CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

Chapter 3 described for research design to support the data collection completely support to the research objectives and questions. The design was related to cognitive in a pattern of designing, relevant objectives, and variables, realistic investigation, examined units and items included methodologies in population, sampling and analysis methods.

The contents for both design and methods assigned into below sub-headings

3.1 Population and Samples

3.1.1 Population of Logistics Operators

Population in logistics industries were employed by secondary data of each country (Thailand; Vietnam; and China) association's sources of logistics operators, such as:-

- TIFFA (Thailand International Freight Forwarders, 2015) indicated that there were total 214 members were listed in her 11 WebPages.

- VIFFAS (Vietnam Freight Forwarders Association, 2015) stated that there were total 396 members were listed in her 40 WebPages.

- CIFFA (China International Freight Forwarders Association, 2015) indicated that there were total 738 members were in CIFA Members List in her 123 WebPages.

Therefore, the total listed members as populations in were total 1,348 of these three countries (214, 396, and 738 members for Thailand, Vietnam, and China respectively).

3.1.2 Samples size calculation

Dr. Jeffrey Oescher (2012) focus on five methodological issues: sampling, data collection, data analysis, design validity, and ethical/legal responsibilities. In sampling, Oescher (2012) indicated in his work that there were two following issues:-

- Identifying the type of sampling techniques will use
- Generalizing the results of a study

However, under Terminology as the nomenclature; specification of population there were:-

- ***Population*** – all members of a specified group divided into "Target population", the larger population to which the researcher ultimately wants to generalize the results, and "Sampling frame" (for an example, the accessible population), the population to which the researcher could access.
- ***Sample*** – a subset of a population
- ***Subject*** – a specific individual is participating in a study.

All the goals were same into one was to select a representative sample, to avoid both sampling error and sampling bias, either by the result and the observed result that can attribute to

using samples rather than populations as well as the difference between the actual result and the observed result caused by the researcher making mistakes. Therefore, the non-probabilities sampling were verified by seven Items Objective of Congruence (IOC) committees. Moreover, the sampling of the target groups was scope within specific servicing industries as logistics fields. The sampling in Probability sampling as a Stratified random sampling method, provided into two types between "Proportional" and "Non-proportional".

Oescher (2012) recommended using non-proportional stratified random sampling when the proportion of two different groups in our same sample target was distinct in the number of population, but it was always used the term "random" when describing either proportional or non-proportional stratified sampling. There were many general Rules of thumb; either:-

- Fifteen (15) subjects per group in a study comparing groups
- Ten (10) to fifteen (15) subjects per variable in a relational study
- One-hundred (100) subject each major subgroup (e.g. gender, race)
studied in survey research

The most used four techniques for sample size calculations were:-

- Lutz (1982)
- Taro Yamane (1973)
- Krejcie & Morgan (1970)
- Rule of Thumb (base on number of variables), Hair et. al (1998).

Table 3.1 Simple random sample

Estimated Proportion	Desirable Sample Size	Estimated Proportion
0.05	420	0.95
0.10	325	0.90
0.15	290	0.85
0.20	255	0.80
0.25	225	0.75
0.30	195	0.70
0.35	170	0.65
0.40	145	0.60
0.45	120	0.55
0.50	100	0.50

Source: Lutz (1982)

Laing (2004) claimed that the feasible of sample size always determined by the availability of resources: time, Human resources, transport, and money. Cost and time with the availability of persons in the survey had to consider in the process of sample size technique.

Lutz (1982) cited in Laing (2004) proposed simple sampling method for how to select people as his sample group in his work about households study. The simple random sample in Table 3.1

Under Lutz's method, total popular is 1,348 members from three countries with sub-groups of 214 members in Thailand, 396 in Vietnam, and 738 from China. If the simple random sample with the values of standard errors at 0.40 ~ 0.50, the samples would be N = 674 to 809 samples. Table 3.2 showed the calculation under simple random by Lutz's method.

Table 3.2 Simple random sample size by country

Est. Proportion	**Population**	**Thailand**	**Vietnam**	**China**
S.E. + p = 1	N = 1,348	N = 214	N = 396	N = 738
(S.E): p	**Total** (n)	**Thailand** (n)	**Vietnam** (n)	**China** (n)
(0.50) : 0.50	674	107	198	369
(0.45) : 0.55	741	118	218	406
(0.40) : 0.60	809	128	238	443
(0.35) : 0.65	876	139	257	480
(0.30) : 0.70	944	150	277	517
(0.25) : 0.75	1011	161	297	554
(0.20) : 0.80	1078	171	317	590
(0.15) : 0.85	1146	182	337	627
(0.10) : 0.90	1213	193	356	664
(0.05) : 0.95	1281	203	376	701

** p = probabilities (0.05~0.50), N = Total Population, n = sample*

** numbers were rounded up to 0 digits.*

Source: *S*imple calculation on Lutz's (1982) method.

The Research Advisor (2006) claimed that "Many researchers (and research texts) suggest that Confidence Level might not less than 95% while the Margin of Error should not over 5%."

Professional researchers typically set a sample size level about 500 to optimally estimate a single population parameter (e.g., the proportion of likely voters who will vote for a particular candidate). This construct had confidence interval value at 95% with a Margin of Error of about ± 4.4% (for large populations).

Next, another test by different calculation: Yamane (1973)'s formula as:-

$$n = \frac{N}{1} + NE2$$

Given that:

n = Sample size

N = Population (N = 1,348)

E = Standard Error (0.05) or 5%

Therefore:

Table 3.3 Sample size calculation based on Yamane (1973)

Population	Thailand	Vietnam	China
N = 1348	N = 214	N = 396	N = 738
n (N)	n (TH)	n (VN)	n (CN)
$1348/1+1348\ (0.05)^2$	$214/1+214\ (0.05)^2$	$396/1+396\ (0.05)^2$	$738/1+738\ (0.05)^2$
1348/1+1348 (0.0025)	214/1+214 (0.0025)	396/1+396 (0.0025)	738/1+738 (0.0025)
n = 1348 / 1+3.37	n = 214 / 1+0.535	n = 396 / 1+0.99	n = 738 / 1+1.845
n = 1348 / 4.37	n = 214 / 1.535	n = 396 / 1.99	n = 738 / 2.845
n = 308	n = 140	n = 199	n = 260

Kent (1993) claimed that a sample of 30 is probably sufficient when research survey made on a new product that obtains feedbacks from customers.

Ruddick, Sherwood, & Stevens (1983) had set the rules of thumb that "No sample should be less than 40", and with a diminishing on returns response rate when sample size increases beyond about 300.

Montfort College (2013); Unisa (2016) recommended applying Krejcie & Morgan (1970)'s table for sample sizes calculation. Determining the size of the sample, according to Robert V. Krejcie and Earyle W. Morgan (1970), they created a table and sample size, population size up. Researchers can choose the size of the sample as defined in the table. This chart was employed estimating the proportion of the population and determined the value of the percentage of the population be equal to 0.5, standard errors of 5% with 95% confidence level to calculate the sample size of the group, starting from the small population as 10 and up.

Krejcie & Morgan (1970) cited in The Research Advisor (2006), proposed formula as:-

$$n = \frac{X^2 * N * P * (1-P)}{(ME^2 * (N-1)) + (X^2 * P * (1-P))}$$

Where :

n = sample size

X^2 = Chi-square for the specified confidence level at 1 degree of freedom

N = Population Size

P = population proportion (.50 in this table)

ME = desired Margin of Error (expressed as a proportion)

Table 3.4 Krejcie & Morgan (1970)'s sample size determination (CMU, 2007)

N	(n)	N	(n)	N	(n)	N	(n)	N	(n)
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	100000	384

To calculate with population in this thesis (N = 1,348: N1 = 214, N2 = 396, N3 = 738), then the outcome as Table 3.5

Table 3.5 Sample size calculation based on Krejcie & Morgan (1970)

Krejcie & Morgan	**Population**	**Thailand**	**Vietnam**	**China**
N	1348	214	396	738
Round up	**1400**	**220**	**400**	**750**
(n)	n = 302	n = 140	n = 196	n = 254

Tables 3.1 to 3.5 showed illustrations of three methods (Lutz, 1982; Yamane, 1973; Krejcie & Morgan, 1970) as the review of the past research.

3.1.3 Sample size by Rule of Thumb for SEM study

The rule of thumb method is familiar found in SEM study, the sample size calculation proposed to valid samples according to the number of variables. In this study total 14 variables are Endogenous variables (X1-X3; X4-X6; Y1-Y5; Y6-Y8) in 4 Exogenous variables (Latent).

Table 3.6 Sample size by Rule of Thumb (Hair, et al. 1998)

Rules of Thumb	S	N	Thailand	Vietnam	China	Total (N)
1 variable	10	10	4	4	4	12
3 variables	10	30	10	10	10	30
3 variables	10	30	30	30	30	90
14 variables	10	140	47	47	47	141
14 variables	20	280*	94	94	94	282

S = size of sample, N = Number of samples

According to several SEM examinations, Hair, et. al (1998) recommended the samples size in SEM (Structural Modeling Equation) required for at least 10-20 samples per a variable.

Since the SEM analysis will has the identity modeling suitable for the analysis result. If lower the minimum requirement, the input will produce out the uncertainty results and insufficient output.

Therefore, this thesis employed Hair, et al. (1998)'s method (according to rule of thumb) for sample size calculation which resulted for 14 variables x 20 were minimum = at least 280 samples (Table 3.7).

Table 3.7 Sample size in this Study (applied Hair, et al., 1998).

Country	Population	Sample (n)	Actual Respondents
Require	14 variables	20 / variable	Minimum 280
Thailand	N1 = 200	159	Single-group 159
Vietnam	N2 = 200	157	Single-group 157
China	N3 = 200	193	Single-group 193
Total	**N = 600**	**509**	**Holistic group 509**

Table 3.7 showed the minimum size 280 samples were required by this study. Population was control to send the number of questionnaires with the samples back from the respondents.

3.2 Research Design

3.2.1 Background of design and theoretical base

Summarization from all previous research works, related to the dimensions of 5 perceives as a ServQual dimension as well as other studies in servicing. Most used were service quality, service level, benchmarking and best practices. While the academic's world, all institutions were around TQF's five dimensions. Hence, the suitable construct latent and keys of servicing factors were modified into the design and aligned into five main service factors in performance measuring.

3.2.2 Triangulation and related definitions

Triangulation survey mostly divided into two different concepts, by the same distances of three different target groups in engineer science, and by the multiple data sources or method to investigate results of one same subject in social science.

The research algorithm showed steps in Figure 3.1 Research process design

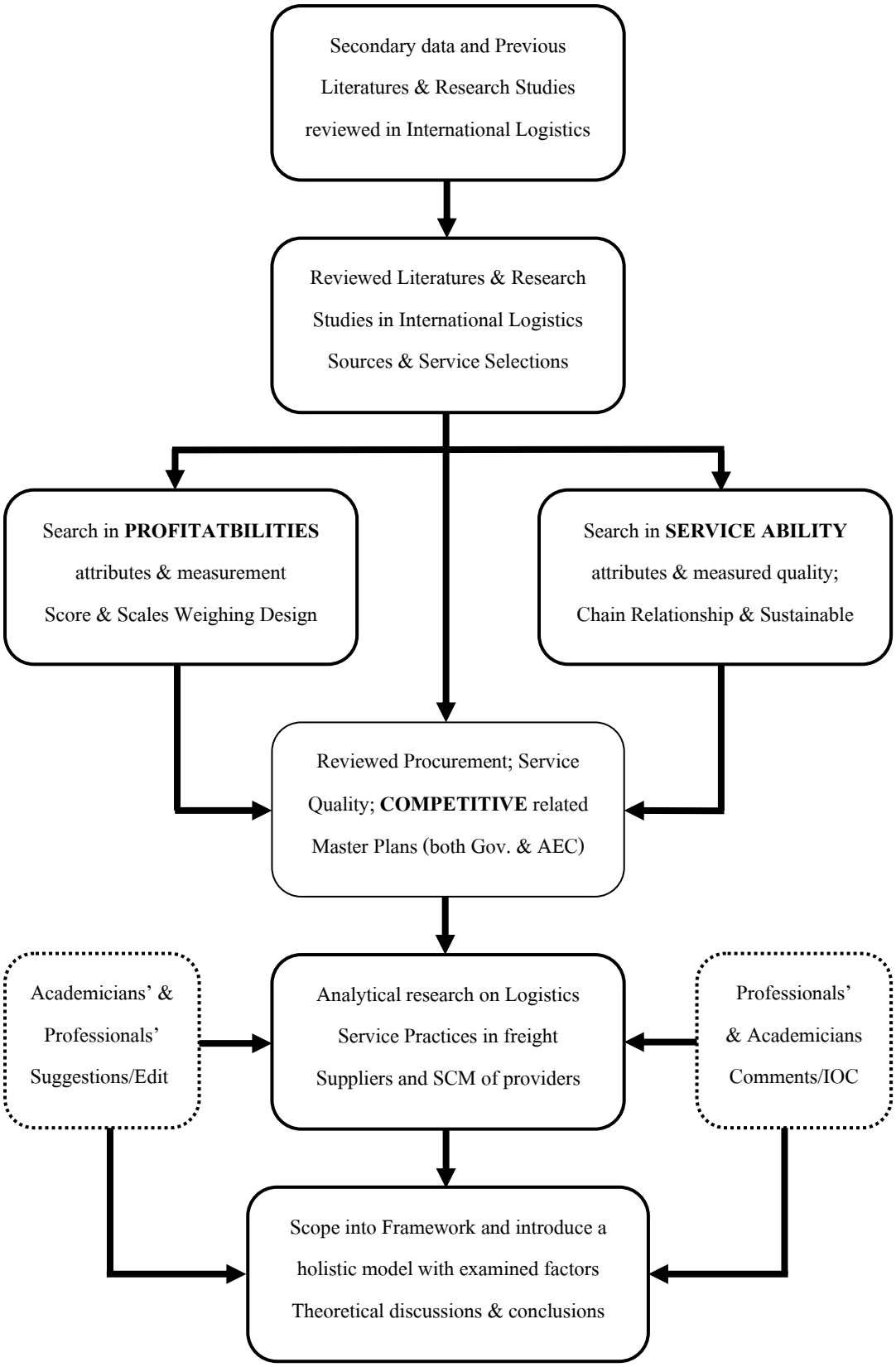

Figure 3.1 Research process design algorithm

The Intergovernmental Committee on Surveying and Mapping's (ICSM, 2016) defined Triangulation is a surveying method that measures the angles in a triangle formed by three survey control points using trigonometry and the measured length of just one side. The other distances in the triangle calculated. In 1950, Trilateration was introduced. The distances in a triangle could then be measured directly instead of calculating them from the observed angles. The most used known as the speed of light in Electromagnetic Distance Measurement (EDM).

Wendy Olsen's (2004) worked on Triangulation in Social Research: Qualitative and Quantitative Methods Can Really Be mixed. Olsen (2004) defined Triangulation as:-

> "In social science triangulation is defined as the mixing of data or methods so that diverse viewpoints or standpoints cast light upon a topic. The mixture of data types, known as data triangulation, is often thought to help in validating the claims that might arise from an initial pilot study. The mixture of methodologies, e.g. mixing the use of survey data with interviews, is a more profound form of triangulation."

Patrick (2009) advised that the problem with relying on just one option was to do with bias. There are several types of bias encountered in research, and triangulation can help with most of them.

BetterEvaluation (2014) defined four basic types of triangulation:

1) Data triangulation: involves time, space, and persons
2) Investigator triangulation: includes multiple researchers in an investigation
3) Theory triangulation: involves using more than one theoretical scheme in the interpretation of the phenomenon
4) Methodological triangulation: involves using more than one option to gather data, such as interviews, observations, questionnaires, and documents

Cohen & Manion (cited in BetterEvaluation, 2014) defined "Triangulation is not just about validation but about deepening and widening one understands. It can be used to produce innovation in conceptual framing. It can lead to multi-perspective meta-interpretations. [Triangulation is an] attempt to map out, or explain more fully, the richness and complexity of human behavior by studying it from more than one standpoint?"

To examine the inductive items; First, the dimensions of 5Rs Service Performance Units were modified as proposed model and published in the year 2013 as a conceptual framework. In the year, 2015 such five dimensions were examined and issued as a second paper. The study of

candidates in logistics careers as quantitative research, all the key factors were well fitted efficiently, and more exemplify the result within the five areas of the study's interest.

Explicit the Triangulation, the third study was a survey on the employer's perceptions. Model with the same concept of 5Rs keys had examined again. Finally, these five constructs had been verified its reliabilities and validities to confirm its generality for the implementation to any studies related to servicing.

This thesis under the theoretical concept of performance service units (SPU) therefore 5Rs had been passed through triangulation investigations. First, all requirements were collected data by an interview the professionals (practitioners/executives) as a qualitative method. Second, dimensions were employed to design the construct items and examined the logistics candidates' intention as a quantitative method (employee's perspectives). Third, adopted to implement and re-examined again in a research study of the employers' preference (quantitative). All these papers purified by using same modified 5Rs SPU model based on using a modification of Service quality as theoretical base.

3.2.3 Constructs and items development

The constructed items designed into three parts (Part I, II & III) showed in *Appendix-I.*

Part I was about the respondents' data

A) Demographic

The importance of those surveyed' data represented in their core activities. Since in logistics industry, there were several fields of operators, such as Liners, Air or Sea, land transport service provider, 3PL, and warehouse operator (Pisoot & Heesawat, 2015). The previous studies showed the result that size of the organization, and the types of business had significantly impacted variables differently (Pisoot & Heesawat, 2015). However, this research was also studied on the experiences of each organization by checking the period of operating years from their establishment.

Part II was divided into two sub-sequential headings (B; and C):

B) Financial Measuring (Ability in Profit & Margin)

The Respondents were asked to give their selling rates per unit to three majors areas represented as Asia by Port of Singapore, Europe by Port of Hamburg, and the United States of America by Port of Los Angeles, whereby all the respondents applied their selling rates from their

loading ports as origin port. Hence, there will be three different groups of origin countries were from Thailand, Vietnam, and China. (4 Scales of equally 25% adopted by 100% as the full mark)

C) Behavioral on Decisions Making (Overall)

This part was designed to understand the strategies in recent practicing. Decisions in procurement process with purchasing strategies in which forms of Make or Buy and both multi-methods. Survey research studied into a deeper level on the types of dominant power on the relationships which established by decision makers. Personal relationship, the commandants, or by the organization's policy (contracts) had investigated. Respondents were asked for the key practicing only one most particular choice as desirable key. An item was designed to learn which methods they shipped the cargo to all three ports as a conclusion. (To re-confirm the strategic MOB decisions and what are they practicing nowadays, latent of strategic sourcing technique had repeated in degree of choices).

Supplier Selection Strategies – 3 items

Latent examined the enforcement on relationship building in selecting carriers to be investigated regarding three selected sources (by types of focus: Price, People, or Policy).

3.3 Research Latent Variables and Constructs

Part III - Survey Module all this part measured by degrees of five Linkert's scales.

Latent1: SST *(Strategic Sourcing Techniques) – 6 items*

Since the prior part of research just was made as a single chosen choice, this part to re-confirm their strategic into measuring scales. Purchasing strategies were repeated and required to be answered again to verify the congruence of respondents' answering from the part A. These provisions to ensure the factors were examined completely as a cross-check on the outcome as the congruence of the final results.

Latent2: SSD (Selection Source under Dominant Decision) *– 6 items*

These repeat the prior part of dominant powers by three facets of buyer's focus into each of two measured items and in the form of 5 Linkert's scales.

Latent3: SPU *(Service Performance Unit) – 41 items*

Latent examined the facets of five performed service units: Reliability, Rates, Resources, Risk avoidance, and Responsiveness. All these 5Rs were independent variables, with the conclusion of one dependent variable performed as total dimensions in service performance.

Latent4: Dependent Variable *(Service Competitiveness) – 7 items*

Final part: the service competitiveness investigated by all four prior latent and concluded into final three variables of service level (Cost, Time, and Flexibility). It encourages understanding the primary key to which most leading variable of one's organization and country.

3.4 Research Measurement, Sampling, Analysis

3.4.1 Items measurement

With the main five areas of study: Strategic sourcing techniques, selected partnerships and influencing factors, service quality, service responsiveness, competitiveness and ability in service level. Previously, chapter 2 was a section on historical developments in related literature were reviewed and not limited to financial constructs, this leads the researcher to study more on previous research in the tradition of financial measurement; measuring abilities and performance.

Profit performance was not presented in this paper and can be reached at the studying profit performance units and forecasting by Candlestick chart (Pisoot & Manisri, 2014); Relationship between strategic sourcing techniques and profitability for competitiveness (Pisoot, 2015). For benchmarking and competitiveness with service level was studied and published in the same year on Best Practice and Collaboration enabling the service level (Pisoot & Pasawat, 2015) in order to eliminate too long contents, this research on the profitability behavioral level, just only on a simple survey observation with four quadrants.

Table 3.8 summarized the research items and constructs measurement.

Table 3.8 Theoretical Design Research Items and Measures

PART I. DEMOGRAPHIC

A	Respondent Profile	Business Data	Measures
1.1	Core Activities	3PL focus (Biz Types)	Numeric
1.2	Business Size by Staff no.	Size of organization	Ordinal
1.3	Types of Certificate	Assurance (+ 1 Open-ended)	Nominal
1.4	Business Operated Year	Biz. Experience	Ordinal

PART II. II. ABILITIES (Financial)

B	Respondent Profit	(3 items) Profit Ability	Ordinal
2.1	Asia	Selling rate	4 choices
2.2	Europe	Selling rate	4 choices
2.3	USA	Selling rate	4 choices
C	**Overall Decisions**	**(3 items) Behavioral**	Nominal
3.1	Method MoB theory	Make/Buy/Both	3 choices
3.2	Decisions Dominant Power	Decision Maker*	4 choices
3.3	Desirable Key Purpose	Org. Objective	4 choices

PART III. LATENT & CONSTRUCTS (Non-Financial Term)

SSS	Carrier Selections	(3 items) Relationship	Scale
4.1	Price Focus	Money	5 choices
4.2	Policy / Management Focus	Management	5 choices
4.3	People / Personal Focus	Man	5 choices
SPU	**Service Performance Unit**	**(41 items)**	**Numeric**
R1	**Reliability**	**(9 items)**	**Scale**
R1.1	Org.Reputation	Confident in Name & Goodwill	5 choices
R1.2	Brand+Advertisment	Brand & Loyalty	5 choices
R1.3	Service Reputation	Word of mouth (Skill level)	5 choices
R1.4	Time accuracy	Punctual with Commitment	5 choices
R1.5	Detail accuracy	Reliable B/L & Contents	5 choices
R1.6	Trust experience	Trust on ensure service	5 choices
R1.7	Trust information	Background Ability	5 choices
R1.8	Stability	Stable on Accomplished	5 choices
R1.9	Service Promotion	build more trust & Goodwill	5 choices
R2	**Rates**	**(8 items)**	**Scale**
R2.1	Fair to low price	Reasonable Price	5 choices
R2.2	Standardize	Market Price	5 choices
R2.3	Cheap/ Low price	Slash Price	5 choices
R2.4	Overall acceptable charge	TCO	5 choices
R2.5	In market	Aligning / Survival	5 choices
R2.6	Unexpected/hidden costs	Extra Overheads	5 choices
R2.7	Overcharges	Expensive perceptions	5 choices
R2.8	Competitive Price	Competitive advantage in price	5 choices
R3	**Resources**	**(8 items)**	**Scale**
R3.1	Sufficient HR	HR (efficiency ~than effectiveness)	5 choices
R3.2	Invested Sys (Asset)	Assets	5 choices
R3.3	Resources DVP	Investment	5 choices
R3.4	Avail equipment	workplace functions	5 choices
R3.5	Add value	Controllable resources	5 choices
R3.6	Invested Tools	Investment	5 choices
R3.7	Invested funds (Tang)	Tangibility	5 choices
R3.8	HR improve SME	shift to Medium size (benchmark	5 choices

Table 3.8 (Continued)

R4	**Risk avoidance**	**(6 items)**	**Scale**
R4.1	Risk Mgt in Liabilities	Risk Management	5 choices
R4.2	Compensate*(own pocket)*	Retention (sympathy, willing to help)	5 choices
R4.3	Proof records	historical data & evidence	5 choices
R4.4	Avoid claim	accuracy avoid risk / loss	5 choices
R4.5	Traceability	trace & track records	5 choices
R4.6	Zero defects	zero failures & mistakes	5 choices
R5	**Responsiveness**	**(10 items)**	**Scale**
R5.1	Availability tools	Sufficiency to operate Core.Biz in	5 choices
R5.2	quick response	quick reply outcome	5 choices
R5.3	quick solving	prompt support (after sales service)	5 choices
R5.4	prompt action	quick response to enquiries	5 choices
R5.5	availability space	the answer to primary need (Hierarchy)	5 choices
R5.6	ability in response service	value added service	5 choices
R5.7	match timing	Customer need (specific requirement)	5 choices
R5.8	reasonable teamwork	Multifunction as "multidisciplinary."	5 choices
R5.9	no delay delivery	Service level (Time variance)	5 choices
R5.10	energetic support	Assistance & solving partner	5 choices
		(managerial level) “Prof. Respect"	5 choices
DP5R	Svc. Performance	**(5 items)**	**Scale**
D6.1	Reliability	independent var.1	5 choices
D6.2	Rates	independent var.2	5 choices
D6.3	Resources	independent var.3	5 choices
D6.4	Risk avoidance	independent var.4	5 choices
D6.5	Responsiveness	independent var.5	5 choices

Latent	Strategic Sourcing (SST)	**(6 items)**	**Scale**
ST1.1	Insourcing1	Strategic Insourcing (Make)	5 choices
ST1.2	Insourcing2	Strategic Insourcing (Make)	5 choices
ST2.1	Outsourcing1	Strategic Outsourcing (Buy)	5 choices
ST2.2	Outsourcing2	Strategic Outsourcing (Buy)	5 choices
ST3.1	Multi methods1	Insourcing & Outsourcing (Both)	5 choices
ST3.2	Multi methods2	Insourcing & Outsourcing (Both)	5 choices

Latent	**Select Source dominant (SSD)**	**(6 items)**	**Scale**
SR1.1	Price focus	price sensitive	5 choices
SR1.2	Price focus	profit economic perceive	5 choices
SR2.1	Human focus (SVC)	human in the group as quality team	5 choices
SR2.2	Human focus (person)	personal relationship (trust & respect)	5 choices
SR3.1	Policy focus	by management or system	5 choices
SR3.3	Policy focus	by agreement / Incoterms	5 choices

DPV.	**Service Competitiveness**	**(7 items) =(4 Xbar)+(3 Service**	**Scale**
L1	Latent1	Strategic Sourcing Techniques	5 choices
L2	Latent2	Strategic Selecting Relation Source	5 choices
L3	Latent3	Service Performance Unit	5 choices
L4	Latent4	SST + SSS + SPU	5 choices
C1	Cost competitiveness	Service Level (Cost variance)	5 choices
C2	Time competitiveness	Service Level (Time variance)	5 choices
C3	Flexibility competitiveness	Service Level (Flexibility)	5 choices

For non-financial terms, all items which in service relationship, supplier selection, procurement in transportation fields gathered into the process of research tool designing for a holistic model of the framework. Later, researcher followed the Delphi's technique concept, by sending out all items to the volunteers as Delphi's technique committees. These committees were purposive selected to verify all designed items and explained details in next section *(Research instrument*).

3.4.2 Sampling method

The stratified sampling techniques were applied. The number of population (N = 1,348). The confront questions were same faced to the work of Dr. Richard Laing (2004) proposed following questions:-

- Which group of people (study population) do we want to draw a sample from
- How many people do we need in our sample?
- How will these people be selected? Is there an administrative list of the (sampling frame) units of the population involved?

Laing (2004) mentioned on the sampling method possible in the probability sampling methods that:

> "An important issue influencing the choice of the most appropriate sampling method is whether a sampling frame is available, that is, a listing of all the units that compose the study population. If a sampling frame does exist or compiled, probability sampling methods can be used. With these methods, each study unit has an equal or at least a known probability of being selected in the sample."

Five probability sampling methods were:

- Simple random sampling
- Systematic sampling
- Stratified sampling
- Cluster sampling
- Multi-stage sampling.

The stratified sampling technique was chosen and employed with the main reason of the essential to suit into this research study. The sample includes representative groups of study units with specific characteristics (WHO, 2004).

For example in Laing's work, residents from urban and rural areas, or different age groups), and then the sampling frame divide into groups, or strata, according to these characteristics. He employed by every picking on 1 of 40 urban residents; and 1 of 80 from rural areas. His survey conducted on self-medication practices in a district comprising 20,000 households, of which 20% are urban and 80% rural. It had suspected that in urban areas self-medication is less common due to the vicinity of health centers. However, the result seemed to support the proportion of the Pareto's Ratio 80/20 and also the Principle of Fibonacci Ratios.

This thesis study applied the convenience option for the respondents by employed the purposive sample selection method (the first-come first-serve applied quota sampling technique) until achieve the minimum quantity numbers of samples (Not all the respondents will activate their email address), and which were not active on email answering when the time passed.

The numbers of e-questionnaires were applied in XLS form as an attachment in the sent email. Some 40 sets of questionnaires were printed out as physical A4 paper printing forms, another option as a web-page form, for those managers who are working in shipping lines and freight logistics companies but no intention to reply back by their email for privacy issue as an anonymous.

3.5 Research Instrument

3.5.1 Methods in developing tool

This thesis employed mixed methods on both qualitative and quantitative studies. This thesis studied with mixed methods of two different surveys:-

1) Qualitative Interview (in research design)

The sampling employed the Non-Probability Sampling for IOC committees with three purposes in using this method: convenience, purposive or purposeful and volunteers. The framework of designed items was sent out to all academicians (lecturers in logistics and supply chain at high education level: Master and doctoral degrees), as well as the well-known practitioners (Executives in Logistics business). Finally, total seven experts were the IOC committees.

2) Quantitative Survey (in survey research)

The sampling employed the Probability Sampling for target groups from three countries (Thailand, Vietnam, and China).

Quantitative section, the inquiries to collect data from reviewed literature had produced out into variables of items (as concluded in chapter 2) and collection of requirement and adjustment in edition and modification of research tool in questionnaire development. Researcher

started by sending out to the volunteers as Delphi's technique committees to verify the suitable items which will load with questions. The draft e-questionnaires were sent out via email to lecturers: academicians, practitioners in logistics field as professionals.

3.5.2 Experts & Specialists in instrument development

The primary pre-requisite on an expert's specifications followed the criteria:-

Primary requirement: Academicians / Practitioners / Professionals

Specialist in Fields

- Academicians – relate to research study
- Analysts – ability to research methods (Qualitative + Quantitative)
- Leaders in Fields (managerial level)
- Practitioners (skill suits to this study)

Characteristics of Experts in this research

Researcher specified the IOC committee with followed expertise:-

(A) Academicians

- At least a doctoral degree graduated and be a lecturer in supply chain and logistics sciences.
- The teaching class must be higher education (either Master degree or Doctoral degree).
- The academic position from assistance professor, associated professor will be advantaged.
- His/her working papers was published in the academic journal.

(B) Practitioners & Professionals

- Analysts or statisticians with journalist and researcher in qualitative and quantitative
- Executives level in the logistics business.

The first drafts of items into questionnaire forms were sent out to below seven committees to verify the congruencies of item objectives during tool development. All honor committees were well known and achieved the criteria of specialists' essential characteristics.

Experts' Profile

- Professor Dr. Kriengsak Chareonwongsak, President, Institute of Future Studies for Development, and also his assistance, A. Kittiphol T.
- A. Kittiphol Tirasopin, Qualitative research specialist (Researcher, Institute of Future Studies for Development).

- A. Dr. Tanit Sorat, VP: the economy's financial sector. Members of the National Economic and Social Advisory Council. Former: VP, the Federation of Thai Industries Economy and logistics (2007-2014). President, V-Serve group. (Lecturer, in SCM & LM).
- A. Dr. Chatchalee Raktanonchai, Division Manager, Office of Chief Operating Officer - Downstream Petrochemical Business, PTT Global Chemical (Public Company limited). (Lecturer, Engineering Technology, Institute of Thailand-Japan Technology); (Lecturer, in SCM & LM).
- A. Somsak Wisetruangrot, Former: Expert in International Trade: Thailand National Maritime Promotion Committee, Chairman of Trade Facilitation: ASEAN Federation of Forwarders Associations.
- Ms. Orawan Voranij, Director, JWD Logistics PCL. SVP, JVK International Movers Ltd.
- Ms. Jirarat Rattanakupt, TNSC Analyst – Specialist in statistical "Quantitative" study (on behalf of Mr. Nopporn Thepsithar; Chairman, Thai Nation Shippers' Council: TNSC).

Quantitative section, after several corresponding via email and other internet channels (Pisoot, 2013b). The questionnaire with all related items sent to all with the IOC committees' comments (blind on commentators). The instrument development passed one by one committee, with his/her suggestions and followed to edit and modify. This useful process as Delphi's techniques that all committees can learn the comments above, and weigh on his/her final suggestions; feedback and comments that whether any questions or parts were still not understood on both ends of academicians' and practitioners' understanding (Appendix G2).

3.5.3 Instrument Development

The questionnaire was the research instrument in this study. The developing tool had been modified with items adjustments and done through five steps:

(1) Applied Delphi Technique (online focus group)
(2) Item objective congruence (IOC)
(3) Validate quality of research instrument
(4) Languages Translation and Interpenetrations
(5) Pilot test and reliability value

After the field research had studied from TILOG2012 (Thailand International Logistics Fair 2012), face-to-face interviews were conducted during studying the requirement and information collections from the study (Pisoot & Heesawat, 2015) to generate the related items in the international logistics transport operators' problems and issues.

(1) Applied Delphi Technique

First, the Delphi's technique ideal was adapted to support the online communication and information sharing on qualitative comments and suggestions (wordings & contents). With the idea of Delphi's on focus group discussion ideal (Eliot & Associates, 2005), but not on face-to-face since all executives in this industry were always in a business meeting and overseas trip as volunteer's engagement. Comments and suggestions made from respondents' feedback (committee's feedback) were sent to all committees one by one as information sharing to update for which part had modified. The commentators' names were blind as anonymous during the sending via to all.

As a first draft, constructed items were sent to A. Kittiphol as the first volunteer who specializes in content analysis and qualitative research. This first step aimed at trying to verify all wordings were understood and could communicate to the respondents in written without bias from any inducement of the questions. His suggestion was sent back to modify some variables that could lead to multicollinearity result. Therefore, the first adjustment had been made.

After that, such a questionnaire form with new developing contents was sent to Ms. Jirarat who is an analyst of Thai National Shipper Council: TNSC and she had edited the grammar of English with some technical words to achieve both shipper and consignee (exporters and importers) as customers' understanding. With her analyst's experiences in nation statistic research, the grammar approval and proof-reading were reproduced the new editions of items content which now been ready to send out to the other committees. This time, three committees had a same main issue (A. Kittiphol, A. Chatchalee and A. Somsak) suggested and asked on their feedbacks as why researcher had to repeat the Part I and Part III with some same variables?

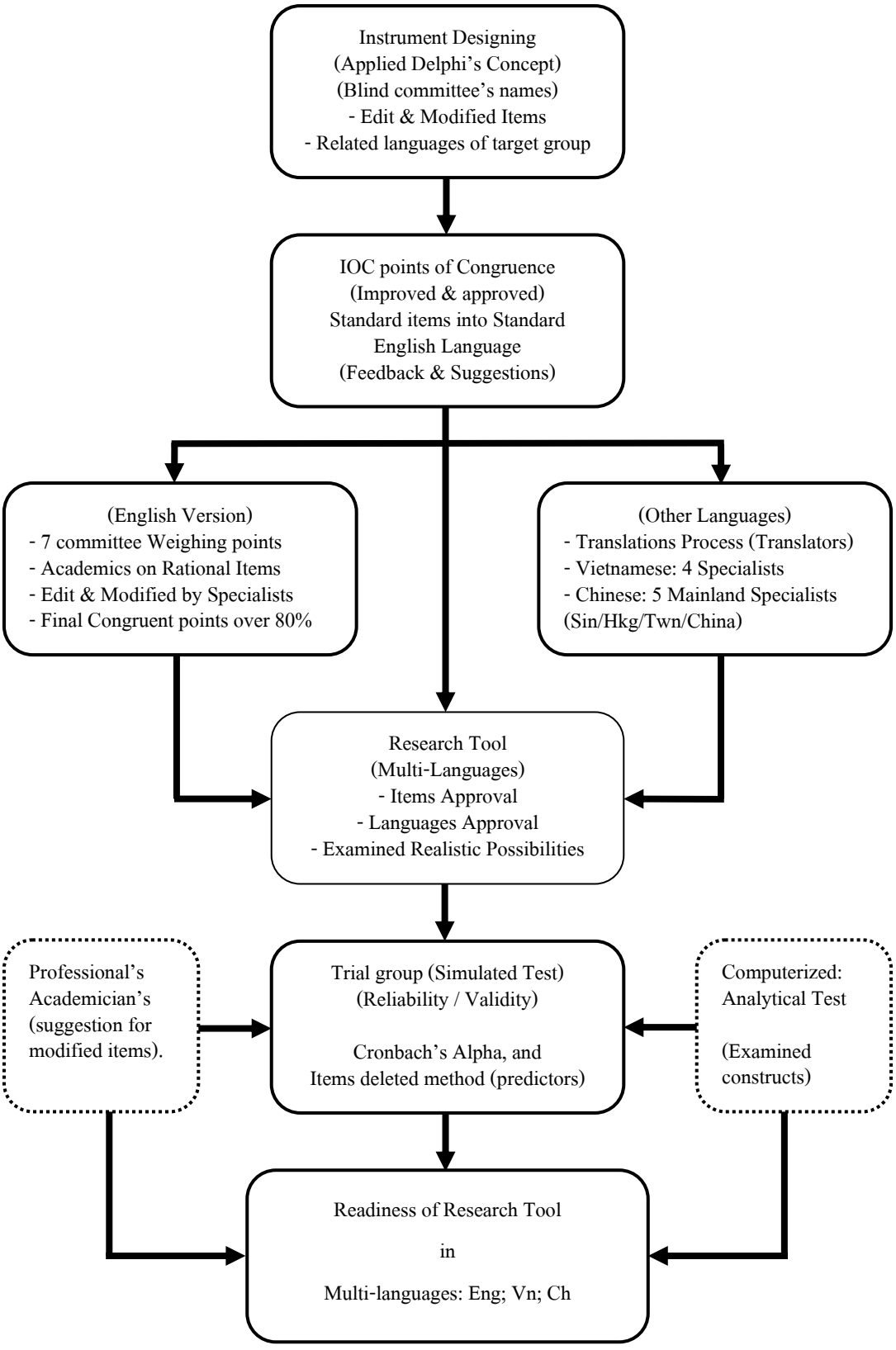

Figure 3.2 Research Instrument development algorithm

After all, committees got good explanations from the researcher that this survey required for two types of factor loadings into the study. Since Part I. was likely the multiple choices, while Part III that needs to investigate the levels of a degree in the form of Linkert's scale. Then all of them were clear and fully understood. Measuring the Subjective items became into objective senses, the valuable comments was needed from a practitioner's view. With the valuable comments and were sent out to a group of professional in logistics business and practices (Mr. Somsak, Ms. Orawan, and Dr.Tanit). These reviewed committees were professional in this industry.

The validated of items keep on the possibilities for asking and understanding for the managements and their managerial levels without any further confusion. Respondents should understand all questions consistently with clear questioned, and all wordings well fitted for all logisticians on their answering.

(2) ICO scoring

Second, Index of Item Objective Congruence (IOC) points of congruence were rated. In the beginning, points of validity were quite low to 37% from the first committee. With some modifications was done on few editions. Finally, IOC scores reached the high level of value 0.8407 or 84.07%

The IOC points in calculations provided into three scales of rating for consistency and congruencies of the items. All committees had to choose only one answer as the given mark from these three alternatives of choices:

+1 = Congruent with clear understanding,
0 = Uncertain or not sure whether item related to the study,
-1 = Not Understand or not congruent or related to this study.

Total points for each item must have the consistency value equal to or above 0.50 (Department of Academics Documents, 2003; Pinyopanuwat, 2014). IOC marks calculated by below equation:

$$\text{IOC} = \frac{\sum R}{N}$$

IOC = Item-Objective Congruence Index
R = Point given by specialists
$\sum$R = Total points of each specialist
N = Numbers of specialists

The total marks of each item from all committees produced out different outcomes. For an example, if the total marks were equal to three (3). It is possible that by 4 of them select one point (4 x 1), and 2 of them select the zero points (2 x 0), and one of them selected minus one point (1 x -1). Therefore, the outcome was: 4+0-1 = 3 points. Moreover, then, such 3 points had to be divided by total committees which was 7, then the outcome of such item will be (3/7) = 0.428.

However, the idea to examine the IOC regarding consistency as validity must not lower than 0.50. The range of data must be above 3.50 by normal means. Therefore, such item had to be revised. Finally, average resulted value 0.82 (lowest 0.57 ~ highest 1.0).

(3) Validate Quality of Research Instrument

The third step, researcher followed the analyst's practices in the quality of research instrument validating into most used four facets (Appendix H).

Pinyopanuwat (2014) recommended validating the quality of research tool which were:

(1) Validity: IOC $\geq$ .05 (p. 10)
(2) Difficulty: p = 0.20-0.80 (p. 6 & p. 14)
(3) Discrimination: r > 0.20 (p. 7 & p. 15); and
(4) Reliability: Cronbach's alpha > 0.70 (p. 18) and KR-20

Validating research tool applied her recommendation and reviewed more on these measurements.

Finally, points from IOC data were examined on four explorations, and the same investigation will apply to the further research response.

Primary, researcher applied below four tests on IOC points and further had examined in the respond of the survey.

1. Validity: the accuracy of the tool which on what to be measured.

1.1) IOC per item, usually, IOC points were rated with condition that IOC each item $\geq$ .05
1.2) Whole validity of research tool on whole items point is over 70%. By calculation on only agreed marks (+1) by total point (546) from total 78 items produced out at 84.07% as a result.

2. Difficulty: percentage or proportion of tool's difficulties for respondents to answer the items

The proportion (p) gives the portion of the number of respondents who response correctly with Right answers: "R" from the total number "N" of those surveyed (outcome between 0.00-1.00). Recommended value to be applicable would be p = 0.20-0.80

However, there were two types of "R" calculations on the quantifier (Right answered samples)

(a) Non-quantifier R: Number of samples with correct answers as a whole group; and

(b) Quantifier R = Number of Right answering samples into two separated quantifiable groups of high (H) and low (L) marks.

Case a) Non-quantifier R: (R as Single group)

$$p = \frac{\text{S of Right answer}}{N} \quad \text{(or) } p = \frac{R}{N}$$

Given:

p = Difficulty value

R = Number of Right answered samples

N = Number of total population

Case b) Quantifier R (R from multiple groups: High & Low)

$$p = \frac{H + L}{N} \quad \text{(or) } p = \frac{RH + RL}{R}$$

Given: p = Difficulty value

H = No. of samples with Right answer (at High mark)

L = No. of samples with Right answer (at Low mark)

N = No. of R (only right answered samples; R = RH+RL)

3. Discrimination: Power of research tool (r-value) to identify the separation among the High mark group from the Low mark group. Value in between -1 ~ +1, recommend r-value > 0.20

$$r = \frac{RH - RL}{RH}$$

4. Reliability: The consistency or stability of the respond marks. Two types of most used in reliability test are:-

4.1 Kuder – Richardson (KR-20); (KR-21) which $r_{tt} \geq 0.70$

4.2 Cronbach alpha ($\alpha \geq 0.70$)

4.1 Kuder–Richardson's method used in test the reliability with below equations: -

4.1.1 KR-20 with the whole group.

$$r_{tt} = \left(\frac{k}{k-1}\right)\left(1-\frac{\sum pq}{s^2}\right)$$

Given: r_{tt} = Reliability of tested tool
k = number of items
s^2 = variance of all marks in the whole set
p = Portion of Right answerers
q = Portion of Wrong answerers ($q = 1 - p$)

4.1.2 KR-20 with each item. (Recommended by Pinyopanuwat, 2014)

$$\text{KR-20} = \frac{\left[\frac{k}{k-1}\right]\left[S_x^2-\sum piqi\right]}{S_x^2}$$

Given: k = number of items
S^2_X = variance of all marks in the whole set (per item)
pi = Portion of Right answerers (per item)
qi = Portion of Wrong answerers (per item)

4.1.3 KR – 21

$$r_{tt} = \left(\frac{k}{k-1}\right)\left(1-\frac{\bar{X}\left(k-\bar{X}\right)}{kS^2}\right)$$

Given: r_{tt} = Reliability of tested tool
k = number of items
$\bar{X}$ = mean of total marks
s^2 = variance of all marks in the whole set

The differences of KR-20 and KR-21 in case that if p were in same stable value, usually result from KR-21 produced out the lower outcome.

4.2 Cronbach's Alpha method, usually Reliability by Cronbach's suited for measuring degrees of five scales.

$$\alpha = \frac{k}{k-1}\left[1-\frac{\sum S_i^2}{S_x^2}\right]$$

Outcome of Quality test with IOC results

1) Validities Result (IOC by items)

Any item with score lowers than 0.50 must be modified (Pinyopanuwat, 2014). This instrument had only a few items with lower than 0.5 marks. Only three questions (Q.1.3, 3.3, and Q.R3.7) from 78 items were below standard at 0.43 because of wrong grammar. Later, they were adjusted according to suggestions from the experts' feedback. All the elements with IOC scores were in between 0.57 ~1.00 which above than minimum standard requirement (0.50).

The analyzed outcomes of consistency from full marks 546 marks (78 x 1 x 7) were: 459 as agreed (+1); 65 as uncertain (0); and -22 were disagreed (-1).

For only the agreed scores 459 resulted as 84.07% consistency and validated. Net off-set scores from all seven committees were 74, 76, 78, 78, 78, 52, and 78 respectively. Such total net marks as 514 points from full score 546 were 94.1%

Table 3.9 IOC Results

IOC points	Agreed (+1)	Uncertain (0)	Disagreed (-1)	(N) $\sum X$	mean $\bar{X}$	S.D. σ	Coeff.var (CV)
78 x 7	459	65	22	546	0.824	0.4556	0.5529
(%)	84.07%	11.90%	4.03%	100%	82.4%	45.56%	55.29%

By an average of means, results produced out 459 marks from total marks of 546 research instrument has overall consistency value at 84.07% percentages as validity, whereas 0.824 by mean of average after items adjustment, standard deviation value at 0.4559 which was not over 1.00 and Coefficient of variation at 55.29%. These had confirmed that such validated research tool was valid enough and ready to be implemented in the research (Appendix G).

2) Difficulty Result (p)

Applicable (p) value should be in between 0.20 ~ 0.80, here were calculated in different R and N.

Table 3.10 Difficulty of Non-quantifier R and Quantifier R

Cases	RH (+1)	RL (0)	E (-1)	(N) $\sum X$	(p) R/N	R	p $\geq$ 0.2	S.D. σ
(a1)	459	65	22	546	H/N	459	0.841	0.9801
(a2)	459	65	22	546	50%H/N	229.5	0.420	2.6482
(b)	459	65	-	524	H+L/R	459	0.876	2.6952

Case a1 = R number only on +1, with N = all population of answers.
Case a2 = R number 50% for +1, with N = all population of answers.
Case b = R number for +1 and 0, with N = only Right answers.

Remark the theory concept is to test the difficulty in examination whether correct and the fault of answers. The difficulty value in the examination may recommend between 0.20 ~ 0.80contrasts with the purpose of congruencies on item measuring whereby the need of r values should near to achieve 1.00 will be an advantage. However, all p values of difficulty were above 0.20

3) Power of Discrimination (r)

Discriminations were tested into 4 cases: per set; per item; net marks by 50%; and by mean.

In the calculation, overall the whole set of questionnaire, N_R as Numbers of whole set only the Right answers with points of +1, and 0 as population. Where +1 as Right with high marks (RH) and 0 as Right with low marks (RL). Re-test had repeated for per item (mean average of the mark from each item), R in the calculation subtracted from RH-RL.

Another discrete value as N_R had retested by a group of persons who rated high marks and low marks. After ranking the committees' net scores, the separation was split by 50 percentages as the cutting point. N_H represented for only persons in the group of high scores.

Table 3.11 Power of Discrimination

Cases	RH (+1)	RL (0)	N_R ($N_{H)}$	R (diff)	R	r ($N_{H)}$ ≥ 0.2
Set	459	65	524	H-L	394	0.752
Items	5.88	0.83	6.71	H-L	5.05	0.753
50% Rank	4	3	4	H-L	1	0.250
Mean	5	2	5	H-L	3	0.600

By the other way, researcher applied the value of mean to replace the 50 percentages cutting-point to investigate for more different results. Results from all four methods, the r values of discrimination were valid in between 0.20 ~ 0.80 as recommended.

4) Reliability

4.1 KR-20 Results

Limitations of Kuder–Richardson's method that data was required only scores only as 1 and 0. To test the reliability from IOC scores, the researcher had re-arranged the IOC scores from +1, 0 and -1 into only +1 and 0. For score +1 remain as 1 passed approval (item was agreed) while 0 and -1 were not acceptable, then both 0 and -1 value as zero. The new table of IOC score was re-arranged into one same column per committee with all 78 items in different rows (Table 3.12).

4.2 KR-21 Results

The use of KR-21 in the production of the reliability of the test into p value from the whole set by population mean score. Results of pKR21 value are usually always lower than pKR20 for the reliability of the test. However, it had no any significant difference with KR20 methods. Result was over 0.97 (Table 3.13).

Table 3.12 Reliability by two different KR-20 formulas

KR-20		**KR-20**	
$\left(\frac{k}{k-1}\right)\left(1-\frac{\sum pq}{S^2}\right)$		$\frac{\left[\frac{k}{k-1}\right]\left[S_x^2-\sum piqi\right]}{S_x^2}$	
k	78	k	78
$k/k\text{-}1$	1.012987013	$k/k\text{-}1$	1.012987013
$\sum pq$	8.93878	$\sum piqi$	8.93878
S^2	257.619	S_x^2	257.619
$\sum pq / S^2$	0.03469764	$S_x^2 - \sum piqi$	248.680272
$\left(1-\frac{\sum pq}{s^2}\right)$	0.96530235	$\left[\frac{k}{k-1}\right] S_x^2 - \sum piqi$	251.90989
$\mathbf{r_{tt}}$	**0.977838744**	$\mathbf{r_{tt}}$	**0.977838744**

Table 3.13 Reliability by KR-21

k	78	$\overline{X}$	65.5714	$k-\overline{X}$	12.428571
$k/k\text{-}1$	1.01298701	$\overline{X}\left(k-\overline{X}\right)$	814.959	kS^2	20094.285
$\left(\frac{\overline{X}\left(k-\overline{X}\right)}{kS^2}\right)$	0.04055676	$\left(1-\frac{\overline{X}\left(k-\overline{X}\right)}{kS^2}\right)$	0.95944	ρ**KR21**	**0.9719035**

ρKR21 = ρ=k/k-1[1-(μ (k-μ)/kσ^2)] Where: $\left(\frac{k}{k-1}\right)\left(1-\frac{\overline{X}\left(k-\overline{X}\right)}{kS^2}\right)$

(4) Research tool for English Standard *(Technical words and Global Understanding)*

The fourth step, out of seven IOC committees, eleven specialists in logistics fields are practitioners at managerial levels (directors, shareholders, secretarial of stakeholders). All of them from various countries where using both American English and British English. Where the Chinese people are including the mainland, such as Singapore, Malaysia, Hong Kong and Taiwan should also understand the same meanings of all questions. All these executives were supporting feedback in understanding and modification needed in this said industry, some technician words had been revised into new version, such as consolidate box, the standard meaning is the cargo container. All volunteers were selected purposively under the criteria that must have worked in the logistics field, freight forwarding industry more than ten years and above. Therefore, the research tool in both type of English languages were verified by these entire specialist and improved.

Experts as respondents were sent the questionnaire form with items in English as the final form, and all of them require to vote for which was the best understanding for each questions. Tool be ensure all nations understanding, e.g. Australia, Bangladesh, India, Pakistan and European countries were well understand the same Standard English.

(5) Pilot test and reliability

Fifth, at last, step, a pilot test was done to examine the reliability of investigation tool whether the outcome of observed variables will result into the realistic statistic meaning. Samples of total 35 had run in the pre-test (Appendix E).

The questionnaires were sent out via email to all worldwide agents in Standard English languages. Therefore, samples were limited only on a managerial level, such as president, directors, managers in logistics businesses. However, were not restricted by geographic since English was the standard language globally for this industry. In the pre-test, there were no any limitation in nations and included Singapore, Hong Kong, Taiwan, Malaysia and Indonesia.

Pre-test results

The results from respondents were using the if-then function in XLS platform to decode the response data into numeric result before import into the statistic analysis (Pisoot, 2013b). Later the results were imported to run as the pre-test for the reliability of the questionnaire.

From the pilot test, 10 items was separated as descriptive of respondent's geographical data. The remainder 68 items were considered reliable that alpha coefficients values were over 0.7 with the outcome at 0.841, as the reliability result (Appendix J1 and J2).

Table 3.14 Reliability of Pre-test

Variables	Cronbach Alpha	Number of Items	Type of Choices
Q4.1~Q.C3	.841	68	degrees
Standardized items	.900	68	5 scales

Outcomes (refer to Appendix-J1, J2) from the pre-test with 68 items resulted had shown alpha value over 0.70 as resulted at 0.841 which high reliability of tool.

From Part II, as well as Part III (Q.4.1~4.3) were designed with selecting prices by quartile not by degree. However, the Make or Buy decision of strategies, dominant decisions, and relations. All of them had to analyze by averages of mean which produce out in level score output in separated perceive.

By the way, since Q4.1~4.3 must be separated from dominant effects of the decision, design was only for an illustration of reliabilities. Therefore, the design in Part II just only reserved as a cross-check indicator. In the full testing for investigate the conguenence of answering to the latent.

Under triangulation design, the latent were check by multiple choices in Part II, and Part III at the end by own constructs, and end up with the third examined by their single items named L1~L4 as dependent variables.

3.6 Data Collection

The research collected the questionnaire results through e-mail survey. Samples from three countries: Thailand, Vietnam, and China will be sent the questionnaire form under XLS with Standard English language: (No different between American and British English). The target groups of respondents are only manager level and higher level as executives of a service operator in the logistics business. Moreover, will follow-up by telephone call or a post-mail to confirm for the high return response rate. Such process had taken between three to five months.

3.7 Data Analysis

This study employed two data analyzers which were Simple Statistics and Structural Equation Model. Both functions to measure separated objectives

Results reported into means standard as well as frequencies and levels of degree, applications of averages; 4 scales by 25% percents quartile.

The Statistical Package for Social Science was employed to summarize the descriptive data. Descriptive analyses are respondents' profiles with frequency tables of results in standard statistics mean. The value of means and standard deviations of variables had reported.

For Structural Equation Modeling: SEM, the path analysis, observed Lisrel 9 for Windows analyzed variables, mediators (intervening) with latent and second orders of the model.

Structural Equations Modeling Analysis (SEM)

The analysis was planned into 9 steps of investigations:-

SEM 1) Measurement model fit (Confirmatory Factor Analysis: CFA)

a) Convergent validity: Observed variables and Latent correlated by factor loading.
b) Path analysis reliability (T-value, Composite reliability: CR; Average Variance Extracted: AVE, R^2). Reports with values of X^2, df, P-value, RMSEA, SRMR, CFI, GFI.

SEM 2) AVE Correlation Coefficient

SEM 3) Normal Distribution of factors

SEM 4) SEM Covariance Matrix by Path Analysis (Path Coefficient; T-Value)

SEM 5) Direct effects; indirect effects by standardized Path Coefficient, and Total effects of determinant & intervening variables

SEM 6) Conclusion on Hypotheses Testing results

SEM 7) Relationships on path directions

SEM 8) Conclusion for the relationship degree of variables

SEM 9) the Invariance Model Test