture of the building site and to assess the level of compatibility between the 'culture of quality' and the building environment. It was hypothesised that some attitudes held by workers on construction sites would run counter to those needed for successful implementation of quality systems. The study was limited to the construction process only, and did not include any investigations into the design and documentation phases of projects. While the position of management is critical to the introduction of any new system, the attitudes of on site workers need to be recognized or best management practice is unlikely to be fully delivered. Management is the driver of systems implementation but workforce attitudes can either assist or retard the success of the implementation.

DATA COLLECTION

Information on building industry statistics was sought, which resulted in a list twenty one companies who are based in Sydney and are currently carrying out projects valued above \$5M. All of the organisations were contacted, and ten agreed to

participate in the study. The actual level of participation differed between the organisations. The most common reason that was given for minimising involvement was pressure due to high work loads. All of the respondents were offered a copy of the study's results, as a means of thanking them for their participation. To provide comparability of results, it was decided to seek the involvement of an organisation from another industry that has gained some recognition for its quality achievements. A manufacturing company was chosen for this role. In addition, the assistance of a QA consultant was also considered advisable, to achieve a more complete understanding of the topic. A self employed individual who has specialised in offering consultancy services to the building industry for the past two years agreed to participate in the study. The person is referred to as the 'Consultant' for the remainder of this report.

The Interview

Eisner (1991) advises that qualitative research considers the researcher as an instrument, not so much to check behaviours but rather to perceive their presence and interpret their significance. It is recognised that this is much easier to achieve in a face-to-face situation, so much of the data for this study has been gathered using the personal interview technique. Most of the interviewees were involved in the quality and project activities that their companies undertake. Apart from general information about their company's quality processes and their own role within the company, each interviewee was asked three open-ended questions, designed to elicit responses regarding their opinions on the attitudes of site staff to quality. They were also invited to offer general comments and qualifications, to see if any commonality of attitude could be discerned. This is in accordance with the advice of Low (1994) who notes that the overt presence of the researcher can cause reactions which yield additional insights. The consultant was also interviewed, and asked the three questions relating to the attitudes of site staff and building companies generally. Leedy's (1993) methods of establishing contact were used, whereby all of the respondents were contacted four weeks in advance to request their participation. A full explanation of the purpose and possible benefits of the study, and a copy of the interview questions, were sent to them.

The Questionnaire

A questionnaire was developed, to gather broad information regarding the culture of the construction site and to investigate the accuracy of man-

Table 2: Survey Questions

	Listed below are six 'work goals'. Rate these goals in respect of their importance to you in your ideal job.
1	(a) A job where I don't have to rely on others. (b) A job which fully utilises my skills and abilities. (c) A job which gives me a personal sense of achievement. (d) A job that gives me safe conditions and good amenities. (e) A job that gives me freedom to do the work my own way. (f) A job that allows me to either improve my skills or learn new skills.
2	How long would you like to continue working for your current employer?
3	How long would you like to continue working within the building industry?
4	How would you rate your understanding of the time, cost and quality goals that the Head Contractor is trying to achieve on this project?
5	From the list below, choose the description that most closely reflects your understanding of the relationship between your job and the project as a whole.
6	Rate your agreement with the following statement; "The work that I do as an individual is necessary for the ultimate success of this project".
7	How often do you feel worried or concerned at work?
8	Rate your agreement with the following statement; "It is important to obey rules and follow directions – even when it is not in the best interests of the project".
9	How often, in your experience, are people on this project reluctant to disagree with their supervisors?
10	Listed below are six more 'work goals'. Rate these goals in respect of their importance to you in your ideal job. (g) A job that allows me to earn more money. (h) A job that gives me personal recognition when its well done. (i) A job where I work with people who cooperate and like each other. (j) A job that gives me access to promotion to higher levels. (k) A job that allows me to live in an area that suits me and my family. (l) A job which provides employment security, such that I can work for the company as long as I want to.
11	Nominate, from the choices below, the style of decision making that most closely reflects that used by your supervisor. Please note that your supervisor is the person who is currently supervising your work, whether they work for the same company as you or not.

agement perceptions within their organisations. The questionnaire that was used was directed towards on-site staff, while management attitudes were tested in the interviews. The responses are completely anonymous. All of the questions were closed-ended, with no allowance for comment or qualification. Part A of the questionnaire contains five optional questions, concerning the gender, age, ethnicity, occupation and employment terms of the respondents. Part B contains eleven compulsory questions over four pages. The questions were of the sliding scale type, using responses such as never, sometimes, always. As the questionnaire is designed for completion by site workers, particularly those working directly “on the tools”, most of the respondents were not directly employed by the participating organisations. They are instead the employees of a host of smaller subcontracting firms. A modified version of the questionnaire was also distributed within the control company. The responses from this organisation provide comparability between the major cultural influences in the construction industry and those that operate elsewhere. The questions asked are listed in Table 2 above.

METHODOLOGY

The purpose of the interview was to elicit responses that are based on the interviewees own opinions and perceptions. The questions that were asked were open-ended, and so the responses are difficult to statistically compare. Correlations in intent and phraseology were instead sought, and highlighted. Opinions that were shared by more than one respondent were noted for comparison with the questionnaire results. The aim of the questionnaire was to provide a comparison between a sample of construction workers and a sample of manufacturing workers on a number of cultural aspects that pertain to quality. As the questions were all of a sliding scale type, it was decided to apportion a numerical value for each response, numbering from 0 to 4. In all of the questions the number 4 was given to the response most aligned with quality, and 0 to the response least aligned with quality. The results from the control group were all set at unity, to establish a standard base line for comparative scoring. The simple technique of averaging the scores by industry and organisation was carried out, to provide direct comparability in an easy to read format. The organisations were then ranked in the order of the scores for each of the values under consideration. The questionnaire data was then compared with the interview responses, to establish a correlation and to seek out any contrary issues.

Table 3: Survey results

Factor Influencing Quality	Construction Industry Rating
Team work	2.1
Loyalty	1.15
Long term Orientation	1.3
Understanding of project goals	0.97
Pride in workmanship	1.1
Uncertainty avoidance	1.05
Lack of fear	1.05
Leadership	0.7

Calculation for Index for tables

The selections from never to very often are scaled from 1—4. Scales used here are; 0 = Not important, 1.0= Of little importance, 2.0 Relatively important, 3.0 Very important, of utmost importance

All the scores obtained under each question are tabulated to give the total score for each factor. This is calculated by multiplying the frequency of occurrence for each item by the scale number assigned to that selection.

Weighted score is then calculated by: (total score/no of respondent)

Results

In this study, the major cultural influences that operate on the construction site have been examined to assess the level of cultural compatibility with quality. The study specifically targets site workers who actually “work on the tools”, as it is considered that their attitudes have an impact on the quality of the built product and if not managed well can run counter to management goals. The identified cultural aspects that were investigated are: long term orientation; leadership; fear; teamwork; pride in workmanship; loyalty; risk avoidance; and understanding of goals. All of these values have been identified from a previous literature review as being aligned with a perceived “culture of quality”.

DISCUSSION

Teamwork and Leadership

These two values are clearly obviously linked. Individuals unsuited to participative teamwork are likely to prefer autocratic styles of management, while the others will perform better under more flexible arrangements. The results generally reflect this link, with correlation of ranking found in four cases. This indicates that there is a willing-

ness on the part of supervisors to suit their style to the needs of their workers.

The industry ranked positions are, however, an issue. The construction industry achieved its highest score (2.1) for teamwork, and its lowest score (0.7) for management style. This result clearly indicates that the management style that predominates in the construction industry may be more authoritarian than is really required by the workers. It is noted that when the interviewees were asked whether site workers would like to be more involved in the planning and decision making processes associated with their work, the responses were fairly polarised, with the majority of respondents thinking that site workers would not like to be more involved or would not be interested. This anomaly may be explained by a comment from one of the interviewees. He stated that it is actually management, both site and senior, that is not yet ready for a participative workforce.

Teamwork and Long Term Orientation

Sommerville (1994) has advised that, due to the transient nature of the construction workforce, teams are almost impossible to maintain from project to project. He also notes that the site is a highly unstable workplace, thereby creating a work culture that is relatively unlikely to commit to long term policies or goals. The results from the questionnaire however, found that the construction industry scored on the high side for these two values. In fact all of the construction companies ranked above the Control in both these aspects. During the interviews the managers were asked about the procurement of their subcontractors. The general trend is to use subcontractors who are known to the company, and who have a good relationship with the head contractor. It is therefore quite probable that cohesive teams are maintained across projects, and that a participative approach to management could be successfully adopted. Similarly, the commitment of the whole team is critical to the success of lean construction principles.

Uncertainty Avoidance, Pride in Workmanship and Lack of Fear

When the data was examined for correlation, a link was found between pride in workmanship, risk avoidance and lack of fear. The three companies that ranked highest in risk avoidance were ranked lowest in pride in workmanship and lack of fear, and vice versa. It can be concluded that the cultural value of risk avoidance is incompatible with the values of pride in workmanship and lack of fear. This could mean that any quality system

designed to raise uncertainty avoidance may actually work to lower pride in workmanship. Other cultural incompatibilities may also exist, and they need to be fully investigated. If implemented without due care, lean construction principles might also provoke negative responses from site workers which could covertly undermine implementation.

Quality Assurance

Quality assurance is the most common system of quality control used on construction sites today. The interviewees were each asked about the attitude of site workers to QA. One aspect that was noted throughout was that site workers generally know very little about QA, and all of the QA activities are invariably carried out by their supervisors. It was noted by James (1996) that the elimination of inspection and supervision is one of the basic tenets of TQM and lean construction, as quality should be built into the product in the first place. It appears that James' warnings are being ignored by the construction industry, as we simply appear to use QA as "a form of documented supervision". Two of the interviewees stated that site workers can be insulted by QA, due to the inference that they can or will not do a good job without a check sheet. Uncertainty avoidance is the cultural value most closely linked with the aims of a QA system, and it was found that pride in workmanship may be lower in organisations that ranked high in uncertainty avoidance. This finding tends to substantiate the opinions of the interviewees. Many of the interviewees noted that the paperwork associated with QA is seen as a problem for site workers. One explanation for this attitude could be that construction workers tend to be people who like to work with their hands in an outdoor environment. While nobody really enjoys excessive paperwork, site workers have possibly made a conscious choice to avoid it by choosing an occupation that is remote from the office environment. The interviews clearly indicated that the general attitude of site workers to QA is negative, and it is therefore assumed that a low level of commitment to QA is expressed on Australian building sites. This finding is in direct opposition to many comments contained within the professional literature, that is, that commitment to the chosen quality system is imperative to ensure its ultimate success (Hall 1992). It was decided not to ask a specific question on QA in the questionnaire, due to the widespread opinion of the interviewees that site workers generally have a limited understanding of the system.

Loyalty and Long Term Orientation

All of the aspects of quality that were examined are considered to be of equal weighting and importance. It is noted however, that each value will be of differing importance to individual companies, depending upon their individual quality goals. It is noted that the only two cultural values that contain the two highest ranking organizations in the upper ranks are loyalty and long term orientation. This finding could indicate that any organisation that wants to improve its overall quality production should concentrate on improving the loyalty and long term orientation of its staff and subcontractors.

The Human Perspective

It was noted continuously in the literature review that quality activities are carried out by people, and that to introduce systems that ignore the human perspective is to miss the whole point. This criticism has sometimes been made of lean construction (Green 2002). The results from this study support this claim. The two highest ranking organisations have both introduced quality and best practice systems that are specifically designed to improve staff satisfaction and increase participation. This holistic approach may very well have resulted in the generally higher scores that have been shown in this study.

CONCLUSION

It is widely accepted that the Australian Construction Industry needs to implement quality procedures to maintain competitiveness, but are we prepared to accept the degree of cultural change that will have to be introduced to achieve this, and is this level of change even possible? The inherent barriers to such change are the principle issues this research sought to establish. The quality imperative of customer satisfaction is usually achieved by the implementation of a recognised quality system, such that customer requirements are consistently met or exceeded. In its search for quality, Australia has generally considered only two options, to implement a recognised quality system in the form of quality assurance (QA), or to go down the total quality path by introducing total quality management (TQM). The record of accreditation to the ISO 9000 series for quality assurance is currently quite high in the Australian construction industry. This is in no small part due to the requirements of both state and federal governments for accreditation for acceptance on to tender lists for work above a certain value. There exists however some doubt as to whether QA is

actually achieving any positive results in the construction industry. Much of the existing literature suggests that this reported failure may be due to a cultural misalignment, that is, that our cultural values may be incompatible with those required by quality assurance. This research confirms that the construction industry faces particular problems with quality concepts, and that the cultural change that will be required of participants in this industry will be even greater than for the broader Australian community.

The cultural issues that have limited the effectiveness of TQM in the Australian construction industry could have the same deterrent effect on the diffusion of lean construction principles. This study was not directly aimed at finding latent cultural barriers to the implementation of lean construction. Nevertheless there are several parallels between the barriers faced by quality control systems and those that are likely to be met by the advocates of lean construction. Many management theories based in manufacturing have found the translation to construction a difficult one. Further research needs to be done to examine cultural attitudes among construction workers in Australia and elsewhere with the goal of predicting potential obstacles to the adoption of lean principles throughout the construction sector. Although lean construction is a set of principles and therefore not intrinsically culturally dependent, cultural differences may affect the most efficient and ultimately successful method of implementation.

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