

Analysis of Relationship between Teamwork Attitude and the Job Satisfaction of Project Participants

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Abstract

Conflict may occur during teamwork activities. Conflict is the incompatibility of interest of participants; hence, it is more common in a wide varied activities involved construction field. Goals and values involve positive or negative features and are therefore common sources of conflict in construction field. Excessive conflict is a major hindrance to the effective operation of a team. If the conflict is not managed timely and properly, it could be transformed into a big dispute, thus to avoid these situation, it is necessary to augment working together culture. This paper aims to identify project team working factors and to uncover underlying relationships between these factors. A questionnaire survey was used to collect data from professionals. Factor analysis was employed to categorize twenty-one teamwork items evaluated by 169 respondents working in three major construction parties namely, owners, consultants and contractors. Factor analysis uncover that these team work factors can be grouped under three categories titled as: integrative working culture, relationship building and trust building. Multiple regression analysis however, showed that relationship building factor does not influence job satisfaction of project participants. Results of this study can be used as a tool to strengthening relationship between project participants in the construction industry.

Key Words : Teamwork, Culture, Construction field, Project participants, Job satisfaction

1. Introduction

The construction industry is considered to be one of the most important industries in the economy. It interacts with nearly all fields of human endeavors. Unfortunately, the intrinsic complexity, uncertainty and dynamics of most construction projects create difficulties for even the best project managers (Nguyen, Ogunlana and Lan 2004).

A construction project is commonly acknowledged as successful when it is completed on time, within budget, conformity to quality and the satisfaction of stakeholders. In these days functionality, profitability to contractors, absence of claims and court proceedings, as well as fitness purpose for occupiers have also been used as

measures of project successes.

Success in a project means that certain expectations for a given participant are met, whether owner, planner, engineer, contractor or operator. De Wit (1988, cited in Nguyen et al. 2003) remarked that one of a main factor to a project to be considered as an overall success is a high level of satisfaction concerning the project's outcome among key people (participants) in the parent organization. Project people play a decisive role regarding the success or failure of a project. It is not surprising since they are responsible for creating, managing, operating and utilizing the project and are invariably affected it (Nguyen et al. 2004).

Cooperation between construction organizations has always been the basis of construction project success. However, the perception that the construction industry is a contentious sector that is "beset by disputes", which consequently leads to limited cooperation is supported by a wealth of academic literature and anecdotal evidence within the industry itself (Phua and Rowlinson 2004).

Collaborations, partnerships and networks have evolved as interorganizational innovations to address multifaceted social,

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financial and environmental problems. The term interorganizational innovation is to denote the variety of interorganizational arrangements that can develop among public, private and non-profit groups to work together on mutual problems (Mandell and Steelman 2003).

The involvement of many parties is a dominant characteristic of construction projects. If one of the parties is not capable to act within his/her role, the project is likely to fail. In this study, it is postulated that relationship (teamwork) at personal level will have a great impact on the job satisfaction and success of the project, eventually which would lead toward prevention of construction conflict. Here construction conflict shall be understood as the incompatibility of interest of participants. If the conflict is not managed in time and properly, it could be transformed into a critical state and will result into a dispute. Dispute is associated with distinct justiciable issues hence, might need undesirable extra cost, time and efforts of participants.

Therefore, purpose of this study is to identify project team working factor and to uncover underlying relationships between these factors. The focus of this study will be on the behavior of professionals working in the three main project participants group namely, owner, consultant and contractor. The study has been delimited within Korean construction industry and the results shall be termed as the outcome of Korean context.

2. Interpersonal Relational Factors

Sections 2 and 3 are related to literature about participants' relationship and teamwork building. The literature are based on what are the key ideas of topic rather than gaps of knowledge, hence these reviews have tried to explore some basic knowledge pertinent to this research work. Regarding participants' relationship and performance of project, Phua and Rowlinson (2004) reported that there is a consensus among researchers that cooperation and aspects of cooperation such as open communications between the project participants have a direct positive influence upon project performance. Project success depends mainly on the right combination of the skills and will of the people involved, which itself is an output of their effective integration (Ayas 1996).

Lack of interpersonal, communication, and negotiation skills reduces team members' effectiveness and their ability to perform joint problem solving. Therefore, the essence of 'professional'

project management lies in the ability continually to enhance the underlying knowledge base-the learning capacity. This implies that all individuals involved in a project are engaged in a constant process of learning that they transmit their learning to others and the cumulative knowledge acquired is then embodied in the project organization.

Owner-contractor relationship deteriorates due to individual styles of key personnel. Some of the cases of this are: an inexperienced supervising engineer, a less professional contractor, mean-spirited assistant of project manager, change of project staff etc. (Drexler and Larson 2000). Here, one must be aware that learning within a project does not happen naturally, it is a complex process that needs to be managed. It requires commitment, cooperation, social bonds, trustworthiness and continuous investment of resources. In the context of project management, the final project outcome is influenced by the initial intentions and expectations of the parties involved. If all the parties enter the relationship with the intention of not trusting, the project will enter a downward spiral of dynamics, the final outcome of which will be unsuccessful project (Munns 1995).

3. Team Building Practices in the Construction Project

A team is a group of people, who are interdependent. If the members are not interdependent, then they only termed as a group. According to a scholar, "Teamwork is a make or break situation. Either you help make it or the lack of it will break you." Groups at work are complex, dynamic systems that change over time. These systems are defined by a set of relations among the members who compose them, the work they perform, and the tools and procedures by which they accomplish their work. The most basic feature of a group, what makes it recognizable as a particular group at work is its membership.

Changes are experiencing in recent years in construction industry, and these changes have spirally increased the complexity of construction processes, highly fragmented, very adversarial and resulting claims and litigation on a dramatic rise throughout the construction industry (Slater 1998). The researchers working in construction industry are trying to find out best way to overcome those problems. Chan, Ho and Tam (2001) have found inter-organizational teamwork has a positive correlation with overall project performance and project participants' job satisfaction in Hong Kong construction industry.

Team building is difficult and often lead to poor performance and highly unstable (Stanek 2004). Failure of team building could be the result of several factors. They are: many team alliances are stillborn, perception gap between expectations and results, lack of continuous open and honest communication, lack of intimacy, issues allowed to slide and escalate, unwillingness to compromise, lack of empowerment in the client's controlling bodies, dealing with client's large bureaucratic organizations, controlling body's lack of technical knowledge, and project team's relative autonomy and the parent organization's desire for control.

High team conflict almost destroys the teamwork and relationships among the team members. Through a study in Hong Kong, Leung, Liu and Ng (2005) revealed that conflict level in the decision process has the direct relationship. Higher task conflict induces an emphasis by participants on relationship maintenance.

3.1 Team Building Measures

Formal teambuilding in the early stages in construction projects followed by informal activities such as awaydays or social events happens to be main ways of sustaining integration or preventing stagnation (Bresnen and Marshall 2000). Interpersonal relationships based on respect, trust and openness stimulate the development of teamwork, win/win spirit and shared goals (Uher and Toakley 1999). These are the essential components that encourage the development of group synergy, which in turn generates new ideas, explores new concepts and shift paradigms.

Some of the recommendations of the study of Bresnen et al. (2000) are dramatic cultural changes in participants, cooperation and collaboration through different team working approaches such as partnering and alliancing. Contracting parties often work at arms length in disjointed relationships, usually motivated by divergent objectives and hidden agendas. In this regard, Lownds (1998) has voiced to bring construction supply chain stakeholders together under a one-team concept to optimize benefits (cited in Rahman and Kumaraswamy 2004).

Bresnen (2000) has suggested some measures to organizing and managing the teamwork in construction field. They are: tiered team structure, decentralization to promote self-governing and self policing team, joint project office, fully integrated team, strong personal contact, and use of sophisticated information technology.

Staneart (2005) has proposed seven tips for the improvement in interpersonal relationship to avoiding and ultimately managing and

resolving conflicts. They are: i) be proactive instead of reactive, ii) be slow to anger-especially over petty issues, iii) instead of telling people they are wrong, point out mistakes indirectly, iv) look for some type of common ground as soon as possible, v) if you find that you are in the wrong, admit it, vi) admit one of your own poor decisions before pointing out a similar error by others, vii) mend fences whenever possible:

4. Research Methods

4.1 Questionnaire Design

A questionnaire was designed based upon literature to obtain inherent team working factors and satisfaction level of project participants in construction field. The questions or variables were derived from the literature related to relational improvement in construction and business (marketing) fields such as Chan et al. (2001), Hausman (2001), Mavondo and Rodrigo (2001), Rokkan and Haugland (2002), Stanek (2004), Thevendren and Mawdeseley (2004), Muhmin (2005). Questionnaire field survey was performed to obtain the responses from the engineering professionals. The respondents included were the professionals working in the owner, consultants and contractors' organizations.

The questionnaire has contained three parts. Part A is related to demographic information of the respondents, which is about affiliation to organization category, experience, and nature of the project with construction amount. Part B is consisted of 21 item-interpersonal relationship (teamwork) instruments in 5-point Likert scale. No any formula was used to determine the numbers of variables. 21 constructs were selected from the literature employing subjective judgment of the authors, in addition the respondents were also requested to add the variables as per their experience and rate those accordingly. However, no any additional measures were obtained from the respondents.

The scale was calibrated into 1 to 5; where 1 represented as 'completely disagree' and 5 represented as 'completely agree'. The respondents were asked to rate their practice to maintain good relationship with other project participants. Part C consisted of four instruments about personal satisfaction from their project outcome. To elicit the extent of personal satisfaction, the respondents were asked to rate against the 5-point scale as in Part B.

4.2 Data Collection

Several means were employed to deliver the questionnaires and to receive the responses. Electronic mail method was preferred to get the responses from subjects as it is quick and less expensive in compare to other methods. Email addresses were collected from various sources e.g. personal contact, professional and institutional organizations etc. The questionnaire was also delivered directly (face-to-face) to the respondents. The responses were received by all means of delivery system e.g. return email, fax, post mails, and by hands (himself and through others).

4.3 Treatment of the Data

The responses of questionnaire were analyzed through descriptive as well as comparative and associational measures. Scale rate mean as descriptive measure was employed to obtain the importance ranking of part B and part C variables. If two or more attributes happened to have the same mean rating score, the one with the lowest standard deviation had been assigned the highest importance ranking among those attributes. Factor analysis was performed to reduce the data by clustering the number of correlated factors. The varimax orthogonal rotation of principle component analysis was used to interpret the components.

Student's t-test for two groups, one way ANOVA for more than two groups and Pearson correlation at 5% significant level were performed to compare the association of factors with different population and project characteristics. Multiple regression analysis was employed to get a relationship between the job satisfaction factor and the teamwork factors.

Effect size statistic has been used to determine the magnitude of insignificant result, because a small p-value (eg smaller than 0.05) is

(i) Practical significance (d) = $(\text{Mean}_A - \text{Mean}_B) / \text{Std Dev}_{\text{max}} (A \text{ or } B \text{ group}) \dots\dots$ (for means of two groups)

(ii) Practical significance (d) = $(\text{Mean}_A - \text{Mean}_B) / \text{Root MSE} \dots\dots$ (for means of more than two groups)

(iii) Practical significance (f^2) = $R^2 / (1 - R^2) \dots\dots$ (for Multiple regressions)

Figure 1. Practical significance formula

considered as sufficient evidence that the result is statistically significant. However, statistical significance does not necessarily imply that the result is important in practice because these tests have a tendency to yield small p-values (indicating significance) as the size of the data sets increases. Regarding ANOVA and student's t-tests, effect size illustrates whether the comparison results of ANOVA and t- tests are of practical significance or not. The amount of difference in ANOVA and t- test is expressed in standard-deviation units.

The formula used to determine the practical significance of differences (effect size, d) when t test (mean of two groups) used and ANOVA (means of more than two groups) are illustrated in fig. 1. Cohen (1988, cited in Coetzee 2005) has recommended cutoff points for the practical significance of differences between means as small effect = 0.20, medium effect = 0.50, and large effect = 0.80. A cutoff point d = 0.50 was set for the practical significance of differences between means. In case of correlation between variables, the effect size is determined by using the absolute value of r and relating it to the cutoff points for practical significance. Cohen (1988) has recommended as small effect (r = 0.10), medium effect (r = 0.30) and large effect (r = 0.50). A cutoff point of r = 0.30 was set regarding the practical significance of correlation in this study. Similarly a cutoff point for practical significance (f^2) regarding multiple regression was set at 0.35 value. SPSS statistical computer program was employed to analyze the data.

Table 1. Characteristics of respondents

| Number of Response | Experience | Project types | Mgmt. position | Project nature | Project delivery | Project Amount(\$) | Team members | Project delay |
|-----------------------|-----------------|---------------------|----------------|-----------------|--------------------|---------------------|------------------|---------------|
| Owner = 55 (32%) | <15 years = 51% | Building = 20% | Top = 53% | New = 72% | Traditional = 73% | <1 million = 42% | <10 nos. = 36% | Yes = 50% |
| Consultant = 74 (44%) | >15 years = 49% | Road/Railway = 50% | Middle = 30% | Extension = 8% | Design/build = 13% | > 1 million\$ = 58% | 11-50 nos. = 49% | No = 50% |
| Contractor = 40 (24%) | | Water related = 18% | Lower = 17% | Renovation = 6% | BOT/BOOT = 5% | | >51 nos. = 15% | |
| Total = 169 | | Others = 12% | | Others = 14% | Others = 9% | | | |

4.4 Parametric and Non-parametric Test

Variables clustered under one factor were collapsed and a new response rating was calculated for each respondent. This process will now yield only four independent variables. Two types of statistics, namely parametric and nonparametric are available when deciding on the most appropriate statistical method. Parametric statistics are those which assume a certain distribution of the data (usually the normal distribution), assume an interval level of measurement, and assume homogeneity of variances when two or more samples are being compared. Most common significance tests (z tests, t-tests, and F tests) are parametric. A parametric test is appropriate when the population score is normally distributed, the variances of the groups are equal and the dependent variable is an interval scale. In order to determine whether a factor is normally distributed, the skewness and kurtosis should not be more than 2.5 times the standard error of skewness and kurtosis (Coetzee, 2005).

4.5 Characteristics of Respondents

The respondents were grouped into owners, consultants and contractors. A total 484 numbers of questionnaire were distributed through various means of delivery as described previous section. However, only 169 (34.9%) responses were received usable to

analyze for the study. Various forms of characteristics of the respondents are shown in table 1.

The respondents have 15 years of average field experience and most of them are working in more than 10 million dollars projects. Information depicted in the table verified that the research has well covered important aspects of the construction projects.

5. Analysis and Findings

In the structured part of the questionnaire, the respondents were asked to rate the degree of agreement of 21 hypothesized factors related to team work in construction field and 4 instruments related to professionals' satisfaction in working with other participants drawn from the literature review. This section reports the mean scale values of the both categorical instruments. The Cronbach alpha was performed to test the reliability of data collected. Cronbach alpha of twenty-one item scale for team work had a high value of 0.92 (near to 1) and four-item scale of satisfaction factors was 0.82 (>0.50), these high values of alpha indicated that

the surveyed data were highly reliable and had a high internal consistency for further statistical analysis (Leung et al. 2005). The data are further analyzed to identify underlying factors and testing the significance within various groups of population and project

Table 2. Ranking, mean score and standard deviation of teamwork items

| Item No. | Hypothesized team work items | Overall Mean | Std. Dev. |
|----------|--|--------------|-----------|
| 1.8 | Bringing other partners into own confidence | 4.06 | 0.75 |
| 1.10 | Being fair and reasonable in work proceedings | 4.00 | 0.75 |
| 1.9 | Showing mutual respect and tolerance to each other | 3.96 | 0.84 |
| 1.21 | Adopting a 'Look to the future, learn from the past' | 3.94 | 0.80 |
| 1.7 | Showing reliability on other team on other team members | 3.89 | 0.78 |
| 1.15 | Use of principle of totality | 3.88 | 0.81 |
| 1.19 | Praising high problem solving ability of working partners (members) | 3.85 | 0.75 |
| 1.1 | Setting of clear and realistic milestones (benchmark) for team response | 3.84 | 0.81 |
| 1.3 | Never promise what you cannot delivery (Keeping promise) | 3.84 | 0.85 |
| 1.5 | Ability of members to negotiate and reach compromise | 3.83 | 0.68 |
| 1.14 | Collective co-operation of all participants (interdependence) | 3.82 | 0.81 |
| 1.4 | Understanding of other team members' objectives | 3.80 | 0.69 |
| 1.13 | Encouraging positive conflict between participants to get best results | 3.76 | 0.82 |
| 1.18 | Strong off-site friendship | 3.53 | 0.86 |
| 1.12 | Solving the problem with everybody's agreement | 3.44 | 0.99 |
| 1.20 | Regular monitoring of relationship between participants | 3.41 | 0.78 |
| 1.6 | Avoid blaming partners as can as possible in meetings | 3.41 | 0.90 |
| 1.17 | Realistic profit margins for all team members (making mutual benefit) | 3.39 | 0.87 |
| 1.16 | Teaming of similar levels of experience and like mind set | 3.25 | 0.84 |
| 1.11 | Sacrificing profit or cost saving for long term reputation and cooperation | 3.25 | 0.86 |
| 1.2 | Delegating power (authority) to subordinates | 3.25 | 0.90 |

characteristics.

5.1 Mean Scale Value

5.1.1 Teamwork

Table 2 shows the rankings of 21 factors by all the respondents, and the breakdown of responses for different organizations (owner, consultant and contractor). Being 4 rating as 'Agree' on a 5-point likert scale in the questionnaire, the mean scale rating greater than 4 had been considered as 'critical teamwork success factor'. Two factors namely, bringing confident (Rank 1, mean = 4.06) and being fair and reasonable (Rank 2, mean = 4.00) were very highly ranked constructs by all the respondents. The mean scale ratings of all twenty-one variables ranged from 3.25 to 4.06, which indicates slightly agree to agree towards the acceptance of variables as a team working factor. Hence, these all variables are included for factor analysis.

To confirm whether or not there were general agreements among different respondent's groups towards ranking, correlation test are necessary and Pearson correlation test was performed accordingly (Nguyen et al. 2004). The Pearson's correlation coefficient between owners and consultants, owners and contractors, and consultants and contractors were found to be 0.802, 0.872 and 0.768 respectively. Moreover, the correlation was significant at the 1 percent level (two-tailed). These figures have indicated that there were strong agreements among the different groups on the ranking of factors.

5.1.2 Job Satisfaction Factor

Four items as shown in table 3 is deliberately labeled as job satisfaction factor. Table 3 illustrates the satisfaction level of professionals at interpersonal as well as overall project level. The table also shows that the professionals feel proud of being a member of project (mean value= 3.87), but are less satisfied from the outcome of the project (mean value = 3.63) in comparison to other constructs.

5.2 Factor Analysis

To capture the multivariate interrelationships existing among the team working strategies in terms of the degree of significance, factor analysis was employed. Factor analysis addresses the problem of analyzing the structure of the correlations among a large number of variables by defining a set of common underlying dimensions, known as factors or components.

The factor analysis technique was used to derive a cluster of relationships. Various tests for the appropriateness of factor analysis were done. High Cronbach alpha value 0.92 of the surveyed data indicated the highly appropriate for factor analysis. Communalities (h²) value, which is the amount of variance in each variable that can be explained by the retained factors (Field, 2005) are more than 0.4. The Kaiser-Meyer-Olkin (KMO = 0.907) measure of sampling adequacy was also highly appropriate (>0.70) and the Bartlett Test of Sphericity classified the data adequate for the analysis (BTS= 1685.472, p <0.05). These all diagnostic tests confirm that the data are suitable for factor analysis. The 21 items were intercorrelated with principal factor component method and rotated to form a simple structure by means of the varimax rotation. Table 4 shows a result of factor analysis with factor loadings after Varimax rotation in three principal factors based on Kaiser's criterion (eigenvalue more than 1) with communalities. Variables found to be factor loadings less than 0.40 and cross loading differences less than 0.10 were eliminated for clarity. Three factors in Table 4 explain 55.26% of the data variability. Interpretation of each of these factors will now be briefly discussed.

5.2.1 Interpretation of Factors

Factor 1 alone consists of eleven variables from total of 20 items accounted for factor analysis. A closer look at the list in table 4 shows that this factor focuses on close team work activities, hence labeled as integrative working culture building factor. It had an eigenvalue of 6.045 and accounted for 29.028 percent of total variance. The elements of this factor include showing reliability,

Table 3. Mean score and standard deviation of job satisfaction items

| Item no. | Job satisfaction factor | Mean score | Std. Dev. |
|----------|---|------------|-----------|
| 2.3 | I feel proud of being a participant in this project. | 3.87 | 0.8 |
| 2.2 | I enjoy working with project participants as an integrated group. | 3.84 | 0.7 |
| 2.1 | Generally, team stability in my project is positive and continuous. | 3.72 | 0.7 |
| 2.4 | I am satisfied from the results (outcome) of the project. | 3.63 | 0.8 |

Table 4. Factor loading matrix with varimax rotation

| Item no. | Team working factors | F1 | F2 | F3 | h ² |
|----------|---|--------|--------|--------|----------------|
| 1.7 | Showing reliability on other team on other team members | 0.801 | | | 0.651 |
| 1.8 | Showing reliability on other team on other team members | 0.797 | | | 0.664 |
| 1.9 | Showing mutual respect and tolerance to each other | 0.755 | | | 0.661 |
| 1.10 | Being fair and reasonable in work proceedings | 0.727 | | | 0.590 |
| 1.21 | Adopting a 'Look to the future, learn from the past'. | 0.674 | | | 0.523 |
| 1.15 | Use of principle of totality. | 0.667 | | | 0.576 |
| 1.14 | Collective co-operation of all participants (interdependence) | 0.664 | | | 0.564 |
| 1.19 | Praising high problem solving ability of working partners | 0.650 | | | 0.518 |
| 1.5 | Ability of members to negotiate and reach compromise. | 0.643 | | | 0.582 |
| 1.13 | Encouraging positive conflict between participants... | 0.632 | | | 0.620 |
| 1.1 | Setting of clear and realistic milestones (benchmark) for... | 0.626 | | | 0.471 |
| 1.16 | Teaming of similar levels of experience and like mind set. | | 0.751 | | 0.590 |
| 1.18 | Strong off-site friendship. | | 0.673 | | 0.562 |
| 1.17 | Realistic profit margins for all team members (making ...) | | 0.649 | | 0.463 |
| 1.20 | Regular monitoring of relationship between participants | | 0.472 | | 0.394 |
| 1.2 | Delegating power (authority) to subordinates. | | | 0.746 | 0.566 |
| 1.12 | Solving the problem with everybody's agreement | | | 0.606 | 0.574 |
| 1.6 | Avoid blaming partners as can as possible in meetings | | | 0.656 | 0.489 |
| 1.3 | Never promise what you cannot delivery (Keeping promise) | | | 0.514 | 0.406 |
| | Eigenvalue | 6.096 | 2.830 | 2.681 | |
| | % of Variance | 29.028 | 13.474 | 12.765 | |

Note: F1: Integrative working culture building, F2: Relationship building, F3: Trust building, h²: Communalities

bringing into own confidence, showing mutual respect, being fair and reasonable, adopting learning from the past, use of principle of totality, collective cooperation, praising other's abilities, ability to negotiate, encouraging positive conflict, and setting a clear and realistic milestones.

Factor 2 consists of four variables, which focuses on relationship building of participants at project level, hence labeled as relationship building factor. It had an eigenvalue of 2.830 and accounted for 13.474 percent of total variance. The elements of this factor include teaming of similar levels of experience, strong off-site relationship, realistic profit margin, and regular monitoring of relationship.

Factor 3 relates to faith on subordinates and promise keeping in construction sites, hence labeled as trust building factor. It had an eigenvalue of 2.681 and accounted for 12.765 percent of total variance.

5.3 Normality Test

Variables clustered under one factor were collapsed and a new response rating was calculated for each respondent. The means, variance, standard deviation, skewness and kurtosis for the total

sample regarding the identified team working factors and job satisfaction factor with Cronbach's alpha (internal consistency) values are provided in table 5.

As explained in earlier sections, to be a parametric sample, the skewness and kurtosis value of data set should be less than 2.5 times of their respective standard errors (for skewness: $2.5 \times 0.18 = 0.45$ and for kurtosis: $2.5 \times 0.37 = 0.925$). A closer look at the table 5 shows that skewness and kurtosis values of all three team working factors and job satisfaction factor are within the permitting value hence fall under parametric sample.

5.4 Student's t-test and One Way ANOVA

Independent t-test was used for demographic characteristics having only two categories. Some of professional's project data (e.g. experience, project duration, project amount) were categorized into two categories for simplicity. Table 6 indicates how the professionals related to various project categories differ with regard to the various conflict avoiding factors. Since the dependent variables are approximately normally distributed and measured on a scale that at least approximates interval data, parametric t-test were used.

Table 5. Descriptive statistics of team work factors and job satisfaction

| Factors | Mean | Std. Dev. | Skewness | Skewness error | Kurtosis | Kurtosis Error | Cronbach's alpha |
|----------------------------|-------|-----------|----------|----------------|----------|----------------|------------------|
| F1 (11 items) | 3.917 | 0.544 | -0.396 | 0.188 | 0.874 | 0.374 | 0.91 |
| F2 (4 items) | 3.411 | 0.582 | 0.181 | 0.188 | 0.560 | 0.374 | 0.65 |
| F3 (4 items) | 3.498 | 0.638 | -0.011 | 0.188 | -0.177 | 0.374 | 0.66 |
| Job Satisfaction (4 items) | 3.766 | 0.607 | -0.114 | 0.187 | -0.029 | 0.371 | 0.82 |

Table 6. Student t-test comparisons of the mean scores of demographic and project characteristics in respect of three teamwork factors

| Teamwork factors | Category | Levene's test | | t-value | Sig. | Pract. Sig. (d) |
|------------------------------|---------------------|---------------|---------|---------|-------|-----------------|
| | | F | Sig. | | | |
| F1- Integrative work culture | Yrs. of Experience | 3.815 | 0.052 | -1.295 | 0.197 | |
| F2- Relationship building | | 5.654 | 0.019** | 0.072 | 0.942 | |
| F3- Trust building | | 1.365 | 0.244 | -1.122 | 0.264 | |
| F1- Integrative work culture | Project amount (\$) | 3.414 | 0.067 | -0.897 | 0.371 | |
| F2- Relationship building | | 0.070 | 0.792 | -1.242 | 0.216 | |
| F3- Trust building | | 0.000 | 0.994 | 1.032 | 0.304 | |
| F1- Integrative work culture | Project duration | 2.068 | 0.153 | -1.695 | 0.092 | |
| F2- Relationship building | | 0.414 | 0.521 | -1.275 | 0.205 | |
| F3- Trust building | | 0.003 | 0.957 | 0.379 | 0.705 | |

*Mean significance at the 0.05 level, ** Unequal variance

One way ANOVA test was performed to identify the significance of variance with regard to independent variables having more than two groups (Table 7). In order to determine an appropriate post hoc test (to identify difference in means of two particular groups), the overall significance (F-value) and the assumption of equality of variances (Levene's test) were investigated. Since, ANOVA assumes equal variances across groups or samples, so Levene's test of homogeneity of variance (F) is necessary to verify the assumption that the variances of groups are equal. The SPSS program provided applicable statistics where Levene's F test was significant and the assumption of normality was violated.

Tables 6 and 7 provide the student's t values, ANOVA F-values and p-values of various demographic as well as project domains with regard to four identified conflicting factors. These tables indicate how the various groups (country, organizational, experience, project types, positions and project size-as per numbers of participants involved, project amount, project delay, conflict experience etc.) differ with regard to the various conflicting factors. Responses of demographic and project domains with regard to the identified teamwork factors as shown in fig.2 below will now be discussed.

5.4.1 Factor 1: Integrative Working Culture Building

According to tables 6 and 7, professionals in organization

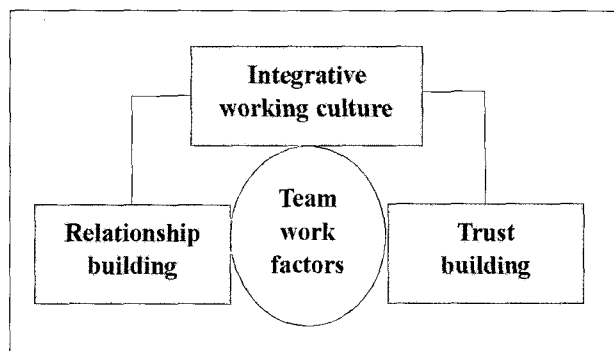


Figure 2. Team work factors' triangulation

(p=0.004) only differ significantly (p<0.05) in the mean scores with regard to integrative working culture. Since the Levene's test detected the equality of variance, a Tukey's post hoc test was used to find the mean difference between two particular groups in organization domain. Table 8 indicates statistically significant difference (p<0.05) between owner and consultant mean scores. The mean score result indicates that owner group is more inclined to integrative working culture than consultant group.

5.4.2 Factor 2: Relationship Building

Results depicted in tables 6 and 7 indicate that professionals related to all demographic and project domains have statistically no significant mean differences (all p>0.05) with regard to relationship

Table 7. ANOVA test comparisons of the mean scores of demographic and project domains in respect of the teamwork factors

| Factors | Category | Levene's test | | ANOVA | |
|------------------------------|---|---------------|-------|-------|--------|
| | | F | Sig. | F | Sig. |
| F1- Integrative work culture | Organization (Owner/Consultant/Contractor) | 1.596 | 0.206 | 5.633 | 0.004* |
| F2- Relationship building | | 0.645 | 0.526 | 1.619 | 0.201 |
| F3- Trust building | | 0.508 | 0.602 | 2.411 | 0.093 |
| F1- Integrative work culture | Management Position (High/Medium/Lower) | 1.781 | 0.172 | 2.488 | 0.086 |
| F2- Relationship building | | 1.466 | 0.234 | 0.736 | 0.481 |
| F3- Trust building | | 0.055 | 0.946 | 1.225 | 0.296 |
| F1- Integrative work culture | Present Project (Building/Roads/Rail/Water related/Others) | 0.330 | 0.894 | 0.925 | 0.466 |
| F2- Relationship building | | 0.881 | 0.495 | 0.704 | 0.621 |
| F3- Trust building | | 0.344 | 0.885 | 0.506 | 0.771 |
| F1- Integrative work culture | Nature of project (New/Extension/Renovation/Others) | 0.504 | 0.680 | 2.058 | 0.108 |
| F2- Relationship building | | 0.977 | 0.405 | 0.540 | 0.655 |
| F3- Trust building | | 0.475 | 0.700 | 2.621 | 0.053 |
| F1- Integrative work culture | Procurement method (Traditional/Design-build/BOOT/others) | 1.225 | 0.303 | 1.723 | 0.165 |
| F2- Relationship building | | 2.063 | 0.108 | 2.127 | 0.099 |
| F3- Trust building | | 0.828 | 0.481 | 2.625 | 0.053 |

*Mean significance at the 0.05 level, ** Unequal variance

Table 8. Tukey's multiple comparisons in relation to F1-integrative work culture factor

| (I) Organization | (J) Organization | Mean Difference (I-J) | Mean sq. root error | Sig. | Practical sig.(d) |
|------------------------------|--------------------------------|-----------------------|---------------------|--------|-------------------|
| Owner ($\bar{x}=4.080$) | Consultant ($\bar{x}=3.770$) | 0.30972* | 0.529 | 0.004* | 0.58 |
| | Contractor ($\bar{x}=3.976$) | 0.10393 | 0.529 | 0.622 | |
| Consultant | Contractor | -0.20579 | 0.529 | 0.123 | |

* The mean difference is significant at the 0.05 level.

building factor. This result indicates similar view of professionals from all sectors that relationship building is important in construction projects to improve team working culture.

5.4.3 Factor 3: Trust Building

According to tables 6 and 7, professionals related to all demographic and project domains have statistically no significant mean differences (all $p>0.05$) with regard to trust building factor. This result indicates similar view of professionals from all sectors that trust building is important in construction projects to improve team working culture.

5.5 Association of Teamwork Factors and Job Satisfaction

Table 9 indicates significant and positive correlations between three factors. This result indicates that these three items can be employed for developing team working strategies. In this study, four constructs were designed to measure job satisfaction of participation in relationship with other participants and outcome of the project. Table 9 shows that job satisfaction is significant ($p<0.001$) and of practical significance ($r>0.30$) with regard to integrative work culture and trust building constructs. However, there is a very weak correlation and non significant relationship between job satisfaction and relationship building, although the correlation of four job

Table 9. Correlation matrix of team factors

| Team working factor | Pearson's correlation | | | |
|--------------------------|-----------------------|-------|-------|----|
| | F1 | F2 | F3 | JS |
| F1-Integration | 1 | | | |
| F2-Relationship building | 0.47* | 1 | | |
| F3-Trust building | 0.55* | 0.47* | 1 | |
| JS- Job satisfaction | 0.30* | 0.13 | 0.33* | 1 |

Table 10. Pearson correlation matrix of job satisfaction factors

| I.N. | Job satisfaction factors | 2.1 | 2.2 | 2.3 |
|------|------------------------------|-------|-------|-------|
| 2.1 | Generally, team stability... | 1.00 | - | - |
| 2.2 | I enjoy working with ... | 0.50* | 1.00 | - |
| 2.3 | I feel proud of ... | 0.56* | 0.53* | 1.00 |
| 2.4 | I am satisfied ... | 0.52* | 0.41* | 0.66* |

*Correlation is significant at the 0.01 level (2-tailed).

satisfaction measures themselves are significant and highly positive (all $r > 0.50$). This result indicates that good relationship building between project participants can not measure the professionals' job satisfaction.

Table 10 shows the strong and positive association ($r = 0.41 \sim 0.66$) between job satisfaction factors. This result indicates that project participants have positive feelings towards the project performance and enjoying working with each other in a group.

Multiple regression was performed to measure dependent variable (job satisfaction) from the independent variables (team work factors). Beta value of trust building (0.266) and integrative work culture (0.185) indicates that these two factors could predict job satisfaction of professionals reasonably, however relationship building factor is not significant ($p > 0.05$), hence this factor does not influence job satisfaction. The multiple correlation of 0.36 is practical significant ($f^2 = 0.15$) with medium effect. The regression equation which predicts job satisfaction is shown at the bottom of the table 11.

6. Research Findings and Discussions

A principal factor analysis with varimax rotation identified three team work factors. These all three factors were compared with regard to different population categories. Independent t test and ANOVA

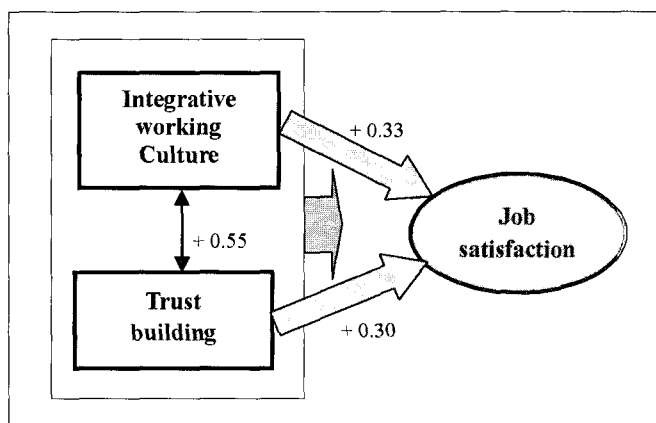


Figure 2. Team work factors' triangulation

test confirmed that all population groups are consistent with the results therefore, three factors namely, integrative working culture, relationship building and trust building constructs are teamwork building activities. However, correlation analysis and multiple regressions indicated that out of three factors, relationship building factors cannot influence the job satisfaction of the project participants. Job satisfaction can be predicted only by integrative working culture and trust building.

Interrelation model of team work factor and job satisfaction is shown in Fig. 3. Developing common norms and understanding and building trust each other enables better cooperation during projects. The cooperation between parties eliminates the motivation for opportunistic behavior in the short run and increases the motivation for integration (due to mutual gains in the short and long run). Understanding among the participants also increases the ability to achieve integration (due to goal congruence, understanding of each other's culture and way of work, and development of common norms).

Working together culture development is very important to the success of project. As shown in the result of this study, factors such as bringing into confidence to other partners, showing respect and reliability, encouraging positive conflict would develop the teamwork. Construction project are usually happens to be temporary, so personnel who work on projects are often employed on a temporary basis. As a result, they lack the motivation to participate in the long-term success of the project. They are oriented towards completing their tasks quickly and efficiently and moving on to the next project. In this context, developing trust and reliability on partners' work will yield teamwork and success of project. So, result of this study is found to be in consistent with the notion of Munns (1995) about building trust and reliability among project participants.

Result of this study is also found to be in line with the findings of Uher and Toakley (1999) about issues important in interpersonal relationships. High mean scale rating (more than 3.5 value)

Table 11. Multiple regression of team work factors with job satisfaction

| Model: Job satisfaction | Unstandardized Coefficients | Standardized Coefficients | Sig. (p) | R value | R ² value | Pract. Sig. (f ²) |
|----------------------------|-----------------------------|---------------------------|-------------|---------|----------------------|----------------------------------|
| | B | Beta value | | | | |
| (Constant) | 2.343 | - | 0.000 | 0.36 | 0.132 | 0.15 |
| F1-Integrative work | 0.206 | 0.185 | 0.044 | | | |
| F2-Relationship building | -0.082 | -0.078 | 0.366* | | | |
| F3-Trust building | 0.253 | 0.266 | 0.004 | | | |

Regression equation, Job satisfaction = 2.343 + 0.206 (F1) + 0.253 (F3), * Regression is not significant at 5% level.

illustrated in table 2 (section 5.1.1) for bringing other partners into own confidence, being fair and reasonable in work proceedings, showing mutual respect, tolerance and reliability; praising problem solving ability of partners reveals that professionals are very much aware of the need to develop strong interpersonal relationships as the foundation of conflict free construction work. They assessed very highly their own contribution to the development of strong and effective interpersonal relationship.

Integration is the second teamwork factor revealed by this study towards strengthening the teamwork among project participants. Integration includes the collaboration and compromising habits of the project participants that is; it concerns both self and others in the management process. Sitting in a place and discussing benefit of each other by sacrificing and convincing would help to secure high performance of the project.

Non-coercive power enhances the willingness to cooperate and reduces conflict. However, use of integration management style is little among project participants. Lower beta value of this factor in table 11 also proves above said fact. This result is also in line with the results of a study carried out by Leung et al. (2005). Their study revealed that conflict resolution involving an integration style can be considered a moderating variable in the conflict resolution process on construction projects.

In this study, Integration technique in the construction project is defined as encouraging positive conflict to get the best result, joint approach problem solving, sacrificing the one side profit, maintaining regular relationship and all side cooperation between the project participants. Cooperation is a buzzing word in management practice. However, cooperation is needed in every human endeavor. Obviously, it is necessary to have a smooth cooperation and joint problem-solving maneuvers among the project participants to obtain the goals of construction project. It is important to the contracting parties that the relations between the interacting individuals are kept co-operative and that the perceptions of un-fairness are avoided. A regular meeting between the project participants eases the friction by sitting together and understanding each other. The minutes of the meeting are the reliable proof of coordination work.

Understanding to each other is categorized as one most important factor of integration. Every project participants need to understand each other's position. They should think every project related matters from different participants' position.

Project teams deliver projects and shape the implementation of the

project. A team consisting of all necessary specialists, professionals and experts is able to make integrative decisions based on seeing the picture as a whole, and executes them later on with greater pace. Proper project planning and control require project teams to utilize appropriate project management techniques and tools.

The comparison test results show that all three organizational respondents are in a strong agreement that these two factors could create good teamwork in a temporary construction projects. The participants who have been employing these techniques frequently in construction project are found to be satisfied. Their satisfaction level from the project outcome is also highly correlated.

7. Significance and Limitations of Study

This study has covered a good cross section of construction industry. All the respondents in this survey are construction professionals involved directly in managing and executing the construction projects; so, the results of the study can be regarded as reliable and useful information. Results of this work can be useful especially to those construction participants with a history of adversarial relations and seeking to develop more collaborative relationship with their key partners.

As every research work faces some limitations, this work should be also considered in the light of some limitations. First limitation could be as this study has focused on only three principal project participants namely, owner, consultant and contractor, this means the study has left out some aspects of other project participants namely, sponsors, subcontractors/ suppliers etc. Had all of participants included in the research, results would have been more reliable. Second limitation is the fair response rate. These limitations have created difficulties in generalization of results for whole construction industry. However, as far as three principal participants are concerned, the results yielded can be considered as reliable and adequate.

8. Conclusions

The main objective of this study was to identify inherent teamwork factors and project outcome satisfaction level of project participants. Twenty-one team work measuring variables and four satisfaction measuring factors were sorted out from the literature study. Mean score rating, factor analysis with varimax rotation,

independent t-test, ANOVA test, Pearson correlation coefficient and multiple regression methods were used to analyze and test the data.

Project participants were found to be satisfied from the project outcome individually as well as in agreement with other groups. Factor analysis has reduced 21 teamwork factors into important 13 factors within three major components. Two components of teamwork namely, integrating working culture and trust building can predict the job satisfaction of project participants. The team working constructs discussed in this paper are consistent, therefore, recommended to use in construction field to improve the team working culture among project participants.

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