

## Modeling The Influence of Project Manager Trustworthy Leadership Behavior Upon Construction Team Trust

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**Abstract:** Appropriate trust and leadership have been frequently cited as key answer to the problems of cooperation and coordination in contractor's teamwork. The objectives of this paper are to measure trust level of construction projects team, to investigate trustworthy leadership behavior of project managers, and to model the influence of project managers' trustworthy leadership behavior upon team trust level. Sixty-one respondents from nine on-going construction projects participated in the questionnaire survey. The analyses show that in general the levels of trust and project managers' trustworthy leadership behavior are medium (scores of 82.71 and 102.09 respectively). Meanwhile the positive influence of project managers' trustworthy leadership behavior upon team trust level, modeled through multiple regression analysis with one dependent variable (i.e. trust) and three independent variables (i.e. leadership-results, leadership-integrity, and leadership-concern), is found to be significant. The model is evaluated and validated; the results reveal that the prediction of the model is satisfactory.

**Keywords:** leadership, project manager, trust, construction.

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### Introduction

Much of the work of a project manager in construction is organizing and working with a team of people to identify and determine solutions to problems, and to coordinate their efforts in a common direction to bring a project to successful completion [1]. It is a challenging task since most project team members are assigned to the project from their respected departments. The project manager must foster the development of personnel loyalty to the project while they maintain loyalty to their respected departments. Moreover, the temporary characteristic of construction project makes it difficult for team members to develop long-term commitment and relationships as in permanent organization.

Thus the project manager must develop a good working relationship with people in order to benefit from the best of their abilities. For this to be effective, the project manager needs to gain trust and respect of other team members for efficient team work through his leadership. In other words, the duty of effective project managers is to develop trusting relationships with those whom they seek to lead.

Despite the aforementioned claims, researches considering leadership and trust in construction are still lacking. Bresnen et al. [2] and Chan and Chan [3] expressed their concerns on the under research of leadership in the construction industry. Meanwhile Lazar [4], Kadefors [5] and Wong and Cheung [6] remarked that very little attention have been given to bring trust concepts to specific context in construction. In particular to date no research has been conducted to directly investigate the relationship between leadership and trust in construction projects.

Considering the shortcomings of these previous studies, as part of a research project, the present paper tries to investigate the role of project manager's leadership in building trust in construction projects. It will first measure the levels of trust and trustworthy project manager's leadership behavior taking into account the imperatives of trust. The second and more important objective is to model the relationship between the two measures. It is hypothesized that project managers' trustworthy leadership behavior influence the team trust level.

### Trust

There are many definitions of trust. Munns [7] defines trust as a decision to become vulnerable to or dependent on another in return for the possibility of a shared positive income. Meanwhile, Wood and McDermott [8] describe trust as the willingness to rely upon the actions of others, to be dependent upon them, and thus be vulnerable to their actions. Trust, as Shaw [9] argues, is more than simple confidence and less than blind faith. He then defines trust as

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belief that those on whom someone depends will meet his/her expectations of them.

Trust has been identified to have several antecedents. As indicated by Shaw [9] trust is founded on a few basic imperatives: achieving results, acting with integrity, and demonstrating concern. For high levels of trust to exist, he recommends that these factors must be exhibited and practiced consistently. This study employs Shaw's theory of trust to measure the level of trust in construction team. The following paragraphs briefly explain the three imperatives of trust. More discussions can be found elsewhere [9, 10].

The first and perhaps most important imperative in earning trust in any setting, which demands action and results, involves people's performance in fulfilling their obligations and commitments. The results are the key, even if people's motives are characterized by goodwill, they will not retain others' trust if they are incompetent or powerless to fulfill the expectations others have of them. In such cases, they are deemed unworthy of trust because they can't deliver the results. This imperative deals with such issues as obligations, meeting commitment and ability [9, 10].

A second imperative for trust is acting with integrity. Integrity means honesty in one's words and consistency in one's actions. In most cases, people trust those who behave consistently in their words and actions, who truly live by the motto of "do what you say you will do". Inconsistency suggests that others may be dishonest and self-serving and thus unworthy of trust. Gaps between what one anticipates and what actually occurs give rise to distrust. This imperative takes into account attributes of honesty, consistency, keeping promises, benevolence, coherent, fairness, predictability, openness, honor commitment, reliability, dependability, and responsibility [9, 10].

A third imperative for trust is demonstrating concern for others. At the most basic level, one trusts those who care and concern about her/him and those who will act in a way that meets or at least does not conflict with her/his needs. This element of concern involves the degree to which one believes others are supporting her/his own well-being or that of the whole. Concern for others as an imperative goes beyond caring for someone as individuals. It includes a broader concern for the groups, work team, or company of which someone is part. This is particularly important in relation to trusting those in positions of leadership and authorities. This imperative considers among others caring, faith, competence, support, responsiveness, availability, loyalty, receptivity, and reciprocity [9, 10].

Research by Wong et al. [11] has examined Shaw's three antecedents of trust by conducting survey questionnaire to three public sector organizations in Singapore. The research however was limited to measure the general trust level and its three antecedents in organization setting, but not specific to construction projects. Moreover, although the authors noted that leadership could influence team members' trust, it has not examined it.

### **Trustworthy Leadership Behaviors**

Management theory includes four major theories to the study of leadership [12]. They are trait, behavioral, contingency, and neocharismatic theories. The most contemporary leadership theory is the neocharismatic theories, which have three common themes, i.e. they stress symbolic and emotionally appealing leader behaviors, they attempt to explain how certain leaders are able to achieve extraordinary levels of follower commitment, and they look at leadership more the way the average "person on the street" today views the subject [12]. Including in this theory is transformational leadership. In the process of influencing team members, transformational leaders pay attention to the concern and development needs of individual team members. Leaders influence their members' attitude by helping them to look at old problems in new ways, and they are able to excite, arouse, and inspire members to inject extra effort to achieve the group's goals. Cheung et al. [13] applied the theory to examine leadership behavior for design consultants.

Research conducted by Andi [14] employed the transformational leadership behaviors (charismatic, inspirational, intellectual stimulating, individualized consideration, and participative) proposed by Cheung [13] to explain the potential influence of project manager's leadership behavior to the trust level in construction team. Whilst taking into account leadership behaviors, this research did not directly measure project managers' trustworthy leadership behavior based on the trust imperatives previously described.

Shaw [9] argues that since trust is built primarily on actions rather than pronouncements, nothing can undermine trust within an organization faster than a senior leader (project manager in this study) who is incompetent, unethical, or uncaring. Project managers need to act in ways that clearly demonstrate their commitment in each of the areas on which trust, and ultimately project performance, rests. Thus to effectively building trust in construction team, project managers must first personally behave in a trustworthy way, i.e. achieving results, acting with integrity, and demonstrating concern—all the

while balancing these needs appropriately. Explanations of these imperatives are basically the same as before, but here they are applied or seen specifically from the behaviors of a leader. This research employs these behaviors and examines their influence on team trust level.

**Research Method**

The study employed questionnaire survey method to collect the required data. The target respondents were contractors’ team members (except the project managers) on several on-going projects at the time of the survey. The questionnaire consisted of three major parts. First part contained general information about the respondent and project.

Adopting the Shaw’s questionnaire [9], the second part of the questionnaire was designed to assess team trust level by evaluating the imperatives of trust, i.e. achieving results, acting with integrity, and demonstrating concern. There were eight questions to be answered for each imperative of trust. Each question had two contradictory statements, which were separated by scores from 1 to 5 in which the higher the rating the higher the level of trust would be. The respondents were required to indicate a score reflecting the current condition in their project for each question.

To get the profile of each imperative, the scores for eight questions were summed up, where a total score between 8-18, 19-29, and 30-40 signified low, medium, and high levels of trust imperative, respectively. The overall score of trust level in a project was obtained by summing up the scores of trust imperatives. It would be somewhere between 24 to 120, where ranges 24-55, 56-88, and 89-120 indicated low, medium, and high trust level, respectively.

The final part of the questionnaire assessed the trustworthy leadership behavior of construction

project managers. For each trust imperatives there were 10 questions [9]. Depending on a day-to-day basis operation, the respondents were required to rate how often their project manager exhibited such behavior using a five-rating scale from not at all (1) to very great extent (5).

The total score for each trustworthy leadership imperative would range between 10-22, 23-37, and 38-50, which represented low, moderate, and high leadership level, respectively. Using similar procedure for obtaining the aforementioned trust level, the overall rating of leadership trustworthiness would fall somewhere between 30 to 150, where ranges 30-69, 70-110, and 111-150 that specified low, medium, and high-trustworthy leadership levels, respectively.

To analyze the influence of project manager’s trustworthy leadership behavior upon the construction team trust level, a forward pass multiple regression was performed. The proposed model consisted of one dependent and three independent variables. The equation of multiple regression would be in the following form:

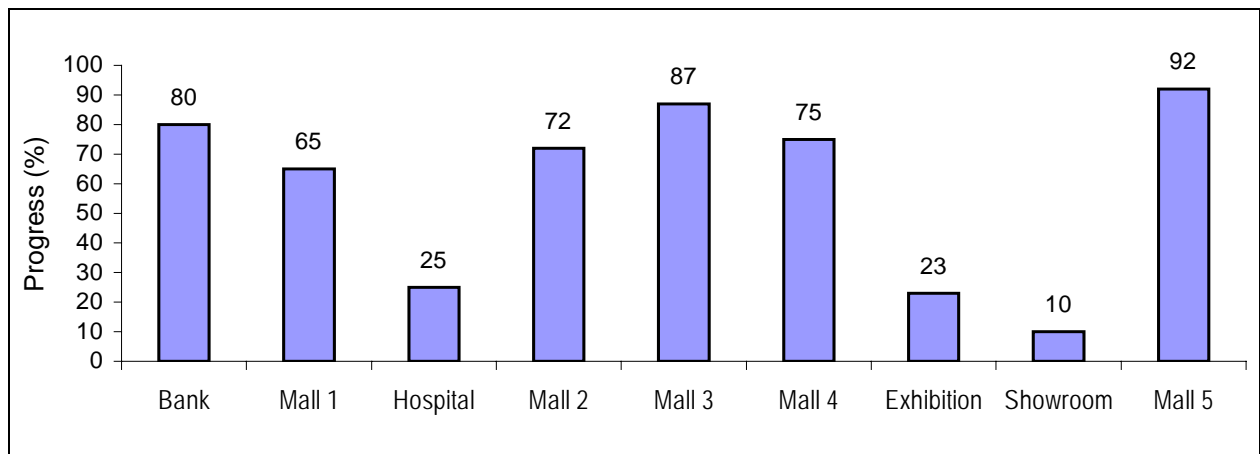
$$Y = B_0 + B_1 X_1 + B_2 X_2 + B_3 X_3 \tag{1}$$

where, *Y* is trust level, *X<sub>1</sub>*, leadership-results, *X<sub>2</sub>*, leadership-integrity, *X<sub>3</sub>*, leadership-concern, and *b<sub>i</sub>*, constants. Model analysis was conducted using SPSS software. Throughout the paper, the model would be evaluated and validated.

**Results And Discussions**

**General Information**

Sixty-one respondents from nine construction projects participated in the survey. The projects were under construction during the survey and were all building projects, which included shopping malls, hospital, showroom, exhibition, and bank. The progress of the projects ranged from 10% to 92% as shown in Figure 1.



**Fig. 1.** Progress of the Projects

**Reliability Analysis**

Before proceeding with analyses, data obtained were used to test the reliability of the questionnaire by means of Cronbach alpha technique. The recommended threshold value for the reliability is 0.7 [15]. Table 1 summarizes the analysis. The alpha scores of all variables were above the threshold, and thus were deemed reliable.

**Table 1.** Results of reliability analyses

Items	No of questions	Cronbach alpha
Trust imperatives		
Achieving results	8	0.792
Acting with integrity	8	0.832
Demonstrating concern	8	0.794
Trustworthy leadership		
Leadership-results	10	0.896
Leadership-integrity	10	0.886
Leadership-concern	10	0.873

**Team Trust Level**

Table 2 presents the mean score of construction team trust level and also its imperatives in the surveyed projects. The lowest and highest trust scores were 72.60 (Showroom project) and 97.57 (Mall 5) respectively. Meanwhile the overall trust level in the projects was medium (score of 82.71), although two projects (Mall 3 and Mall 5) were observed in the range of high trust.

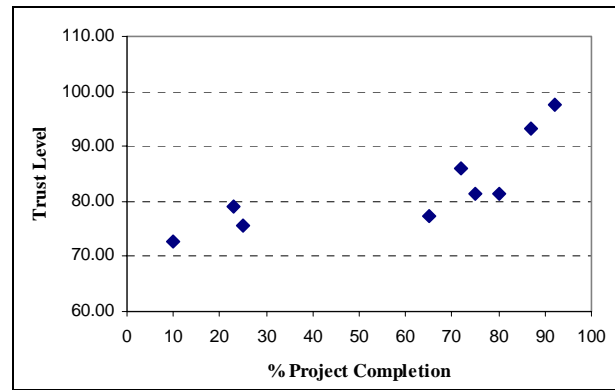
**Table 2.** Trust level in each project

Project	Trust Imperatives			Trust Level
	Achieving results	Acting with integrity	Demonstrating concern	
Bank	25.40	25.20	30.80	81.40
Mall 1	24.88	25.50	27.00	77.38
Hospital	25.14	25.57	24.86	75.57
Mall 2	32.60	24.10	29.40	86.10
Mall 3	33.00	25.60	34.60	93.20
Mall 4	22.89	26.11	32.33	81.33
Exhibition	25.20	27.40	26.60	79.20
Showroom	26.60	21.20	24.80	72.60
Mall 5	32.57	34.43	30.57	97.57
Average	27.59	26.12	29.00	82.71

Table 2 shows that in average the three trust imperatives scores in the projects fall in the medium range (between 19-29) with demonstrating concern and acting with integrity having the highest and lowest scores respectively.

An analysis was performed to see the relationship between the trust levels and percent project completion. Figure 2 plots the relationship. It shows

a tendency that project with higher percent completion enjoys higher trust levels. Statistical Pearson correlation analysis (Table 3) confirms significant relationship between the two parameters. The finding thus strengthens the results reported elsewhere [14].



**Fig. 2.** The relationship between project completion and trust level

**Table 3.** Correlation analyses between trust and project completion

Correlation Analyses	Pearson <i>r</i>	<i>sig.</i> (2-tailed)
Completion vs. Achieving results	0.280	0.029
Completion vs. Acting with integrity	0.248	0.054
Completion vs. Demonstrating concern	0.482	0.000
Completion vs. Trust Level	0.413	0.001

\*significant at  $\alpha = 5\%$

To investigate further the relationship, correlation analyses were also conducted between project completion and each trust imperatives. It was found that only demonstrating concern and achieving results significantly correlated with project completion. Table 3 details the statistical analyses results. The results may explain that trust grows as the project progresses overtime where the team members become more concern to the need of others. Another explanation is that as the project closes to the completion date typically the project becomes more critical, where strong cooperation and coordination among team members are greatly required in achieving the target date. Demonstrating concern to others and achieving the project target date (result) are thus essential ingredients to boost the cooperation.

**Project Managers' Trustworthy Leadership**

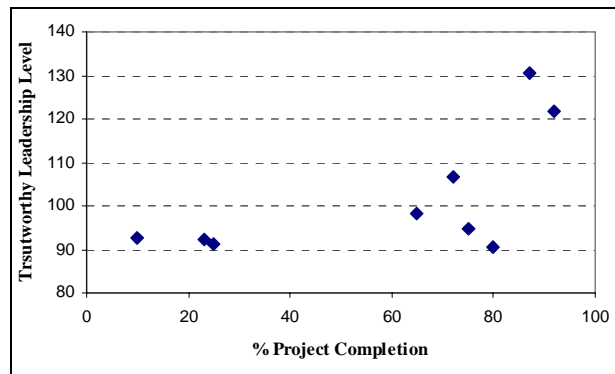
The analyses results of leadership behavior are shown in Table 4. The average score of the project managers' leadership trustworthiness level was medium (102.09), with the lowest and highest scores

of 91.14 and 130.40 respectively. Only one project (Mall 3) experienced high-trust leadership behavior. It can be gauged from Table 4 that in general the project managers maintained a balance leadership behavior regarding to the three trust imperatives.

**Table 4.** Trustworthy leadership behavior level in each project

Project	Leadership-Trust Imperatives			Trustworthy Leadership Level
	Achieving results	Acting with integrity	Demonstrating concern	
Bank	30.00	29.80	30.60	90.40
Mall 1	29.63	33.38	35.25	98.25
Hospital	30.71	31.14	29.29	91.14
Mall 2	39.50	31.20	36.10	106.80
Mall 3	43.60	42.40	44.40	130.40
Mall 4	27.78	29.67	37.44	94.89
Exhibition	28.80	33.60	30.00	92.40
Showroom	35.20	25.00	32.60	92.80
Mall 5	30.00	29.80	30.60	90.40
Average	33.93	33.20	34.96	102.09

Visual observation of Figure 3 points out that project managers exercised higher trustworthy leadership level in more completed projects. Correlation analyses were also carried out to see any relationships between leadership trustworthiness and percent project completion. As highlighted in Table 5, the overall leadership trustworthiness and also the three imperatives exhibited significant correlation with project completion (at  $\alpha = 5\%$ ).



**Fig. 3.** The relationship between project completion and trustworthy leadership level

**Relationship between Trust Level and Trustworthy Leadership Behavior**

The relationship analysis was initiated by finding out any correlations between trust levels and trustworthy leadership behaviors. Table 6 puts on the analyses results, where all imperatives of trustworthy leadership significantly correlated (at  $\alpha = 0.01$ ) with the trust level. The correlation analyses

results justify that there are strong relationships between trust level and leadership behavior. This directs to the next step of analysis to model the relationships employing statistical regression analysis. The model is intended to analyze the influence of project managers’ leadership behavior upon construction team trust. The proposed model includes one dependent variable, i.e. the trust level, and three independent variables covering the three imperatives of leadership trustworthiness, i.e. leadership-results, leadership-integrity, and leadership-concern.

**Table 5.** Correlation analyses between trustworthy leadership and project completion

Correlation Analyses	Pearson <i>r</i>	<i>sig.</i> (2-tailed)
Completion vs. Leadership-results	0.261	0.042*
Completion vs. Leadership-integrity	0.369	0.003*
Completion vs. Leadership-concern	0.404	0.001*
Completion vs. Trustworthy leadership	0.401	0.001*

\*significant at  $\alpha = 5\%$

**Table 6.** Correlation analyses between trust level and trustworthy leadership behaviors

Correlation Analyses	Pearson <i>r</i>	<i>sig.</i> (2-tailed)
Trust level vs. Leadership-results	0.739	0.000*
Trust level vs. Leadership-integrity	0.760	0.000*
Trust level vs. Leadership-concern	0.753	0.000*
Trust level vs. Overall leadership-trust	0.875	0.000*

\*significant at  $\alpha = 1\%$

For the purpose of analysis, fifty-two cases were utilized to develop the model and the rests nine cases randomly selected would be applied to validate the developed model. Tables 7, 8, and 9 indicate the results of the forward pass multiple regression analysis. In step one (Table 7) leadership-integrity was first introduced as independent variable since its correlation coefficient with trust level was the highest (Table 6). The  $R^2$  value of the resultant regression equation is 0.5587, which records the proportion of variation in the dependent variable (trust level) explained or accounted by the variation in the independent variable (leadership-integrity). It is statistically significant (less than 1%). The regression coefficient of 1.3601 is significant at  $\alpha = 1\%$  with  $t$ -value of 7.9565, which measures the partial correlation of the variable with the dependent variable.

**Evaluating the overall fit of the regression model**

The overall fit of the final model was first assessed by evaluating its assumptions of linearity, homoscedasticity and normality. These were observed to be

satisfactory. The impact of multicollinearity was also evaluated by examining the tolerance and VIF (variance inflation factor) values. The two measures are reciprocal and indicate the degree to which each independent variable is explained by the other independent variables. A common cutoff threshold is a tolerance of 0.10, which corresponds to VIF values above 10 [16]. Since all tolerance values exhibited in Table 9 are greater than the threshold, multicollinearity should not affect the interpretation of the regression variate coefficients.

The next step was the inclusion of leadership-concern as independent variable in the regression equation. The selection was based on the value of partial correlation of the independent variables with the dependent variable. As resulted in step one (Table 7), the value of leadership-concern's partial correlation (0.5963) was higher than that of leader-

ship-result and was significant at  $\alpha = 1\%$ . Table 8 summarizes the analysis results of step two. The  $R^2$  value of the resultant regression equation increased from 0.5587 (Table 7) to 0.7156. All regression coefficients of the independent variables (0.9208 and 0.8681) were highly significant. Examination of the independent variable excluded, i.e. leadership-results, showed that the partial correlation of the variable was significant ( $t$ -value of 3.4428). It was thus possible to perform the next step of the regression analysis by including the variable.

The final analysis (step three) took into account all three imperatives of leadership behavior as illustrated in Table 9. The model was significant ( $F = 54.152$ ,  $sig. = 0.000$ ) and its  $R^2$  value increased into 0.772, which records the proportion of variation in the dependent variable (trust level) explained or accounted by the variation in the independent

**Table 7.** Results of step one multiple regression

<b>Model Summary</b>						
	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate		
	0.7475	0.5587	0.5499	9.3574		
<b>ANOVA</b>						
	Sum of Squares	df	Mean Square	F	Sig.	
Regression	5542.9980	1	5542.9980	63.3051	0.0000	
Residual	4378.0020	50	87.5600			
Total	9921	51				
<b>Variable included</b>						
	B	Std. Error	t	Sig.	Tolerance	VIF
intercept	38.1083	5.6059	6.7979	0.0000		
leadership-integrity	1.3601	0.1709	7.9565	0.0000	1	1
<b>Variable excluded</b>						
	Beta in	Partial correlation	t	Sig.	Tolerance	VIF
leadership-results	0.4477	0.5713	4.8722	0.0000	0.7184	1.3921
leadership-concern	0.4639	0.5963	5.1992	0.0000	0.7291	1.3715

**Table 8.** Results of step two multiple regression

<b>Model Summary</b>						
	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate		
	0.8459	0.7156	0.7040	7.5883		
<b>ANOVA</b>						
	Sum of Squares	df	Mean Square	F	Sig.	
Regression	7099.5015	2	3549.7508	61.6473	0.0000	
Residual	2821.4985	49	57.5816			
Total	9921	51				
<b>Variable included</b>						
	B	Std. Error	t	Sig.	Tolerance	VIF
intercept	22.1917	5.4807	4.0490	0.0002		
leadership-integrity	0.9208	0.1623	5.6719	0.0000	0.7291	1.3715
leadership-concern	0.8681	0.1670	5.1992	0.0000	0.7291	1.3715
<b>Variable excluded</b>						
	Beta in	Partial correlation	t	Sig.	Tolerance	VIF
leadership-results	0.3073	0.4450	3.4428	0.0012	0.5963	1.6770

**Table 9.** Results of step three multiple regression

Model Summary						
	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate		
	0.8786	0.7719	0.7577	6.8659		
ANOVA						
	Sum of Squares	df	Mean Square	F	Sig.	
Regression	7658.2490	3	2552.7497	54.1518	0.0000	
Residual	2262.7510	48	47.1406			
Total	9921	51				
Variable included						
	B	Std. Error	t	Sig.	Tolerance	VIF
intercept	17.7343	5.1252	3.4602	0.0011		
leadership-integrity	0.7431	0.1557	4.7730	0.0000	0.6490	1.5408
leadership-concern	0.6327	0.1658	3.8160	0.0004	0.6052	1.6523
leadership-results	0.5470	0.1589	3.4428	0.0012	0.5963	1.6770

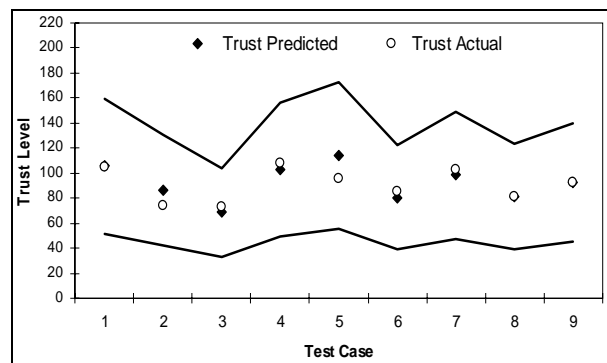
variables (leadership behaviors). The final regression equation is:

$$Y = 17.734 + 0.547 X_1 + 0.7431 X_2 + 0.633 X_3 \quad 2$$

where, Y is the trust level, X<sub>1</sub>, leadership-results, X<sub>2</sub>, leadership-integrity, and X<sub>3</sub>, leadership-concern. The model indicates a positive influence of trust-worthy leadership behavior upon team trust level. In other words, by increasing the project managers' trustworthy leadership behavior, the level of trust in construction project will be enhanced.

**Validating the Regression Model**

After identifying the best regression model, the final step is to validate that the model represents the general population and is appropriate for the situations in which it will be used. The validation was accomplished by testing the model on the nine-holdout cases. Figure 4 displays the lower and upper limits of the predicted trust levels, which represent the 95% confidence interval bands. It is encouraging that all nine cases fall in the specified range. Table 10 exhibits the predicted and actual scores of trust level. It portrays that all the predicted trust levels correspond to the actual levels. It can be said that the prediction of the model is satisfactory.



**Fig. 4.** Upper and lower limits of test cases' trust level

**Table 10.** Validation of regression model

Test Case	Leader-ship-Results	Leader-ship-Integrity	Leader-ship-Concern	Trust (score-level*)	
				Actual	Predicted
1	41	47	48	105-H	105.46-H
2	32	37	37	74-M	86.14-M
3	27	29	23	73-M	68.61-M
4	48	39	47	108-H	102.71-H
5	50	50	50	96-H	113.88-H
6	29	36	32	85-M	80.60-M
7	42	43	41	103-H	98.60-H
8	30	35	34	81-M	81.67-M
9	33	41	41	93-H	92.20-H

\*L = low, M = medium, H = high

**Discussions**

Construction project team requires close working relationship to face the complexity and uncertainty of construction projects. Trust can be regarded as glue to foster good relationship among members so that they can work in flexible manner. This is the role of project manager to lead her/his team to high

trust environment. This study has been directed to investigate trust, leadership and their relationship.

The survey conducted depicts that in general the trust level in the construction projects is moderate (mean score of 82.71), including its imperatives (Table 2). It can be said therefore that in overall the trust profiles in the surveyed projects are in the balance. Two projects (Mall 3 and 5) hold high trust levels, whereas the lowest trust level is exhibited in showroom project (mean score of 72.60). Analysis of the three imperatives points out that only Mall 5 that maintains high-level scores for all trust imperatives. In average, demonstrating concern imperative has the highest average score (29.00), where four projects (Bank, Mall 3, Mall 4, and Mall 5) are in position of high-level score (more than 30). Meanwhile, acting with integrity is the imperative with the lowest average rating (mean score of 26.12). Moreover, no project displays high-level score for this imperative, except in Mall 5.

The average levels of trustworthy leadership behavior (score of 102.09) and its imperatives (Table 4) are also moderate. Thus, the project managers can be alleged maintaining balance trustworthy behaviors. Similar to the results in the previous paragraph, demonstrating concern and acting with integrity have the highest (34.96) and lowest (33.20) average scores respectively. Only in Mall 3 where the project manager possessed high-level scores for all imperatives.

Results of correlation analyses between percent complete of project and overall trust level are found to be significant ( $r = 0.413$ ;  $sig. = 0.001$ ). Similar analyses to the trust imperatives (Table 3) indicate only acting with integrity that is not significantly correlated with the percent complete. It is interesting to see that projects with the highest trust level (i.e. Mall 5 and Mall 3) embrace the highest percent complete (i.e. 92% and 87%, respectively). Likewise, project with the lowest trust level (Showroom) had the lowest percent complete (10%). It may determine that trust can grow overtime. In other, words the levels of trust increase as the project progresses. The trust growth overtime can be traced from the demonstrating concern imperative, which has the most significant correlation ( $r = 0.482$ ;  $sig. = 0.000$ ) with the project completion.

Meanwhile, the project managers' trustworthy behavior is also significantly correlated with project percent complete ( $r = 0.482$ ;  $sig. = 0.000$ ). In this case the correlations of all trust imperatives with project completion are significant. It can be gauged that the project managers maintained higher trustworthy behaviors as the project proceeds, especially to the

demonstrating concern imperative in which its correlation coefficient is the highest (Table 5). In addition there is highly significant relationship between project managers' trustworthy behavior with team trust level ( $r = 0.875$ ;  $sig. = 0.000$ ).

The forward pass regression approach demonstrates that there is a significant influence of trustworthy leadership behavior upon team trust levels. The result of this study thus reinforces the Shaw's assertion that trust can be built through leadership in a way that leader personally behaves in a trustworthy way [9]. The positive beta coefficients of the three imperatives denote that the team's trust levels can be enhanced by balancing the project managers' trustworthy leadership behavior through acting with integrity, demonstrating concern, and achieving results. Notably by increasing the acting with integrity behavior the trust level will greatly enhanced since its beta coefficient is the highest (0.7431). This can be done by, among other things, establishing open communication [17] between project managers and their team members

This finding is consistent with Robbins' note in his book [12], which states that among trust dimensions, integrity is the most critical. He remarks that without this imperative other dimensions of trust are meaningless. Shaw [9] adds that leadership integrity (honesty) was what followers most often looked for in a leader. Moreover, it was found to be the single most important ingredient in the leader-follower relationship. Interestingly the average score of this imperative is the lowest among the three imperatives as discussed in the previous paragraphs.

## Conclusions and Further Research

This research has empirically measured the trust level and project managers' trustworthy behaviors in construction projects and established a model to identify the influence of project managers' behavior upon construction team trust. The proposed model draws on Shaw's three imperatives of trust; achieving results, acting with integrity, and demonstrating concern. The model does support the hypothesis that project managers' trustworthy leadership behaviors, through the three imperatives, significantly enhance the team trust level.

The finding of this study provides valuable insight for construction project managers that, in building team trust, it is not enough for them to be competence, skillful and have the ability to produce results. The model sets out that the project managers should balance their behaviors, and more importantly increase their integrity for a successful trust building. However, notice that currently the



project managers place more attentions to the other two imperatives, i.e. concern and results. Beyond modeling integrity, project managers are also responsible for holding their members to the same standard, for requiring that everyone in the team act with integrity. The model has been validated and the results are satisfactory, and thus can be used in the future to assess the construction team trust by collecting and measuring scores of leadership-results, leadership-integrity, and leadership concern variables.

Although the results indicate the existence of significant correlation between trust level and project completion, it is not conclusive and needs further investigation. It is because, as a practical consideration, construction project is complex and relatively unstable. The uncertain conditions in construction, as described in the introduction, give rise to instability and rapid changes during the execution of a project. This may mean that a project's (project manager's) direction may be in constant flux. Such circumstances may fluctuate the level of trust in a team depending on a specific condition. In the mean time, the circumstances may also create conflict to the project managers in maintaining the balance of the three imperatives. When a project under severe delay, for an example, a project manager may place emphasis on results and lessen concern to others or his subordinates. It is interesting if further research may measure the trust and trustworthy leadership levels regularly during the execution of the project and observe their stability towards particular circumstances.

In addition, as Shaw [9] determines, creating trust-based organizations is not enough by focusing on leaders' behavior. Two other important supports in building trust, which are not yet touched in this research, are organizational architecture and organizational culture. These need to be explored in next researches.

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