

# Structural relationship of leadership qualities with worker's issues for Saudi Arabia's construction industry

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**Abstract.** One of the important factors for construction project success is managing the workers. It requires good leadership qualities in handling the workers' issues. This paper presents a study on associating good leadership qualities with the workers issues of Saudi Arabia's construction industry. The study was conducted within Makkah development region where all the construction workers are foreigners. A questionnaire survey involved 203 construction leaders who were asked to rate the degree of importance of each the identified leadership qualities in handling several construction workers issues. Collected data from this survey was used to develop PLS-SEM model which relates structural relationship of leadership qualities with the worker issues. Validation of the model shows that it is fit with Goodness of Fit (GoF) value of 0.30. The validated model indicates that problem solving group of qualities is the most dominant in handling workers issues. These findings are helpful for Saudi Arabia's construction practitioners in handling workers issues effectively and thus ensure completion of construction projects timely.

## 1 Introduction

Construction's leadership is important factor in ensuring the success of construction projects [1,2]. It considered a crucial aspect in all fields of human endeavor but more essential for the construction industry which requires a quality construction project management team [3]. In nature, construction industry is unique, fragmented and resources driven, hence issues faced by construction industry are tremendous in numbers such as delay, cost overrun, quality, productivity, workmanship, safety, waste and human related issues. These issues engulfed construction industry in every country including Saudi Arabia where the Saudi's construction industry faces several impediments and challenges to be completed successfully. Recently, Saudi's construction industry witnessed a noticeable regression due to several reasons including drop of oil price and intervention military in Yemen which have exposed the country to growing risks, lowering scores in this industry [4]. Nevertheless of construction boom in the country in the last decades, the construction

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industry of Saudi Arabia is facing chronic problems such as delay, cost overrun [5,6] and poor safety [7].

Construction workers are one of the most important factors for construction project success because constructions tasks mainly implemented by this group regardless of their skilled or unskilled. In Saudi Arabia's construction industry, most of the construction workers are foreigners from several countries with different knowledge, skills and cultures. These workers face many problems in their daily life, problems not only related to construction demanding tasks but also related to social, cultural and climate adoption. Restrictions to non-Muslim skilled workers, limited visa quota, being away from family, delay in salary payment, cheating of workers skill's status, safety issues, communication barriers and living conditions among the important issues engulfing workers in Makkah's construction industry [8]. Besides that Almannae, [9]and Andrieu et al., [10] have identified problems faced by workers in Saudi Arabia including shortage of skilled workforce, poor living condition, low wages, delaying in wages payment, poor living condition, safety issues. These problems have adverse impacts to construction project performance which requires serious attention by construction leaders to handle them.

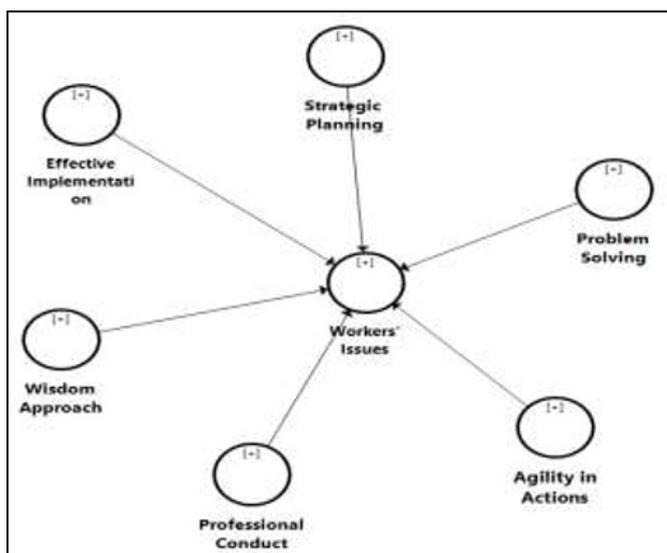
Construction industry requires a professional who possesses quality management and leadership skills to steer projects successfully [11]. Although experience and technical background are important in engineering and construction field, but the critical part should be required by construction leader is the leadership and managerial qualities [1]. According to Benator & Thumann [12], leadership and management expertise can help the construction leader to achieve the project objectives timely. Moreover, good leadership qualities of construction leader are essential component for steering construction project successfully. Thus to be outstanding leaders, they should possess good leadership attributes such as problem solver, communicator and motivator in their organizations [13]. Hence, this paper has uncovered 56 leadership qualities from previous researchers. These leadership qualities are then classified into 6 groups which were used as latent variables which comprises of independent variables of leadership qualities in developing PLS-SEM structural model. Besides that, this study has identified 21 issues engulfed construction workers from past literature review. Worker issues group was used as dependant variable in developing structural relationships model to associate appropriate leadership qualities with worker issues.

## **2 Methodology**

Quantitative data was collected using questionnaire survey to gauge the level of importance of each leadership quality in handling several workers issues. The important items in the questionnaire are list of leadership quality and also workers issues which were extracted from on literature review work. Prior to data collection, the questionnaire survey form was evaluated through pilot survey to check the relevance and workability of the survey questions to the construction industry of Makkah city. The pilot survey involved 31 experts who have more than 10 years of working experience in Saudi construction industry. The feedback of pilot survey was then used for improving the contents of the questionnaire form. The final form of the questionnaire was used for data collection where the forms were distributed to the targeted construction leaders from contractor's organizations in Makkah city through site visit and managed to secure 203 valid responses. Respondents were requested to indicate the level of importance based on 5-points Likert's scale on each of the identified 56 leadership qualities in resolving the identified workers' issues.

## 2.1 Model development

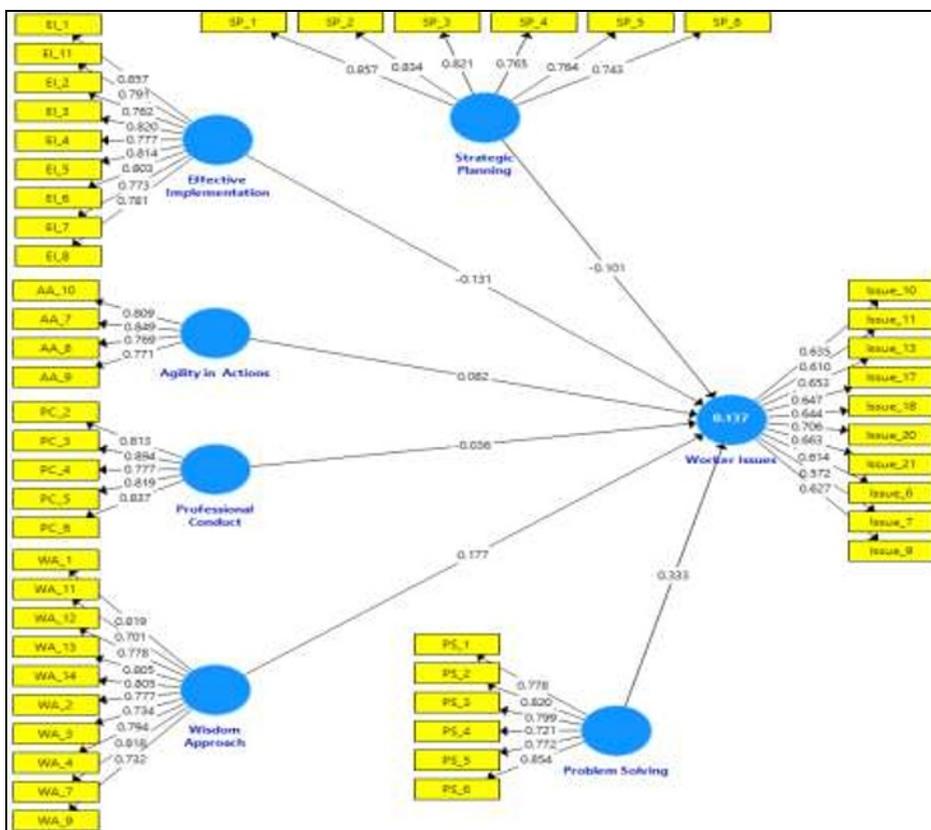
A model is developed using PLS-SEM method which relate leadership qualities with workers issues for the construction industry of Makkah city. This method uses Partial Least Square (PLS) technique which is a second generation of multivariate statistical analysis that simultaneously evaluates multiple variables[14]. Before a model can be developed in SmartPLS software, a theoretical/hypothetical model has to be formulated for identifying the relationships between the constructs. To identify the conceptual path model, it must begin with fundamental explications about the model which usually build on existing research knowledge [15]. In this content, the theoretical model is based on 6 groups of leadership qualities (independent variables). These 6 groups are converged to one dependent variable that is “workers’ issues”. Based on these groups, the theoretical model is hypothesized as figure 1.



**Fig. 1.** Theoretical Model of the Study.

This theoretical model of figure 1 is applied in SmartPLS 3.0 software to develop a relationship of leadership qualities with worker issues. The model was developed based on 56 leadership qualities (items) assigned to 6 groups (known as independent variables) namely as *Strategic Planning (SP)* with 8 items, *Effective Implementation (EI)* with 11 items, *Wisdom Approach (WA)* with 14 items, *Professional Conduct (PC)* with 6 items, *Problem Solving (PS)* with 7 items and *Agility in Actions (AA)* with 10 items. These 6 groups are converged to one dependent variable named as worker issues consisted of 21 items (issues). Raw data for model development were derived from the questionnaire survey which involved 203 respondents who are construction leaders working in Makkah’s construction industry. Number of raw data used to develop a structural relationship model between leadership qualities and workers’ issues is 15631 which include 21 issues plus 56 qualities multiplied by 203 respondents. These data are recorded in *sav* format of excel software and then converted into the *.csv* format by using (*save As*) function in the software. Once the data is converted, the following step is to create a new project sheet in SmartPLS and then import the data to the project worksheet. After importing the data to SmartPLS software the next steps are to draw the path model according to the hypothetical model, assigned name of constructs, connecting the independent variables with dependent variable and assigning the items to the respective construct and then the model is ready for

modelling processes. Modelling process is commenced with PLS algorithm in the software with the number of iterations set at 300 [16]. Throughout the process, some of the items found unreliable having outer loadings below 0.5 which represents the correlations of the items with their respective latent variables. According to Hulland [17], items with loading of 0.7 or more are considered significant items and suggested that items with loadings of less than 0.4 should be dropped. However, item with loading between 0.4 to 0.7 be reviewed and may be dropped if they do not increase value to composite reliability [18]. During the modelling process, several weak items were generated and eliminated at each iterative process as suggested by Aibinu et al. [19] and Rahman & Nagapan, [20] in order to obtain a fit PLS model. 12 iterative processes were carried out before reaching reliability of all the items resulted in deleting 26 weak items (15 qualities and 11 issues) and left 51 significant items (41 qualities and 10 issues) which are reliable for the final graphical representation. The final structural relationships model of leadership qualities with workers' issues for Saudi Arabia's construction industry is portrayed as figure 2.



**Fig. 2.** The Final Structural Relationship Model of the Study.

The required assessments of the developed PLS-SEM path model of structural relationship between leadership qualities and worker issues for Makkah's construction industry (figure 2) were carried out which involved assessing measurement model, assessing structural model and overall assessment as discussed in the following sections.

### **3 Results and Analysis**

Data analysis is carried out using SmartPLS software to relate good leadership qualities with workers issues for Saudi's construction industry. In order to ensure the results of each leadership quality has impact towards workers issues, the model needs to be assessed. The assessments process involves 3 essential steps that are assessing measurement mode, assessing structural model and overall assessment on the model. These assessments are elaborated in more details as in the following subsections.

#### **3.1 Assessing measurement model**

Assessment of measurement model (outer model) is to check internal consistency of the model whether relationships between independent and manifest/items variables are adequate [14]. According to Hair et al. [18], assessment of the measurement model includes estimating the composite reliability, average variance extracted (AVE), Cronbach's alpha, reliability of individual indicators and discriminant validity. Required threshold values for the parameters are Average Variance Extracted (AVE)  $\geq 0.5$ . However, AVE equal to 0.4 can be accepted if the composite reliability is higher than 0.6 for the particular construct [21]. For Composite Reliability (CR), it should be  $\geq 0.7$  and Cronbach's alpha should be  $\geq 0.7$  [18]. For individual item reliability, each manifest is considered significant if its loading value is more than 0.5 [18]. Results of individual items reliability and convergent validity for independent variables (leadership qualities groups) are presented as in table 1.

**Table 1.** Measurements Model Results for Independent Variables.

Items	Description	Loading	Construct	Alpha	CR	AVE
AA_10	Alert with project details	0.809	<b>Agility in Actions</b>	0.814	0.877	0.640
AA_7	Very focused in achieving tasks	0.849				
AA_8	Prioritizing tasks	0.769				
AA_9	Alert with contractual compliance	0.771				
EI_1	Effective management	0.857	<b>Effective Implementation</b>	0.930	0.940	0.637
EI_11	Develop good team members	0.791				
EI_2	Evaluating targets continuously	0.762				
EI_3	Effective time management	0.820				
EI_4	Continuous quality improvement	0.777				
EI_5	Handling situation confidently	0.814				
EI_6	Effective resources management	0.803				
EI_7	Having Sufficient experience	0.773				
EI_8	Effective negotiation capacity	0.781				
PS_1	Decision making capacity	0.778				
PS_2	Problem solving capacity	0.820				
PS_3	Decisive in resolving problems	0.799				
PS_4	Develop trust with stakeholders	0.721				
PS_5	Resolving conflict	0.772				
PS_6	Proactive in avoiding problems	0.854				
PC_2	Integrity	0.813	<b>Professional Conduct</b>	0.886	0.916	0.687
PC_3	Honest and trustworthy	0.894				
PC_4	Ethical behavior	0.777				
PC_5	Perform work sincerely	0.819				
PC_6	Willingness to take responsibility	0.837				
SP_1	Effective planning	0.857	<b>Strategic Planning</b>	0.889	0.913	0.638
SP_2	setting Goal	0.834				
SP_3	Creating strategies	0.821				
SP_4	Assessing risks	0.765				
SP_5	Clear mission & vision	0.764				
SP_8	Success oriented	0.743				
WA_1	Respectful with workers	0.819				
WA_11	Influencing workers	0.701				
WA_12	Empathy with workers	0.778				
WA_13	Effective communication	0.805				
WA_14	Fair treatment regardless nationalities	0.805				
WA_2	Sincere with workers	0.777				
WA_3	Persuasiveness capacity	0.734				
WA_4	Good listener	0.794				
WA_7	Reliable with workers	0.818				
WA_9	Good motivator	0.732				

Generated results of independent variables for the measurement model as in table 1, indicates that all values of composite reliability, average variance extracted (AVE), Cronbach’s alpha and reliability of individual indicators are above the cut-off values. Besides that, the results measurement model (individual items reliability and convergent validity) for the dependent variable (worker issues) are shown as table 2.

**Table 2.**Measurements Model Results for Dependent Variables.

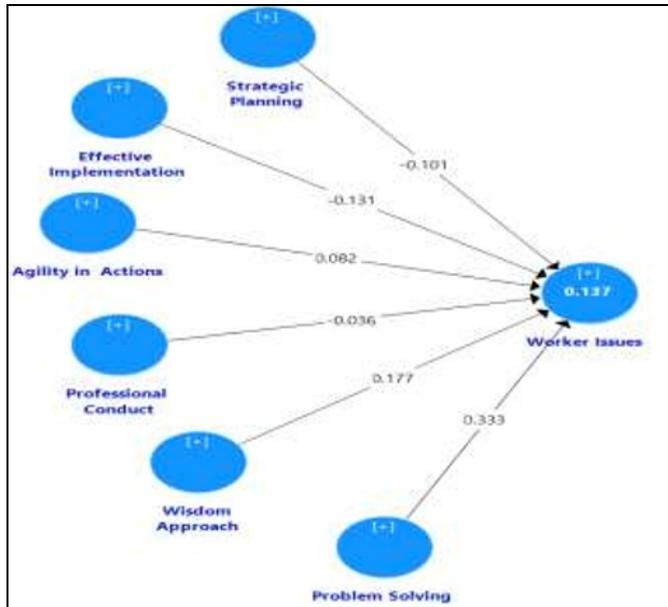
Items	Description	Loading	Construct	Alpha	CR	AVE
Issue_10	Insecurity of job	0.635	<b>Worker Issues</b>	0.840	0.873	0.407
Issue_11	Low salaries	0.610				
Issue_13	Discrimination in wages distribution	0.653				
Issue_17	Lack of incentives affecting targeted performance	0.647				
Issue_18	Crowded accessible area to the project	0.644				
Issue_20	Absence of overtime	0.706				
Issue_21	Disruption of work due to Strike	0.663				
Issue_6	Lack of orientation programs	0.614				
Issue_7	Restriction in bringing worker’s family	0.572				
Issue_9	Delay in payment	0.627				

Results of dependent variable shown in table 2 are within the acceptable threshold values as suggested by [18,21]. To assess discriminant validity; two essential requirements should be met. These include the outer loading of each indicator should be higher than its loadings on other constructs, and according to Fornell-Larcker criteria, the square root of AVE of each construct should be higher than its highest correlation with any other construct [16,21]. Generated values of the model found that the outer loading of each item/manifest variable is higher in their relative independent variable than other independent variables. And also the correlation values of the independent variables of the model are higher than non-diagonal values. This indicates that the developed model has achieved its discriminant validity assessment.

### 3.2 Assessing structural model

After the measurement model has achieved its threshold values, the following step is to assess the structural model. This involves examining relationship between dependent variable with independent variables. It is carried out by checking the strength of impact path ( $\beta$ ) of independent variable to the dependent variable and also the explanatory power ( $R^2$ ). A structural path can be considered acceptable if the  $\beta$ -value is above 0.1 [18]. According to Aibinu and Al-Lawati [22], the higher  $\beta$ -value shows the stronger impact of a predictor independent variable on the dependent variable. Another criterion to assess structural model is explanatory power. It is to examine the overall ability of the model in representing the impact of independent variables toward the dependent variable [14]. The indicator used to describe the explanatory power is the model’s coefficient of determination which is  $R^2$  value [18]. According to Cohen [23], a model can be assessed as substantial if  $R^2 = 0.26$ , moderate if  $R^2 = 0.13$  and weak if  $R^2 = 0.02$ . Results of structural model assessment are as presented in figure 3. The  $R^2$  value is 0.137 which means that the

developed model has moderate explaining power in representing the impact of the groups of leadership qualities in handling workers' issues.



**Fig. 3.** Results of Structural Model of the Study.

The path co-efficient ( $\beta$  values) of each path in figure 3 are summarized as in table 3.

**Table 3.** Impact of Leadership Qualities on Workers Issues.

Rank	Independent Variables	Path Co-efficient ( $\beta$ value)	Dependent Variable
1	Problem Solving	0.333	Worker Issues
2	Wisdom Approach	0.177	
3	Effective Implementation	-0.131	
4	Strategic Planning	-0.101	
5	Agility in Actions	0.082	
6	Professional Conduct	-0.036	

Table 3 demonstrates the ranks of leadership qualities groups in terms of ( $\beta$ ) their impacts towards workers issues. It perceived that Problem Solving group of qualities is the most dominant in handling workers issues with co-efficient value of 0.333 followed by Wisdom Approach group with co-efficient value of 0.177. However Professional Conduct group of qualities is having the smallest co-efficient value of -0.036 which indicates that this group is giving the least impact in handling workers' issues. Thus, it can be concluded that problem solving group of qualities has the strongest impact toward workers' issues.

### 3.3 Overall assessment

Goodness of Fit (GoF) defined as the geometric mean of both average variance extracted (AVE) and the average of R<sup>2</sup> of all endogenous variables [24]. PLS results can be assessed globally for the overall model and locally for the measurement model and the structural model [25]. The model’s overall goodness of fit should be the starting point of model assessment if the model does not fit the data; the data contain more information than the model conveys [25]. The criteria of GoF to determine whether GoF values are no fit, small, medium, or large to be consider as global valid PLS model are given by Akter et al. [24] as presented as table 4.

**Table 4.** GoF Index Criteria.

GoF Value	GoF Criteria
GoF less than 0.1	No fit
GoF between 0.1 to 0.25	Small
GoF between 0.25 to 0.36	Medium
GoF greater than 0.36	Large

The calculation formula of GoF was adopted from Akter et al. [24] as follow:

$$GoF = \sqrt{AVE \times R^2} \tag{1}$$

Where, R<sup>2</sup> for this study is 0.137 and the Average of AVE for endogenous variables (6 groups of leadership qualities) is 0.639

Thus,

$$GoF = \sqrt{0.639 \times 0.137}$$

$$GoF = 0.30$$

Therefore, the GoF value for this study is 0.30, which in the range of 0.25 to 0.36 cut-off value as indicated in table 4. This certifies that the developed model is medium in explaining the issues of construction workers for Makkah’s construction industry.

## 4 Conclusion

The developed PLS-SEM path model of structural relationship between leadership qualities and worker issues for Makkah’s construction industry comprised of 56 leadership qualities which are clustered into 6 groups and one dependent variable consisted of 21 worker issues. Assessments on the model were carried out and found that after carrying out 12 iterations all the manifests in the measurement model are reliable and valid. In the structural model, it was found that Problem Solving group of qualities is the most dominant in handling workers issues with co-efficient value of 0.333. Finally, overall assessment on the model shows that the model is fit with Goodness of Fit (GoF) value of 0.30. This relationship

model can assist the Saudi's construction stakeholders in nominating potential leaders to handle workers issues effectively and efficiently.

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