A Case Study of the Impact of Culture on the Construction Projects in Tamil Nadu State

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Abstract **—** In Tamil Nadu, infrastructure development has increased the growth of the state economy and has generated large amount of job opportunities. Hence those projects involve a large amount of investment to carry out. In view of that, if any sort of impact of culture would lead to waste of resources and delay of construction. In this connection, this study mainly discusses the critical cultural factors and its assessment techniques through comparative study of construction projects across Tamil Nadu by using questionnaire survey which would reveal the strong correlation between the culture followed in project and the outcome of the project. About 30 relevant articles published over the last 20 years have been reviewed. The review resulted that a simple assessment technique will be developed for each project task to assess the impact of culture in construction project easily and quickly, which will encourage the practitioners to do the cultural analysis in their project. This study concluded that the earlier cultural identification in the project assessment of the construction will lead to the better estimation of the escalation on time overrun. Such cultural assessments help to successful completion of the project.

Keywords Tamil Nadu Construction Projects, Culture, Performance

1.   Introduction

1.1 Culture in Construction Project

In undertaking any research, it is necessary to initially establish the need for such study. By doing so, a point of reference is provided against which the outcomes of the study can be assessed. This is the intention of this study in which the context is set, and the aim and objectives are defined.

The aim of this paper is to determine the extent to which the Tamil Nadu construction project performance influences organizational culture and to develop a model to assess construction project / organizations in terms of performance, and to their possible outcomes of cultural orientation.
To achieve the above, the study would seek to:

1.   Review the literature based on performance of understanding the factors influencing the role of culture in Tamil Nadu.
2.   Trace the evolution of 'culture' based on project culture in Tamil Nadu.
3.   Develop a relationship model between performance and organizational culture.
4.   Develop an instrument for diagnosing and measuring organizational cultures in Tamil Nadu.
5.   To assess the performance of organizational culture in Tamil Nadu.

Figure 1. Four Dimension of Culture (Hofstede, 1993)

Figure 1, depicts the four dimension of culture as described by Hofstede, (1993). These are said to be of great importance when considering the effect of cultural differences on management and organizations. According to Fuber, Smith and Crapper (2012) this model is highly influential and has been widely used to predict how a group of people from a certain cultural background will react in a given scenario.

Hofstede's dimensions of culture are described by Amponsah (2012) as:

- *Individualism vs Collective* - the Individualism dimension is dealing more on the individual person and how self-centred and selfish they are, because they are not tied to anyone in society. The collectivism dimension is the opposite of individualism. In this society the individuals are strongly tied to people in their society. Nonetheless, "it appears that an individualistic country is wealthier than a collectivist country".

- *Power Distance* - this dimension is more focused on the degree of inequality found in a country. In an organization context it refers to the degree of centralized authority.

- *Uncertainty Avoidance* - in this dimension, as the name speaks for itself, the degree of uncertainty and anxiety about the future is measured in a society. The weaker this measure is it means the more secure the people of that society are and vice versa.

- *Masculinity Vs Femininity* - this dimension deals more with the role that men and women play in society, the divisions caused by these sex roles and how important it is that these roles are clearly defined. The more defined these roles are in a society, the more "masculine" that society is, whereas the society with less defined roles is "feminine".

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2. History of Impact of Culture in Construction Projects

2.1 The 1990's – Origin of Cultural Analysis in Construction Industry

During 1990s Culture in construction became a hot research topic. Many researchers developed a series of thumb rule to analyze and assess culture in construction. (Al-Bahar, 1988)

The culture in construction project can be managed by a systematic approach during planning stage in order to minimize their effects. This approach involves identifying sources of culture and its impact on construction project and selecting ways to control them. (Birinie and Yates, 1991). Accordingly, the impact of culture in construction were categorized based on controllable and uncontrollable factors which lead cost and time overrun in a project (Akinel,1998).Based on this result, different cultural assessment models have been formulated to analyze and assess impact of culture in project during construction (Mustafa and Bahar 1991).

2.2 The New Systematic Approaches

Till 2000, only few attempts have made on the identification and assessment of impact of culture in construction projects. As a result there was a lack of systematic approaches to identify and manage the culture in construction projects. Chapman, (2001) grouped culture into three subdivisions: industry, client and projects. Shen,(2001) categorized them into four groups with the nature of the culture in construction projects i.e legal, management, policy and political. Chen et al.,(2004) proposed 10 cultural factors affecting construction project and they were grouped under two factors such as, management factors and parent factors. Dikmen et al., (2007) used cultural influence diagrams to define the factors which have influence on construction projects. In the post 2000's many researchers made an attempt to propose the impact of culture in construction project using assessment tools such as Analytical hierarchy process (AHP).

2.3 The Post 2011's – Development of More Sophisticated Techniques

There is a sharp increase in the number of cultural assessment papers published after 2011. By many researchers, various intergrated approach is developed for analyzing the cultural assessment in comprehensive decision making frame work. Rezakhani (2012) classified the cultural factors under three heads: External, Legal and internal. External cultural was sub divided into two subsets: unpredictable/ uncontrollable, predictable/ uncontrollable and Internal cultural factor was sub divided into two subsets: Non- technical / controllable and Technical / controllable. Further he suggested a hierarchy based cultural analysis and identified the key cultural factors Goh et al (2013) identified various cultural factors in the life cycle of the project under five heads such as Planning, Design, Procurement, construction, and Handling. They discussed the cultural impact with an integrated approach which includes brain storming, checklist, probability impact matrices, and subjective judgment. Finally they suggested that the cultural assessment workshop will be useful for cultural identification and analysis, as a means of managing culture. Many researchers have tried various approaches for representing the interdependencies between project culture and its complexity of the surrounding environment (Lazzerini and mkrtchyan, 2011). (Hwang et al., 2013) reported that impact of culture in construction project is relatively high in large construction projects and this is due to time and budget and high profit margin. The results indicated a positive connection between cultural

assessment/ analysis implementation and improvement in project quality, cost and schedule performance of large projects.

3. Analysis and Discussion on Identification and Assessment of Cultural Factors

3.1 Different Types of Culture in Construction Projects

Culture in construction has been classified in different ways. Tah *et al.* (1993) categorized project culture into external and internal risks and developed a fuzzy model for analyzing cultural impact. External cultures are those that are prevalent in the external environment of projects. Internal culture covers labour and subcontractor. Consequently many researchers identified several cultural factors and they are classified into different types depends on nature of the project. (Mustafa, 1991; Akincl et al., 1998; Prasanta kumar dey, 2002; Ghosh et al., 2004; Wiguna and scott, 2005; Enshasi and mosa, 2008; wang et al., 2010; Razakhani, 2012; Goh et al., 2013).

3.2 Methods for Analyzing Culture in Tamil Nadu

Principally two research methods are adopted across Tamil Nadu namely In-Depth interview method and Computation method. The In-Depth interview method has Limitation in its application. The Computation method is termed to be reliable and allows data collection to large spectrum of organization. In most instances Computation method is achieved by collecting data through the use of questionnaire.

The current study adopted the Computation method and hence questionnaire survey was used to collect data. The Computation Method is preferred than In-Depth interview method since it was important that respondent answered to the same questions that were prepared before. Firstly a Preliminary Survey was conducted across Tamil Nadu to assist with developing the main questionnaire survey. The concept was to ensure questionnaire questions were absolute to yield desired outcome.

Respondents to the preliminary study gave suggestions that to be included in the main survey and the analysis indicated certain changes to the questionnaire were necessary to be more reliable. The main questionnaire was conducted in the second stage of data collection. Respondents were requested to answer on a five-point Likert scale. Respondents were requested to rate to which they agree or disagree based on their project performance. Each of the scaling given a percentage to show the weightage of each answer.

Table 1: Likert Scale used for drafting the Questionnaire

Scale	Description	Percentage Allogation(%)
5	Strongly Agree	80-100
4	Agree	50-80
3	Neutral	50
2	Disagree	20-50
1	Strongly Disagree	0-20

4. Case Study: Tamil Nadu Construction Projects

4.1 Data Collection

The impact of cultural factors identified by many researches done in 4 different projects in Tamil Nadu (2 in Chennai, 1 in Nilgiris and 1 in Nagercoil) by drafting Questionnaire using the Appendix (Section A and Section B) as shown below. From the demographic information it is understood that, factors like Respondents age, Respondents gender, Respondents qualification, Respondent experience, Respondents organization category, Respondent role in the project (Foreman, Construction Manager, Engineer, Project Engineer, Project Manager, Engineering Manager etc) are the critical cultural factors in any construction projects.

Table 2: Companies visited for Collecting Questionnaire

Sl. No	Name of the Company	Address	Place
1.	Priyadarshini Construction	No 3G/1, Kanagar Street, Tiruvottiyur, Chennai - 600019, Opposite Agathiyar Madam & Ambal Tower	Chennai
2.	Raja Rajan Construction	No 15, 2nd Main Road , NGO Colony, Adambakkam, Chennai - 600088, Near NGO Colony Bus Depot, NGO Colony	Chennai
3.	Dream House Construction	No 90/1, Bank Colony, Coonoor Road, Nondimedu, Ooty - 643001	Nilgiris (Ooty)
4.	Abinaya Construction	No 51, Court Road, Nagercoil - 629001, Opposite SLB School	Nagercoil

From the Appendix (Section A and Section B) it is concluded that, there is an urge for a cultural flowchart map which depicts the sources of critical cultural factors and its impact on the construction project. Accordingly a cultural flowchart map has been developed and it is discussed below.

4.2 Cultural Flowchart Map

From the review of literature, the major Cultural analysis and their impact are identified. The cultural flowchart map representing the cultural sources affecting the project success is shown in figure 2. This flow chart consists of various cultural factors, which are forecasted or inevitable. The evitable factors should be forecasted during the earlier stage of the project whereas the inevitable factors involve uncertainties; this should also be estimated for the successful completion of the project because these cultural factors will affect the cost, time, quality of the project.
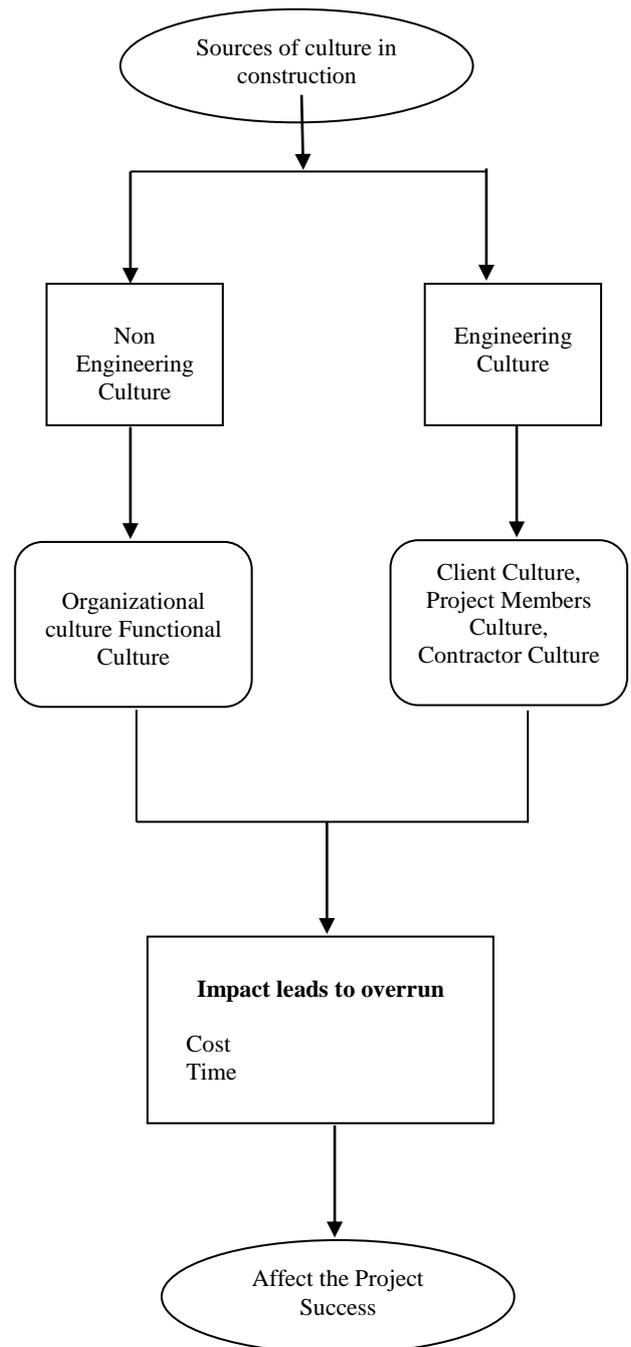

Figure No.2 Cultural Flow Chart Map representing the cultural sources affecting the project success

4.3 Demographic Information

Information on the profile of respondents in terms of age, gender, race, ethnicity, educational background and organizational category is presented in this section.

The respondent's age distribution is shown in Figure 3. The findings show that almost 2% of the respondents were between the age of 18 and 24 years. This group also had the lowest responses. The low responses from the mentioned group could be that questionnaires were sent mainly to project and engineering managers. Most 18 to 24 year olds would normally not be in that category of professionals who were requested to participate in the study. The majority of respondents constituting 45.4% of all respondents were between the age of 25 and 34 years. This finding was not surprising as most of the respondents were

recruited from networks and contacts that had been formed by the researcher, whose age also falls within this group. In addition, it could be because the respondents found the topic to be interesting and therefore were keen to respond to the questionnaire.
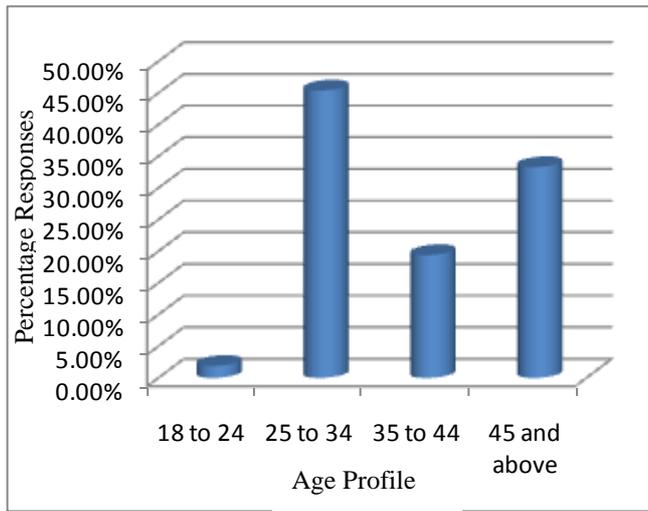

Figure 3: Respondent's Age Profile

In terms of the gender profile, findings show that there were more males and than females (Figure 4) who took part in the study, accounting for about 88% of the respondents. Women contributed about 12% of the respondents. This finding was not surprising because the construction industry is said to be dominated by males. The other reason for this low participation from the females could be that not enough women received the questionnaires, which is in a way as a result of few women being involved in construction projects, and hence and lack of interaction.
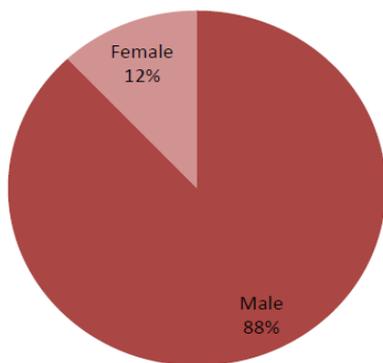

Figure 4: Respondent's Gender

The Respondents were also required to indicate their highest level of education, and these qualification distributions are shown in Figure 5 below. The figure shows that about 1.9% of the respondents had a Matric certificate, with the majority, over 90% of junior and senior management in the construction industry having a qualification higher than Matric. Most of the respondents had a post-graduate qualification accounting for 50.5%, while 37.4% of the respondents had an undergraduate qualification. The current study benefited from the unique feature of having respondents with such varying backgrounds and hence assuring and reliability of the study.
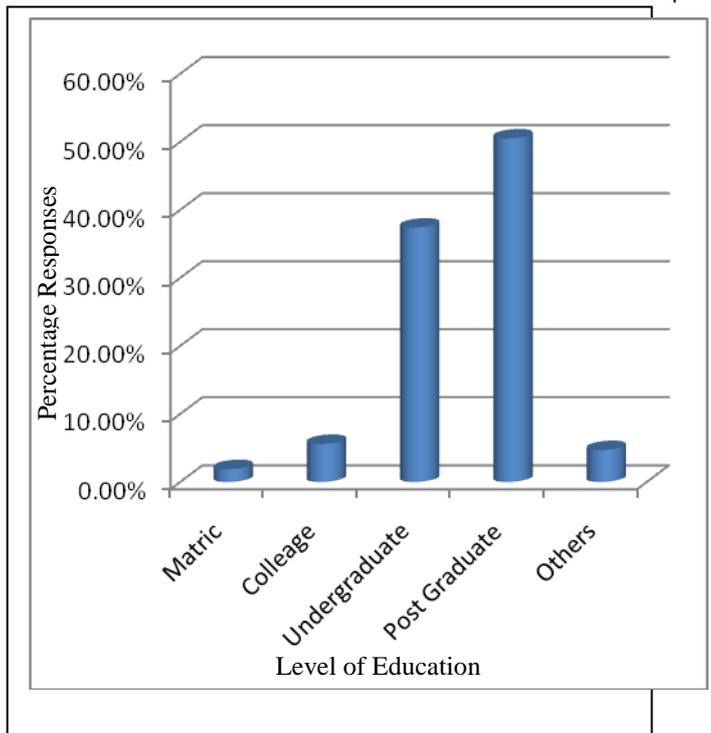
Figure 5: Respondent's Highest Qualification

In Figure 6 below, the respondents' experience in the construction industry is depicted. Respondents having between 6 and 10 years of experience accounted for 23.1% followed by those having between 11 to 20 years of experience. This category accounted for 25.9%. Finally, respondents having more than 20 years of experience accounted for 28.7%.
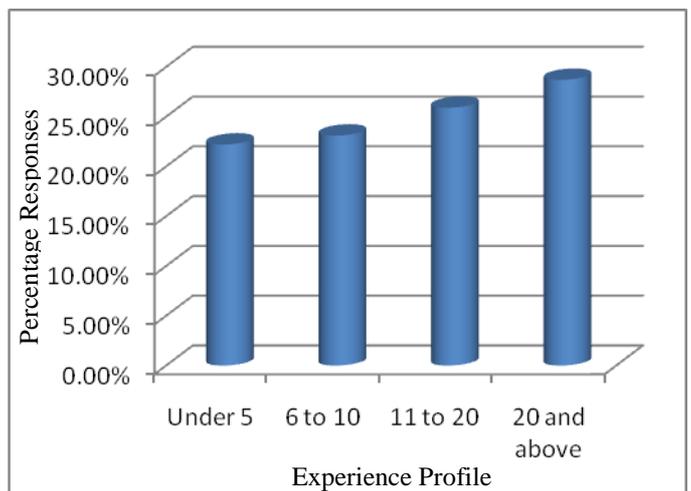
Figure 6: Respondent's Experience profile in Construction

In this study, it was important to establish which sectors of the built environment the respondents represented. As shown in Figure 7, 51% of the respondents worked for consulting firms. The client organisations contributed about 30% and the contracting organisations contributed 18%, with the remainder 1% indicating 'other'.

The majority of the respondents were engineers accounting for 33.3% (Figure 8), 19.4% were project managers. 13.9% were engineering managers and 13% were project engineers. Only 6.5%

were categorized as construction managers.

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Figure 7: Respondent's company (organisation) category

5. Summary

This paper reviewed the study on culture in construction project both in a general and in a construction context. Generally, the culture within one construction project influences the behavior of the participants and also the performance of the project/organization. Although there is no clear definition of Project culture, it is generally accepted that an appropriate project culture (e.g. positive, strong, Co-operative, and collaborative) should be developed and maintained within each p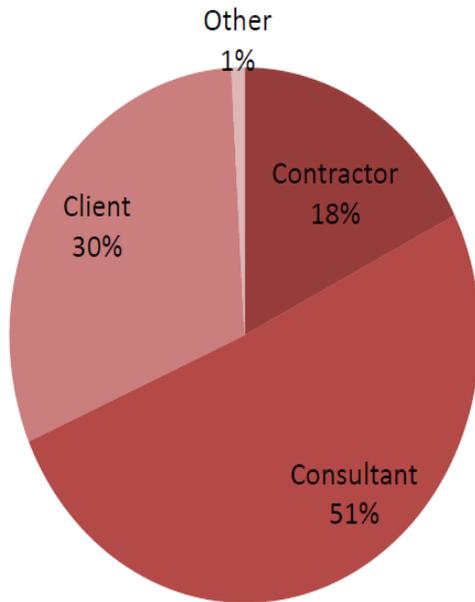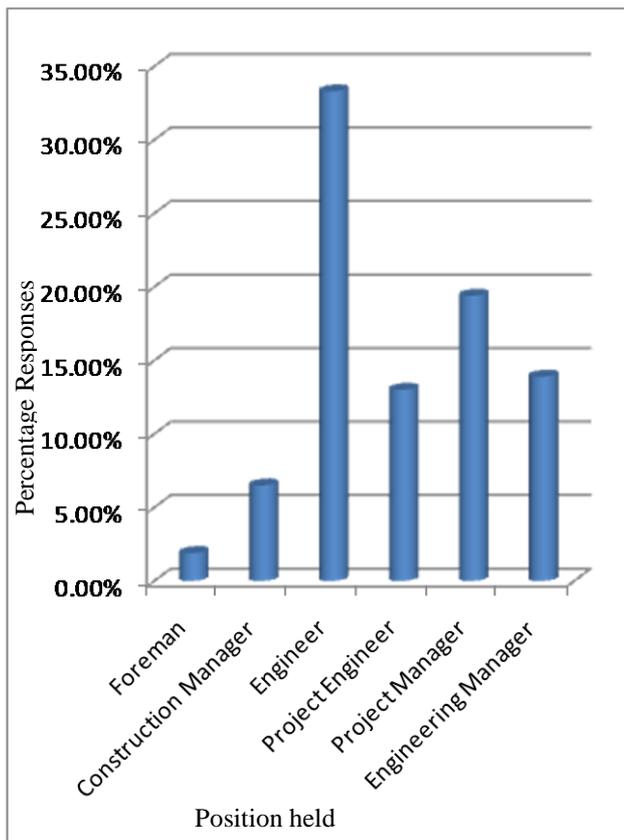roject environment for in order to promote improvement and performance of a project/organization. At the same time, 'Lean Thinking' is recognized as a catalyst to promote cultural change and to create a positive project culture by facilitating participants to focus on satisfying client's requirements at the project level. By suggesting a modification of a well-established and well-recognized organizational culture model, this paper proposes a clear definition and a conceptual framework for project culture in the construction context.

6.   6. Conclusion

The questionnaire survey from the four construction companies in Tamil Nadu is collected which reveals that statistically that there is 'strong correlation between the project culture and the project outcomes from the Construction industry practitioners' perspective. It is clear the practitioners focus on the process of the project as well as on the outcomes. However, the findings will show that the affordability of developing an appropriate project culture is a major concern of industry practitioners. The incorporation of objective measures (e.g. key performance indicators) will help to validate the performance evaluation. A wider survey from more areas will be helpful to further validate the findings. In addition, it would be beneficial to have more in-depth interviews of parties other than contractors to further establish the nature of culture at the project level and its impacts on the project outcomes.

Figure 8: Respondent's Position in the Project

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Appendix (Questionnaire)

Section A –DEMOGRAPHY

A QUESTIONNAIRE OF IMPACT OF CULTURE ON THE PERFORMANCE OF CONSTRUCTION PROJECTS IN TAMIL NADU STATE

The questionnaire is in four parts Section A, B, C, D. Section A is related to personal information about respondent. Section B is with respect to provide some information about recently completed construction project. Section C is collection of details about the performance of recently completed project, and the last Section D is related to my opinion on the attitudes, behaviors and conditions that existed on this project.

Section A General Information of respondent

Name ....

Position ....

Experience..

Age ....

Gender ....

Level of Education/ Qualification..
....

Name of Company...

Address of company...
....
....
....

Telephone...

Mobile...

Email:..

Section B – Survey

(Please tick appropriate box)

The following rating options have been provided on the scale of 1 to 5.

Strongly Disagree (0to 30%)	1
Disagree (30to50%)	2
Neutral (50%)	3
Agree (50to80%)	4
Strongly agree (80to 100%)	5

1.   Consideration of team members background on projects

Dimension	Statement: According to my experience on Construction project, I state that	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
		5	4	3	2	1
Gender	Gender is a factor in the allocation of tasks to project team members					
	My opinion is considered on the project regardless of my gender					
Age	Age is a factor in the allocation of task on the project					
	My opinion is considered on the project regardless of my age					
Race/Ethnicity	My opinion is considered on the project regardless of my race					
	My opinion is considered on the project regardless of my ethnicity					
Educational Background	My opinion is considered on the project regardless of my qualification					

2. Team Dynamics

Dimension	Statement: According to my experience on Construction project, I state that	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
		5	4	3	2	1
Communication	I could easily communicate with all team members on the project					
	All project team members easily communicate with other team members on the project regardless of race, gender, age or ethnicity					
	Despite the difference in age among team members, communication is not hindered between them.					
Trust	Due to our cultural differences, Trust has been affected within the project team.					
	Due our differences in organizational cultural background, Trust has been affected within the project team.					
Knowledge Sharing	I could share information with all project members without hindrance from gender differences					
	I could share information with all project members without hindrance from age differences					
	I could share information with all project members without hindrance from differences ethnicity					

2.   Team Dynamics (Continues)

Dimension	Statement: According to my experience on Construction project, I state that	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
		5	4	3	2	1
Knowledge Sharing	share knowledge with other project members regardless of my gender.					
	I could share my knowledge with other project members regardless of my qualification.					
Integration	I could form a good project team despite difference in background					
	Our cultural background difference have affected integration as a team					

3.   Cultural Backgrounds Influence on project

Dimension	Statement: According to my experience on Construction project, I think	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
		5	4	3	2	1
Gender	Colleagues with a different gender from me view project quality differently					
	Colleagues with a different gender from me view and treat cost implications differently					
	Colleagues with a different gender from me view time differently					
	Colleagues with a different gender from me view safety differently					
Age	Project members with different age group than me view quality differently					
	Project members with a different gender from me view and treat cost implications differently					
	Project members with a different gender from me view time differently					

3.Cultural Backgrounds Influence on project (Continues)

Dimension	Statement: According to my experience on Construction project, I state that	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
		5	4	3	2	1
Age	Project members with a different gender from me view safety differently					
Race/ Ethnicity	Project members from other ethnic background than me view quality differently					
	Project members from other ethnic background than me view cost implications differently					
	Project members from other ethnic background than me view cost time differently					
	Project members from other ethnic background than me view safety differently					
Educational background	Project members who have a different educational background and qualification from me view project performance differently.					

4. Cultural Backgrounds Influence on Decision making in projects

Dimension	Statement: According to my experience on Construction project, I state that	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
		5	4	3	2	1
Gender	Gender differences between project team members affects how decision are made on projects					
Age	Age differences between project team members affects how decision are made on projects					
Race/Ethnicity	Ethnic Background of project team members affects how decision are made on projects					

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4. Cultural Backgrounds Influence on Decision making in projects (Continued)

Dimension	Statement: According to my experience on Construction project, I state that	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
		5	4	3	2	1
Race/Ethnicity	Differences between project team members affects how decision are made on projects					
Educational Background	Different educational backgrounds between project team members affects how decision are made on projects					
Organizational Culture	Organizational Culture Differences between project team members affects how decision are made on projects					

5. Project Performance

Dimension	Statement: According to my experience on Construction project, I state that	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
		5	4	3	2	1
Schedule	Respondent and his project team members always achieve schedule commitments regardless of the stipulated time					
	Respondent and his project team members complete their project within the stipulated time					
	Respondent and his project team members complete their projects within time regardless of cost overrun and defect implications					
Cost	Respondents and his project team members complete their project within the stipulated budget					
	Respondents and his project team members complete their project within the stipulated budget regardless of quality and schedule slippage					

5. Project Performance (Continues)

Dimension	Statement: According to my experience on Construction project, I state that	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
		5	4	3	2	1
Quality	Respondent and his team members complete their project within the specified quality					
	Respondent and his team members complete their project within the specified quality regardless of time and cost implications					
Safety	Respondent and his team members complete their project safely without any incidents or accidents					
Productivity	Respondent and his team members achieve their level of productivity by the end of each day					
Project Team Satisfaction	Respondent and his team members always achieve an integrated team at the end of the project					
	Respondent and his team members are happy at the end of the project					
	Knowledge transfer is always achieved between project team members on a project					