

CHAPTER 4

DATA ANALYSIS

Chapter 4 described for research results from the data collection and its outcome. The analyses were cognitively plan to achieve objectives of hypotheses, variables and relationship investigations. The simple statistical testing and analyzed methods by SEM were applied in the analysis.

PART I: Simple Statistics and Frequency

4.1 Response Rate

4.2 Respondents' Profile (Size of business, Years of experiences, and Memberships)

4.3 Descriptive statistics on Strategic Sourcing Techniques, Supplier Selection & Relations, Service Performance Units, and Service Level

PART II: Structural Equation Modeling (SEM)

4.4 Analysis on Structural Equation Modeling (Major Model)

4.5 Analysis on Structural Equation Modeling (Individual Model)

4.6 Path Analysis and Effects (Co-efficient and covariance)

4.7 Generalities of the Model (Invariance Model)

Table 4.1 Variable Codes and Names for this Survey

Abbreviation	Meaning
X1	Make
X2	Buy
X3	Both Make & Buy
X4	Money (Price) Focus
X5	Man (People) Relations Focus
X6	Management (Policy) Focus
Y1	Reliability
Y2	Rates
Y3	Resources
Y4	Risk Avoidance
Y5	Responsiveness
Z1	Cost
Z2	Time
Z3	Flexibility
L1 (MOB)	Latent 1 (Make or Buy)
L2 (DOM)	Latent 2 (Dominant Power)
L3 (SPU)	Latent 3 (Service Performance Units)
L4 (SVL)	Latent 4 (Competitive Service Level)
\bar{X}	Arithmetic Mean
S.D.	Standard Deviation
CR	Construct Reliability
AVE	Average Variance Extracted
χ^2	Weighted Least Squares Chi-Square
df	Degrees of Freedom
χ^2 / df	Normed Chi-Square
RMSEA	Root Mean Square Error of Approximation
SRMR	Standard Root Mean Square Residual
CFI	Comparative Fit Index
AGFI	Adjusted Goodness of Fit Index
GFI	Goodness of Fit Index

4.1 Response Rate

The research instruments were in the form of E-Questionnaire (under XLS format) and sent out via email to approach the target, and also the web-survey form under Google-doc to facilitate the possibility of target approaching. Some physical distribution by paper-printed forms were allowed only in some certain cases which support by third agent in helping as a data-collector. Paper forms had been distributed to some liners and forwarders managers who did not want to be advertised or disclose their name. Others regional agents as the collectors at each destinations were also regards as a volunteer and assist to follow the E-questionnaire after distributed (Appendix-E).

Table 4.2 Instrument Distribution

Channel	THAILAND	VIETNAM	CHINA	Total (Respond)
Email	200 (99)	200 (150)	200 (188)	600 (437)
Web-Survey*	(0)	(7)	(5)	(12)*
Paper	80 (60)	0 (0)	0 (0)	80 (60)
Total (by Nation)	280 (159)	200 (157)	200 (193)	680 (509)

* Web-Survey platform resulted as not a good tool for this industry

* Parentheses means the numbers of respondents.

Table 4.2 showed that the total 600 questionnaires distributed to each nation equally at 200 sets per nation. Total 509 were completed and returned as a whole 680 or response rate was 74.85%. Among the 509 sets of questionnaires that were received, 159 (31.24%) are from transporters in Thailand, 157 (30.84%) are from Vietnam, and 193 (37.92%) are from the Chinese forwarders.

4.2 Respondents' Profile

The general data demographical data were analyzed using Simple Standard Statistic by applied the frequency method in order to understand the respondents' characteristics.

4.2.1 Type of Business

Respondents selected one core activity from eight types of businesses

Table 4.3 Core Activity for Type of Business: ALL (N = 509)

TYPE (N)	Thailand	Vietnam	China	Total	TH (509)	VN (509)	CN (509)	Total%
3PL (Sea)	100	102	154	356	19.65%	20.04%	30.26%	69.94%
Liner	28	6	7	41	5.50%	1.18%	1.38%	8.06%
4PL	9	15	4	28	1.77%	2.95%	0.79%	5.50%
3PL (Air)	10	4	13	27	1.96%	0.79%	2.55%	5.30%
Custom	8	8	3	19	1.57%	1.57%	0.59%	3.73%
Truck	2	10	7	19	0.39%	1.96%	1.38%	3.73%
Other	1	10	1	15	0.20%	1.96%	0.20%	2.95%
W/H	1	2	1	4	0.20%	0.39%	0.20%	0.79%
(All)	159	157	193	509	31.24%	30.84%	37.92%	100%

Table 4.3 showed the type of business from total 509 respondents. Most of them were 3PL in SEA mode (69.94%), followed by liners (8.06%) and 4PL (5.50%) respectively.

Table 4.4 Type of Business by Country (n = 159/157/193)

TYPE (N)	Thailand	Vietnam	China	Total	TH (159)	VN (157)	CN (193)
3PL (Sea)	100	102	154	356	62.89%	64.97%	79.79%
Liner	28	6	7	41	17.61%	3.82%	3.63%
4PL	9	15	4	28	5.66%	9.55%	2.07%
3PL (Air)	10	4	13	27	6.29%	2.55%	6.74%
Custom	8	8	3	19	5.03%	5.10%	1.55%
Truck	2	10	7	19	1.26%	6.37%	3.63%
Other	1	10	1	15	0.63%	6.37%	0.52%
W/H	1	2	1	4	0.63%	1.27%	0.52%
(Total)	159	157	193	509	100%	100%	100%

Table 4.4 showed the type of business by country of the respondent's. Most and same for all three countries were 3PL in sea transport: Thailand (62.89%), Vietnam (64.97%), and China (79.79%). Secondly, followed by Liners for Thailand (17.61%), 4PL for Vietnam (9.55%), and 3PL (Air) for China (6.74%).

4.2.2 Size of Business

The Size of companies by numbers of employees, four sizes were divided into small, medium, big and large.

Table 4.5 Size of business: ALL (N = 509)

SIZE (N)	Thailand	Vietnam	China	Total	TH (509)	VN (509)	CN (509)	Total%
1-25	35	14	98	147	6.88%	2.75%	19.25%	28.90%
26-50	68	26	43	137	13.36%	5.11%	8.45%	26.90%
51-100	31	34	25	90	6.09%	6.68%	4.91%	17.70%
101 up	25	83	27	135	4.91%	16.31%	5.30%	26.50%
(All)	159	157	193	509	31.24%	30.84%	37.92%	100%

From N = 509, the most size of business were small size (1-25 employees) at total 147 respondents, followed by medium (26-50 employees) at 137, and the large organization (over 100 employees) at 135 respondents.

4.2.3 Years of Business Operation

The years of operating business defined as years of experience in their business.

Table 4.6 Years of experiences: ALL (N = 509)

Year (N)	Thailand	Vietnam	China	Total	TH (509)	VN (509)	CN (509)	Total%
<1	38	1	5	44	7.47%	0.20%	0.98%	8.64%
1-3	16	11	17	44	3.14%	2.16%	3.34%	8.64%
3.1-5	26	8	26	60	5.11%	1.57%	5.11%	11.79%
5.1-10	31	34	36	101	6.09%	6.68%	7.07%	19.84%
>10	48	103	109	260	9.43%	20.24%	21.41%	51.08%
(All)	159	157	193	509	31.24%	30.84%	37.92%	100%

The years of business operation, showed that more than 50% of firms, 260 were having more than 10 years in their business (51.08%). Followed by more than 5 years but less than 10 at 101 business firms (19.84%), and 60 business firms (11.79%) were more than 3 years but less than 5 years in operation.

4.2.4 Certificates and Membership

The types of memberships were divided into five types.

- (1) IATA = International Air Transport Association.
- (2) FIATA = International Federation of Freight Forwarders Association.
- (3) Local = The Freight or Customs Association in their own country (TIFFA, VIFFAS, CIFA).
- (4) Others = other transport associations in abroad (not in respondent's country).
- (5) None = Not applied for any membership nor join in any associations.

Table 4.7 showed the types of certificates as membership of the associations. For one was not a member was showed as "None", and only 24 firms in Thailand were none, other the rest were having at least one membership.

Table 4.7 Types of Certificate and Membership

Association & Membership	Countries			Total	n = 159/157/193			Total N=509
	Thailand	Vietnam	China		Thailand	Vietnam	China	
NOT a Member	24	0	0	24	15%	0%	0%	5%
1.1 IATA	11	20	16	47	7%	13%	8%	9%
1.2 FIATA	17	45	17	79	11%	29%	9%	16%
1.3 LOCAL	71	58	73	202	45%	37%	38%	40%
1.4 OTHERS	34	34	70	138	21%	22%	36%	27%
(One Membership)	133	157	176	466	84%	100%	91%	92%
2.1 IATA/LOC	0	0	1	1	0%	0%	1%	0%
2.2 IATA/OTH	1	0	0	1	1%	0%	0%	0%
2.3 FIATA/LOC	0	0	5	5	0%	0%	3%	1%
2.4 LOC/OTH	0	0	4	4	0%	0%	2%	1%
(Two Memberships)	1	0	10	11	1%	0%	5%	2%
3.1 ITA/FIA/LOC	1	0	4	5	1%	0%	2%	1%
3.2 ITA/FIA/OTH	0	0	1	1	0%	0%	1%	0%
3.3 ITA/LOC/OTH	0	0	1	1	0%	0%	1%	0%
3.4 FIA/LOC/OTH	0	0	1	1	0%	0%	1%	0%
(Three Memberships)	1	0	7	8	1%	0%	4%	2%
Total	159	157	193	509	100%	100%	100%	100%

Table 4.7 showed both Vietnamese and Chinese companies were having at least one certificate or joined in at least one type of association. Only in Thailand, there were total 24 firms did not join with any associations.

Most of them (202 companies) preferred to join the local association within their country.

138 of them joined in association which across the countries, 79 of them in FIATA (sea mode), and 47 under IATA (air mode). Total 24 of them had no any certificates (all are Thai enterprises).

Total 446 (or 92%) of them had only a single certificate, 5% have no certificate, 2% had only two certificates and the rest 2% applied for three memberships.

From the samples, the probabilities showed that “None” membership of any association could be happened in Thailand, but not in those two countries.

4.3 Level of Degrees: Items and Constructs

4.3.1 Latent 1: Strategic Sourcing Technique (SST)

Latent 1: Strategic Sourcing Techniques (SST) was constructed by 3 types of sources applied from Make or Buy (MoB) theory. “Make” regarded as making own consolidation (Insourcing). “Buy” regarded as Outsourcing (Buy the space as a co-load from other master); and “Both”, mixed methods were applied.

The level of mean scores identified the level of degrees are as following:-

1.00-1.50 = very low

1.51-2.50 = low

2.51-3.50 = moderate

3.51-4.50 = high

4.51-5.00 = very high

Table 4.8 Means and S.D. of MOB in SST

Descriptive Statistics						
Variables	ALL Mean	Std. Deviation	Level	TH Mean	VN Mean	CN Mean
Make1	3.695	1.113	High	3.717	3.758	3.627
Make2	4.110	.918	High	4.038	4.210	4.088
Make (X1)	3.903	.855	High	3.877	3.984	3.858
Buy1	3.694	1.098	High	*3.415	3.675	3.938
Buy2*	*3.389	1.056	Moderate	*3.459	*3.210	*3.477
Buy (X2)	3.541	.880	High	3.437	3.443	3.707
Both1	3.888	1.034	High	3.811	4.089	3.788
Both2	3.943	.977	High	3.830	4.013	3.979
Both (X3)	3.916	.862	High	3.821	4.051	3.883
SST (L1)	3.787	.677	High	3.712	3.826	3.816
Valid N (listwise)	509			159	157	193

* Moderate < 3.50

Table 4.8 showed level of Make or Buy (MOB) items in SST. Most were at “High” levels.

Make (X1) at “High” level ($\bar{X} = 3.903$, S.D. = 0.855). Buy (X2) at “High” level ($\bar{X} = 3.541$, S.D. = 0.88), and Both (X3) at “High” level ($\bar{X} = 3.916$, S.D. = 0.862).

By the highest mean scores were:-

- (1) “Both” (X3) with the value of mean 3.916 and standard deviation 0.862
- (2) “Make” (X1) with the value of mean 3.903 and standard deviation 0.855
- (3) “Buy” (X2) with the value of mean 3.541 and standard deviation 0.88

The MoB construct variables under SST (L1) was at “High” level ($\bar{X} = 3.787$, S.D. = 0.677).

4.3.2 Latent 2: Dominant Power in Selected Suppliers (DOM)

The dominant power (DOM) leads to select suppliers and building relationship by three focuses: Price (Money); People (Man); and Policy (Management) during the selection.

Table 4.9 Means and S.D. of DOM

Descriptive Statistics						
Items	ALL Mean	Std. Deviation	Level	TH Mean	VN Mean	CN Mean
Focus on Price1	3.933	.911	High	3.818	3.790	4.145
Focus on Price2	3.876	.913	High	3.874	3.707	4.016
Money (X4)	3.905	.836	High	3.846	3.748	4.080
Focus on People1	4.045	.849	High	4.000	3.955	4.155
Focus on People2	3.517	1.047	High	3.610	*3.236	3.668
Man (X5)	3.781	.814	High	3.805	3.596	3.912
Focus on Policy1	3.556	1.004	High	3.572	*3.446	3.632
Focus on Policy2	3.733	.986	High	3.597	3.701	3.870
Manage (X6)	3.644	.902	High	3.585	3.573	3.751
SSR (L2)	3.777	.734	High	3.745	3.639	3.915
Valid N (listwise)	509			159	157	193

* Moderate < 3.50

Table 4.9 showed the level of Dominant power (DOM) under Selected Suppliers & Relationships (SSR) that all were at “High” levels. Money (X4) at “High” level ($\bar{X} = 3.905$, S.D. = 0.836). Man (X5) at “High” level ($\bar{X} = 3.781$, S.D. = 0.814), and Management (X6) at “High” level ($\bar{X} = 3.644$, S.D. = 0.902).

Ranking by the highest mean values of variables were:-

- (1) X4 “Price” (Money) with the value of mean 3.905 and standard deviation 0.836
- (2) X5 “People” (Man) with the value of mean 3.781 and standard deviation 0.814
- (3) X6 “Policy” (Management) the value of mean 3.644, standard deviation 0.902

Three DOM construct variables under SSR (L2) was at “High” level ($\bar{X} = 3.777$, S.D. = 0.734).

4.3.3 Latent 3: Service Performance Units (SPU)

Service performed into five facets (5R’s): Reliability (Y1), Rates (Y2), Resources (Y3), Risk avoidance (Y4), and Responsiveness (Y5). The theoretical modification based on ServQual (PZB) model.

Table 4.10 Means and S.D. of SPU

Descriptive Statistics						
Items	ALL Mean	Std. Deviation	Level	TH Mean	VN Mean	CN Mean
y1.1 Well-known	4.081	.825	High	3.937	4.115	4.171
y1.2 Brand	*3.466	1.069	Moderate	3.686	*3.401	*3.337
y1.3 Bkg.CFM right	4.220	.827	High	3.950	4.166	4.487
y1.4 Punctual	4.155	.804	High	3.874	4.032	4.487
y1.5 Accuracy	4.228	.808	High	3.906	4.146	**4.560
y1.6 Reputation	4.224	.807	High	4.094	4.025	4.492
y1.7 Full inform	3.892	.944	High	3.868	3.732	4.041
y1.8 Duty SI	4.265	.827	High	4.050	4.185	**4.508
y1.9 Advertisement	3.978	.983	High	3.597	4.178	4.130
Reliability (Y1)	4.057	.602	High	3.885	3.998	4.246
y2.1 Reasonable	4.139	.775	High	3.874	4.038	4.440
y2.2 Mkt.LOC	4.053	.803	High	3.862	3.936	4.306
y2.3 Attractive	3.813	.906	High	3.723	3.580	4.078
y2.4 TCO	3.752	.917	High	3.881	3.490	3.860
y2.5 Std.POL	4.014	.879	High	3.704	4.013	4.269
y2.6 Std.POD	3.980	.815	High	3.780	3.796	4.295
y2.7 Low. Complain	3.864	.867	High	3.642	3.529	4.321
y2.8 Win Bidding	3.505	.923	High	3.579	*3.121	3.756
Rates (Y2)	3.890	.622	High	3.756	3.688	4.166
y3.1 Sufficient staff	4.139	.877	High	3.849	4.146	4.373
y3.2 Op. Software	4.161	.833	High	3.855	4.134	4.435
y3.3 HR.R&D	3.974	.861	High	3.824	3.987	4.088
y3.4 Suff. equip.	3.937	1.004	High	4.000	3.510	4.233
y3.5 Suff. storage	3.908	.908	High	3.660	3.669	4.306
y3.6 Suff. IT/HW	4.022	.884	High	3.717	4.121	4.192
y3.7 Invest intention	3.829	.867	High	3.585	3.968	3.917
y3.8 Special dept.	3.784	1.065	High	3.704	3.745	3.881
Resources (Y3)	3.969	.630	High	3.774	3.910	4.178

Table 4.10 (Continued)

Items	ALL Mean	Std. Deviation	Level	TH Mean	VN Mean	CN Mean
y4.1 Insured B/L	4.065	.944	High	4.031	3.987	4.155
y4.2 Claim-pocket	*3.438	1.185	Moderate	*2.868	3.873	3.554
y4.3 Tally record	4.077	.887	High	3.830	4.076	4.280
y4.4 B/L details	4.238	.789	High	3.906	4.178	**4.560
y4.5 Track & Trace	4.094	.915	High	3.541	4.166	4.492
y4.6 Miss-delivery	3.528	1.441	High	3.868	4.076	2.803
Risk avoidance (Y4)	3.907	.606	High	3.674	4.059	3.974
y5.1 Avail contact	4.442	.841	High	4.201	4.427	**4.653
y5.2 Quick Booking	4.285	.818	High	4.069	4.229	**4.508
y5.3 Help Problem	4.334	.790	High	4.101	4.318	**4.539
y5.4 Fast Quote	4.102	1.045	High	3.673	4.236	4.347
y5.5 Avail. Space	4.204	.843	High	3.830	4.210	**4.508
y5.6 Avail. Dest.	4.096	.918	High	3.717	4.108	4.399
y5.7 Avail. T/T	4.114	.880	High	3.679	4.140	4.451
y5.8 Response TF	4.255	.812	High	3.855	4.312	**4.539
y5.9 Not Delay	3.835	.920	High	3.755	3.701	4.010
y5.10 Support svc	4.189	.856	High	4.006	4.191	4.337
Responsiveness (Y5)	4.186	.657	High	3.889	4.187	4.429
SPU (L3)	4.002	.530	High	3.796	3.969	4.199
Valid N (listwise)	509			159	157	193

* Moderate 2.51- 3.50, ** Very High > 4.50, (High 3.51 – 4.50).

Table 4.10 showed that the levels of Service Performance Units (SPU) under 5R's concept (5Rs) that all were at "High" levels.

Reliability (Y1) at "High" level ($\bar{X} = 4.057$, S.D. = 0.602).

Rates (Y2) at "High" level ($\bar{X} = 3.89$, S.D. = 0.622).

Resources (Y3) at "High" level ($\bar{X} = 3.969$, S.D. = 0.63).

Risk avoidance (Y4) at "High" level ($\bar{X} = 3.907$, S.D. = 0.606).

Responsiveness (Y5) at "High" level ($\bar{X} = 4.186$, S.D. = 0.657).

Ranking by the highest mean values of variables were:-

- (1) Responsiveness (Y5) with the value of mean 4.186 and standard deviation 0.657
- (2) Reliability (Y1) with the value of mean 4.057 and standard deviation 0.602
- (3) Resources (Y3) with the value of mean 3.969 and standard deviation 0.630
- (4) Risk avoidance (Y4) with the value of mean 3.907 and standard deviation 0.606
- (5) Rates (Y2) with the value of mean 3.890 and standard deviation 0.622

Total five construct variables under SPU (L3) was at “High” level ($\bar{X} = 4.002$, S.D. = 0.53).

4.3.4 Latent 4: Service Level (SVL)

The Competitiveness explained by Service Level (SVL). The competitiveness was investigated by Cost (Z1), Time (Z2), and Flexibility (Z3).

Table 4.11 Means and S.D. of SVL

Descriptive Statistics						
Variables	ALL Mean	Std. Deviation	Level	TH Mean	VN Mean	CN Mean
Cost (Z1)	3.912	.919	High	3.692	3.688	4.275
Time (Z2)	3.908	.944	High	3.516	3.873	4.259
Flexibility (Z3)	3.996	.905	High	3.686	3.949	4.290
Service Level (L4)	3.939	.821	High	3.631	3.837	4.275
Valid N (listwise)	509			159	157	193

Table 4.11 showed the level of Service Level Competitiveness (SVL). All were at “High” levels. Cost (Z1) at “High” level ($\bar{X} = 3.912$, S.D. = 0.919). Time (Z2) at “High” level ($\bar{X} = 3.908$, S.D. = 0.944), and Flexibility (Z3) at “High” level ($\bar{X} = 3.996$, S.D. = 0.905).

Ranking by the highest mean scores were:-

- (1) “Flexibility” (Z3) with the value of means 3.996 and standard deviation 0.905
- (2) “Cost” (Z1) with the value of mean 3.912 and standard deviation 0.919
- (3) “Time” (Z2) with the value of mean 3.908 and standard deviation 0.944

The three construct variables under SVL (L4) was at “High” level ($\bar{X} = 3.939$, S.D. = 0.821).

END of Part I: Simple Statistics Analysis

PART II

Structural Equation Modeling (SEM)

This section, the investigations made on measurement model and its causal relationships. The confirmation of model fitness with the criterion outcome supports by the exploratory data.

4.4 Major Model

4.5 Individual Model

4.6 Path Analysis and Effects (Co-efficient and covariance)

4.7 Invariance Test

Table 4.12 showed the 14 variables constructed in 4 Latent applied for all analyses

Table 4.12 Latent of Constructs and Variables

Latent	Construct	SEM	Variables	Factors
L1 Exogenous (SST)	MOB Make or Buy <i>(Strategic Sourcing Techniques)</i>	KSI-1	X1 X2 X3	Make Buy Both
L2 Exogenous (SSR)	DOM Dominant Power <i>(Selected Suppliers & Relation)</i>	KSI-2	X4 X5 X6	Price People Policy
L3 Endogenous (SPU)	SPU Service Performance Units (5Rs) <i>(Service Quality)</i>	ETA-1	Y1 Y2 Y3 Y4 Y5	Reliability Rates Resources Risk Avoidance Responsiveness
L4 Endogenous (SVL)	SVL Service Level <i>(Competitive Advantages)</i>	ETA-2	Z1 Z2 Z3	Cost Time Flexibility

4.4 Major Model

The analyzed data made on N=509 with these standard investigations:-

- 4.4.1 Univariate Summary Statistics for Continuous Variables
- 4.4.2 Correlations Matrix of the Observed Variables
- 4.4.3 Measurement Model (Validity)
- 4.4.4 Model Modification (Before & After Criteria)
- 4.4.5 Construct Reliability (CR) and Average Variance Extracted (AVE)
- 4.4.6 Path Analysis (The Effects)

4.4.1 Univariate Summary Statistics for Continuous Variables

The means scores of 14 observed variables arranged into 5 degrees of levels which are: Very low =1.0-1.50, Low =1.51-2.50, Moderate = 2.51-3.5, High = 3.51-4.5, Very high =4.51-5.0

Table 4.13 Descriptive Statistics: ALL (N = 509)

Variable	Mean	St. Dev	Min	Max	Level	Skewness	Kurtosis
X1	3.89	0.697	2.000	5.000	High	-0.270	0.011
X2	3.87	0.737	2.000	5.000	High	-0.301	-0.108
X3	4.10	0.687	3.000	5.000	High	-0.137	-0.878
X4	3.93	0.773	1.000	5.000	High	-0.500	0.474
X5	3.83	0.821	1.000	5.000	High	-0.459	0.350
X6	3.89	0.818	1.000	5.000	High	-0.408	0.121
Y1	4.14	0.671	1.000	5.000	High	-0.844	2.263
Y2	4.03	0.645	1.000	5.000	High	-0.687	1.864
Y3	4.10	0.694	1.000	5.000	High	-0.884	2.097
Y4	4.23	0.715	1.000	5.000	High	-1.079	2.488
Y5	4.26	0.695	1.000	5.000	High	-0.960	1.794
Z1	3.96	0.739	1.000	5.000	High	-0.408	0.182
Z2	3.99	0.762	1.000	5.000	High	-0.540	0.458
Z3	3.97	0.732	1.000	5.000	High	-0.522	0.676

Table 4.13 showed all means scores were at “High” level. The three highest scores were: Y5 (Responsiveness $\bar{X} = 4.26$, S.D. = 0.695), Y4 (Risk avoidance $\bar{X} = 4.23$, S.D. = 0.715), and "Y1 (Reliability $\bar{X} = 4.14$, S.D. = 0.671). ALL ARE “HIGH” LEVEL.

Skewness & Kurtosis (Normal Distribution)

Skewness (+/- 0.00) = Normal; (-) Left = < 0; (+) Right = > 0

Kurtosis (0.00 to 3.00) = Normal; (-) Low = < 0; (+) High = > 0

4.4.2 Correlations Matrix of the Observed Variables

The investigation made on Pearson's Product Moment Correlation, to investigate the relationship and directional relations among the variables.

The high correlation values were over .60, except only Y1 with all X_n

The highest was .940 were Z1 & Z3 (Cost & Flexibility).

The lowest correlations were: Y4 with X2 (.365), Y4 with X3 (.381), Y4 with X1 (.401), or it means that the "Risk Avoidance" factor (Y4) has low relationship to Latent 1 (SST).

Table 4.14 Correlation Matrix (Pearson)

R	X1	X2	X3	X4	X5	X6	Y1	Y2	Y3	Y4	Y5	Z1	Z2	Z3
X1	1.000													
X2	0.751	1.000												
X3	0.690	0.613	1.000											
X4	0.450	0.452	0.395	1.000										
X5	0.502	0.499	0.380	0.802	1.000									
X6	0.501	0.454	0.419	0.826	0.815	1.000								
Y1	0.479	0.439	0.446	0.546	0.512	0.530	1.000							
Y2	0.518	0.467	0.473	0.528	0.518	0.520	0.800	1.000						
Y3	0.478	0.410	0.428	0.515	0.479	0.504	0.666	0.758	1.000					
Y4	0.401	0.365	0.381	0.508	0.470	0.502	0.638	0.656	0.814	1.000				
Y5	0.443	0.409	0.402	0.505	0.485	0.502	0.761	0.695	0.721	0.785	1.000			
Z1	0.511	0.490	0.427	0.647	0.665	0.709	0.603	0.597	0.607	0.599	0.622	1.000		
Z2	0.531	0.520	0.439	0.620	0.654	0.670	0.616	0.597	0.617	0.602	0.635	0.901	1.000	
Z3	0.509	0.496	0.434	0.653	0.656	0.694	0.603	0.589	0.611	0.597	0.620	0.940	0.902	1.000
MEAN	3.89	3.87	4.10	3.96	3.93	3.83	3.89	3.89	4.14	4.03	4.10	4.23	4.26	4.15
S.D.	0.697	0.737	0.687	0.629	0.773	0.821	0.818	0.752	0.671	0.645	0.694	0.715	0.695	0.606
Bartlett's Test of Sphericity Chi-Square = 7258.311, df = 91, p = .000, KMO = 0.919														

Moreover, table 4.14 showed all in positive directions, with the highest correlated values were:-

Highest correlations: Z1&Z3 (.940); Z2&Z3 (.902); Z1&Z2 (.901).

Highest correlations in L1 were: X1&X2 (.751)

Highest correlations in L2 were: X4&X6 (.826)

Highest correlations in L3 were: Y3&Y4 (.814)

Highest correlations in Z1 were: X6 (.709), X5 (.665), Y5 (.622).

Highest correlations in Z2 were: X6 (.670), X5 (.654), Y5 (.635).

Highest correlations in Z3 were: X6 (.694), X5 (.656), X4 (.653).

Highest means values on Dependent variables: Z2, Z1, Z3 (4.26, 4.23, 4.15)

Highest means values on Independent variables: Y3, Y5, X3, Y4, X4, X5 (4.14, 4.10, 4.10, 4.03, 3.96, 3.93) respectively.

For the Kaiser-Mayer-Olkin Measurement of Sampling Adequacy (KMO) and Barlett's test of sphericity for observed variables investigations whether all are Identity Matrix.

Hair, et. al., 2006 recommended that Correlation > 0.30 was not equal all Matrix. KMO (Measure of Sampling Adequacy) between 0 ~1; KMO (0.70~0.79) = Good Factor Analysis; KMO (0.80 up) = Very Good Factor Analysis.

For the Barlett's Test (Sig. 0.00) to Reject H_0 : Not Identity Matrix; H_a : Model was Identity Matrix (all variables are having relationships).

4.4.3 Measurement Model (Validity and CFA)

The investigations on model's validity were made on 2 steps which were 1st order and 2nd order investigations. The first order investigated only on KSI-1 and KSI-2, the second order investigated the KSI-1, KSI-2, and ETA-1. Both test in order to prove for the validity of the model.

- 1st Order investigation

2KSI represented by X1-X3 (Sourcing) and X4-X6 (Dominant power in selection).

Table 4.15 showed the Covariance Matrix, means and S.D. values for latent 1 (X1, X2, X3) and latent 2 (X4, X5, and X6).

Table 4.15 (1st Order Analysis) – Covariance Matrix, Means, Standard Deviations

Covariance Matrix						
	X1	X2	X3	X4	X5	X6
X1	0.486					
X2	0.386	0.543				
X3	0.330	0.310	0.471			
X4	0.243	0.257	0.210	0.598		
X5	0.287	0.302	0.214	0.509	0.673	
X6	0.286	0.274	0.235	0.522	0.547	0.670
Means						
	X1	X2	X3	X4	X5	X6
	3.892	3.874	4.104	3.933	3.835	3.894
Standard Deviations						
	X1	X2	X3	X4	X5	X6
	0.697	0.737	0.687	0.773	0.821	0.818

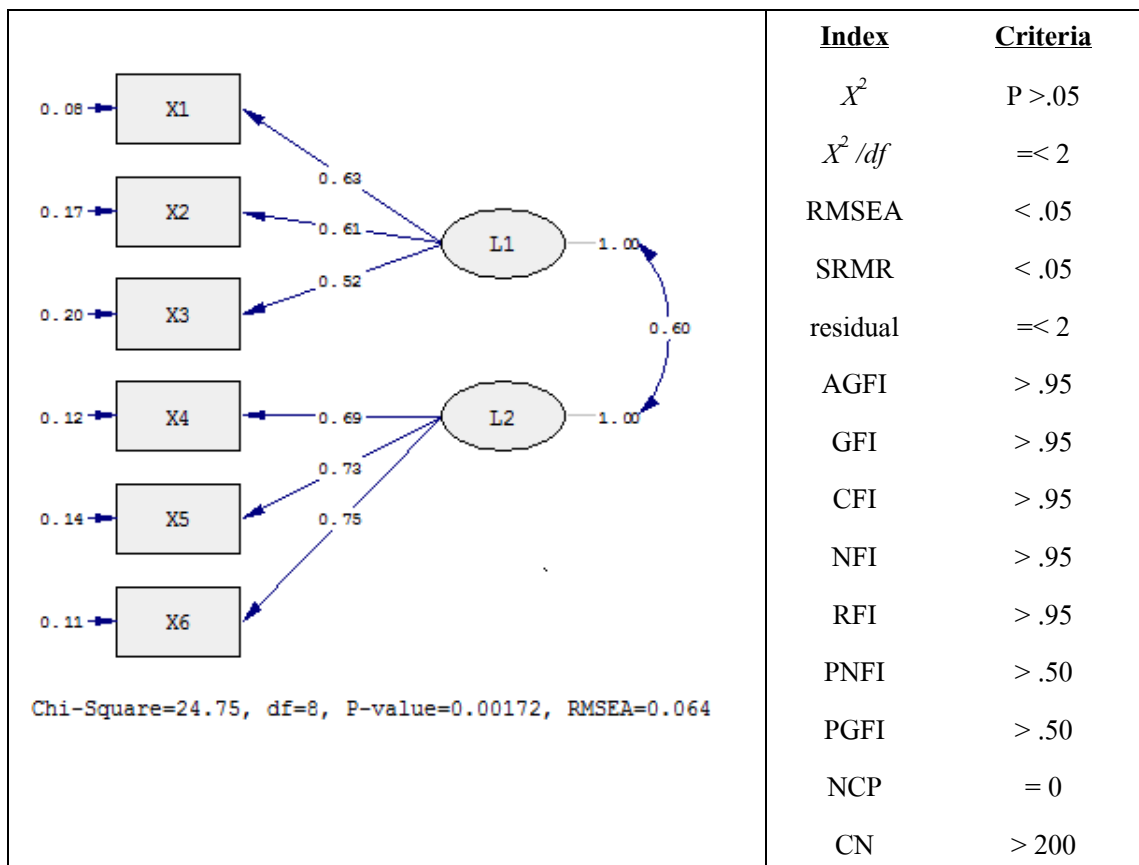


Figure 4.1 First Order Diagram – Major Model

Table 4.16 (1st Order Analysis) – Modification Indices

Modification Indices for LAMBDA-X		
	L1	L2
	-----	-----
X1	--	0.93
X2	--	1.84
X3	--	0.14
X4	3.29	--
X5	2.72	--
X6	0.03	--

Modification Indices for THETA-DELTA						
	X1	X2	X3	X4	X5	X6
	-----	-----	-----	-----	-----	-----
X1	--					
X2	0.40	--				
X3	1.84	0.93	--			
X4	7.99	0.73	1.56	--		
X5	0.62	8.02	8.52	0.03	--	
X6	2.11	7.10	1.69	2.72	3.29	--

The first modification had to consider on the indices which support the Chi-square value reduction ($X^2 = 24.75$, $df = 8$, $p = 0.00172$, $RMSEA = .064$), the $X^2 / df = 3.094$ which still over 2.0.

Selection made on which greater value between the highest of LAMBDA-X (LX) or X4 (3.29) or LX(4,1) and in THETA-DELTA (TD) which was X3-X5 (8.52), or TD(5,3)= 8.52 had more reduction on Chi-Square value than LX(4,1)=(3.29). Thus, the new expected changes value from 24.75-(8.52) was approximately 16.23. Table 4.17 showed the record of modified steps.

Table 4.17 (1st Order Analysis) – Modification Indices Record

Step	Start	Stop	X^2	df	X^2/df	p	RMSEA	SRMR	CFI	GFI	AGFI
0	-	-	24.75	8	3.094	0.00172	0.064	0.017	0.99	0.98	0.96
1	X3	X5	15.88	7	2.269	0.02625	0.050	0.016	1.00	0.99	0.97
2	X2	X5	11.05	6	1.842	0.08696	0.041	0.012	1.00	0.99	0.97
3	X1	X4	1.74	5	0.348	0.88446	0.000	0.005	1.00	1.00	1.00

Table 4.16 (Continued)

Summary Statistics for Standardized Residuals		(Less than 2.0)
Smallest Standardized Residual =	-0.78	= pass
Median Standardized Residual =	0.23	= pass
Largest Standardized Residual =	0.78	= pass

Finally, the model after 3 modifications passed all the criteria and support the study that model was good enough for the fitness.

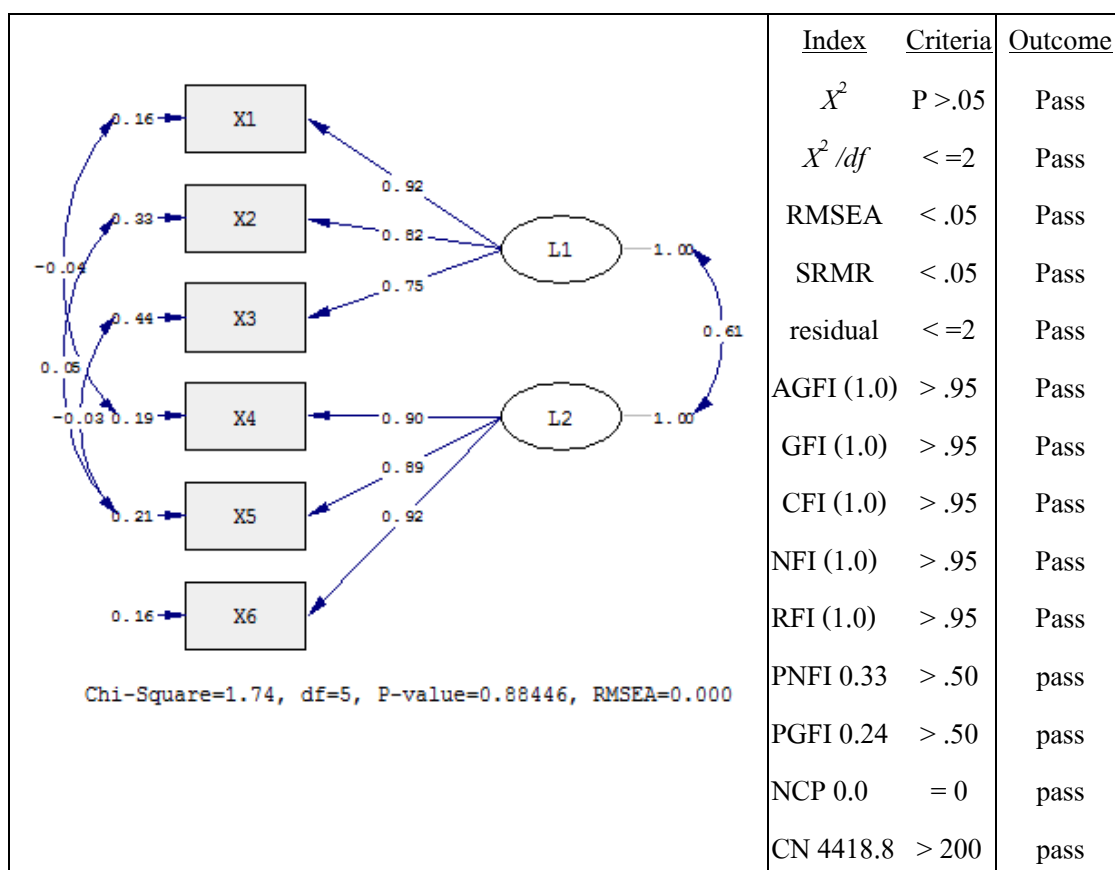


Figure 4.2 First Order Diagram – Fitted Model (Standardized)

The X-Model showed value Chi-Sq=24.75, df=8, (chi/df=3.094), P=0.0017, RMSEA=0.064. Total 3 times adjustments followed Modification Indices' suggestion to pass standard criteria. Final value Chi-Sq=1.74, df=5, (chi/df 0.348), P=0.88446, RMSEA=0.000 (GFI=1.00, AGFI=1.00, NFI=1.00). This was a very good X-Model

- 2nd Order investigation

Aforementioned 2KSI represented by X1-X6 with insert 1ETA (Y) as Y1-Y5 (SPU).

Table 4.18 (2ND Order Analysis) – Summary Statistics

– Univariate Summary Statistics for Continuous Variables

Variable	Mean	St. Dev	T-Value	Skewness	Kurtosis	Min (Frq)	Max (Frq)
Y1	4.143	0.671	139.373	-0.844	2.263	1 (2)	5 (141)
Y2	4.028	0.645	140.784	-0.687	1.864	1 (1)	5 (99)
Y3	4.102	0.694	133.351	-0.884	2.097	1 (2)	5 (132)
Y4	4.228	0.715	133.442	-1.079	2.488	1 (3)	5 (182)
Y5	1.257	0.695	138.228	-0.960	1.794	1 (1)	5 (190)

– Test of Univariate Normality for Continuous Variables

Variable	Skewness		Kurtosis		Skewness and Kurtosis	
	Z-Score	P-Value	Z-Score	P-Value	Chi-Square	P-Value
Y1	-6.916	0.000	0.551	0.000	78.225	0.000
Y2	-5.838	0.000	4.954	0.000	58.624	0.000
Y3	-7.176	0.000	5.291	0.000	79.494	0.000
Y4	-8.358	0.000	5.795	0.000	103.439	0.000
Y5	-7.655	0.000	4.845	0.000	82.070	0.000

– Test of Multivariate Normality for Continuous Variables

Value	Skewness		Kurtosis		Skewness and Kurtosis		
	Z-Score	P-Value	Value	Z-Score	P-Value	Chi-Square	P-Value
-----	-----	-----	-----	-----	-----	-----	-----
11.865	18.722	0.000	164.139	10.027	0.000	451.066	0.000

Table 4.18 showed the second order general summary statistics and the normality of variables.

Table 4.18 showed the highest means was Y5 (4.257), Y4 (4.228), and Y1 (4.143) in Latent 3. X4, X6, X5 = 3.933, 3.894, and 3.835 respectively of Latent 2, and X3, X1, and X2 values as 4.104, 3.892, and 3.874 respectively.

Table 4.19 (2ND Order Analysis) – Covariance Matrix, Means, Standard Deviations

Covariance Matrix											
	X1	X2	X3	X4	X5	X6	Y1	Y2	Y3	Y4	Y5
X1	0.486										
X2	0.386	0.543									
X3	0.330	0.310	0.471								
X4	0.243	0.257	0.210	0.598							
X5	0.287	0.302	0.214	0.509	0.673						
X6	0.286	0.274	0.235	0.522	0.547	0.670					
Y1	0.224	0.217	0.206	0.283	0.282	0.291	0.450				
Y2	0.233	0.222	0.210	0.264	0.274	0.275	0.346	0.417			
Y3	0.232	0.210	0.204	0.277	0.273	0.286	0.310	0.340	0.482		
Y4	0.200	0.192	0.187	0.281	0.276	0.294	0.306	0.303	0.404	0.511	
Y5	0.215	0.210	0.192	0.271	0.277	0.285	0.355	0.312	0.348	0.390	0.483

Means											
	Y1	Y2	Y3	Y4	Y5	X1	X2	X3	X4	X5	X6
	4.143	4.028	4.102	4.228	4.257	3.892	3.874	4.104	3.933	3.835	3.894

Standard Deviations											
	Y1	Y2	Y3	Y4	Y5	X1	X2	X3	X4	X5	X6
	0.671	0.645	0.694	0.715	0.695	0.697	0.737	0.687	0.773	0.821	0.818

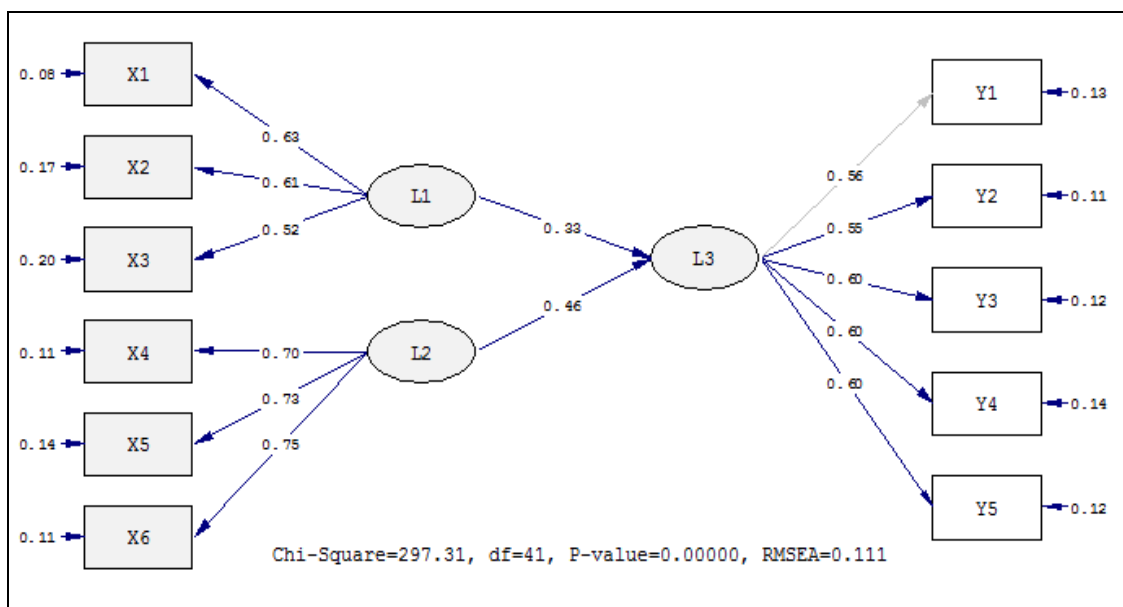


Figure 4.3 Second Order Analysis (Y1: Before Modification)

Figure 4.3 showed before modification, the Y-Model showed beginning Chi-Sq=297.31, df =41, P=0.000, RMSEA =0.111. Total 6 times Modification Indices were followed to pass standard criteria (Table 4.20). The final value Chi-Sq=39.35, df =35, (chi/df 1.124), P=0.28151, RMSEA=0.016 (GFI=0.99, AGFI=0.97, NFI=1.00). This model was also a good XY-Model (Figure 4.4).

Table 4.20 (2ND Order Analysis) – Modification Indices Record

Step	Start	Stop	χ^2	df	χ^2/df	<i>p</i>	RMSEA	SRMR	CFI	GFI	AGFI
0	-	-	297.31	41	7.251	0.00000	0.111	0.033	0.97	0.90	0.85
1	Y3	Y4	215.70	40	5.393	0.00000	0.093	0.027	0.98	0.93	0.88
2	Y4	Y5	116.31	39	2.982	0.00000	0.062	0.023	0.99	0.96	0.93
3	Y1	Y3	86.86	38	2.286	0.00001	0.050	0.025	0.99	0.97	0.95
4	Y2	Y5	63.08	37	1.705	0.00478	0.037	0.023	1.00	0.98	0.96
5	X1	X4	53.01	36	1.473	0.03357	0.030	0.023	1.00	0.98	0.97
6	X2	X5	39.35	35	1.124	0.28151	0.016	0.021	1.00	0.99	0.97

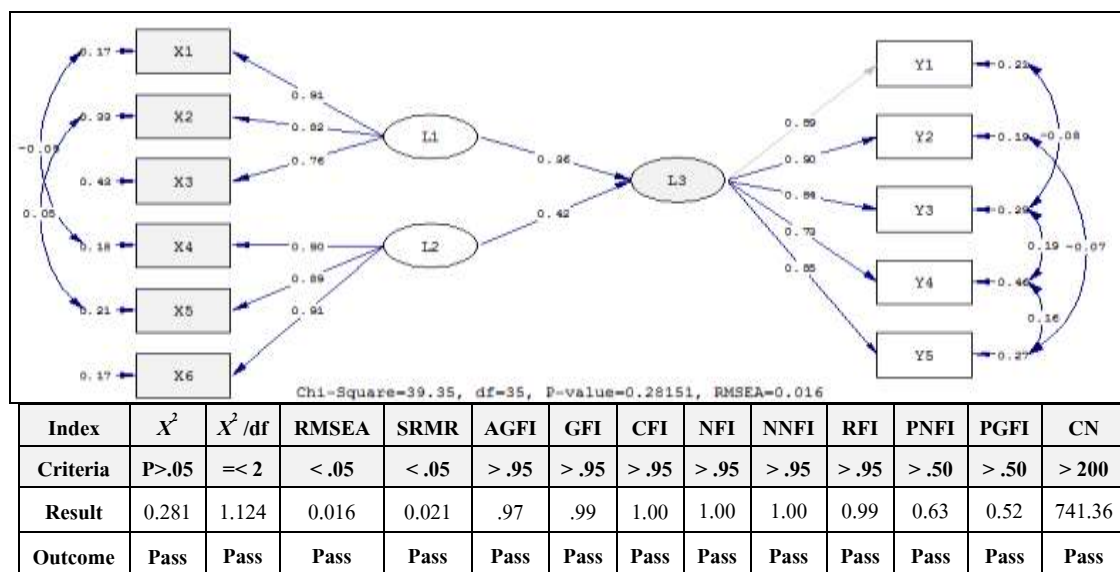


Figure 4.4 Second Order Analysis (Y1: Standardized Model)

- Confirmatory Factor Analysis: CFA

CFA investigated the factors component bases for Construct validity. The competitiveness of logistics providers' model was inspected by maximum likelihood method. The findings resulted the Goodness of Fit Index (GFI) has a high consistency with empirical information (GFI = 0.98). At the beginning of the model input with the maximum likelihood method found that the GFI remained inconsistent with empirical information and was not concurrent with the set criteria when evaluating based on the Chi-Square = 340.93, df = 71, p-value = 0.00, CFI = 0.98, GFI = 0.91, AGFI = 0.87, RMSEA = 0.087, and SRMR = 0.029.

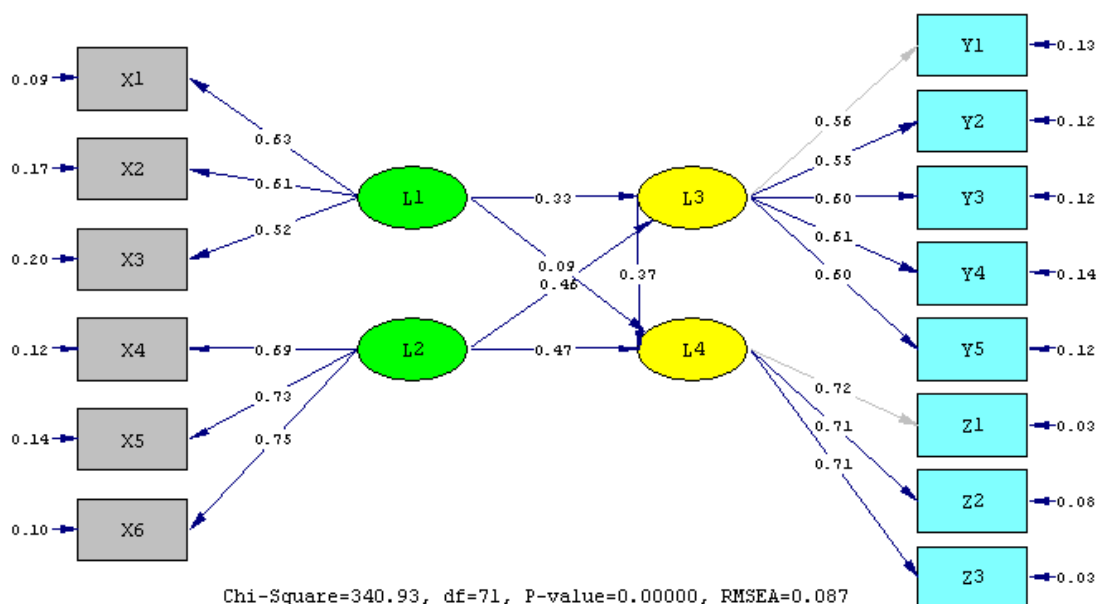


Figure 4.5 Path Diagram - the Competitive Service Level of Logistics Providers (Before)

4.4.4 Model Modification (Before & After Criteria)

The relationship model between Sourcing Technique, Dominant Power in Selection, Service Performance Units, and Competitive Service Level was analyzed by applied the maximum likelihood method.

Based on the Chi-Square of 340.93, df of 71, p-value of 0.00, CFI of 0.98, GFI of 0.91, AGFI of 0.87, RMSEA of 0.087, and SRMR of 0.029 failed to pass set criteria (Joreskog & Sorbom, 1996)

Hence, Model Modification Indices (MI) was employed for the parameter adjustment recommendations. Adjustment made by consent to relax preliminary agreements for discrepant values to achieve the Goodness of Fit Index (for the consistency result with empirical information, the overall analytical results of the Goodness of Fit Index of the Post-Adjustments to obtain model fitness with the empirical information).

Table 4.21 showed the model before modifications.

Table 4.21 Model before Modification

Goodness of Fit Index	Criteria	Measured Index Values	Results
Chi-Square/df	< 2	4.80	Not Pass
CFI	≥ 0.95	0.98	Pass
GFI	≥ 0.95	0.91	Not Pass
AGFI	≥ 0.95	0.87	Not Pass
RMSEA	< 0.05	0.087	Not Pass
SRMR	< 0.05	0.029	Pass

Table 4.22 and 4.23 showed between the modification record and after modifications were made.

Table 4.22 Modification Indices Record

Modification Indices			Criteria		< 2.00	> 0.05	< 0.05	< 0.05	$> .95$	$> .95$	$> .95$
Step	start	end	Chi-Sq	df	Chi/df	p	RMSEA	SRMR	GFI	AGFI	CFI
0	-	-	340.93	71	5.506	.00000	.087				
1	Y3	Y4	270.03	70	3.858	.00000	.075				
2	Y4	Y5	174.64	69	2.531	.00000	.055				
3	Y1	Y3	145.50	68	2.140	.00000	.047				
4	Y2	Y5	120.42	67	1.797	.00007	.040				
5	L4	Y4	104.65	66	1.586	.00173	.034				
6	L3	Z2	96.64	65	1.487	.00662	.031				
7	X3	X5	87.42	64	1.366	.02756	.027				
8	X2	X5	81.65	63	1.296	.05710	.024				
9	X1	X4	72.75	62	1.173	.16501	.018	.017	.98	.97	1.0
			Outcome	=	PASS	PASS	PASS	PASS	PASS	PASS	PASS

Finally, the outcome passed all criteria by total 9 modified times as above record. For more details with the Syntax, please see Appendix-R3.

Table 4.23 Model after Modification

Goodness of Fit Index	Criteria	Measured Index Values	Results
Chi-Square/df	< 2	1.17	Pass
CFI	≥ 0.95	1.00	Pass
GFI	≥ 0.95	0.98	Pass
AGFI	≥ 0.95	0.97	Pass
RMSEA	< 0.05	0.018	Pass
SRMR	< 0.05	0.017	Pass

The overall model was found to fit the empirical information with all fitness indices passing the acceptance criteria with the following index values: Chi-Square/df of 1.17, CFI of 1, GFI of 0.98, AGFI of 0.97, RMSEA of 0.018, and SRMR of 0.017.

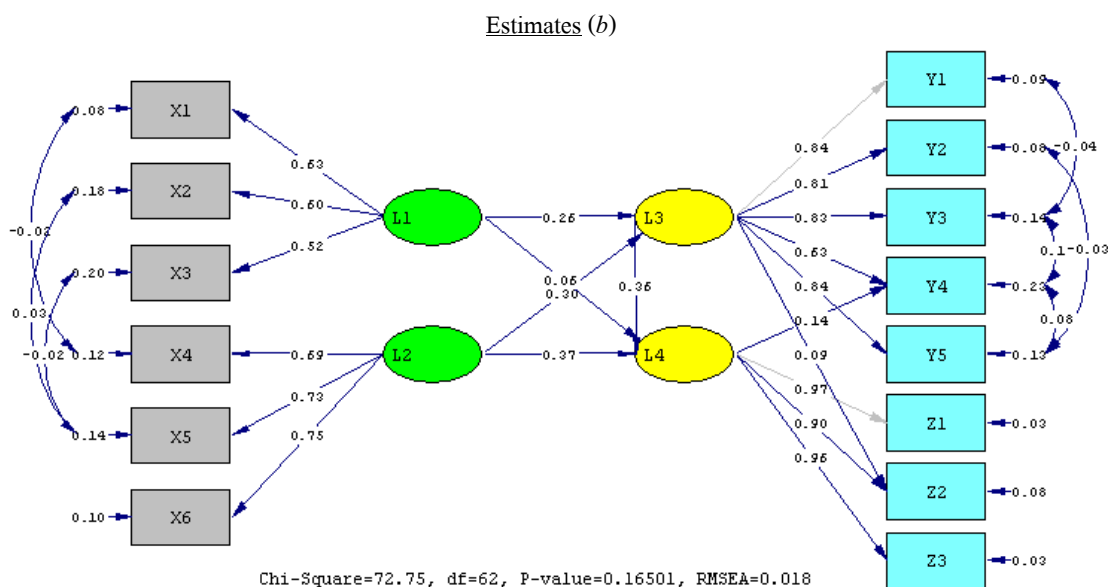


Figure 4.6 Path Diagram - the Competitive Service Level of Logistics Providers (After)

The fitness of model supported by empirical information and can be explained as follows:

- (1) Relative Chi-Square (Chi-Square/df) of 1.17 shows that the model fit with empirical information because the relative Chi-Square value was less than 2.

- (2) The Comparative Fit Model (CFI) was 1.00 and showing that the model had comparative fitness because CFI was more than or equal to 0.95.
- (3) The Absolute Fit Indices, which were Goodness of Fit Index (GFI) of 0.98 and Adjusted Goodness of Fit Index (AGFI) of 0.97 showed that the model was fit with empirical information because GFI and AGFI scores ranged between -1 and accepted GFI and AGFI were above 0.90.
- (4) The Root Mean Square Error of approximation (RMSEA) obtained a score of 0.018, which meant that the model was rather fit with empirical information because the RMSEA score was less than 0.05 or ranged from 0.05 to 0.08.
- (5) The index used with consideration given to the discrepancy fit index was the Standardized Root Mean Square Residual (SRMR), which equaled to 0.01; thereby, showing that the model fit with the empirical information because the square was below 0.05.

Model Validity

Table 4.24 showed the results (of all 14 variables for the competitive service level of all Logistics service providers in Thailand, Vietnam, and China) were consistent to the empirical information at “High” level.

Factor loading (b) showed all in positive values between 0.52 to 0.97, all were significantly statistical different from zero ($t > 2.58$) $p < .01$

Table 4.24 Measurement Model Analysis (Model Validity)

Constructed Factors	Factor Loading			** $p < .01$ $t > 2.58$	R^2	Factor Scores Regression
	b	B	SE			
X1	0.63	0.91	(0.03)	25.19**	0.83	0.77
X2	0.60	0.82	(0.03)	21.73**	0.68	0.34
X3	0.52	0.76	(0.03)	19.29**	0.57	0.25
X4	0.69	0.89	(0.03)	25.57**	0.80	0.37
X5	0.73	0.89	(0.03)	25.40**	0.79	0.33
X6	0.75	0.92	(0.03)	26.86**	0.85	0.45
Y1	0.84	0.89	(0.00)	-	0.79	0.30
Y2	0.81	0.90	(0.03)	27.62**	0.80	0.31
Y3	0.83	0.85	(0.04)	23.17**	0.72	0.33
Y4	0.63	0.63	(0.05)	13.86**	0.54	-0.20
Y5	0.84	0.86	(0.03)	25.63**	0.73	0.32

Table 4.24 (Continued)

Z1	0.97	0.97	(0.00)	-	0.94	0.41
Z2	0.90	0.87	(0.03)	31.65**	0.87	0.16
Z3	0.96	0.97	(0.02)	59.33**	0.94	0.40

Maximum Likelihood: (b: factor loading), (SE: Std.Error), (T); B (Completely Standardized Solution); R²(Square Multiple Corr.)

(B) > .05 = Factors are at high Convergent Validity

By Standardized Factor Loading (B) found that the construct of *Latent-1* (Make or Buy) ranked by the most important factor loadings were: Make (.91) with R² (83%), Buy (.82) with R² (68%), and Both (.86) with R² (57%), respectively. *Latent-2* (Dominant Power) was: Policy (0.92) with R² (85%), while Price and People were same equally (0.89) with R² (80% and 79%)

Service Performance Unit (SPU) as *Latent-3* with values of y2 (.90), y1 (.89), y5 (.86), y3 (.85), and y4 (.63) meanings were:

Rates with R² (80%), Reliability with R² (79%), Responsiveness with R² (73%), Resources with R² (72%), and Risk Avoidance with R² (54%).

Servicing Competitiveness as the Service Level (*Latent-4*) showed that most important factors were: Cost and Flexibility were equal at 0.97 and 0.97 with R² (94%), while Time was at 0.87 with R² (87%).

t-Test

H₀: Factor Loading equal to 0

H₁: Factor Loading not equal to 0

Significant Value (t-Sig.)

t-Sig. < 1.96 = Not Significant

t-Sig. > 1.96 = Significant at * p < 0.05

t-Sig. > 2.58 = Significant at ** p < 0.01

R² represented for the RELIABILITY of the Latent Construct must higher than 50%

4.4.5 Construct Reliability (CR) and Average Variance Extracted (AVE)

CR (construct reliability) must over 0.60 considered as high reliability. The AVE value above 0.50 considered as good average variance extracted. Table 4.24 showed the Construct reliability (ρ_c) values were: L4, L2, L3, L1 at .969, .928, .923, and .870 respectively, which all are above 0.60 considered as high reliability. For the average variance extracted (ρ_v) showed the

values were: L4, L2, L3, L1 at .9135, .8127, .7091, and .6931 respectively. All values are above 0.50 regarded as good extraction.

Table 4.25 The causal influence analysis of variables in the model of Competitiveness (N=509) Appendix-U2, -U3

Causal Outcome	L1			L2			L3		
	TE	IE	DE	TE	IE	DE	TE	IE	DE
L3	0.26**	-	0.26*	0.30**	-	0.30**	-	-	-
	(0.03)	-	(0.03)	(0.03)	-	(0.03)	-	-	-
	7.42	-	7.42	8.70	-	8.70	-	-	-
L4	0.15**	0.09**	0.06*	0.48**	0.11**	0.37**	0.36**	-	0.36**
	(0.03)	(0.02)	(0.03)	(0.03)	(0.02)	(0.03)	(0.04)	-	(0.04)
	4.77	5.52	1.82	14.23	6.24	11.26	8.20	-	8.20

Statistics Chi-Square = 72.75, df = 62, P = 0.1650, GFI = 0.98, AGFI = 0.97, SRMR = 0.017

Variables	X	X1	X2	X3	X4	X5	X6		
Reliability (R2)		0.83	0.68	0.57	0.80	0.79	0.85		
Variables	Y	Y1	Y2	Y3	Y4	Y5	Z1	Z2	Z3
Reliability (R2)		0.79	0.80	0.72	0.54	0.73	0.94	0.87	0.94
Variable	(SEM)	L3	L4						
R Square (Reduced)		0.50	0.61						

Correlation Matrix ETA and KSI					Construct Reliability & Avg. Variance			
LATENT	L3	L4	L1	L2	Latent	Construct	ρ_c	ρ_v
L3	1.00				L1	MOB	0.870	0.6931
L4	0.71	1.00			L2	DOM	0.928	0.8127
L1	0.62	0.59	1.00		L3	SPU	0.923	0.7091
L2	0.64	0.77	0.61	1.00	L4	SVL	0.969	0.9135

Remarks * < .05 ** < .01

P_c validity > 0.60, P_v extraction > 0.50

4.4.6 Path Analysis: Major Model

The causal model of the development of competitive service level of logistics service providers in Thailand, Vietnam, and China were totally affected significantly the most by variables of Latent L2(.48), L3(.36), L1(.15), by Power of Dominants (L2), Service Performance (L3), and Strategic Sourcing (L1) respectively, all were statistical significantly at $p < .01$

Table 4.25 showed the Direct Effects (DE) and Indirect Effects (IE) for the path analysis. The Competitiveness as Service Level (L4) was affected directly by Direct Effects (DE) from L2 (.37), L3 (.36), and L1 (.06) significantly with $p < .01$ and it was affected indirectly by Indirect Effects (IE) from L2 (.11), and L1 (.09)

For the Service Performance Unit (L3), it was affected directly by L2 (.30), L1 (.26) and these influence affects were significantly at $p < .01$

The Correlation Matrix among the Latent showed that correlation (R) were positive values from 0.59 to 0.77, the most correlated variables (0.77) were L4 with L2.

Figures 4.7 and 4.8 showed the diagram results in standardized and t-value.

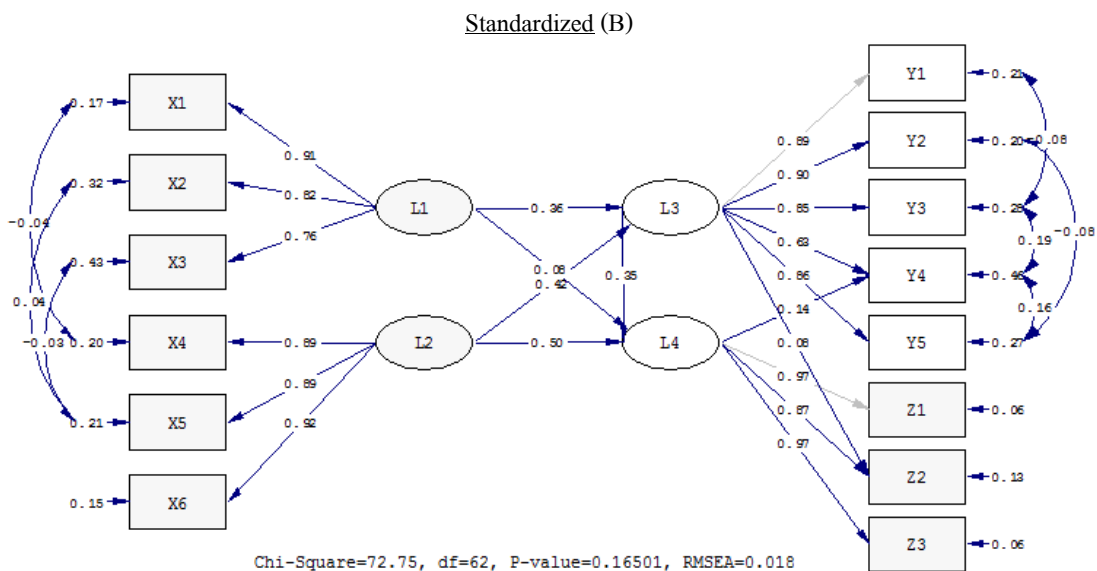


Figure 4.7 Path Diagram of the Competitive Service Level Model (Standardized)

The T-values model showed the t-significant ≥ 1.98 to 2.58 at $p = .05$, and >2.58 at $< .01$

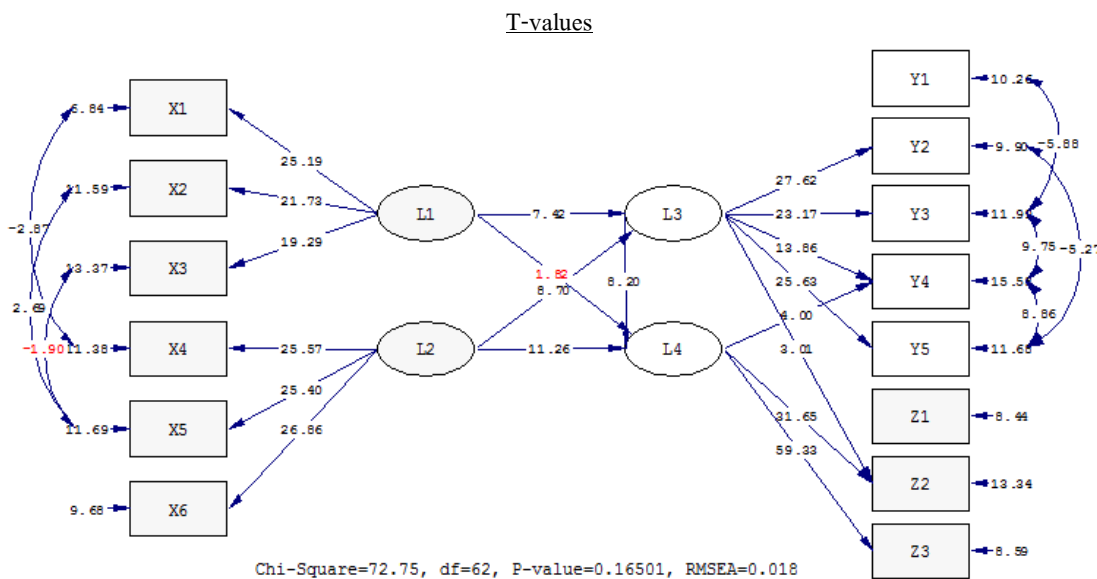


Figure 4.8 Path Diagram of the Competitive Service Level Model (T-value)

Figures 4.9 and 4.10 showed the separated X-model, Y-model, and Structural model.

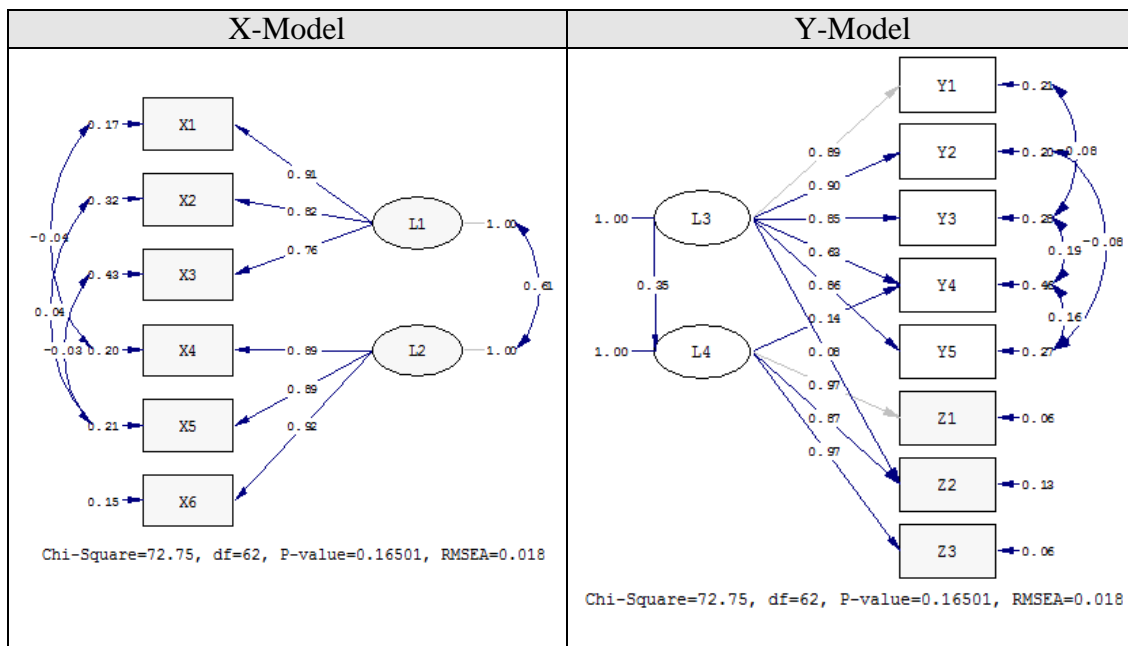


Figure 4.9 Path Diagram of the Competitive Service Level Model (X and Y-model)

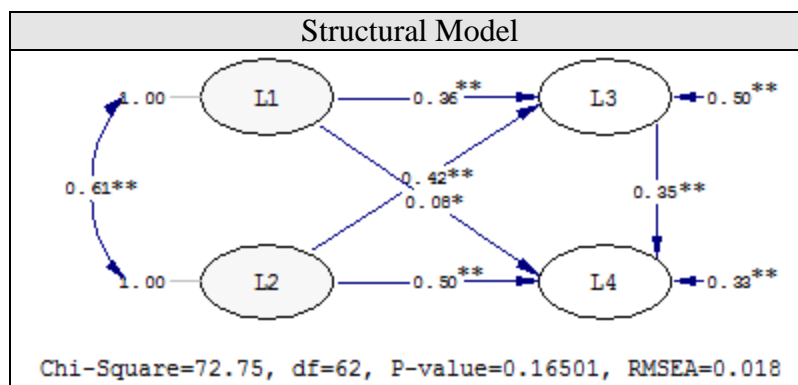


Figure 4.10 Path Diagram of the Competitive Service Level Model (Structural Model)

END OF - MAJOR MODEL

4.5 Single Nation Analysis

The single nation analysis for Thailand (N) = 159, Vietnam (N) = 157, and China (N) = 193.

4.5.1 Descriptive Statistics

Table 4.26 Descriptive Statistics: Thailand (n = 159)

Variable	Mean	St. Dev	Min	Max	Level	Skewness	Kurtosis
X1	3.87	.932	1.500	5.000	High	-.550	-.367
X2	3.43	1.00	1.000	5.000	Moderate	-.514	-.147
X3	3.82	.900	1.000	5.000	High	-.964	.977
X4	3.87	.896	1.000	5.000	High	-.895	1.154
X5	3.43	.961	1.000	5.000	Moderate	-1.050	1.262
X6	3.82	1.081	1.000	5.000	High	-.728	.168
Y1	3.88	.799	1.222	5.000	High	-.878	.880
Y2	3.75	.791	1.375	5.000	High	-.549	.547
Y3	3.77	.762	1.250	5.000	High	-.929	1.141
Y4	3.67	.712	1.333	5.000	High	-.835	1.215
Y5	3.88	.782	1.100	5.000	High	-1.495	2.922
Z1	3.69	.961	1.000	5.000	High	-.820	.709
Z2	3.52	1.078	1.000	5.000	High	-.716	.066
Z3	3.69	1.038	1.000	5.000	High	-.610	.121

Levels of Means: <1.50 very low; 1.51-2.50 = low; 2.51-3.50 = moderate; 3.51-4.50 = high; 4.51-5.0 very high

Table 4.27 Descriptive Statistics: Vietnam (n = 157)

Variable	Mean	St. Dev	Min	Max	Level	Skewness	Kurtosis
X1	3.984	.675	2.000	5.000	High	-.226	-.117
X2	3.44	.75	1.000	5.000	Moderate	-.210	.093
X3	4.050	.698	1.500	5.000	High	-.413	.129
X4	3.748	.701	2.000	5.000	High	-.106	-.161
X5	3.595	.635	2.000	5.000	High	.279	-.208
X6	3.573	.674	2.000	5.000	High	.111	.057
Y1	3.997	.377	2.889	4.889	High	-.126	-.106
Y2	3.687	.405	2.875	4.875	High	.430	.285
Y3	3.910	.456	2.750	5.000	High	.119	.146
Y4	4.059	.464	3.000	5.000	High	.141	-.272
Y5	4.187	.498	3.000	5.000	High	-.098	-.869
Z1	3.69	.883	1.000	5.000	High	-.134	-.448
Z2	3.87	.723	1.000	5.000	High	-.113	-.403
Z3	3.95	.758	1.000	5.000	High	-.183	-.593

Levels of Means: <1.50 very low; 1.51-2.50 = low; 2.51-3.50 = moderate; 3.51-4.50 = high; 4.51-5.0 very high

Table 4.28 Descriptive Statistics: China (n = 193)

Variable	Mean	St. Dev	Min	Max	Level	Skewness	Kurtosis
X1	3.85751	.915	1.000	5.000	High	-.714	.052
X2	3.70	.83	2.000	5.000	High	-.186	-.814
X3	3.88342	.937	1.000	5.000	High	-.937	.780
X4	4.08031	.855	1.000	5.000	High	-.959	.782
X5	3.91192	.787	1.000	5.000	High	-.441	.022
X6	3.75130	.897	1.000	5.000	High	-.275	-.410
Y1	4.24588	.503	2.667	5.000	High	-.860	.415
Y2	4.16580	.497	2.500	5.000	High	-.424	.014
Y3	4.17811	.568	2.500	5.000	High	-.463	-.328
Y4	3.97410	.558	1.833	5.000	High	-.585	.673
Y5	4.4292	.552	1.500	5.000	High	-1.645	4.157
Z1	4.27	.792	2.000	5.000	High	-.850	.059
Z2	4.26	.851	1.000	5.000	High	-1.139	1.311
Z3	4.29	.803	1.000	5.000	High	-.940	.567

Levels of Means: <1.50 very low; 1.51-2.50 = low; 2.51-3.50 = moderate; 3.51-4.50 = high; 4.51-5.0 very high

Outcome Results

For Thailand, the moderates were only X2, and X5, for Vietnam only X2, for China were all high.

4.5.2 Pearson Correlation

The Pearson correlation represented in table 4.29, 4.30, and 4.31

For Thailand, most correlated were Z2 to Z3 at .853, X4 to X5 at .841 and Y1 to Y2 at .813

For Vietnam, most correlated were Y4 to Y5 at .688, Z2 to Z3 at .644, and Y1 to Y5 at .569

For China, most correlated were Z2 to Z3 at .774, Y4 to Y5 at .667, and Z1 to Z2 at .651

Table 4.29 Pearson's Correlation with KMO and Barlett's Test (Thailand)

TH	X1	X2	X3	X4	X5	X6	Y1	Y2	Y3	Y4	Y5	Z1	Z2	Z3
X1	1													
X2	.328**	1												
X3	.752**	.461**	1											
X4	.661**	.456**	.624**	1										
X5	.616**	.568**	.636**	.841**	1									
X6	.497**	.669**	.516**	.703**	.778**	1								
Y1	.647**	.498**	.645**	.764**	.737**	.629**	1							
Y2	.631**	.460**	.638**	.728**	.702**	.610**	.813**	1						
Y3	.719**	.474**	.618**	.652**	.637**	.575**	.701**	.691**	1					
Y4	.680**	.440**	.547**	.684**	.669**	.553**	.687**	.630**	.764**	1				
Y5	.703**	.465**	.619**	.759**	.731**	.585**	.797**	.715**	.760**	.780**	1			
Z1	.579**	.430**	.543**	.745**	.688**	.604**	.589**	.547**	.516**	.561**	.586**	1		
Z2	.441**	.638**	.441**	.584**	.663**	.769**	.581**	.505**	.522**	.532**	.544**	.655**	1	
Z3	.496**	.585**	.491**	.665**	.709**	.695**	.664**	.557**	.532**	.597**	.608**	.727**	.853**	1
MEAN	3.88	3.44	3.82	3.85	3.81	3.58	3.88	3.76	3.77	3.67	3.89	3.69	3.52	3.69
S.D.	0.932	1.009	0.901	0.896	0.961	1.081	0.799	0.792	0.763	0.712	0.782	0.961	1.078	1.038
Barlett's test of Sphericity Chi-Square = 2149.499, df = 91, p = .000, KMO = .935														
**. Correlation is significant at the 0.01 level (2-tailed).														

Table 4.30 Pearson's Correlation with KMO and Barlett's Test (Vietnam)

VN	X1	X2	X3	X4	X5	X6	Y1	Y2	Y3	Y4	Y5	Z1	Z2	Z3
X1	1													
X2	0.074	1												
X3	.246**	.361**	1											
X4	0.086	.193*	.304**	1										
X5	0.089	.262**	.343**	.446**	1									
X6	0.112	0.156	.285**	.493**	.529**	1								
Y1	.227**	0.043	.262**	.212**	.426**	.276**	1							
Y2	.172*	.182*	.324**	.443**	.438**	.455**	.453**	1						
Y3	.335**	.228**	.303**	.234**	.359**	.195*	.489**	.416**	1					
Y4	.259**	0.144	.416**	.397**	.303**	.375**	.404**	.479**	.536**	1				
Y5	.281**	-0.023	.408**	.277**	.351**	.254**	.569**	.431**	.539**	.688**	1			
Z1	-0.046	.218**	.431**	.452**	.327**	.458**	.250**	.411**	.226**	.361**	.234**	1		
Z2	0.048	.210**	.470**	.404**	.306**	.440**	.307**	.479**	.176*	.421**	.269**	.560**	1	
Z3	0.092	0.135	.411**	.169*	.389**	.409**	.487**	.448**	.244**	.382**	.361**	.455**	.644**	1
MEAN	3.98	3.44	4.05	3.75	3.60	3.57	4.00	3.69	3.91	4.06	4.19	3.69	3.87	3.95
S.D.	0.676	0.755	0.698	0.702	0.636	0.674	0.378	0.406	0.457	0.464	0.499	0.883	0.723	0.758
Barlett's test of Sphericity Chi-Square = 898.762, df = 91, p = .000, KMO = .839														
* p < .05 ** p < .01														

Table 4.31 Pearson's Correlation with KMO and Barlett's Test (China)

CN	X1	X2	X3	X4	X5	X6	Y1	Y2	Y3	Y4	Y5	Z1	Z2	Z3
X1	1													
X2	.384**	1												
X3	.412**	.573**	1											
X4	.279**	.264**	.177*	1										
X5	0.109	.403**	.298**	.430**	1									
X6	.345**	.436**	.168*	.620**	.439**	1								
Y1	.386**	.217**	.222**	.332**	.190**	.296**	1							
Y2	.392**	.311**	.254**	.516**	.341**	.457**	.644**	1						
Y3	.393**	.227**	.219**	.323**	.264**	.348**	.572**	.587**	1					
Y4	.246**	.240**	.244**	.230**	.244**	.222**	.432**	.493**	.543**	1				
Y5	.186**	.173*	.220**	.296**	.333**	.244**	.569**	.591**	.591**	.667**	1			
Z1	.205**	.149*	.156*	.490**	.235**	.408**	.310**	.435**	.380**	.334**	.387**	1		
Z2	.302**	.264**	.178*	.583**	.310**	.494**	.391**	.534**	.417**	.319**	.410**	.651**	1	
Z3	.205**	.216**	0.114	.478**	.313**	.401**	.306**	.410**	.340**	.205**	.301**	.529**	.774**	1
MEAN	3.86	3.71	3.88	4.08	3.91	3.75	4.25	4.17	4.18	3.97	4.43	4.27	4.26	4.29
S.D.	0.915	0.838	0.937	0.855	0.787	0.897	0.504	0.498	0.568	0.559	0.553	0.792	0.851	0.803
Barlett's test of Sphericity Chi-Square = 1306.600, df = 91, p = .000, KMO = .860														
* p < .05 ** p < .01														

4.5.3 Model Before and After Modification (Thailand)

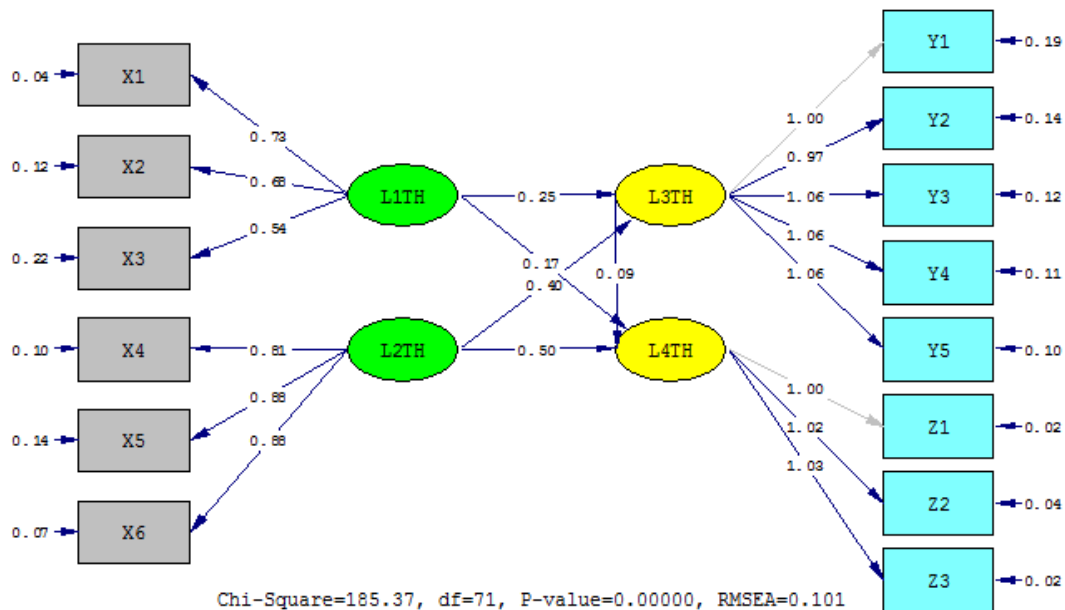


Figure 4.11 Path diagram of the competitive service level for Thailand (Before Modified)

After Modification (Thailand)

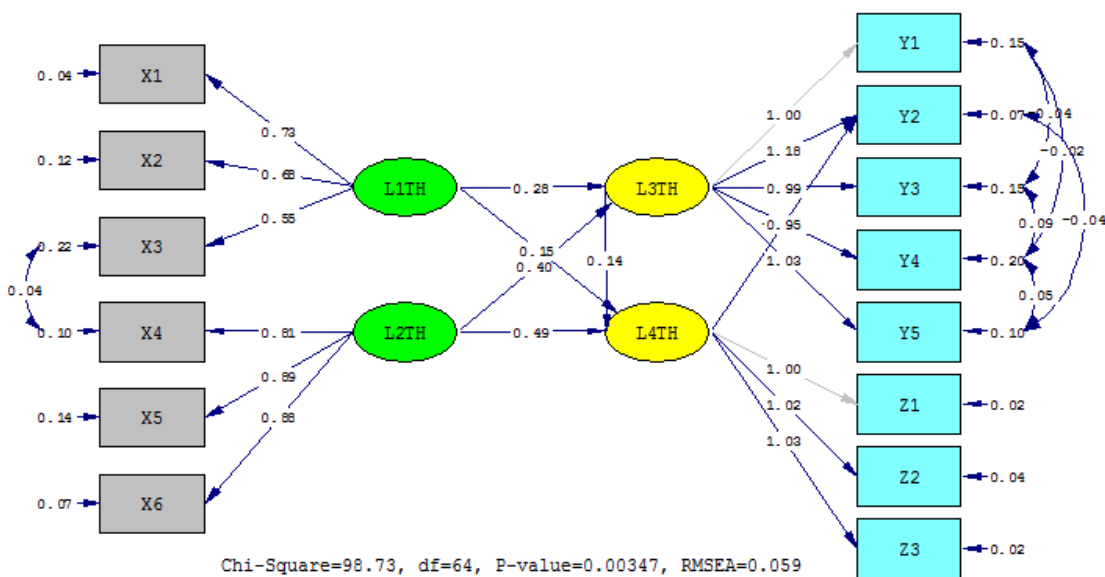


Figure 4.12 Path diagram of the competitive service level for Thailand (After Modified)

Table 4.32 Modification of Competitive Service Level Model (Thailand)

Goodness of Fit Index	Criteria	BEFORE		AFTER	
		Measured Index Values	Results	Measured Index Values	Results
Chi-Square	$p > 0.05$	0.000	Not Pass	0.00347	Not Pass
Chi-Square/df	< 2	2.610	Not Pass	1.542	Pass
GFI	≥ 0.95	0.86	Not Pass	0.92	Not Pass
RMSEA	< 0.05	0.101	Not Pass	0.059	Not Pass

4.5.4 Model Before and After Modification (Vietnam)

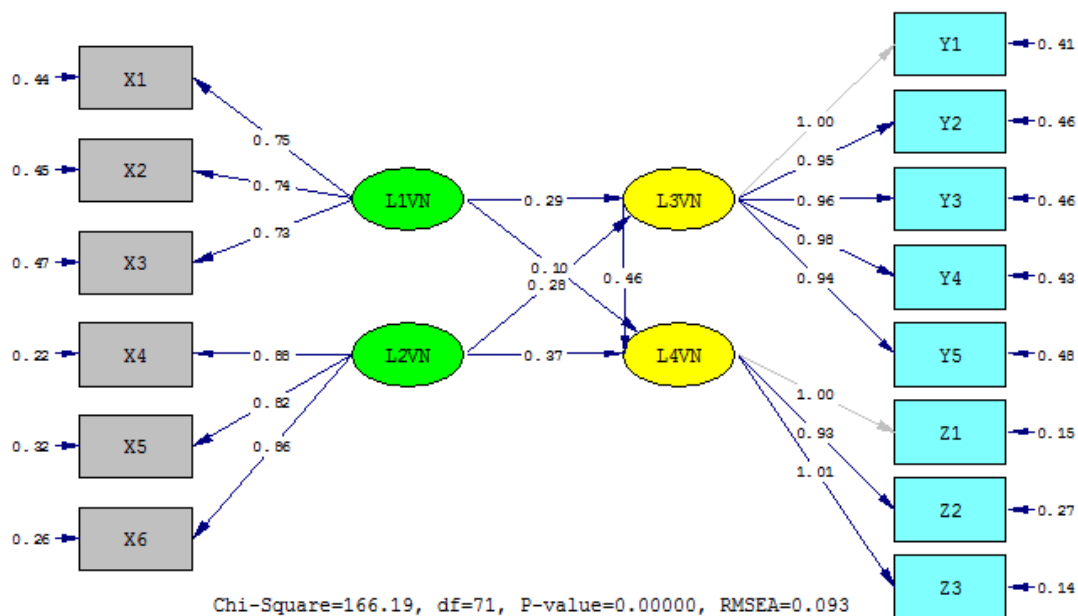


Figure 4.13 Path diagram of the competitive service level for Vietnam (Before Modification)

After Modification (Vietnam)

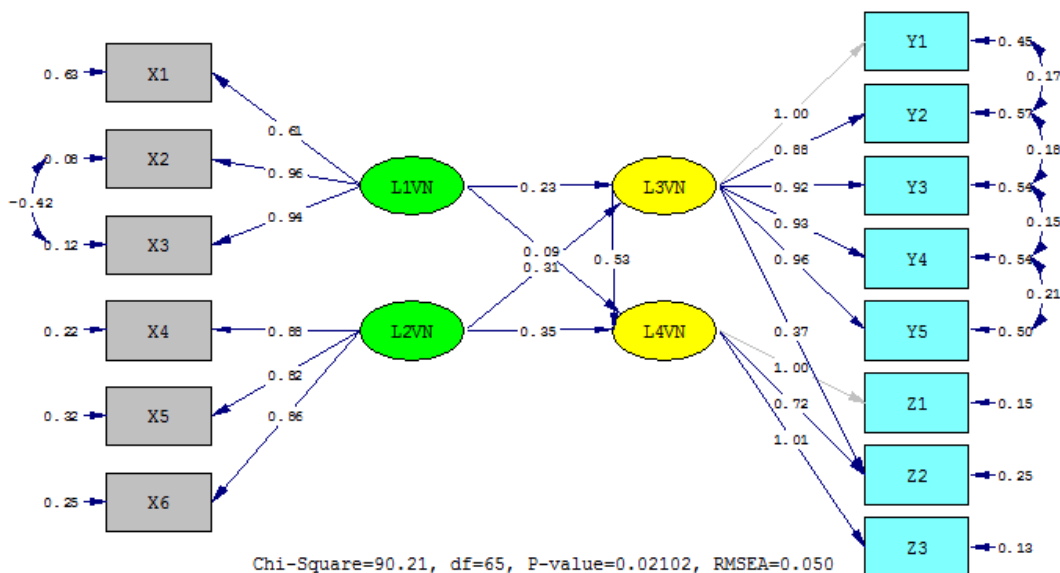


Figure 4.14 Path diagram of the competitive service level for Vietnam (After Modification)

Table 4.33 Modification of Competitive Service Level Model (Vietnam)

Goodness of Fit Index	Criteria	BEFORE		AFTER	
		Measured Index Values	Results	Measured Index Values	Results
Chi-Square	$p > 0.05$	0.000	Not Pass	0.021	Not Pass
Chi-Square/df	< 2	2.340	Not Pass	1.387	Pass
GFI	≥ 0.95	0.87	Not Pass	0.92	Not Pass
RMSEA	< 0.05	0.093	Not Pass	0.050	Pass

4.5.5 Model Before and After Modification (China)

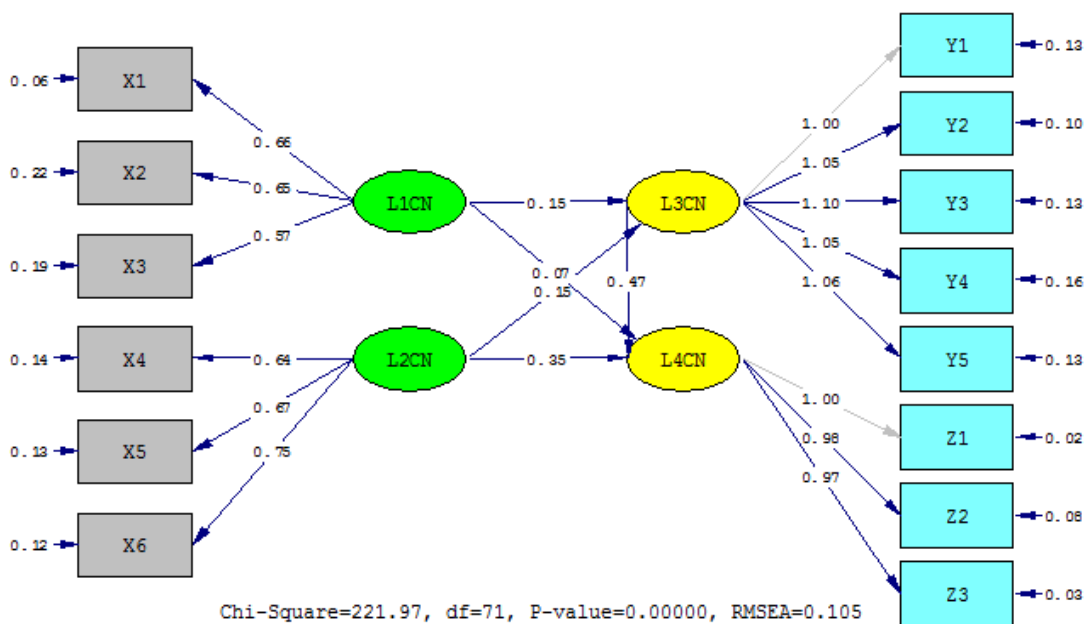


Figure 4.15 Path diagram of competitive service level for Chinese service providers

After Modification (China)

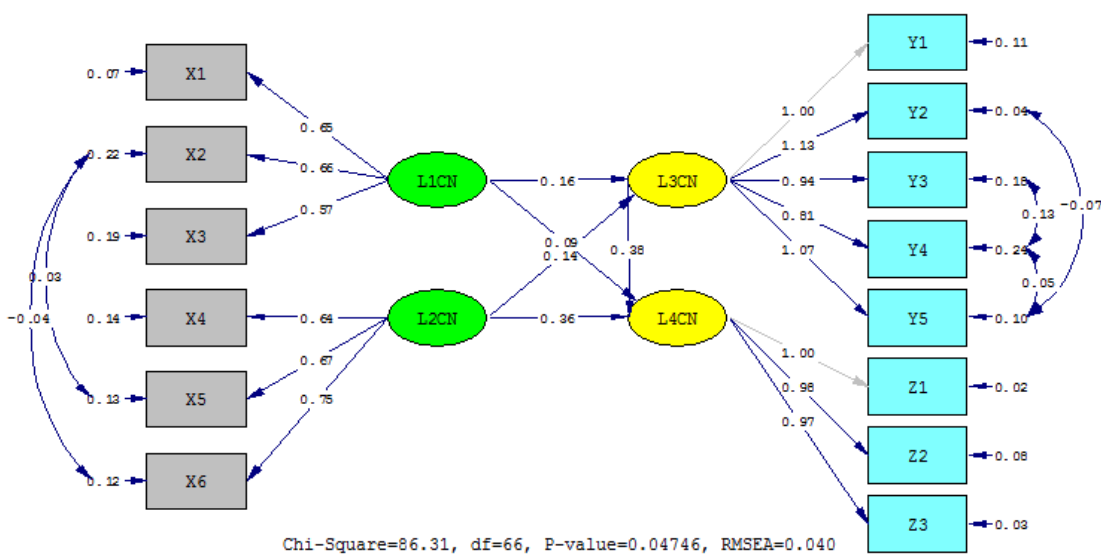


Figure 4.16 Path diagram of competitive service level for Chinese service providers

Table 4.34 Modification of Competitive Service Level Model (China)

Goodness of Fit Index	Criteria	BEFORE		AFTER	
		Measured Index Values	Results	Measured Index Values	Results
Chi-Square	$p > 0.05$	0.000	Not Pass	0.05	Pass
Chi-Square/df	< 2	3.126	Not Pass	1.307	Pass
GFI	≥ 0.95	0.86	Not Pass	0.94	Not Pass
RMSEA	< 0.05	0.105	Not Pass	0.040	Pass

The Validity of Measurement Model of Thailand, Vietnam, and China (Appendix-V4)

The Effects Analysis (Single nation)

Table 4.35 The causal influence analysis of variables in the model (Thailand)

Causal Outcome	L1			L2			L3		
	TE	IE	DE	TE	IE	DE	TE	IE	DE
L3	0.28**	-	0.28**	0.40**	-	0.40**	-	-	-
	(0.06)	-	(0.06)	(0.06)	-	(0.06)	-	-	-
	4.83	-	4.83	6.48	-	6.48	-	-	-
L4	0.19**	0.04	0.15	0.54**	0.06	0.48**	0.14	-	0.14
	(0.06)	(0.03)	(0.06)	(0.06)	(0.04)	(0.06)	(0.10)	-	(0.10)
	3.35	1.42	1.93	8.72	1.46	7.26	1.48	-	1.48

Statistics Chi-Square = 98.73, df = 64, p=0.00347, RMSEA .059 GFI = 0.92 AGFI = 0.87, SRMR = 0.031

Variables	X	X1	X2	X3	X4	X5	X6
Reliability	(R2)	0.93	0.79	0.58	0.87	0.85	0.92

Variables	Y	Y1	Y2	Y3	Y4	Y5	Z1	Z2	Z3
Reliability	(R2)	0.78	0.89	0.78	0.71	0.85	0.97	0.94	0.97

Variable	(SEM)	L3	L4
R Square	(Reduced)	0.74	0.77

Correlation Matrix ETA and KSI					Construct Reliability & Avg.Variance			
LATENT	L3	L4	L1	L2	Latent	Construct	ρ_c	ρ_v
L3	1.00				L1	MOB	0.9068	0.7660
L4	0.79	1.00			L2	DOM	0.9564	0.8797
L1	0.79	0.76	1.00		L3	SPU	0.9562	0.8154
L2	0.83	0.87	0.77	1.00	L4	SVL	0.9863	0.9600

Remarks *<.05 **<.01
t >1.96 > 2.58

P_c validity > 0.60, P_v extraction > 0.50

THAILAND:

The causal model of the development of competitive service level of logistics service providers in Thailand totally affected by L2, L1, L3 (.54, .19, .14) respectively. Table 4.35 showed the Direct Effects (DE) and Indirect Effects (IE) for the path analysis.

The Competitiveness as Service Level (L4) was affected directly by Direct Effects (DE) from L2 (.48), L1 (.15), and L3 (.14) significantly with $p < .01$ and it was affected indirectly by Indirect Effects (IE) from L2 (.06), and L1 (.04)

For the Service Performance Unit (L3), it was affected directly by L2 (.40), L1 (.28) and these influence affects were significantly at $p < .01$

The Correlation Matrix among the Latent showed that correlation (R) were positive values from 0.76 to 0.83, the most correlated variables were L4 with L2 (0.87).

Table 4.36 The causal influence analysis of variables in the model (Vietnam)

Causal Outcome	L1			L2			L3		
	TE	IE	DE	TE	IE	DE	TE	IE	DE
L3	0.23**	-	0.23**	0.31**	-	0.31**	-	-	-
	(0.07)	-	(0.07)	(0.07)	-	(0.07)	-	-	-
L4	3.44	-	3.44	4.17	-	4.17	-	-	-
	0.21**	0.12**	0.09	0.51**	0.16**	0.35**	0.53**	-	0.53**
	(0.07)	(0.04)	(0.07)	(0.08)	(0.05)	(0.08)	(0.13)	-	(0.13)
	3.13	2.75	0.38	6.71	3.07	3.64	4.09	-	4.09

Statistics Chi-Square = 90.21, df = 65, p=0.02102, RMSEA .050 GFI = 0.92 AGFI = 0.88, SRMR = 0.039

Variables	X	X1	X2	X3	X4	X5	X6		
Reliability	(R2)	0.37	0.92	0.88	0.78	0.68	0.75		
Variables	Y	Y1	Y2	Y3	Y4	Y5	Z1	Z2	Z3
Reliability	(R2)	0.55	0.42	0.46	0.46	0.50	0.85	0.75	0.87
Variable	(SEM)	L3	L4						
R Square	(Reduced)	0.37	0.45						

Correlation Matrix ETA and KSI					Construct Reliability & Avg.Variance			
LATENT	L3	L4	L1	L2	Latent	Construct	ρ_c	ρ_v
L3	1.00				L1	MOB	0.8899	0.7332
L4	0.67	1.00			L2	DOM	0.8924	0.7346
L1	0.47	0.44	1.00		L3	SPU	0.8210	0.4789
L2	0.53	0.64	0.38	1.00	L4	SVL	0.9292	0.8173

Remarks * < .05 ** < .01
t > 1.96 > 2.58

P_c validity > 0.60, P_v extraction > 0.50

VITENAM:

The causal model of the development of competitive service level of logistics service providers in Vietnam totally affected by L3, L2, L1 (.53, .51, .21) respectively. Table 4.36 showed the Direct Effects (DE) and Indirect Effects (IE) for the path analysis.

The Competitiveness as Service Level (L4) was affected directly by Direct Effects (DE) from L3 (.53), L2 (.35), and L1 (.09) significantly with $p < .01$ and it was affected indirectly by Indirect Effects (IE) from L2 (.16), and L1 (.12)

For the Service Performance Unit (L3), it was affected directly by L2 (.31), L1 (.23) and these influence affects were significantly at $p < .01$

The Correlation Matrix among the Latent showed that correlation (R) were positive values from 0.38 to 0.67, the most correlated variables were L4 with L3 (0.67).

Table 4.37 The causal influence analysis of variables in the model (China)

Causal Outcome	L1			L2			L3		
	TE	IE	DE	TE	IE	DE	TE	IE	DE
L3	0.16**	-	0.16**	0.14**	-	0.14**	-	-	-
	(0.04)	-	(0.04)	(0.04)	-	(0.04)	-	-	-
L4	3.91	-	3.91	3.41	-	3.41	-	-	-
	0.14**	0.06**	0.08	0.42**	0.05**	0.37**	0.38**	-	0.38**
	(0.04)	(0.02)	(0.04)	(0.05)	(0.02)	(0.05)	(0.08)	-	(0.08)
	3.39	3.09	0.30	8.97	2.96	6.01	4.98	-	4.98

Statistics	Chi-Square = 86.31, df = 66, p=0.04746, RMSEA .040 GFI = 0.94 AGFI = 0.90, SRMR = 0.044								
Variables	X	X1	X2	X3	X4	X5	X6		
Reliability	(R2)	0.87	0.67	0.63	0.75	0.78	0.82		
Variables	Y	Y1	Y2	Y3	Y4	Y5	Z1	Z2	Z3
Reliability	(R2)	0.69	0.89	0.54	0.39	0.74	0.95	0.85	0.92
Variable	(SEM)	L3	L4						
R Square	(Reduced)	0.27	0.59						

Correlation Matrix ETA and KSI					Construct Reliability & Avg.Variance			
LATENT	L3	L4	L1	L2	Latent	Construct	ρ_c	ρ_v
L3	1.00				L1	MOB	0.8860	0.7225
L4	0.59	1.00			L2	DOM	0.9159	0.7840
L1	0.47	0.55	1.00		L3	SPU	0.9032	0.6540
L2	0.45	0.75	0.53	1.00	L4	SVL	0.9667	0.9063

Remarks * < .05 ** < .01
t > 1.96 > 2.58

P_c validity > 0.60, P_v extraction > 0.50

CHINA:

The causal model of the development of competitive service level of logistics service providers in China totally affected by L2, L3, L1 (.42, .38, .14) respectively. Table 4.37 showed the Direct Effects (DE) and Indirect Effects (IE) for the path analysis.

The Competitiveness as Service Level (L4) was affected directly by Direct Effects (DE) from L3 (.38), L2 (.37), and L1 (.08) significantly with $p < .01$ and it was affected indirectly by Indirect Effects (IE) from L1 (.06), and L2 (.05)

For the Service Performance Unit (L3), it was affected directly by L1 (.16), L2 (.14) and these influence affects were significantly at $p < .01$

The Correlation Matrix among the Latent showed that correlation (R) were positive values from 0.45 to 0.75, the most correlated variables were L4 with L2 (0.75).