CHAPTER VI
EXPLAINING MODEL FOR SUPERVISORS' BEHAVIOR BASED ON ACTUAL PRACTICE

This chapter investigated the impact of actual practice on supervisors' behavior. Data analyzing process will be conduct from descriptive statistic to factor analysis, and finally structural equation modeling. Although this Chapter and Chapter 5 have the same approach, they have different objective and meaning of results. While Chapter 5 developed model for explaining supervisors' behavior based on their perception, Chapter 6 will examine factors considered likely to impact on supervisor behavior from actual practice. It explores the relations among these variables and develops a model for explaining behavior on safety actions. All of these objectives are conducted by supervisors' evaluation about practical safety issue and reality indexes.

6.1 Descriptive Statistics

6.1.1 General Survey Details

In order to achieve objectives as discussed above, the first section of questionnaire was used. The list of variables comprised twenty eight statements, which designed to measure current practice that impact the supervisors' behavior on safety action. There are two subsections of questionnaire section one that respondents were required to answer. The first subsection required supervisors state their reality indexes such as experience in years, their age, their personal education background, number of times attend training course as supervisor, their safety knowledge, their salary satisfaction, and some personal habits. The second subsection required supervisors evaluate the real safety issue of the construction site in which they were working. The questions were designed to evaluate variables that influence supervisors from company level to project level. The examples of variables are company safety vision, financial support for safety issue, safety management system, safety regulation and procedure and so forth. Appendix A described these questions in details.

Data collection for this chapter took place at the same time with other data which were analyzed in Chapter 4 and 5, on March and April 2010 in Vietnam. Data were screened using the complete sample ($N = 434$) prior to the main analyses to examine for accuracy of data entry, missing values, and fit between distributions and the assumptions of

necessary analyze tools. After deleting unusable cases, 403 data are used for factor analyses and only 241 data are used for SEM.

6.1.2 Coding and Cleaning Data

Each response must be assigned a numerical code before it can be entered into SPSS. Almost responses were classified in three levels except the first, the second and the twentieth question. Data were coded from 1 to 3 with the assumption that the increase of coding value is directly proportional to the higher safety level of supervisor behavior. For example in question of safety knowledge, code the first listed response "I have little knowledge about safety" as 1, the second response "I understand necessary safety information and general hazards onsite" as 2, and the last response "I know how to control or avoid all potential hazards according to safety procedures" as 3. Coding based on assumption that the higher level of safety knowledge can increase supervisors' behavior in keeping safety at construction site.

Prior to analyses and using the usable sample (N = 403), it is important to check for mistake initially. So data were examined for accuracy of data entry, missing values. The data screening process involves a number of steps which are checking for error, finding the error in the data file and correcting the error in the data file. The accuracy of the data file was checked by proofreading a random sample of 100 of the original data against a computerized listing. In addition, the frequencies and descriptive statistic command in SPSS Version 17 was used to detect any out of range values. Table 6.1 below presents the frequency, coding value number and valid percentage of data for each item in the final sample of 403. No missing data was found.

Table 6.1 Frequency and coding of responses (N=403)

Issues	Coding	Frequency	Percent	Valid Percent	Cum Percent
Experience As Supervisor					
Less than 2 years	1	206	51.1	51.1	51.1
From 2 to 5 years	2	130	32.3	32.3	83.4
More than 5 years	3	67	16.6	16.6	100.0

Table 6.1 Frequency and coding of responses (N=403) (Continued)

Issues	Coding	Frequency	Percent	Valid Percent	Cum Percent
Age					
Less than 25	1	107	26.6	26.6	26.6
From 25 to 35	2	243	60.3	60.3	86.8
More than 35	3	53	13.2	13.2	100.0
Education Background					
Completed high school	1	36	8.9	8.9	8.9
Undergraduate	2	352	87.3	87.3	96.3
Graduate	3	15	3.7	3.7	100.0
Times attend training course as Supervisor					
Never	1	88	21.8	21.8	21.8
1 time	2	244	60.5	60.5	82.4
From 2 times	3	71	17.6	17.6	100.0
Safety Knowledge					
Little knowledge about safety	1	137	34.0	34.0	34.0
Necessary safety information and knowledge	2	186	46.2	46.2	80.1
Can control or avoid all potential hazards	3	80	19.9	19.9	100.0
Salary Satisfaction					
Not Satisfied	1	243	60.3	60.3	60.3
Satisfied	2	157	39.0	39.0	99.3
Very Satisfied	3	3	.7	.7	100.0
Control workers capacity					
Very Difficult	1	205	50.9	50.9	50.9
Not Difficult	2	177	43.9	43.9	94.8
Easy	3	21	5.2	5.2	100.0
Drinking Habit					
Drink at working time	1	6	1.5	1.5	1.5
Drink not at working time	2	261	64.8	64.8	66.3
Don't drink at any time	3	136	33.7	33.7	100.0

Table 6.1 Frequency and coding of responses (N=403) (Continued)

Issues	Coding	Frequency	Percent	Valid Percent	Cum Percent
Smoking Habit					
Smoke at working time	1	54	13.4	13.4	13.4
Smoke not at working time	2	46	11.4	11.4	24.8
Don't smoke at any time	3	303	75.2	75.2	100.0
Safety Remind from Family					
Never remind	1	69	17.1	17.1	17.1
Rarely remind	2	162	40.2	40.2	57.3
Often remind	3	172	42.7	42.7	100.0
Safety Attitude of Coworker					
Usually break the safety regulations	1	27	6.7	6.7	6.7
Committed basic safety regulations	2	305	75.7	75.7	82.4
Against people break safety and unsafe procedures	3	71	17.6	17.6	100.0
Workers' Safety Behavior					
Usually break the safety regulations	1	76	18.9	18.9	18.9
Sometimes break the safety regulations	2	175	43.4	43.4	62.3
Rarely break the safety regulations	3	152	37.7	37.7	100.0
Awareness of Top Manager in Safety					
Rarely	1	42	10.4	10.4	10.4
Sometimes	2	114	28.3	28.3	38.7
Always	3	247	61.3	61.3	100.0
Awareness of Owner in Safety					
Rarely	1	48	11.9	11.9	11.9
Sometimes	2	124	30.8	30.8	42.7
Always	3	231	57.3	57.3	100.0

Table 6.1 Frequency and coding of responses (N=403) (Continued)

Issues	Coding	Frequency	Percent	Valid Percent	Cum Percent
Recognition of Community as Government and Neighborhoods about Safety					
Rarely remind	1	124	30.8	30.8	30.8
Sometimes remind	2	207	51.4	51.4	82.1
Seriously remind and always checking	3	72	17.9	17.9	100.0
Weather Conditions at Construction Site					
Totally uncomfortable	1	65	16.1	16.1	16.1
Little uncomfortable	2	265	65.8	65.8	81.9
Comfortable	3	73	18.1	18.1	100.0
Project Scale					
Level IV (=< 03 stories or <1,000m^2)	1	63	15.6	15.6	15.6
Level III (04-08 stories or 1,000-5,000m^2)	2	125	31.0	31.0	46.7
Level II (09-19 stories or 5,000-10,000m^2)	3	97	24.1	24.1	70.7
Level I (20-29 stories or 10,000-15,000m^2)	4	65	16.1	16.1	86.8
Special Level (>= 30 stories or >= 15,000m^2)	5	53	13.2	13.2	100.0
Project Owner Type					
Government	1	97	24.1	24.1	24.1
Private	2	248	61.5	61.5	85.6
Foreign investment	3	58	14.4	14.4	100.0
Project Schedule					
Very stressful	1	212	52.6	52.6	52.6
Normal	2	177	43.9	43.9	96.5
Idle	3	14	3.5	3.5	100.0

Table 6.1 Frequency and coding of responses (N=403) (Continued)

Issues	Coding	Frequency	Percent	Valid Percent	Cum Percent
Workload Assigned in Project					
Too much	1	97	24.1	24.1	24.1
Moderate	2	277	68.7	68.7	92.8
Gently	3	29	7.2	7.2	100.0
Safety Workplace Environment					
Unsafe	1	45	11.2	11.2	11.2
Average	2	276	68.5	68.5	79.7
Safe	3	82	20.3	20.3	100.0
Safety Management System					
Don't have safety management system	1	40	9.9	9.9	9.9
Need to be improved	2	313	77.7	77.7	87.6
Suitable to perform job	3	50	12.4	12.4	100.0
Practical of Safety Regulation and Procedure					
Useless	1	33	8.2	8.2	8.2
Average	2	234	58.1	58.1	66.3
Useful	3	136	33.7	33.7	100.0
Company Financial Support for Safety Issue					
Low	1	67	16.6	16.6	16.6
Average	2	251	62.3	62.3	78.9
High	3	85	21.1	21.1	100.0
Company Vision about Safety					
Safety is not important	1	65	16.1	16.1	16.1
Safety is important	2	232	57.6	57.6	73.7
Safety is strength of company in developing reputation	3	106	26.3	26.3	100.0

6.2 Factor Analysis

The data discussed above will be analysed with the similar factor analysis approach that was used in Chapter 5. As an early step in the data analysis, all questionnaire responses in section 6.1 were checked to ensure completeness and readability before the data was

processed using the Statistical Package for Social Sciences (SPSS) version 17. The data gathered were factor-analyzed to examine the interrelationships among the 25 variables and to reduce this number of original variables into a smaller set of factors. It is important to remind this factor analysis is based on supervisors' evaluation of actual practice that influence on safety behavior.

The construct validity of the scales in sample (N = 403) was investigated by factor analyzing the items using the Maximum Likelihood (ML) technique with Varimax rotation. Although structural equation modeling was later used, factor analysis was used to help refine the measurement model.

6.2.1 Checks for Factor Analysis

Collected data is required to check whether it appropriates for performing factor analysis. Checking data contents three steps includes checking adequacy of sample size, assessing the factorability of the correlation matrix, and examining the anti-image correlation matrix.

The first step was checking adequacy of sample size. Factor analysis prefer sample size larger than 100 and at least five time of observations (Hair, Black et al., 2010). The sample size of the supervisor is 403, with the ratio of 16.12 cases to 1 variable, which satisfies the specified limit.

The second step was assessing the factorability of the correlation between observations via the correlation matrix of survey. Factor analysis requires a number of correlation which higher than 0.30 (Hair, Black et al., 2010). Result from correlation matrix among 25 observations in this research points out more than 20 percent of correlations greater than 0.30 at the 0.01 level of significance (see Appendix C2).

The third step was examining the anti-image correlation matrix, the diagonals on that specific matrix should have an overall Measure of Sampling Adequacy (MSA) of 0.50 or above (Hair, Black et al., 2010). The set of variables exhibited satisfactory values above 0.50 and therefore were deemed fit for further analysis. The checked data set of 25 variables resulted in a Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy of 0.783, which is considered as meritorious. Another mode of determining the appropriateness of factor analysis is the Bartlett test of sphericity. The analysis of Bartlett test of sphericity reached statistical significance with chi-square 1718, degree of freedom 300 and significance level of 0.000. Therefore factor analysis was deemed appropriate.

6.2.2 Factor Analysis Process

The similar process of factor analysis which present in chapter 5 is used in this section. It starts with principal component of factor analysis. This exercise revealed the presence of eight (8) distinct factors. To obtain interpretable results for those eight factors, a varimax rotation was then performed.

Rotation has the effect of optimizing the factor structure and one consequence for these data is that the relative importance of the eight factors is equalized. Before rotation, factor 1 accounted for considerably more variance than the remaining seven (16.74% compared to 8.574%, 6.104%, 5.807%, 4.874%, 4.622%, 4.297%, and 4.171%), however after extraction it accounts for only 13.493% of variance (compared to 7.873%, 7.244%, 6.451, 5.612, 5.035, 4.795% and 4.691% respectively). Consequently this shows that the 25 items represent eight factors (constructs) and explains 55.19% of the total variance of supervisors' behavior.

Table 6.2 displays the Rotated Component Matrix which is a matrix of the factor loadings for each variable onto each factor. As can be seen from below Table most items loaded properly on construct. The eigenvalues, percentage of variance explained are also displayed in this table. To ensure that the items comprising the factors produced reliable scales, Cronbach's alpha coefficient of internal consistency was calculated for each scale. The results are also shown in Table 6.2. They ranged from 0.170 to 1.000, only the first and the second factor higher than standard value 0.600, indicating only two these factors inadequate internal consistency (Pallant, 2004; Hair, Black et al., 2010). It should be carefully consider for further analyze.

Table 6.2 Pattern Matrix, Eigenvalues, Percentage of Variance explained for factor influencing supervisor's behavior on safety actions based on actual practice (N = 403)

	Factor							
Item	F1	F2	F3	F4	F5	F6	F7	F8
F1.Organizational and Management Influence (Cronbach's α = 0.785)								
Workplace Environment	.730							
Safety Management System	.722							
Financial Support for Safety	.710							
Safety Regulation and Procedure	.703							
Company Vision about Safety	.526							
Type of project Owner	.519							
Worker	.494							
F2. Personal Background and Safety Knowledge Influence (Cronbach's α = 0.620)								
Age		.855						
Working Experience		.818						
Training		.420						
Safety Knowledge		.358						
F3. Project Stakeholder and Family Influence (Cronbach's α = 0.553)								
Community pressure (Government, law, neighbors)			.620					
Family			.585					
Project Owner			.569					
Top Manager			.484					
F4. Project Workload (Cronbach's α = 0.579)								
Amount of work responsibility				.800				
Project Schedule				.756				

Table 6.2 Pattern Matrix, Eigenvalues, Percentage of Variance explained for factor influencing supervisor's behavior on safety actions based on actual practice (Continued)

Item	Factor							
	F1	F2	F3	F4	F5	F6	F7	F8
F5. Weather and Worker Control (Cronbach's α = 0.500)								
Supervisor capability to control worker					.624			
Weather Conditions					.564			
F6. Education and Coworker Influence (Cronbach's α = 0.170)								
Education Background						.687		
Project Scale						.485		
Coworker						.403		
F7. Smoking Habits								
Smoking Habits							.802	
F8. Drinking and Salary Satisfaction (Cronbach's α = 0.218)								
Salary Satisfaction								.767
Drinking Habits								.627
Eigenvalues	4.186	2.143	1.526	1.452	1.219	1.156	1.074	1.043
Percentage of Variance Explained	13.493	7.873	7.244	6.415	5.612	5.035	4.795	4.691

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization

6.2.3 Descriptive Factors

The correlation matrix showing relationships among the various factors, together with the means, standard deviations and important index is presented in Table 6.3.

Table 6.3 Summary Statistics and Correlations for all Factors (N = 403)

Factor	Mean	SD.	Index	F1	F2	F3	F4	F5	F6	F7	F8
F1	2.09	0.39	5.38	1.000							
F2	1.83	0.47	3.94	.124*	1.000						
F3	2.27	0.46	4.98	.409**	.179**	1.000					
F4	1.67	0.46	3.62	-.144**	-.144**	-.166**	1.000				
F5	1.78	0.45	3.94	.297**	.129**	.221**	.056	1.000			
F6	2.29	0.49	4.63	.259**	.240**	.071	-.167**	.082	1.000		
F7	2.62	0.71	3.68	.028	-.128*	-.035	.020	-.028	-.056	1.000	
F8	1.86	0.38	4.95	.015	-.034	-.033	.044	.011	-.082	.088	1.000

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Correlation matrix was used for communicating the pattern of relations among factors. These descriptive statistics were calculated using SPSS Version 17. Level of influence of eight practical factors on supervisor's behavior was all measured using a 3-point scale. The correlation matrix indicated that more than fifty percent relations were significantly related to each other. Based on assumption discussed at the beginning, the responses were coded with an expectation the higher value will get higher level of safety behavior. It means these practical factors were expected positive relations, but the results shown above were inversed. Some significant negative correlations were found between Project Workload factor with other factors as the first, second, third, and sixth factor. This result indicated the influence of Project Workload factor on supervisor behavior on safety action in opposite direction than expected. The factor analysis and correlation results provided some initial considers to develop explaining model for further analyze.

6.3 Structural Equation Modeling (SEM)

Eight independent variables – Organizational and Management Influence, Personal Background and Safety Knowledge Influence, Project Stakeholder and Family Influence, Project Workload, Weather and Worker Control, Education and Coworker Influence, Smoking Habit, Drinking Habit and Salary Satisfaction - were explored their influence on behavioral intention and behavior that were discussed on Chapter 4. The suitable data set that used for this analyze was 241 responses. Since factor analysis reduced the number of variables to eight factors, combined with behavioral intention and behavior measured variable, a satisfactory ratio of 24:1 cases per measured variable was achieved. Moreover, the developed model needs to satisfy conditions for a number of statistic criteria. The

reader is referred to Table 6.5 and Section 6.3.1 for a complete description of these and their threshold acceptance levels. For the purpose of this study, SEM was employed for the main task determining significant structural model between measured variables.

6.3.1 Structural Equation Model for Supervisors' Behavior Based on Actual Practice

Structural model was undertaken using the SEM technique to uncover the significant interrelationships between the factors retained from EFA in section 6.2. It is important to notice that EFA which was explored in section 6.2 based on evaluation and performance related to safety issues. It caused different meaning of this model comparing to model from SEM Chapter 5. In order to clearly distinguish from this section forth, "perceptual model" will be used for final explaining model from SEM Chapter 5 (Figure 5.3Figure 5.3 Final) and "practice model" will be used for final explaining model from SEM in this chapter.

The conceptual model was described in Figure 6.1. Eight constructs related to factor influencing supervisors' behavior based on actual factors which was explored from EFA, one construct represented for behavioral intention and one construct represented for current behavior were in this model. The details of each observed indicators were shown in Table 6.4. The final significant model without link between errors was called middle model shown in Figure 6.2. In order to achieve a higher Goodness-of-Fit model, some links between errors were sequential added based on the result from Modification Indices (MI). The final model which was described in Figure 6.3 was the optimum model that achieved almost criteria for several fit indexes without too complex relationship.

Table 6.4 Observed indicators used in practice model explaining supervisors' behavior

Construct	Description	Scale	Item
Organizational & Management Influence	Safety regulations and procedures	1 – 3 Useless → Useful	Regu
	Workplace environment	1 – 3 Bad → Good	Envi
	Safety management system	1 – 3 Don't have → Good	System
	Company financial supports for safety issue	1 – 3 Low → High	Finan
	Kind of project owner	1 – 3 Government → Foreign	Otype

Table 6.4 Observed indicators used in practice model explaining supervisors' behavior (Continued)

Construct	Description	Scale	Item
	Worker behavior on safety	1 – 3 Unsafe → Safe Behavior	Worker
	Company vision or expected targets of project	1 – 3 Safety not important → Strength	Vision
Personal Background & Safety Knowledge Influence	Age	1 – 3 Low → High	Age
	Working experience	1 – 3 Low → High	Exp
	Providing of safety training programs	1 – 3 Low → High	Train
	Safety knowledge	1 – 3 Low → High	Knowl
Project Stakeholder & Family Influence	Project owner awareness on safety	1 – 3 Rarely → Always	Owner
	Top manager awareness on safety	1 – 3 Rarely → Always	Top
	Community awareness on safety	1 – 3 Rarely → Always	Gov
	Family awareness on safety	1 – 3 Rarely → Always	Family
Project Workload	Amount of work responsibility	1 – 3 Low → High	Load
	Project schedule	1 – 3 Stress → Idle	Sche
Weather & Worker Control	Weather conditions at construction site	1 – 3 Uncomfortable → Comfortable	Wea
	Supervisor capability to control workers	1 – 3 Low → High	Control

Table 6.4 Observed indicators used in practice model explaining supervisors' behavior (Continued)

Construct	Description	Scale	Item
Education & Coworker Influence	Education background	1 – 3 Low → High	Educ
	Project scale	1 – 5 Small → Big	Sca
	Coworker awareness on safety	1 – 3 Rarely → Always	Cowork er
Smoking Habit	Smoking	1 – 3 Never → Always	Smok
Drinking Habit & Salary Satisfaction	Salary satisfaction	1 – 3 Unsatisfied → Satisfied	Salary
	Drinking	1 – 3 Never → Always	Drink
Behavioral intention	The situations include 2 main parts which related to falling from height hazard and electrocution hazard	0 - 10 Frequency	S1 – S10
Behavior	Performances include 4 main responsibility related to safety role	0 - 4 Never - Always	P1 - P12

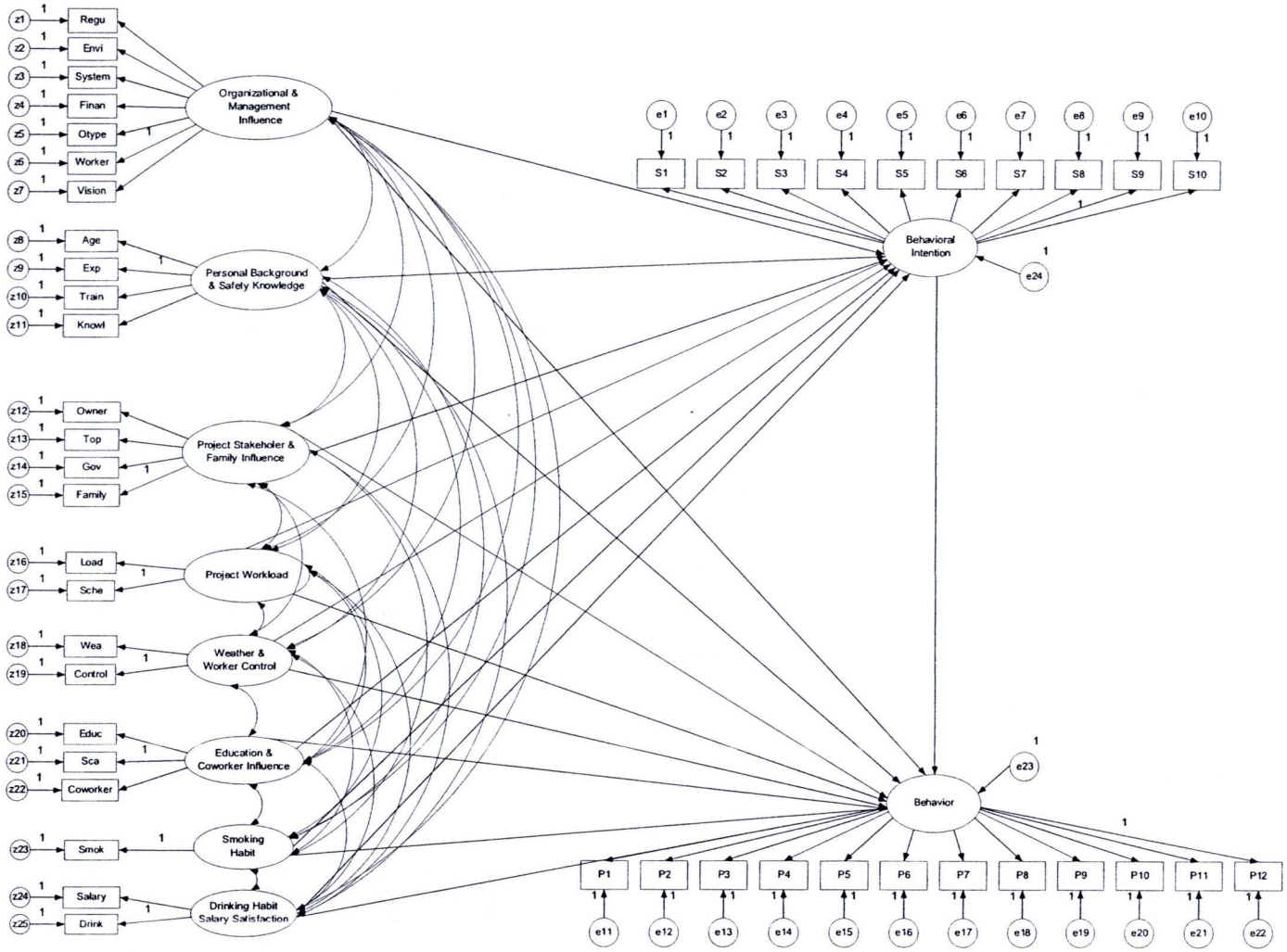

Figure 6.1 Conceptual practice model for explaining supervisors' behavior based on actual practice

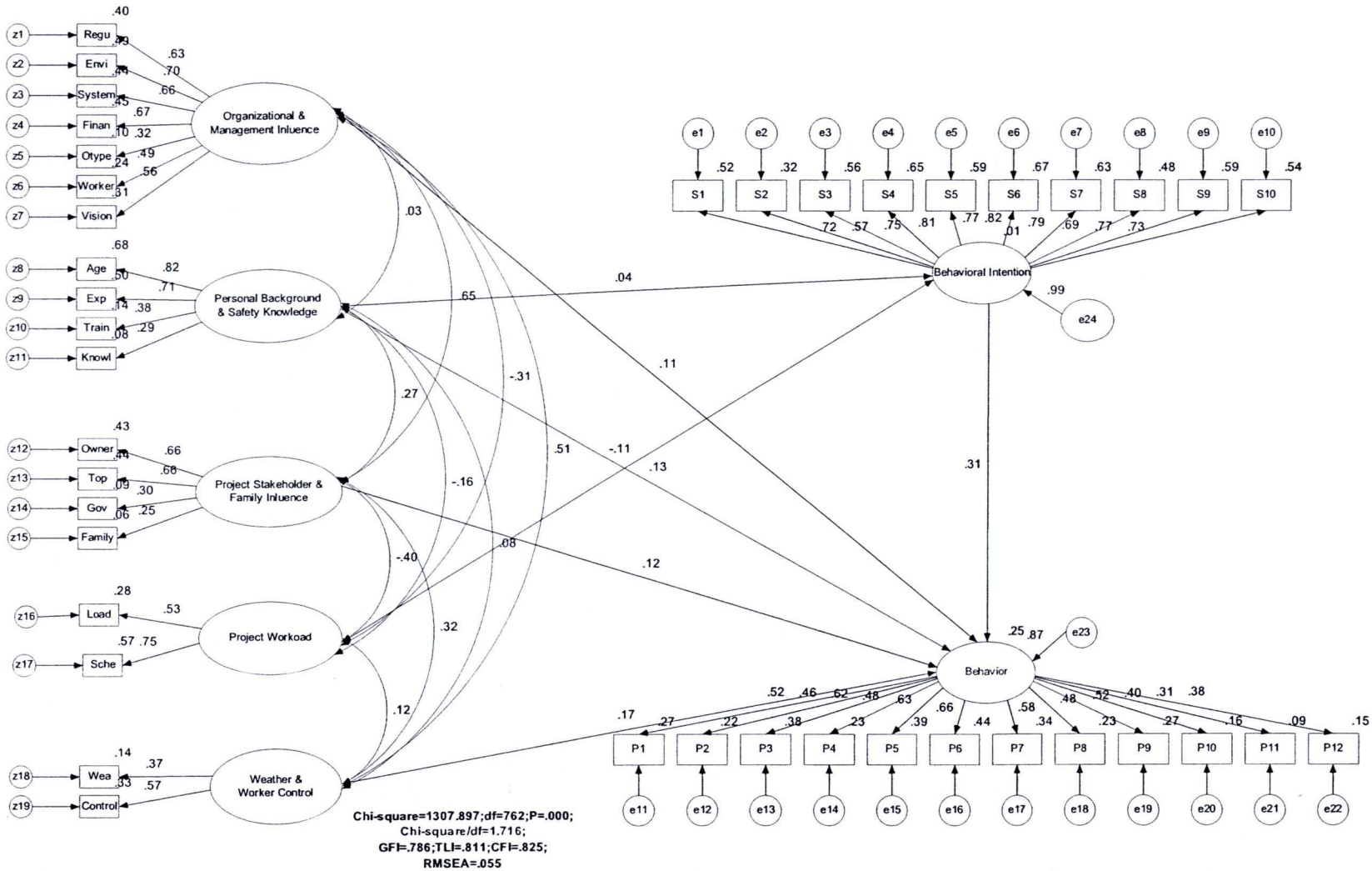

Figure 6.2 Middle practice model for explaining supervisors' behavior based on actual practice

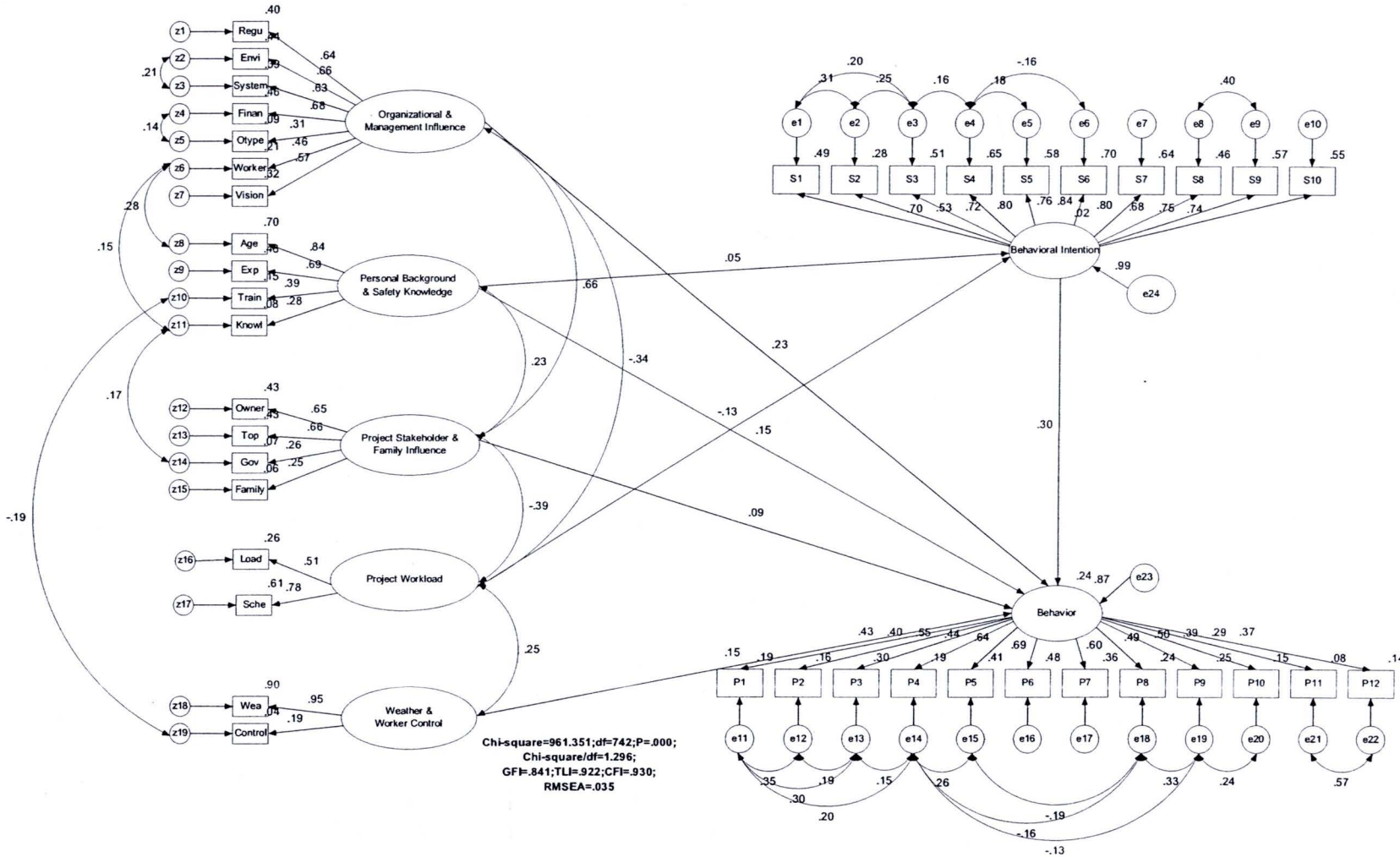

Figure 6.3 Final practice model for explaining supervisors' behavior based on actual practice

6.3.2 Assessing and Results of SEM

The model's key statistics are good since the GFI is 0.841, the CFI is 0.930 and the RMSEA is 0.035. We can thus safely conclude that the model is valid and can continue to analyze the outcome of the causal effects. The analysis results indicated the direct impact of behavioral intention and four factors on supervisor behavior. These factors are organizational and management influence, personal background and safety knowledge, project stakeholder and family influence, weather conditions and worker control. In addition, their safety behavior was also influenced indirectly by project workload through behavioral intention. Personal background and safety knowledge affected behavior in both ways, direct and indirect through behavioral intention. Remaining three factors did not appear in the final model from current practice, they are education and coworker influence, smoking habit, drinking habits and salary satisfaction.

This SEM result was not contradict with the result of EFA and was not difficult to understand. Although these three factors existed as important factors but their percentage of variance explained were lower than 6%. SEM results indicated the non-significant from these three factors influence on both behavioral intention and behavior. Other factors were significant influence on behavioral intention or behavior as shown in Figure 6.3. This model has the following fit coefficients: CMIN/DF = 1.296; RMSEA = 0.035; GFI = 0.841; AGFI = 0.815; NFI = 0.756; CFI = 0.930; and TLI = 0.922, comparing with the critical value are shown in Table 6.5. The final model satisfied more than 50% of critical standards and above the threshold of almost important standards. So, we can be concluded that the model is valid and reliability to explaining the causal effects (Bacon, 1997; Tabachnick and Fidell, 2006).

Figure 6.3 provides the results of testing the structural links of the proposed research model using AMOS program. The estimated path coefficients (standardized) are given, shown in Figure 6.4. All path coefficients can be considered significant at the 90% significance level providing support for seven relationships. These results were explaining supervisor behavior towards intention and other factors. From actual practice, the effects of the behavioral intention and five remained factors (organizational and management influence, personal background and safety knowledge, project stakeholder and family influence, weather conditions and worker control, project workload) accounted for over 24.3% of the variance in behavior variable. This is an indication of the good explanatory power of the model for supervisor behavior.

In summary, structural equations explained the seven causal relationships (paths) which exist between the five retained enabling and outcome factors as presented in. A summary

of the developed structural equations, path coefficients and significance levels is provided in Table 6.6, for more details authors can reference in Appendix D2. The following section discusses the practical implications of each structural equation and its' associated predictor variables.

Table 6.5 Goodness of Fit Indexes for practice model

Indexes	General rule for acceptable fit	Final Model	Comment
$\chi 2$ / *df*	Ratio of $\chi 2$ to $df \leq 2$ or 3, useful for nested models/model trimming	1.296	Good
NFI	>0.95 (Good); > 0.9 (Acceptable)	0.756	Not Acceptable
TLI	>0.95 (Good); > 0.9 (Acceptable)	0.922	Acceptable
CFI	>0.95 (Good); > 0.9 (Acceptable)	0.930	Acceptable
GFI	>0.95 (Good); > 0.9 (Adequate)	0.841	Not Acceptable
AGFI	>0.95 Performance poor in simulation studies	0.815	Not Acceptable
RMSEA	< 0.06 to 0.08 with confidence interval	0.035	Good

Table 6.6 Path coefficients and structural equations

Path	Estimate Un-stand	Estimate Standardized	S.E.	C.R.	P
Behavioral intention ← e24	2.347	.991	.180	13.028	***
Behavioral intention ← Personal Background & Safety Knowledge	.226	.049	.347	2.455	.015
Behavioral intention ← Project Workload	-.652	-.128	.435	-1.629	.104
Behavior ← Behavioral intention	.048	.302	.014	3.356	***
Behavior ← e23	.329	.870	.063	5.243	***
Behavior ← Personal Background & Safety Knowledge	.112	.153	.065	1.620	.085

Table 6.6 Path coefficients and structural equations (Continued)

Path	Estimate Un-stand	Estimate Standardized	S.E.	C.R.	P
Behavior ← Project Stakeholder & Family Influence	.194	.093	.309	2.127	.031
Behavior ← Weather & Worker Control	.527	.153	.314	1.679	.093
Behavior ← Organizational & Management Influence	.257	.227	.159	1.615	.106

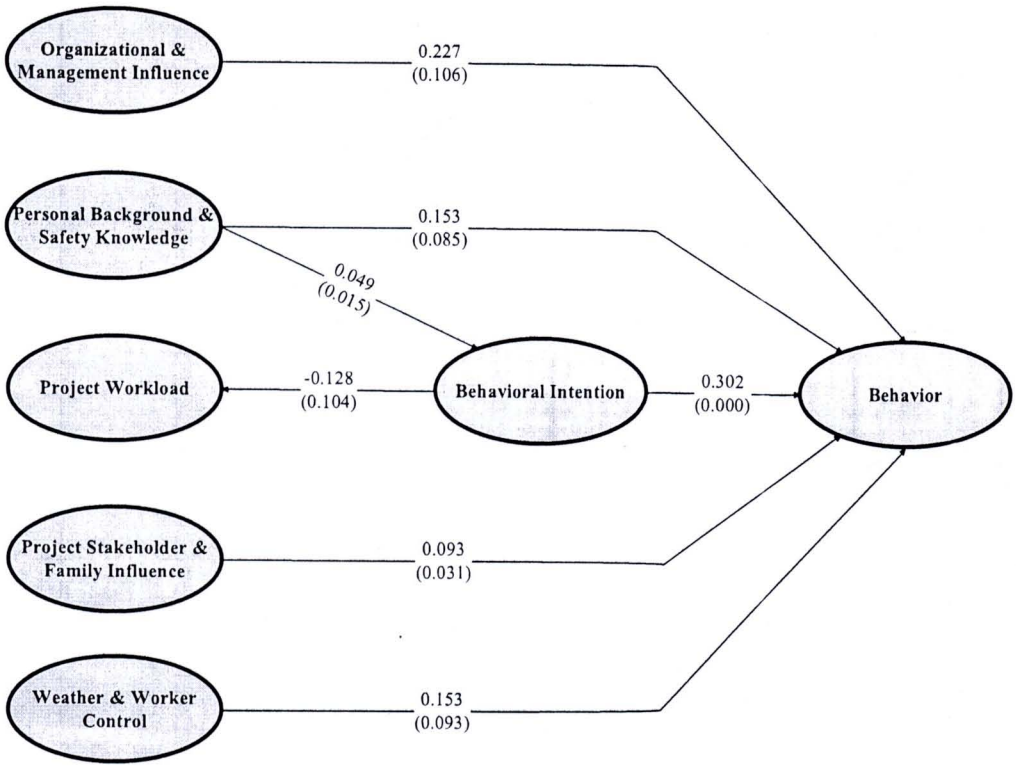

Figure 6.4 Path practice model for explaining supervisors' behavior based on actual practice

SEM result in Table 6.6 and Figure 6.4 indicated many relationships between actual practice and supervisor behavior. Supervisors' behavior on safety actions at construction site are positively affected by their behavioral intention (β= 0.302, P<0.01) and organizational influence (β= 0.227, P<0.10), these results similar with opinion explaining model in Chapter 5. This result again appropriates with some previous theory of behavior that individual behavior can be change through intention and influenced strongly by organization in which they are working for. These results stressed the important role of organization in improving supervisors' behavior on safety. However, practical explaining model indicated some other influences which did not explored from opinion explaining model. They are influences from safety knowledge and learning (β= 0.153, P<0.10), superiors pressure and family influence (β= 0.093, P<0.05), weather conditions and control ability (β= 0.153, P<0.10) on supervisor behavior. In addition, final practice model also indicated the influence of safety knowledge and learning on supervisor behavioral intention. Safety knowledge are positive influence in changing behavioral intention as our expected but the significant very weak (β= 0.049, P<0.05). One unexpected result is the negative affected by work assignment and project schedule on intention (β= -0.128, P=0.1). Normally, we expect that supervisor may constantly concern with safety if they did not stress from schedule and work assignment but the output is reverse direction.

6.4 The Difference Between Perception Model and Practice Model

Base on perception model was discussed in Chapter 5 and practice model in this chapter, we found some difference about factors influencing supervisor behavior. The difference include both what and how factors influencing supervisor behavior. This section will compare perception model and practice model in details to discovering differences in factors may cause changing their perception and current practice in safety action. They are summarized in Table 6.7. The directions of influence are provided from this Table, "Direct" means factor impact to behavior directly, and "Indirect" means factor impact to behavior indirectly through intention. Finally, the brief explaining and suggestion also provide in Table 6.7.

Table 6.7 Comparing factor influencing behavior between perception model and practice model

Item	Supervisor's perception model	Supervisor's practice model	Explaining and Suggestion
Safety regulation and procedures	Positive Direct	Positive Direct	These factors are important in both supervisor perception and practice. These factors should be strongly considered in order to achieve better safety behavior at construction site. These key factors can improve supervisor in particular and all employees at construction site in general. This result gives additional evidence about the way that organization can impact on supervisors who direct influence on workers daily.
Workplace environment	Positive Direct	Positive Direct	
Safety management system	Positive Direct	Positive Direct	
Financial supports for safety	Positive Direct	Positive Direct	
Type of project owner	Positive **Indirect**	Positive **Direct**	
Company vision about safety	Positive Direct	Positive Direct	
Working experience	Positive **Indirect**	Positive Direct, Indirect	The same results in both model indicated the level of important of these personality factor. Positive impact of experience, training, safety knowledge and control worker ability on supervisor' behavior orients manager in selecting suitable supervisor in appropriate project. In addition, this result definitive affirms the significant role of training program, enhance knowledge policy and improve supervisor authority for keeping safety at sites.
Providing of safety training	Positive Direct	Positive Direct, Indirect	
Safety knowledge	Positive **Indirect**	Positive Direct, Indirect	
Supervisor control worker	Positive **Indirect**	Positive Direct	

Table 6.7 Comparing factor influencing behavior between perception model and practice model (Continued)

Item	Supervisor's perception model	Supervisor's practice model	Explaining and Suggestion
Weather conditions	Positive **Indirect**	Positive Direct	Weather conditions were considered positive influence to supervisor' behavior direct or indirect way. Improve working conditions by applying technology, automatic dangerous work should consider improving behavior.
Age	-	Positive Direct, Indirect	Supervisor's perception indicated age was not important but real practice inverse. From practice model, age positively impact supervisor in both direct and indirect way. Older supervisor has higher level of safety behavior. It may come from their experience and knowledge. The result gives a notice about using young supervisor in project.
Family	-	Positive Direct	Supervisor did not perceive the important role of family influence on their behavior. However from the practice model, family has positively impact supervisor behavior directly. Manager should stress the supervisor role in their family in training program and always remind them about that to improve their safety awareness.

Table 6.7 Comparing factor influencing behavior between perception model and practice model (Continued)

Item	Supervisor's perception model	Supervisor's practice model	Explaining and Suggestion
Project owner	**Negative Indirect**	**Positive Direct**	Supervisor may perceive negative influence from owner, top manager, community and worker on their safety behavior. Because these stakeholders may negative effect to their behavioral intention, so supervisor think that they are neglect and unaware about safety at construction site. On the other hand, Supervisor's practice model shows that owner, top manager, community and worker are positively influence on their behavior. From this difference, the manner of expressing awareness and remind safety of project stakeholder more important than frequency of them.
Top Manager	**Negative Indirect**	**Positive Direct**	
Community	**Negative Indirect**	**Positive Direct**	
Worker	**Negative Indirect**	**Positive Direct**	
Education background	Positive Indirect	-	Although supervisor perceives education background may positive influence their behavior indirectly through behavioral intention, but it did not impact in practice. Supervisor who has higher background did not show higher safe behavior. It indicated lack of applying theory in real practice.

Table 6.7 Comparing factor influencing behavior between perception model and practice model (Continued)

Item	Supervisor's perception model	Supervisor's practice model	Explaining and Suggestion
Amount of work responsibility	Positive Indirect	Negative Indirect	The results of perception model show the project workload have positive influence on supervisor behavior. However, from the practice model, these factors have negatively impact on their behavior. It means that project schedule and workload are not supportive on their behavior. Supervisor perceives if they have more idle time, they may take care carefully for safety, but it is inversed in real. Behavior in idle sites was lower influence than stress site which required no mistake to finish on time.
Project schedule	Positive Indirect	Negative Indirect	
Project scale	Positive Indirect	-	The difference between perception and practice indicated project scale not actually impact on behavior. Safety behaviors only depend on organization policy. However in perception model, supervisor perceives their behavior influenced by scale, it should be changed in training program.
Coworker	-	-	These factors were not significant in both perception and practice models even though they were explored from EFA. They are influencing factors but not current urgent factors. However they should be considered in case company have more contexts and want to achieve higher safety level.
Smoking	-	-	
Salary	-	-	
Drinking	-	-	

6.5 Summary

A practice model was formulated to help both researchers and practitioners to better understand the supervisors' behavior on safety action in construction projects. The derived structural model consisted of seven measured structure and seven paths, representing the interrelationships between the five enabling and two outcome factor. Associating perception model in Chapter 5, the practice model provides a clear picture on how to better increase supervisor behavior on safety. EFA and SEM provided some indication that significant factors recognized influencing supervisor should be focused. In influence sequence, they in turn are behavioral intention, organization and management, personal background and safety knowledge, weather and worker control, project stakeholder and family influence.

Although all factors were extracted from EFA, but from SEM all relationships were considered carefully. Only significant influences are retained. From practice model, we can strongly affirm the positive influence of intention and organization on supervisors' behavior. Unexpected and interesting outcome is the negative influence of project workload on intention. In addition, the differences comparing between perception and practice model provide a deeply understand about the manner in changing supervisor behavior. It is hoped that the current study can contribute to the improvement safety approach at construction site in practically.