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Evaluating Factors Affecting Logistics Customer Service Performance for Car Manufacturing Companies in Korea[1]

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ABSTRACT

The objective of this study is to evaluate factors affecting logistics customer service performance in the context of car manufacturing sector. Results indicated that responsiveness is the most significant variable contributing to logistics customer service performance, followed by flexibility and inventory. A paired t-test shows important variables affecting distribution channel performance and offers insight into how to better manage the distribution channel to achieve high customer service level with low cost.

Keywords: International automobile distribution channel, Performance measurement, structural equation modeling

Ⅰ Introduction

As other industries, the automobile industry underwent a revolution during the 1980s and 1990s. Production systems were overhauled and modernized, design and development redefined and the purchasing process streamlined. However, in these two decades the international distribution process remained practically untouched (Mara & Scott, 1998). Furthermore, the move from a manufacturer-push to a customer-pull system was a general phenomenon in all industries except the automobile distribution sector. Therefore it became apparent that the automobile industry had to face up to the challenge of re-engineering its international distribution channel. Consequently, there is a current need for research on the automobile distribution channel from the customers'

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perspective.

The objective of this study is to evaluate factors affecting logistics customer service performance in the context of car manufacturing sector. The following is the organization of this research. Section Ⅱ, defines definitions of efficiency, effectiveness and performance in terms of the physical distribution channel, followed by a review of logistics customer service measurement. Section Ⅲ, describes the research questions based on the research objectives. Section Ⅳ, details the research design and methodology used in this study including an outline of the survey population, data collection methods, questionnaire design and pilot survey. Section V presents the general findings resulting from the analysis of the questionnaire and discusses the empirical results and findings derived from the analysis. The conclusions are provided in Section VI.

Ⅱ Theory and Research Hypotheses

Sanders and Premus (2005) tested a model of the relationship between firm IT capability, internal and external collaboration, and firm performance, using empirical data. They showed that firm IT capability impacts performance both directly and by having a positive impact on performance and , in turn, is impacted by external collaboration.

International organizational collaboration requires cross-functional planning, coordination, and sharing of integrated databases. External organizational collaboration requires sharing of information across the full range of supply chain participants, as well as sharing of internal cross-functional processes (Schrage, 1990).

Rhea & Shrock (1987) defined physical distribution effectiveness as the extent to which distribution programmes satisfy customers. They pointed out that care must be taken to incorporate multiple goals in defining performance. Garland et al. (1994) provided a representative set of answers to the question “what is logistics performance?” as follows: sale growth, customer satisfaction, keeping promises, job security and working conditions, flexibility, cost-efficiency, on-time delivery, product availability, social responsibility, fair price for inputs, low loss and damage, and profitability. These are incorporated into various possible dimensions of performance in a single envelope to help highlight the numerous interdependencies and conflicts

between the goals.

Kearney (1985) suggested that the evaluation of logistics functions may be divided into three areas: productivity, utilization, and performance, where productivity is the ratio of real output to real input, utilization is the ratio of capacity used to available capacity, and performance is the ratio of actual output to standard output. In essence, performance measurement is an analysis of both effectiveness and efficiency in accomplishing a given task. All evaluation is in relation to how well a goal is met. Performance is a function of both effectiveness and efficiency. So, any evaluation of logistics performance needs to reconcile these two aspects of performance measurement (Mentzer & Firman, 1994).

Effectiveness is defined here as the extent to which goals are accomplished. Van der Meulen & Spijkerman (1985) viewed effectively as the ratio between the real outputs and the normal level of outputs. Efficiency is the measure of how well the resources expended are utilized. Again, Van der Meulen and Spijkerman (1985) defined efficiency as the ratio between the normal level of inputs over the real level of inputs.

Effectiveness is generally defined as the extent to which an objective has been achieved and efficiency refers to the degree to which resources are used economically (Gleason & Barnum, 1986). Within the current context, effectiveness involves identifying appropriate service elements and efficiency means achieving adequate performance of those elements without wasting resources.

In the past, various financial performance indicators were regarded as relevant management information, however, today, management needs additional performance indicators. The need for operational performance indicators and information about the connection between these indicators and financial performance indicators is growing (Donselaar, Kokke, and Allessie, 1998).

Many dimensions of logistics performance lend themselves well to hard performance measures. Hard performance measures such as net income or order fill rate are typically impersonal, accurate, and easy and inexpensive to collect. Measures such as net income and accounting ratios such as return on investment (ROI) are useful ways of capturing profitability, and are often easy and inexpensive to collect too, particularly where logistics is treated as a profit centre. Profitability is an especially useful goal

because it directly reflects the goals of all the organizations internal constituent groups to one extent or another, although it may not be a good indicator of the viability of the firm in the long run.

Cost accounting measures may also be useful particularly in evaluating several dimensions of efficiency. Data are often highly accurate and, in many cases, available over long periods of time. However, the measures are not always comparable between one organization and another. Changes in accounting practices may even inhibit valid comparisons with the same organization over time and international comparisons are notoriously difficult to make. Furthermore, financial measures and cost accounting data are often considered confidential, and many firms are reluctant to release information to outsiders. Also, in making comparisons between organizations or time periods, variations in standards or accounting methods are a frequent threat.

The use of input-output ratios (also known as productivity or performance indicators) is common in logistics, and has received extensive treatment in textbooks and other literature. The main advantage is that input-output measures can be used to evaluate goal attainment in many areas, particularly efficiency and effectiveness.

For service measures such as order cycle time or lead time variability, the advantages and disadvantages are essentially the same as those of performance indicators. One limitation common to both is that there are many dimensions of performance which they cannot capture, particularly the extent to which customers are satisfied. The difficulty in capturing customer satisfaction is the underlying reason that hard measures should be supplemented with soft perceptual ones.

Moreover, customer satisfaction cannot be captured by hard measures. A set of soft measures, collected using techniques such as the mail survey, telephone interview, or similar method are needed. Besides their usefulness in identifying problems, soft measures may also be called for where available hard measures are not comparable between one organization and another because of differences in accounting standards or similar problems. These measures are subject to the limitations inherent in any self-report, such as consistency bias, and the social desirability problem.

In order to achieve high performance levels, it is critical to know which operational factors are important for success and which are less important. In this research

distribution channel effectiveness is defined as the extent to which distribution channels satisfy customers and therefore efficiency can be measured by the cost of delivering that level of customer service. Consequently, an excellent distribution channel can be defined as the distribution channel which achieves a high level of customer service with low level of inventory (Kearney, 1991). Therefore, what is needed is to take this normative and explorative research and progress through a framework by developing valid measures of distribution channels effectiveness and efficiency, and identifying research methodologies suited to the data collection requirements. Major empirical studies are summarized in Table 1.

Table 1 Major empirical studies on distribution channel performance measurement

Researchers	Details
Parasuraman et al. (1988)	Five dimensions of service quality -tangibility, reliability, responsiveness, assurance (merging competence, courtesy, credibility and security), empathy (merging access, communication and understanding the customer)
Roger, Layton & Buzzell in 1987 excerpted from Bowersox & Closs (1996)	Existing methods of measuring the performance. - size of promotion costs/marketing costs (as related to production costs), marketing productivity, profitability, degree of innovation or progressiveness/amount of choice provided to consumer, degree of consumer satisfaction, characteristics of the products produced
Kearney (1991)	- Effectiveness measured by the level of customer service it delivers (on time delivery), long-term relationship, JIT, supplier quality, integrated supply chain, stock reduction, superior customer service
Byrne & Markham (1991)	- Customer orientation, integrated long-range planning, supplier partnerships, cross-Functional operations, continuous improvement process, employee empowerment, integrated IT systems, measurements, comparison and action
Cooper et al. (1994)	Used following five key logistics performance indicators for assessing company's efficiency in logistics through interviews of personnel who is in charge of logistics service in companies - using of logistics service suppliers, price paid for logistics services, inventory holding, logistics planning, customer service
Coyle et al. (1996)	Performance measurement criteria from customers' perspective - orders received on time, orders received complete, orders received damage free, orders filled accurately, orders billed accurately.

The first research question examines the logistics theories of distribution channels in relation to the Korean car industry. That is, this study examines the relationships between customer service factor across the other factors (flexibility, IT system,

inventory, and responsiveness factors) and relationships among the others.

Question 2. What are the critical variables for an efficient and effective distribution channel?

The second question primarily seeks to discover the variables essential for an efficient and effective distribution channel from the customers' point of view. In order to find out which variables are critical, a questionnaire survey was conducted among the entire population of Korean car dealers in the UK. Due to the unique character of the Korean car industry[4], dealers are in fact front line customers in the export channel.

Question 3. What is the performance level of the Korean car manufacturers' distribution channel from the customers' perspective?

The third research question seeks to ascertain the distribution channel performance of Korean car manufacturers. To measure the performance level, Korean car dealers in the UK were asked to evaluate their level of satisfaction with the distribution channel.

Ⅲ Research Methods

To answer research questions, this study involved a two-stage methodology. The first stage involved a literature survey and personal interviews with personnel from the car distribution industry and academic world. The purpose of the interview survey and literature survey was to identify car distribution channel performance measurement criteria and methods. In addition, the researcher was able to develop a better understanding of car distribution in the UK and Korean car manufacturers' distribution channel.

The second stage of the methodology involved an empirical investigation of the Korean car manufacturers' distribution channel performance. The investigation was carried out through the use of a questionnaire survey which ascertained the performance level of the Korean car manufacturers' distribution channel and identified critical variables for efficient and effective car distribution channel management from the

[4] The franchised dealers do not place an order based on the customers' demand. They place an order based on their own forecasts and negotiations with manufacturers.

customers' point of view. In order to analyze the survey, we used statistical models such as a structural equation model (Question 1) and paired t-test (Question2 & 3)

The analysis of a structural equation model is a technique commonly used for the analysis of latent variables, and it can be used to confirm the validity of the scales of an instrument and assess the structural relationships among the scales (Jöreskog & Sörbom, 1996). We use SPSS AMOS 4.0 as the major statistical analysis tool for the structural model. Through the model, we want to know relationships between customer service factor across the other factors (flexibility, IT system, inventory, and responsiveness factors) and relationships among the others.

This research focuses on the Korean car manufacturers' distribution channel to the UK. Accordingly, the researcher identified three car companies, three national distributors, three European headquarters, and three hundred and sixty one dealers involved in Korean car distribution channel to the UK through interview surveys and secondary data.

Because of the nature of the motor business[5], the researcher decided to use the entire population group as a research sample for the questionnaire. Accordingly, one hundred and sixty five Hyundai dealers were identified by Hyundai Motors European office and addresses were provided by Hyundai Cars (UK) Ltd owned by the LEX group. In KIA's case, during a personal interview with a sales director at KIA Cars UK Ltd, the researcher was given their KIA UK Dealer Network Guide Book. Seventy four dealers were identified from this book. However, shortly after initial contact with them, four dealers terminated their franchise contracts with KIA. So seventy-dealers were ultimately used as a sample. Finally, one hundred and twenty six Daewoo dealers were identified by the Daewoo Network Guide, and confirmed by Daewoo Cars UK Ltd.

To answer research question 1, 2, and 3, a four page questionnaire was mailed to the three hundred and sixty one Korean car dealers in the UK together with a

[5] Academicians interviewed in the motor industry admitted they experienced problems studying the car industry because the industry rarely released data relating to performance levels and were reluctant to participate in academic research. For example, the Lean Enterprise Research Centre had conducted questionnaire surveys to UK car dealers every two years since 1992, and their average response rate was approximately five per cent.

postage-paid reply envelope and one cover letter identifying the aims of this survey. Also, a pilot survey was performed to avoid possible measurement error in the questionnaire and to eliminate confusing, ambiguous, or potentially offensive questions to the respondent, after which the questionnaire was again revised in accordance with respondents' comments and advice.

Ⅳ Results of Empirical Analyses

The primary objective of this study was to find out relationships between international distribution channel performance factors. This section reviews specific research questions and subsequent findings and then presents conclusions based on the postal questionnaire survey. The questionnaire data were analyzed using the Statistical Package for the Social Science (SPSS) 10.0. For the structural model, we used SPSS AMOS 4.0 as the major statistical analysis tool. Through the model, we want to know relationships between customer service factor across the other factors (flexibility, IT system, inventory, and responsiveness factors) and relationships among the others.

1. Response Rate

All the Korean car manufacturers' had recently launched their cars on the UK market and the rest of the industry was watching them very closely. Because of this situation, they were unwilling to assess their distribution channel performance and release their raw performance data. Also, considering the unwilling nature of the car industry to release performance data, the response rate in this research, which was twenty four per cent, was considered more than reasonable. The response rate is summarized in table 2

2. Respondents' Characteristics

As shown in Figure 1, more than eighty percent of respondents have the title of manager or higher. Thirty seven percent of them are dealership principle, while 18.4 percent have the title of director. Thus the information given from them can be deemed to be good and reliable.

Table 2 Response rate

Respondents	Number Distributed	Number Cancelled	Effective Population	Usable Responses (Sample)	Response Rate
Hyundai Motor Dealers	165	3	162	56	34.57%
KIA Motor Dealers	70	1	69	17	24.64%
Daewoo Motor Dealers	126	0	126	14	11.11%
Total	361	4	357	87	24.37%

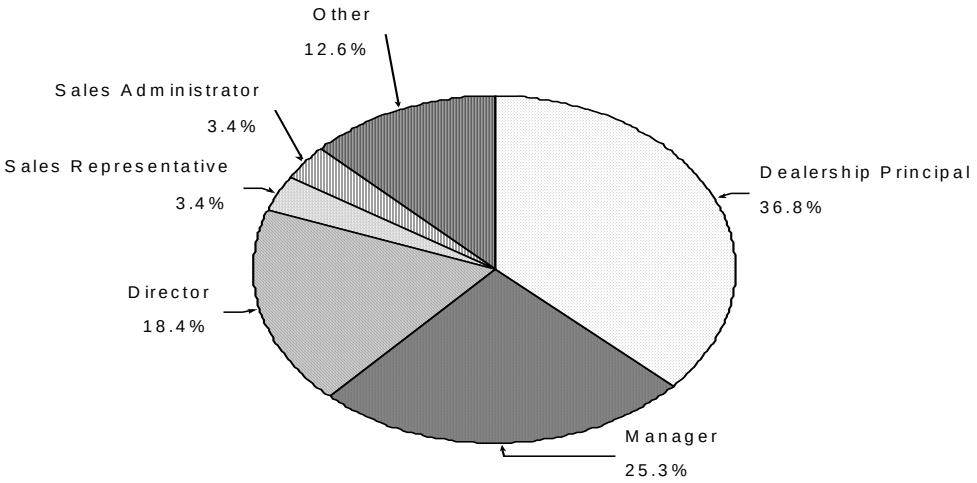

Figure 1 Respondents' Characteristics

To investigate whether respondents have really experienced Korean Car Company's international distribution channel, the length of the time in the current company was investigated. As displayed in Table 3 the average tenure in the current company by respondents was ten years. Most of Korean car manufacturers started to export their cars to UK since 1994, so the respondents can be assumed to have had enough chance to understand and experience Korean car manufacture's international

distribution channel.

Table 3　Respondent's years of working in the current company

	Number	Minimum	Maximum	Mean	Std. Deviation
Years of working in this company	87	.40	40	10.4276	9.5316

3. The Relative Importance and Satisfaction of Logistics Customer Service Performance and Service Factors

Table 4 shows results of paired t-test between importance and satisfaction variables. Except for "Working relationship with trucking company", "Order billed accurately", "Ease of communication with PDI company", "Ease of communication with trucking company", "Level of dealer's new car inventory", and "Adequate detail in response to inquiry from PDI company" variables, the other variables are statistically significant at the 0.05 level. And all the importance variables have greater mean than satisfaction variables. Furthermore, the overall mean of all the importance variables is 4.115 and is greater than 3.381, that of all the satisfaction variables. Also importance score and ranking in Table 4 are the answers to Question 2.

Table 4　Importance and satisfaction of logistics customer service performance and service factors

Factors	Variables	Importance (Mean)	Satisfaction (Mean)	t value	p value
Customer service level	Order Cycle Time	4.494 [9]	3.200[33]	9.531	0.000
	Order Consistency	4.417[14]	3.071[46]	10.662	0.000
	Response Capabilities To Customer Enquires	4.353[20]	3.365[27]	7.592	0.000
	Ability To Substitute Or Back-Order Line Items	3.840[36]	3.198[37]	4.522	0.000
	Full Range Of Product Availability	4.447[12]	3.200[33]	9.109	0.000
	Product Range Consistency	4.301[28]	3.434[21]	7.173	0.000
	On Time Delivery	4.542[6]	3.241[32]	9.292	0.000
	Response To Priority Delivery Request	4.393[17]	3.250[31]	8.057	0.000
	Working Relationship With National Distributor	4.453[11]	3.773[6]	5.272	0.000
	Working Relationship With PDI (Pre Delivery Inspection) Company	3.621[43]	3.259[30]	2.307	0.025
	Working Relationship With Trucking Company	3.575[46]	3.342[28]	1.522	0.132

	Working Relationship With Manufacturer	4.045[32]	3.687[10]	2.342	0.022
	Order Completeness	4.421[13]	3.763[7]	6.253	0.000
	Damage Free Delivery	4.691[1]	3.815[4]	7.248	0.000
	Order Filled Accurately	4.614[3]	4.265[2]	3.695	0.000
	Order Billed Accurately	4.530[7]	4.313[1]	1.975	0.052
	Sales And Marketing Incentive Program	4.614[3]	3.602[12]	7.786	0.000
	Advice Of Late Delivery	4.554[5]	2.699[52]	12.016	0.000
	Strength Of Brand Image	4.619[2]	3.476[17]	8.560	0.000
	National Distributor's Empathy Level Of Dealership's Business	4.333[23]	3.603[11]	5.626	0.000
	PDI Company's Empathy Level Of Dealership's Business	3.721[37]	3.393[26]	2.766	0.008
	Trucking Company's Empathy Level Of Dealership's Business	3.676[41]	3.324[29]	2.585	0.012
	Manufacturer's Empathy Level Of Dealership's Business	4.147[31]	3.426[23]	4.776	0.000
Flexibility	Ability To Adjust Order Quantities And Order Specifications	3.869[34]	3.107[43]	5.511	0.000
	Distribution System Flexibility	3.952[33]	2.917[51]	7.677	0.000
	Ability To React To Market Fluctuation	4.381[18]	2.964[50]	10.203	0.000
Use of IT system	IT System	4.369[19]	3.476[17]	6.921	0.000
	Accuracy Of Data On The System	4.488[10]	3.405[25]	8.176	0.000
	Malfunction Recovery Time	4.277[29]	3.434[21]	6.379	0.000
	Accuracy Of The Real Time Data On The System	4.313[25]	3.506[15]	6.502	0.000
	IT System Accessibility And Ease Of Use	4.400[16]	3.471[19]	7.369	0.000
	Manufacturers Perceived Level Of Importance Of IT	4.337[22]	3.783[5]	4.916	0.000
	Quality Of Documentation	4.306[26]	3.706[9]	6.751	0.000
	Order Processing System	4.353[20]	3.494[16]	7.246	0.000
	Ease Of Communication With National Distributor	4.513[8]	3.850[3]	5.323	0.000
	Ease Of Communication With PDI Company	3.435[51]	3.129[39]	1.912	0.061
	Ease Of Communication With Trucking Company	3.397[52]	3.110[42]	1.686	0.096
	Ease Of Communication With Manufacturer	3.609[45]	3.087[44]	3.096	0.003
Level of new car inventory	Level Of Dealer's New Car Inventory	3.866[35]	3.707[8]	1.129	0.262
	Level Of Importer's New Car Inventory	4.210[30]	3.420[24]	5.274	0.000
Responsiveness	Speed Of Response To Inquiry From National Distributor	4.325[24]	3.463[20]	6.553	0.000
	Speed Of Response To Inquiry From PDI Company	3.550[48]	3.200[33]	2.086	0.041
	Speed Of Response To Inquiry From Trucking Company	3.571[47]	3.071[46]	2.881	0.005
	Speed Of Response To Inquiry From Manufacturer	3.687[39]	3.060[48]	3.430	0.001

	Accuracy Of Response To Inquiry From National Distributor	4.413[15]	3.538[14]	6.733	0.000
	Accuracy Of Response To Inquiry From PDI Company	3.550[48]	3.200[33]	2.007	0.049
	Accuracy Of Response To Inquiry From Trucking Company	3.614[44]	3.114[41]	2.861	0.006
	Accuracy Of Response To Inquiry From Manufacturer	3.682[40]	3.000[49]	3.422	0.001
	Adequate Detail In Response To Inquiry From National Distributor	4.304[27]	3.557[13]	5.723	0.000
	Adequate Detail In Response To Inquiry From PDI Company	3.466[50]	3.121[40]	1.972	0.053
	Adequate Detail In Response To Inquiry From Trucking Company	3.652[42]	3.159[38]	3.065	0.003
	Adequate Detail In Response To Inquiry From Manufacturer	3.698[38]	3.079[45]	3.150	0.003
Average		4.115	3.381	-	

* Note 1: Number in [ ] means ranking within each importance or satisfaction

* Note 2: The items in questionnaire are listed in Table 4

* Note 3:

- total mean in customer service level factor: 4.379 (importance), 3.465 (satisfaction)
- total mean in flexibility factor: 4.067 (importance), 2.996 (satisfaction)
- total mean in IT system factor: 4.150 (importance), 3.454 (satisfaction)
- total mean in new car inventory factor: 4.038 (importance), 3.564 (satisfaction)
- total mean in responsiveness factor: 3.793 (importance), 3.213 (satisfaction)

4. Structural Equation Modelling Results

"Structural equation models, also called simultaneous equation models, are multivariate (i.e., multiequation) regression models". Unlike the more traditional multivariate linear model, however, the response variable in one regression equation in a structural equation model may appear as a predictor in another equation; indeed, variables in an structural equation model may influence one-another reciprocally, either directly or through other variables as intermediaries. These structural equations are meant to represent causal relationships among the variables in the model. A cynical view of structural equation models is that their popularity in the social sciences reflects the legitimacy that the models appear to lend to causal interpretation of observational data, when in fact such interpretation is no less problematic than for other kinds of regression models applied to observational data. "A more charitable interpretation is that Structural equation models are close to the kind of informal thinking about causal relationships that is common in social-science theorizing, and that, therefore, these

models facilitate translating such theories into data analysis" (Fox, 2002).

We used a two-step approach (Anderson and Gerbing, 1988; Jöreskog & Sörbom, 1996) for a structural equation model. The first step is an analysis of the measurement model, which specifies the relationships between the observed variables (items) and latent variables or hypothetical constructs (factors). The results of this analysis identify the measurement properties (reliabilities and validities) of the observed and latent variables. This is done separately before fitting a structural equation model, to look at the relationship between the latent variables. Measurement models were defined for all the independent latent variables. The second step is the structural equation model, which specifies the relationships among the hypothetical constructs (latent variables) as posited by theory or previous research. This two-step approach allows the researcher to identify sources of poor fit of a full structural model and decide whether this poor fit is due to the measurement or structural model (Webster & Fisher, 2001).

In the first step, we created variables at the construct level (constructs or factors), which capture a set of constituent observed variables. Factor validation is done by assessing reliability test and factor analysis (See Table 5).

Table 5 The factors and their variables

Construct (Factor)	# of variables	Included variables after varimax rotation (Criterion: factor loading > 0.5)	Included variables after reliability test	Cronbach alpha
Customer service level	23	15	15	0.9075
Flexibility	3	3	3	0.8310
Use of IT system	12	8	8	0.8789
Level of new car inventory	2	2	2	0.6445
Responsiveness	12	12	12	0.9164

The first construct (factor), "customer service level," refers to 15 variables of performance. These are "order cycle time", "order consistency", "response capabilities to customer enquires", and so on. The second factor, "flexibility," consists of 3 variables: "ability to adjust order quantities and order specifications", "distribution system flexibility", and "ability to react to market fluctuation".

Next, the structural model was estimated for an examination. Factors were derived

from using the factor score regression weights from the measurement models. This approach to model estimation is advantageous, because only the beta and psi matrices are estimated (Jöreskog & Sörbom, 1996). This modeling strategy is efficient and does not require researchers to nominate factors as exogenous (Tam et al., 1999). The second step in the validation of the structural model concerns the entire model. A model takes into account both direct and indirect effects, which means one effect may be reinforced or counteracted by another (Blomstermo et al., 2004). The proposed structural relationships between variables for this study are presented in Figure 1.

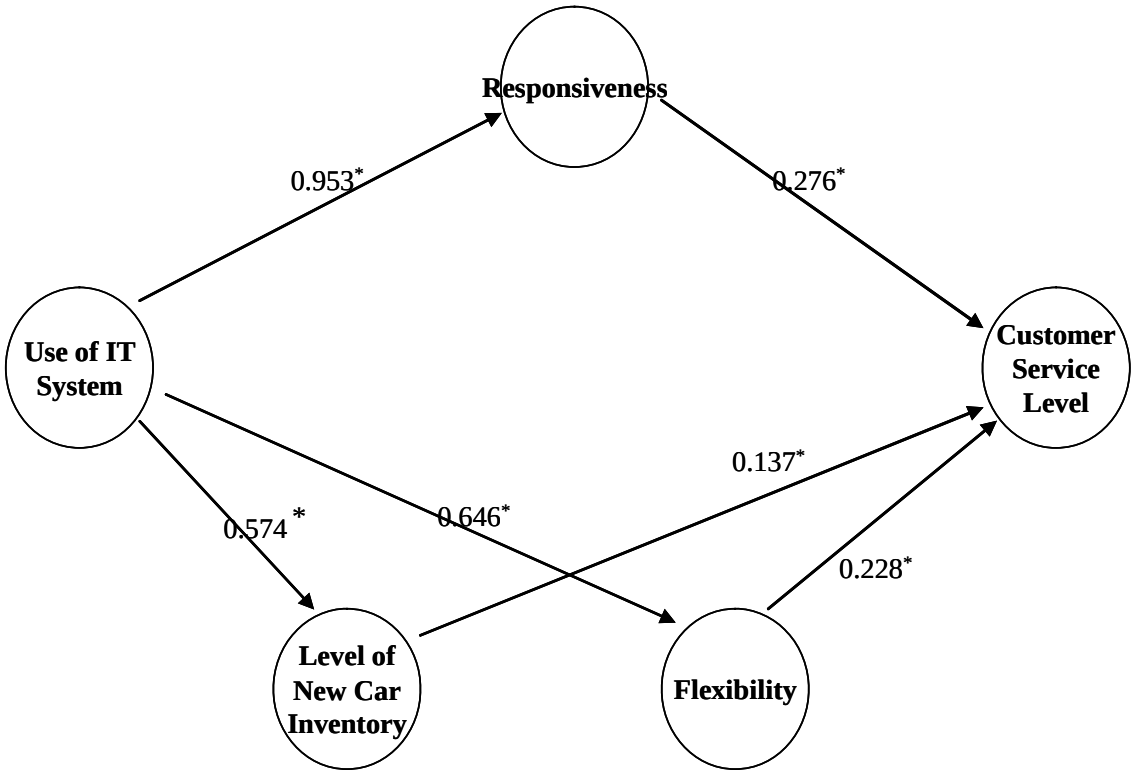

Figure 2　Resulting structural model and estimates

(Note: * Significance t-value, p<0.05)

The fit of the model was evaluated with various measures. The model's key statistics are very good, as the chi-square has the probability of 0.257. The goodness of fit index (GFI) is 0.974 and the adjusted GFI (AGFI) is 0.903, which supports nomological validity. GFI and AGFI are always between zero and one, with any value above 0.9 indicating a good fit and the value one suggesting a perfect line. And root mean-square residual (RMR) is 0.041. A RMR value close to zero (less than 0.08) shows a near perfect fit. And normed fit index (NFI) and non-normed fit index (NNFI) also always between zero and one, with any value above 0.9 indicating a good fit and the value one suggesting a perfect line. The NFI and NNFI values have 0.966 and 0.977 and the model has a highly satisfactory fit.

Figure 2 shows the summary of the maximum likelihood parameter estimates and the significance of the t-values as indicated by asterisks for the model. Consequently, except for use of IT system, responsiveness, flexibility, and level of new car inventory were all significant predictors to customer service level. And use of IT system was the predictor to responsiveness, flexibility, and level of new car inventory. But use of IT system had indirect effect (0.489) to customer service level. When use of IT system was considered into a structural model, the estimate was 0.053 (0-value=0.0630). Therefore the results indicated that use of IT system factor had only an indirect effect on customer service level and was operated as infrastructures of the distribution channel.

5. Performance Level of International Distribution Channel

Evaluating a company's distribution performance is extremely difficult, because of the varying characteristics of products in the supply chain and company data relative to logistics performance is not standardized between companies. Moreover, quantifying all aspects of channel performance is also very difficult, and makes inter-company comparisons difficult if not impossible. However, to manage a distribution channel efficiently and effectively, it is vital to know the critical variables and the performance level of these variables.

Question 3 sought to ascertain the distribution channel performance of Korean car manufacturers. In order to measure Korean car manufacturers' international distribution channel performance, the satisfaction level of each variable was elicited from dealers. Satisfaction score and ranking in Table 4 are the answers to Question 3.

Meanwhile, the fifty two performance measurement criteria were divided into five different factors, namely, customer service, flexibility, use of IT system, level of new car inventory and responsiveness, and examined further. In the customer service factor, advice of late delivery, order consistency, full range of product availability, order cycle time, on time delivery, response to priority delivery request, and response capabilities to customer enquiries were characterized by a relatively low level of satisfaction and a high level of importance. All flexibility related variables, namely, ability to adjust order quantities and order specifications, distribution system flexibility, and ability to react to market fluctuation were considered relatively high in importance but low in satisfaction. Therefore, from the customers (dealers) point of view, flexibility was the most poorly performed criterion even though considered highly important.

According to the responses in the survey, dealers considered the level of a national distributors' new car inventory more important than the level of a dealers' new car inventory. Nonetheless, the satisfaction level of a national distributors' new car inventory was found to be relatively low compared with its importance. Because the geographically long distribution channel causes uncertainty and a long lead-time, Korean car manufacturers' national distributors hold at least a three month sales volumes inventory which is large when compared with European car manufacturers' national distributors' inventory levels. Even though a national distributor carries a large volume of new car inventory, customers (dealers) were not satisfied with their levels of new car inventory. Therefore the important variable was not the amount of new car inventory, but its composition, and the necessity to ensure that inventories contain the correct items. According to the interview survey, Korean car manufacturers' international distribution channels are supply driven distribution channels not demand driven distribution channels. Consequently, making accurate forecasts is essential.

In terms of responsiveness in the IT system factor, Korean car manufacturers' distribution channels performed quite well as all the variables' levels of satisfaction correlated with similar levels of importance.

Ⅴ Conclusions

Through the structural equation model, we found the relationships between customer service factor across the other factors (flexibility, IT system, inventory, and

responsiveness factors) and relationships among the others. Thus based on analysis of the model, paired t-test shows important variables affecting distribution channel performance and offers insight into how to better manage the distribution channel to achieve high customer service level with low cost.

This study also identified the definition of efficiency and effectiveness in the distribution channel and compared the importance level with the satisfaction level within each factor. Moreover, a comparison of the importance level and satisfaction level of each variable provides useful guidance to car distribution practitioners for managing the distribution channel more efficiently and effectively.

The main contribution of this study is to statically model relationships between factors of distribution channel performance from customers' perspective: using a structural equation model and paired t-test, we analyzed the relationships and suggested managerial guidance.

However, the limitation is that the results derived from the empirical study may not be generalized since the research area was confined to the Korean car manufacturers' international distribution channel. Furthermore, compared to other supply chain management areas, only a few researchers have investigated the distribution channel performance from the customers' perspective and even fewer studies have explored the car distribution channel. Therefore, it is hard to conclude a general construct of the car distribution channel. A continued exploration of the make up of the constructs of distribution channel performance measurement is consequently necessary.

The following are interesting areas for further research. First, new factors should be developed. For example, integration level and reliability level of distribution channel can be applied to the proposed model. Second, hard measures such as net income and accounting ratios such as return on investment (ROI) can be considered for any structural equation model.

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