Chapter 3

Research Hypotheses and Models

This chapter consists of two parts. The hypotheses and the proposed "Full Model of Export Performance". The hypotheses are based on the theories discussed in Chapter 2 and incorporate in "The Full Model of Export Performance". The model is presented in the form of Linear Structural Relationship Model (LISREL).

Hypotheses

Eight hypotheses related to the export performance are stated. The objective is to examine whether the hypotheses can be rejected in "Thai exporting context". The elaboration of the theoretical rationale for these hypotheses follows.

1. Marketing Innovation

Marketing innovation in this study consists of three variables: new product, new working process and new market.

New products can have favorable effect on market share to the extent that they satisfy customer needs better than the existing goods (Davidson, 1976) and prevent competitors from taking away a business's customers with their own new products (Hayes and Abernathy, 1980). Hambrick and Schecter (1983) found that continuous and constant innovation were competitive imperatives for maintaining and/or building share. Evidence from studies on "excellent companies" suggests that new products and profits are positively related in the long run (Peters and Waterman, 1982; Maidique and Hayes, 1984). Successful new-product development requires creative inputs and analytical disciplines. Cooper and Kleinschmidt (1987) and De Brentani (1989) found that innovation was found to correlate with the new-product process. In penetrating a new market, previous studies (Robinson, 1967; Day, 1976; Tessler, 1977; Attiyeh and Wenner, 1981)

recommended a market concentration strategy. Based on the traditional notion that larger market share in a few key markets are associated with higher profitability in the long run (Boston Consulting Group, 1968; Buzzel et al., 1975). Other researchers (Hamermesh et al., 1978; Piercy, 1981), recommended a market diversification strategy based on the rationale that taking low market shares in widely dispersed markets may be more profitable than concentrating on a few key markets. From the contradictory empirical results, either export market concentration or market diversification lead to better export performance (Lee and Yang, 1991). In addition, Bello and Williamson (1985) and Rosson and Ford (1982) found that there was a positive relationship between export performance and a firm's support to distributors. Other studies by Christensen et al. (1987) and Kirpalani and MacIntosh (1980) reported a positive relationship between export performance and competitive pricing. Therefore, the first hypothesis for this particular study is stated as follows.

H_1: The greater the degree of marketing innovation, the higher the level of export performance.

2. Firm Resources

Firm resources in this study consist of five variables: finance, R&D budget, technology, human resources and marketing knowledge.

Firm resources enable firms to select better export markets, formulate suitable marketing strategies and effectively implement them (Douglas and Craig, 1989; Terpstra, 1987). Chow et al. (1997) found that intense competition among firms required great financial commitments, especially for survival. They also found that R&D provides the foundation for an organization's offerings. Although the benefit of R&D may not be obvious in the short term, it is an absolutely crucial activity for maintaining one's competitive position. Technology intensiveness is consistently found to be related to propensity to export (Cavusgil and Nevin, 1981; McGuinness and Little, 1981; Cavusgil, 1984; Cooper and Kleinschmidt, 1985; Daniels and Robles, 1982; Joynt, 1982). From the human resources aspect,

Hansen and Wernerfelt (1989) and Powell and Dent-Micallef (1997) found that human resource factors such as organisational climate and goal directedness explained greater proportions of performance variance than strategy and market share factors. Reid (1982) suggested that firms' export expansion was influenced by financial and human resources such as sales, assets, number of employees. Zirger and Maidique (1990) found that when an electronics company built a quality product it required qualified engineers, marketers and R&D. They concluded that a firm's resources had an influence on success or failure of the firm's performance. In marketing, innovation in new products can cannibalise the sales of existing products and consume marketing resources (Hambrick and Schecter, 1983). Continuous and constant innovation are competitive imperatives of maintaining and/or building share (Szymanski et al., 1993).

In conclusion, a company's resources have an association in many aspects of organisational factors and firm performance. No empirical study has employed a resource-based view of export ventures before. Consequently, this area has limited availability of past research findings. The following hypotheses are stated and empirically tested.

H_2:	**Firm resources have positive relationship with firm characteristics.**
H_3:	**Firm resources have positive relationship with marketing innovation.**
H_4:	**The greater the degree of firms resources, the higher the level of export performance.**

3. Firm Characteristics.

Firm characteristics in this study consist of five variables: firm size, management commitment toward exporting, management perception toward profit, number of export product lines, and business culture.

There is inconclusive evidence on export success based on firm size (Aaby and Slater, 1989). Cooper and Kleinschmidt (1985) established a negative relationship between size and export intensity, while McGuinness and Little (1981), Czinkota and Johnston (1983) and Diamantopoulos and Inglis (1988) concluded

that there was no relationship. However, some empirical evidence supported the positive relationship between export performance and a firm's management commitment (Bilkey 1982; Daniels and Robles, 1985; Johnston and Czinkota, 1982; Rosson and Ford, 1982). For example, Gronhaug and Lorenzen (1982) found a high positive correlation between management involvement and export performance among Norwegian exporters. Furthermore, Aaby and Slater (1989) concluded that knowledge of the nature of management attitudes, (mis) perceptions and disposition towards exports was important to enhance export performance.

Based on the traditional belief that firm characteristics are influenced by national culture, firm characteristics in a particular country should have some unique characteristics. This study proposes that Asian business management variables should be included in measuring firm characteristics. It is expected that five variables of firm characteristics proposed in this study can be verified and can explain the relationship between and among export performance and marketing innovation of exporting companies in Thailand. The two hypotheses are stated as follows:

H_5: The greater the levels of firm characteristics, the higher the level of export performance.

H_6: Firm characteristics have positive relationship with marketing innovation.

4. Environment

Social, economic and demographic change results from factors far beyond the control of any individual firm. Even in governmental policy making, where business has a clear responsibility to participate, the individual firm is unlikely to have a significant influence on decisions (Price, 1996). Porter (1990) states that in international markets, innovations that yield competitive advantage anticipate both domestic and foreign needs.

Previous studies have suggested that export performance is enhanced when exporting firms match their marketing strategies with changes in their external

environment (Ansoff, 1987; Kaynak and Kuan, 1993). Indeed, depending on the level of environmental hostility, firms may modify their target markets (Green and Allaway, 1985), standardise or adapt product offerings (Cavusgil and Naidu, 1993), adjust other marketing mix variables (Cooper, Hartley and Harvey, 1970), or intensify their exports (Rao, Kreighbaum and Hawes, 1983).

The environment in this study consists of 9 variables: politics, economics, social factors, international involvement, rules and regulations, culture, ecology, exchange rate, conditions of the International Monetary Fund toward Thai economic policy, and others i.e., foreign competitors, raw materials etc. The seventh and the eighth hypothesis are stated as follows:

H_7: The attitudes of executives toward the environments have an effect on export performance

H_8: The environments have positive relationship with marketing innovation.

The Concept of LISREL Model

The structural equation models (also referred to as "SEM models") have become very popular in the social sciences and the behavioral sciences, especially in psychology, education, sociology, and marketing. For a fuller account of SEM models, see Bollen (1989) and Jöreskog and Sörbom (1996).

A major feature in the development of structural equation models from the earlier causal ("path") models of the 1960s and 1970s is the conceptualization of latent variables. The terms "unmeasured variable models" and "latent variable models" refer to classes of structural equation models which explicitly incorporate measurement error into the estimation, and treat observed, or manifest variables as indicators of underlying constructs rather than perfectly measured representations of these same constructs (Bollen, 1989). These models are quite general, and subsume many of the multivariate techniques which have been dealt with in earlier courses, including confirmatory factor analysis, structural equation (causal)

modeling for recursive and/or non-recursive systems, and to some extent the analysis of variance/analysis of covariance, principal components analysis, etc. In common usage, the model used in this study is referred to as LISREL model, but it should be noted that LISREL is but one of the many computer programs now available to work with these models. Karl G. Joreskog and Dag Sörborm from Uppsala University in Sweden are both well-known as a gurus in this field whom developed the statistic software program in calculating the linear structural relationship model. This software program is known as "LISREL".

LISREL statistic program is one of the first programs available and is widely used among academics and researchers in western countries but this program is considered as innovation tool for Thai researchers (Wiratchai, 1995). Comparing to other programs such as EQS (distributed by BMDP), AMOS, and PROC CALIS (for use with mainframe or microcomputer SAS), LISREL is probably the most widely used and best known.

LISREL Model

The use of path diagrams to represent a structural equation model facilitates the specification and understanding of the LISREL methodology. In LISREL, latent constructs are indicated by circles or ovals, while observed variables are indicated by squares or rectangles. Measurement errors are denoted by epsilon (ε) and delta (δ). Causal relationships are denoted by gamma (γ) and beta (β).

Notation used in LISREL Model

Symbol	Interpretation
***Observed Variables*:**	
□	Observed variable
x_i	Independent observed variable
y_i	Dependent observed variable
δ_i	The error term for x_i
ε_i	The error term for y_i
***Unobserved Variables*:**	
O	Unobserved or latent variable
ξ_i	Independent unobserved variable
η_i	Dependent unobserved variable
ζ_i	The error term for η_i

Primary symbols used in Path Analysis

Straight arrow signifies that variable at base of arrow "causes" variables at head of arrow.

Curved two-headed arrow signifies association between two variables.

Two straight single-head arrows connecting two variables signifies feedback relation or reciprocal causation.

Source: Bollen, Kenneth A. (1989), *Structural Equations with Laten Variables*, New York: John Wiley & Sons, Inc.

Relationships Between Variables

	Interpretation
λ	Coefficient of an observed independent (x_i) or dependent (y_i) variable in a measurement equation. Similar to a factor loading.
Λ_y	is a *p x m* matrix of coefficients of the regression of y on η.
Λ_x	is a *q x m* matrix of coefficients of the regression of x on ξ.
B	is an *m x m* matrix of coeficients of the η-variables in the structural relationship.
Γ	is an *m x n* matrix of coefficients of the ξ-variables in the sturctural relationship.

Sources: Joreskog, Karl G. and Dag Sorbom (1989), *LISREL 7* User's Reference *Guide*. Chicago: Scientific Software International.

Model Estimation

A technique based on maximum-likelihood analyses of a structural equation system was used as the primary analytical tool to examine the plausibility or fit of the proposed model. LISREL VIII (Jöreskog & Sörbom, 1994) provides a method of estimating the unknown parameters in a set of linear structural equations which are believed to be related to observed variables. According to Jöreskog and Sörbom (1994), the most general form of the model assumes a causal structure among a set of latent variables, and it assumes that "the latent variables appear as underlying causes of the observed variables". The method thus allows for the selection or identification of latent or theoretical constructs and of observed variables which are believed to underlie those constructs. Furthermore, the model allows for the inclusion of multiple measures of the latent constructs. Once the latent and/or observed variables are chosen, the hypothesized relationships among them are expressed in the form of structural equations.

The LISREL VIII model consists of two distinct components: (a) the measurement model, and (b) the structural model (Jöreskog & Sörbom, 1989; Jöreskog & Sörbom, 1996; Maruyuma & McGarvey, 1980). The measurement model relates observed variables to latent constructs, thus describing the measurement properties of the observed variables (i.e., their adequacy or accuracy as indicators of the latent constructs). The structural model provides estimates of the hypothesized interrelationships among the variables.

The LISREL VIII measurement models for observed independent (x) and observed dependent (y) variables may be expressed as follows:

Measurement Model for x: $\underline{x} = \underline{\Lambda}_x \underline{\xi} + \underline{\delta}$

Measurement Model for y: $\underline{y} = \underline{\Lambda}_y \underline{\eta} + \underline{\varepsilon}$

where,

$\underline{x}$ = a vector of observed independent variables

$\underline{\Lambda}_x$ = a matrix of coefficients relating observed independent (x) variables to unobserved independent (ξ) variables

$\underline{\xi}$ = a vector of latent independent variables

$\underline{\delta}$ = a vector of errors of measurement in x

$\underline{y}$ = a vector of observed dependent variables

$\underline{\Lambda}_y$ = a matrix of coefficients relating observed dependent (y) variables to unobserved dependent (η) variables in the y measurement equation

$\underline{\eta}$ = a vector of latent dependent variables

$\underline{\varepsilon}$ = a vector of errors of measurement in y

The measurement models in LISREL VIII also produce two matrices, $\underline{\theta}_\delta$ and $\underline{\theta}_\varepsilon$ which are the variance/covariance matrices of δ and ε, respectively.

The LISREL structural model may be expressed as follows:

$$\underline{\eta} = \underline{\beta}\,\underline{\eta} + \underline{\Gamma}\underline{\xi} + \underline{\zeta}$$

where,

$\underline{\eta}$ = a vector of latent dependent variables

$\underline{\xi}$ = a vector of latent independent variables

$\underline{\beta}$ = a matrix of coefficients representing direct causal effects of $\underline{\eta}$ variables on other $\underline{\eta}$ - variables.

$\underline{\Gamma}$ = a matrix of coefficients representing direct causal effects of $\underline{\xi}$ - variables on $\underline{\eta}$ - variables

$\underline{\zeta}$ = a random vector of residuals or errors in the structural equations

LISREL VIII also produces the matrices, $\underline{\Phi}$, which is the covariance matrix of the latent independent variables, and $\underline{\Psi}$, which is the covariance matrix of the error terms, $\underline{\zeta}$.

General Interpretations of the Fit of LISREL Model

Model fit determines the degree to which the structural equation model fits the sample data. LISREL VIII offers the researcher several indicators of the goodness of the hypothesized model. These indices and the general interpretations are as follows:

1. Parameter estimates. The parameter estimates reflect the strength of the hypothesized relationships within the model.

2. Standard errors and t-value for each estimated parameter. Joreskog and Sörbom (1981) stated that the "t-value for a parameter is defined as the parameter estimate divided by its standard error", and that it "can be used to test whether the true parameter is zero". They stated, further, that t-values greater than 2.0 in magnitude are judged to be different from zero. In an analyses having large sample size, this test

is approaching the z test and the z-values of 1.96 is significant at .05 level of significance.

3. Square multiple correlation for each observed variable. The square multiple correlation reflects the amount of variance shared by a given observed variable and the latent construct (s) to which it is purportedly related. Hence, it measured the amount of variation in true score which is also known as reliability.

4. Coefficients of determination. These are measures of the strength of several relationships jointly. LISREL 8.20 provides coefficients of determination for the set of x-variables, the set of y-variables, for each structural equation, and for the system of structural equations collectively.

5. Normalized residuals. The normalized residuals reflect differences between the model's predicted variance/covariances (or correlation) matrix and the sample variance/covariance (or correlation) matrix. According to Jöreskog and Sorbom (1981), a normalized residual greater than 2.0 in magnitude indicates that the model is inadequate to account for the covariance of the two involve variables. Thus, the normalized residuals provide information regarding the possible origin of misspecifications in the model.

6. Modification indices. For each fixed parameter in the model, the modification index provides the expected decrease in chi-square (χ^2) if that parameter alone is freed. This index provides statistical information about specific structural modifications that may be made to improve the fit of the model, provided that those modifications must be in accordance with the theories.

In addition to the above information, model fit criteria commonly used for the overall goodness of fit of the whole model to the data are the overall χ^2 measure (and its associated degrees of freedom and probability), a Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), and Root-Mean-Square Residual (RMR) (Bollen, 1989). These criteria are based on differences between the observed (original, *S*) and model-implied (reproduced, Σ) correlation or covariance matrices.

With respect to the χ^2 measure, Jöreskog and Sörbom (1982) stated that "*although the χ^2 measure may be derived theoretically as a likelihood ratio test statistic for testing the hypothesis that Σ is of the form implied by the model against the alternative that Σ is unconstrained, we emphasize that such a use of χ^2 is not*

valid in most cases for several reasons". They cautioned that in most empirical work the hypothesized model is tentative at best, and further, that the χ^2 statistic is valid only if all observed variables have a multivariate normal distribution, the analysis is based on the sample covariance matrix, and if the sample size is very large. Bollen (1989), consequently, suggested that the most appropriate use of the χ^2 measure is as a goodness of fit measure, which may be of particular importance in comparative model testing. Generally, large χ^2 values (and small probabilities) indicate poor overall fit of the model to the data, while small χ^2 value (and large probabilities) reflect good fit. According to Bollen (1989), the degrees of freedom serve as a standard by which to judge the relative size of the measure. If the model fits the data well, the expected value of χ^2 is equal to the degrees of freedom. Similarly, Bollen (1989) recommended that the GFI and the RMR, both of which have a zero to one range in value, should serve primarily as indicators of the relative fit of different models for the same data or the fit of one model for different data.

For the present analysis, measurement models for x-variables, y-variables, and a structural model are formulated. As suggested by Joreskog and Sorbom (1982), the information provided by LISREL 8.20 is used to assess the goodness of the proposed model and its overall fit to the data. In addition, the original model is modified according to information provided by the analyses based on the evidence from the literature.

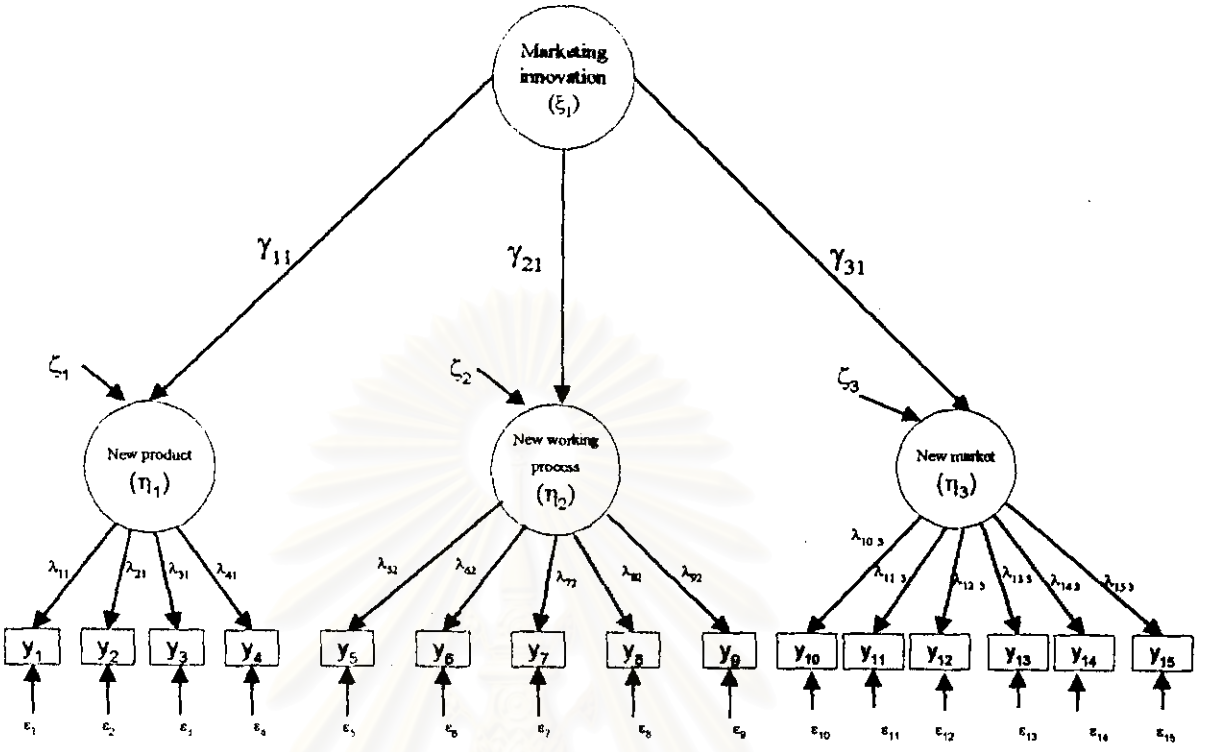
The Models

According to the eight hypotheses, two models are formulated. They are **the conceptual model of marketing innovation** (Figure 3.1) and **the full model of export performance of exporting firms in Thailand** (Figure 3.2). These two proposed models are used as a basis for subsequent empirical work. Both models employ and depict in the form of Linear Structural Relationship Model (LISREL).

The Model of Marketing Innovation

Figure 3.1 depicts that the conceptual model of marketing innovation of exporting firms in Thailand is composed of three sub-constructs. They are new product, new working process, and new market.

Figure 3.1 The Marketing Innovation Model: Constructs, Measurement and Variables



New Product (η_1)

y_1 = totally new to markets
y_2 = unique features
y_3 = customer's need
y_4 = higher quality than competitors

New Working Process (η_2)

y_5 = IT - computer (increase efficiency)
y_6 = ISO 9000 (increase efficiency)
y_7 = downsizing (reduce cost)
y_8 = re-engineering (reduce cost, increase efficiency)
y_9 = new technology (increase efficiency)

New Market (η_3)

y_{10} = access to new market
y_{11} = new packaging
y_{12} = new promotional approach
y_{13} = new training to sales force of foreign distributor
y_{14} = new promotion support provide to foreign distributor
y_{15} = new price competitiveness

Note: $\zeta_1, \zeta_2, \zeta_3$ defines as an error term of η_1, η_2, η_3.
$\varepsilon_1, \varepsilon_2, \varepsilon_3, \ldots, \varepsilon_{15}$ defines as an error term of $y_1, y_2, y_3, \ldots, y_{15}$ respectively.

Operational Definitions of the Constructs in Marketing Innovation Model

Operational definitions of the constructs in marketing innovation model are defined as follows.

Marketing Innovation The important term in this study is "innovation". The term is defined as practices created by learning or discovering new methods to improve competitiveness within the same industry and presenting the result to markets. Thus, marketing innovation is defined as strategies to promote innovation such as new products, new working processes and new markets used by the company during the last five years.

New Product New product is defined as products that are new, both in terms of the products themselves and brand names to customers in foreign markets.

New Working Process New working process is defined as an adaptation of new technology or new management (Porter, 1990) by export companies or units of the companies to help reduce production costs, or management of export costs of the companies.

New Market New market is defined as a market to which the company has never exported its products before, either directly or through sales agents. It also includes marketing activities such as new prices, new sales agents and new sales promotions.

The Proposed Full Model of Export Performance

The proposed full model of export performance is demonstrated in Figure 3.2. This model shows that there are five constructs that are proposed in this model. The exogenous constructs are firm resources, firm characteristics, marketing innovation and environment. The endogenous construct is export performance.

Figure 3.2 The Proposed Full Model of Export Performance: Constructs, Measurement, and Variable

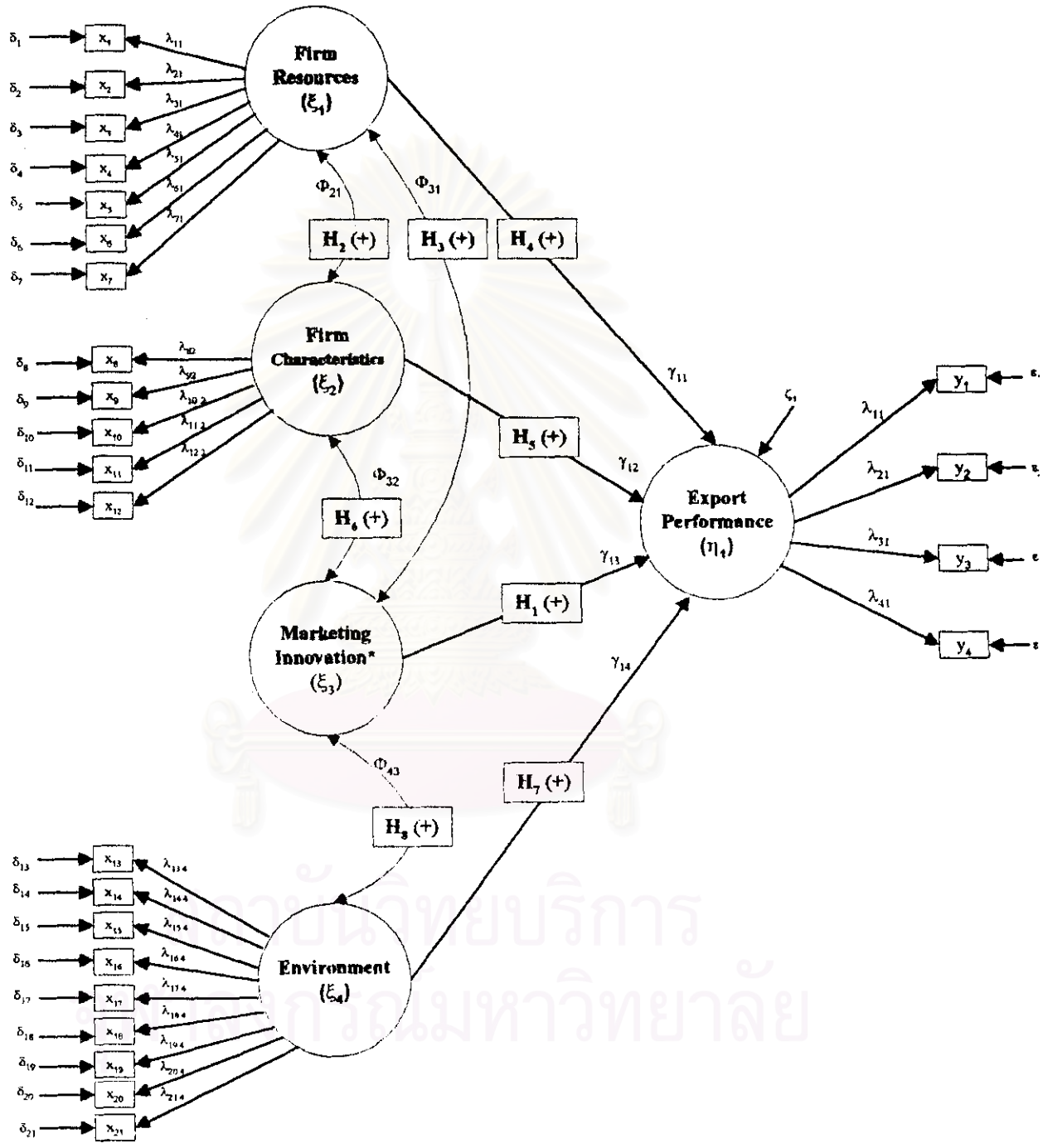


Table 3.1 Factor Affecting Export Performance : Latent and Observed Variables

Exogenous Variables	**Endogenous Variable**
Firm Resources (ξ_1)	Export Performance (η_1)
X_1 = marketing knowledge X_2 = Staff time X_3 = Support services X_4 = Assigned responsibility for export development X_5 = Export marketing department X_6 = Budget for export development X_7 = Technology	Y_1 = Profit Y_2 = Market share Y_3 = Growth Y_4 = Objectives of firm
Firm Characteristics (ξ_2)	
X_8 = Size (number of full-time employees) X_9 = Commitment toward exporting (number of year firm has exported) X_{10} = Perception of managers toward profit from exporting X_{11} = Number of export product lines X_{12} = Business management (relationship, organization structure, decision-making)	
*Marketing Innovation (ξ_3) * variables as have been shown in Figure 3.1	
Environment (ξ_4)	
X_{13} = Politics X_{14} = Economics X_{15} = Social X_{16} = International participation (etc. WTO, GATT) X_{17} = Regulation X_{18} = Culture X_{19} = Environment X_{20} = Exchange rate X_{21} = Condition under IMF	

Operational Definitions of the Constructs in Export Performance Model

Operational definition of the constructs in the proposed full model of export performance are difined as follows.

Export Performance Export performance is defined as executives' acknowledgement concerning exports that marketing innovation strategy has yielded results in terms of the firm's performance .

Firm Characteristics Firm characteristics are defined based on Aaby and Slater (1989); Chetty and Hamilton (1993); Reeding (1995); and Weidenbaum (1996). Components of firm characteristics are firm size, management commitment toward exporting, perception of executives toward profit, number of product lines, and business culture.

Firm Resources Firm resources are defined in this study as competencies in marketing knowledge, export analysis, finance, human resources and technology.

Environment Environment is defined in this study as a perception of executives toward environments outside their exporting company.

Summary

This chapter explains the proposed hypotheses and the models. The two proposed models, marketing innovation and the full model of export performance are demonstrated. All factors in the models are explained. Both models employ and depict in the form of Linear Structural Relationship Model (LISREL). Significant associations are hypothesized between each of the marketing innovation model and each of the proposed full model of export performance. The hypothesized relationships which are expressed in the null form in Hypotheses 1 to 8 will be tested using bivariate correlation analysis.

The hypotheses in the full model of export performance are summarized as follows:

H_1: The greater the degree of marketing innovation, the higher the level of export performance.

H_2: Firm resources have positive relationship with firm characteristics.

H_3: Firm resources have positive relationship with marketing innovation.

H_4: The greater the degree of firms resources, the higher the level of export performance.

H_5: The greater the levels of firm characteristics, the higher the level of export performance.

H_6: Firm characteristics have positive relationship with marketing innovation.

H_7: The attitudes of executives toward the environments have an effect on export performance

H_8 The environments have positive relationship with marketing innovation.