A study on establishing a strategy of supply chain management: focusing on Korean automobile industry

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Abstract

The purpose of this paper is to present a new strategic framework of Supply Chain Management (SCM) in the automobile industry. For our purpose, we first had studied about the structure of relationship between supplier and buyer in Korean automobile industry. With this study, we searched for factors which compose a strategy of SCM, and whether or not the companies’ performance that are influenced by specific SCM strategy factors. Of course, our study based on existing researches, especially Cox et al. (1995) and Venkatraman et al. (1992), but the existing researches is differentiated in this paper that is treated several power factors as resource, value, environment and relation. So, results of our paper are what a good strategy of SCM composed by these factors and how to adopt this strategy on global logistics. And our methodology has some using of statistics method by SPSS 14(v) such as factor analysis, reliability analysis, and SEM (Structural Equation Model) with AMOS.

Keywords: Supply Chain Management, Strategy, Power, Value, Environments.

1. Introduction

During the 1990s, Supply Chain Management (SCM) has become one of the key issues in the manufacturing and logistics, and tremendous changes have occurred in supplier management practice.

Ahn et al. (1999) suggest that world-class manufacturers tend to purchase system parts or sub-
assemblies form outside suppliers rather than make them internally. This results in suppliers obtaining more control over quality, cost, and delivery, and they suggested an importance of supply chain management strategy between supplier and buyer.

Further, several companies have significantly improved their performances by better coordinating the activities of individual members of their supply chain. Supply chain management is a set of practices aimed at managing and coordinating the supply chain form raw material suppliers to the ultimate customers(Heikkila, 2002).

In this viewpoint, it is increasing the importance of SCM strategy between supplier and buyer companies. And a number of former studies were which indicate the competitive advantages and importance of linking supply chain to overall business strategy. They present many type of SCM strategy and structure of strategy, and described the related theory such as a transaction cost, power, social-relationship, and resource dependency, so on.

Another researchers proposed that strategic supply chain management are structured by specific factors such as power-related factors(Cox, 1997), specific assets(Dyer, 1982; Williamson 1985), value (Cooper et al., 1993; Porter, 1981) and so on. But their studies have a limitation which strategy is consist with 1or 2 factors. So our study has a unique method which is finding structure of SCM strategy by using simultaneous several influence factors on existing researches.

This paper is organized as follows. In section 1, we introduce about objects, necessity and unique of our study. Section 2 describes the related studies about supply chain and supply chain management strategy. In section 3 and section 4, we explained the research methodology and data analysis. Finally, section 5 is composed with result of our study.

2. Related studies

2.1 Definition of supply chain and supply chain management

In the past years, various definitions of a supply chain have been offered on many studies as the concept has gained popularity, but the APICS’s definition is a clear and closer. The APICS Dictionary describes the supply chain as:

- the processes from the initial raw materials to the ultimate consumption of the finished product linking across supplier user companies; and
- the functions within and outside a company that enable the value chain to make products and provide services to the customer (Cox et al., 1995).

Another source defines supply chain as, the network of entities through which material flows. Those entities may include suppliers, carriers, manufacturing sites, distribution centers, retailers, and customers(Lummus and Alber, 1997). The Supply Chain Council(1997) uses the definition: “The supply chain – a term increasingly used by logistics professionals– encompasses every effort involved in producing and delivering a final product, from the supplier’s supplier to the customer’s
customer. Four basic processes – plan, source, make, deliver – broadly define these efforts, which include managing supply and demand, sourcing raw materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and order management, distribution across all channels, and delivery to the customer.” Quinn (1997) defines the supply chain as “all of those activities associated with moving goods from the raw-materials stage through to the end user. This includes sourcing and procurement, production scheduling, order processing, inventory management, transportation, warehousing, and customer service. Importantly, it also embodies the information systems so necessary to monitor all of those activities.”

In addition to defining the supply chain, several authors have further defined the concept of supply chain management. As defined by Ellram and Cooper (1993), supply chain management is “an integrating philosophy to manage the total flow of a distribution channel from supplier to ultimate customer”. Monczka and Morgan (1997) state that “integrated supply chain management is about going from the external customer and then managing all the processes that are needed to provide the customer with value in a horizontal way”. They believe that supply chains, not firms, compete and that those who will be the strongest competitors are those that “can provide management and leadership to the fully integrated supply chain including external customer as well as prime suppliers, their suppliers, and their suppliers’ suppliers”.

From these definitions, a summary definition of the supply chain can be stated as: all the activities involved in delivering a product from raw material through to the customer including sourcing raw materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and order management, distribution across all channels, delivery to the customer, and the information systems necessary to monitor all of these activities. Supply chain management coordinates and integrates all of these activities into a seamless process. It links all of the partners in the chain including departments within an organization and the external partners including suppliers, carriers, third party companies, and information systems providers. Managers in companies across the supply chain take an interest in the success of other companies. They work together to make the whole supply chain competitive. They have the facts about the market, they know a lot about competition, and they coordinate their activities with those of their trading partners. It encompasses the processes necessary to create, source, make to, and to deliver to demand. They use technology to gather information on market demands and exchange information between organizations.

A key point in supply chain management is that the entire process must be viewed as one system. Any inefficiencies incurred across the supply chain (suppliers, manufacturing plants, warehouses, customers, etc.) must be assessed to determine the true capabilities of the process.

2.2 Supply chain management and strategy

When companies decide to become involved in any supply chain they have to make decisions about how they will control and manage the primary supply chain itself(Cox, 1999). Hence, the supply chain improvements described indicate that supply chain management has the potential to improve a firm’s competitiveness, and encourages management of processes across departments.
Cox (1999) stated that supply chain strategy can be viewed as the pattern of decisions related to sourcing product, capacity planning, conversion of finished product, deployment of finished product, demand management and communication, and delivery. Linking supply chain strategy to the business strategy involves defining the key business processes involved in producing a company’s product or service. So supply chain management can be utilized to be a point of differentiation for a company.

And he said that “excellence on a certain dimension in product position can provide a competitive marketing opportunity, but shortfalls in providing this dimension by the supply chain can eliminate this advantage. Managers must define a working relationship with customers and put themselves in a position to deliver customer value”.

All components of the supply chain must have the capability to meet strategic objectives. Companies must evaluate the effectiveness of the supply chain strategy using a new set of measures. Typical rewards aimed at improving performance of functions or departments must be revised to strive to improve supply chain performance overall. By tying the supply chain strategy to the overall company strategy, the objectives become process objectives rather than functional. In strategically, companies have to be more specialized and search for suppliers who can provide low cost, quality materials rather than competitor’s own. It becomes critical for companies to manage the entire network of supply to optimize overall performance. These organizations have realized that whenever a company deals with another company that performs the next phase of the supply chain, both stand to benefit from the other’s success.

Advanced Manufacturing Research, a Boston-based consulting firm, developed a supply chain model which emphasizes material and information flow between manufacturers and their trading partners (Davis, 1995). They believe the changes required by management are due to the following changes in how manufacturers are doing business:

- Greater sharing of information between vendors and customers.
- Horizontal business processes replacing vertical departmental functions.
- Shift from mass production to customized products.
- Increased reliance on purchased materials and outside processing with a simultaneous reduction in the number of suppliers.
- Greater emphasis on organizational and process flexibility.
- Necessity to coordinate processes across many sites.
- Employee empowerment and the need for rules-based real time decision support systems.
- Competitive pressure to introduce new products more quickly. Companies are streamlining all operations and minimizing the time-to-customer for their products.

For these reasons, expertly managing the supply chain has become critical for most companies. As Ralph Dyer, vice president of product supply/customer service at Procter and Gamble put it, “Winning in the marketplace of the 1990s is going to require a far different kind of relationship - one that recognizes that the ultimate winners will be those who understand the interdependence of retailer/manufacturer business systems and who work together to exploit opportunities to deliver superior consumer value” (Dyer, 1994). Managers in companies across the
supply chain take an interest in the success of the other companies. They work together to make the whole supply chain competitive.

They have the facts about the market, they know a lot about competition, and they coordinate their activities with those of their trading partners. They use technology to gather information on market demands and exchange information between organizations. Critical to managing the supply chain is managing the link between each node within the chain to synchronize the entire supply chain.

In recognizing that there is a strategic as well as an operational way of thinking about supply chains, it is essential that practitioners recognize that what is appropriate in one context may be inappropriate in another (Cox, 1997b; 1998; 1999). Earlier it was argued that there are serious intellectual flaws in some of the lean thinking literature. Most of these flaws relate to the failure by its proponents to understand that the appropriateness of the use of this, or any other, approach must be based on an understanding of what business is actually about in theory.

Essentially business is about appropriating value for oneself; it is not about passing value to customers unless circumstances decree that this is the only (and it is normally the least desirable) option available to a company in order for it to sustain itself in business. In fact the theoretical ideal in business (from an entrepreneurial perspective) is to be able to put oneself in a position where neither customers, employees, competitors or suppliers can leverage value from you, while putting yourself in a position to leverage all of them. It has to be recognized, of course, that achieving such an idyllic business situation is rare and exceptional. Despite this, it is important to recognize that if one was in this position then - assuming that customers value what we provide for them - we would be in a situation of power over all others in our supply chain relationships. This must be the ideal position to be in, yet the concept of power is rarely discussed in supply chain writing - except to deny it as important (Williamson, 1995), or to argue that power should not be used because lean approaches should be based on equity, trust and openness.

Both of these views are misguided. This is because most writers operate with an a theoretical understanding of the causes of sustainable business success, and focus their analysis on the description of what companies do, rather than have a theoretical understanding of what it is that allows companies to be successful in the first place. It can be argued that companies are only successful if they possess power over something or someone.

This is because only by having the ability to appropriate value from relationships with others - whether these are with customers, employees or suppliers - can business success be sustained (Cox, 1997a). There must, therefore, be objective conflicts of interest between vertical participants in supply chains, just as there are between those competing horizontally in the markets that form around specific supply chain resources. This is because everyone in the chain is seeking to appropriate value for themselves from participation and, assuming economically rational behaviors, must wish to appropriate more of the value for themselves if they are able so to do. Because certain players in the chain recognize that they have limited power to appropriate value from others, is not the same as saying that they would not seek to leverage more value for themselves if circumstances allowed them to do so.

Beside, another many researchers have been studied about the SCM strategy and structure. And we digested about the previous studies of SCM strategy theory as Table 1. There are SCM
strategies such as transaction costs, resource dependency, political economic, power-political and social exchange theory. And there are specific factors such as resource, assets, value, relation and environments.

Table 1
Summary of literature review about theories and factors of SCM strategy

| Researcher | Theory                          | Specific factors   |
|------------|---------------------------------|--------------------|
| Bensaou and Venkatraman(1995), Bensaou(1997) | - Transaction costs  | -Resource          |
|            | - Resource dependency           | -Assets            |
|            | - Political economy             | -Value             |
| Forrester(1961), Sterman(1989), Bakos(1991), Towill et al(1992), Lee et al.(1997), Dyer(1997), Levy(1997), Fishet(1997), Vollmann et al.(1997), Johnston et al.(2004) | - Transaction costs | -Assets |
|            |                                 | -Resource          |
| Lado et al(1997) | - Power-political           | -Relationship      |
| Moody(1993), Vollmann et al.(1996), Lambert et al.(1996), Miller and Shamise(1996), Dyer(1997), Cooper et al.(1997), Doz and Jamel(1998), Monczka et al. Vollmann(2000), Heikkila(2002) | - Power-political   | - Environments |
|            | - Social-exchange               | - Resource         |
| Jap(1999), Alter(2002) | - Resource dependency         | - Resource         |

However, our study has a unique method which is finding structure of SCM strategy by using simultaneous several influence factors on existing researches.

3. Research methodology

This study was conducted with vendor companies on major automobile company such as Hyundai, Kia, GM-Daewoo, Renault-Samsung in Korea. Our research methodology is used by survey method and the target companies were consistent with 102 at Seoul and Inchon area in Korea.

At first, we selected the target companies which have been relationship with major automobile company for a long time as at least over 5 years. In the second, they are participated on global competitions or co-work with major company. The reason is to keep the homogeneity of samples. At third stage, we made a questioner which was consisted with SCM strategic 4 parts as resource, relation, environments and value. Table 2. represent the items of SCM strategy and performance variables, item contents and measuring scales. These items are conducted from the former
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Researchers’ performance (Show as Table 1).

Table 2
Items and scale of SCM strategy variables

| Item | Content | Scale |
|------|---------|-------|
| **Resource** | | |
| R1 | - degree of specific raw materials | |
| R2 | - degree of specific location | |
| R3 | - different human resource | |
| R4 | - different product processing method | |
| R5 | - different manufacturing technology | |
| R6 | - speedy delivery time | |
| R7 | - flexible manufacturing system | |
| R8 | - unique network system | |
| R9 | - plentiful human power | |
| R10 | - low cost parts | |
| **Relation** | | Likert 5 points |
| Rel1 | - amount of sharing information | |
| Rel2 | - degree of trust | |
| Rel3 | - frequent change system | |
| Rel4 | - harmonious communication | |
| Rel5 | - similar corporate culture | |
| Rel6 | - feeling as a family | |
| Rel7 | - longtime trade contract | |
| Rel8 | - trust of pay police | |
| **Environments** | | |
| E1 | - degree of response on order quantity | |
| E2 | - degree of change in demand | |
| E3 | - degree of global environmental effects | |
| E4 | - degree of technical change | |
| E6 | - degree of participants with partners | |
| E7 | - degree of high coordination | |
| E8 | - degree of common goals | |
| E9 | - degree of long cycle time | |
| E10 | - degree of high service requirements | |
| E11 | - degree of distribution cost | |
| E12 | - degree of high cost on supply chain | |
| **Value** | | |
| V1 | - information related products | |
| V2 | - support the management | |
| V3 | - support the technology management | |
| V4 | - sharing the profitability | |
| V5 | - sharing the reduction of inventory cost | |
| V6 | - sharing the know-how | |
4. Data analysis and results

In existing research, the two-step approach developed by Anderson and Gerbing (1988) was employed to assess the factor structure of the measure and theoretical relationship. This procedure affords the opportunity to assess the factor structural parameters for multiple samples (Hair, 1988; Anderson, 1988). Our research model is following as Figure 1.

4.1 Reliability and validity analysis

We examined the dimensionality of the survey instrument that we adapted for SCM strategy in this section. We performed exploratory factor analysis and presented the result on Table 3.

The exploratory factor analytic approach due to the advantage of, it does not set any priori constraints on the estimation of components, to the interpretation of the solution, the concept correctly through different number of factor solutions. It is important to continue and examine the analysis of data through factor technique because it can refine the tools already developed over the quality assurance processes.

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1 The exploratory factor analysis was conducted using principal axis factoring as the factor extraction method and the Oblimin rotation with Kaiser normalization as the rotation method.
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Figure 1. The covariance structural equation modeling (SEM) of the research model

Table 3
The results of reliability and validity analysis

| Factor | Item | Factor score | Eigen value | Cronbach’s α |
|--------|------|--------------|-------------|--------------|
| Resource | Rf1 | R4  | .813 | 3.386 | .848 |
| Resource | Rf1 | R5  | .794 |
| Resource | Rf1 | R3  | .702 |
| Resource | Rf1 | R6  | .680 |
| Resource | Rf1 | R7  | .656 |
| Resource | Rf1 | R8  | .562 |
| Resource | Rf2 | R9  | .879 | 2.648 | .769 |
| Resource | Rf2 | R1  | .803 |
| Resource | Rf2 | R10 | .602 |
| Resource | Rf2 | R2  | .530 |
| Relation | Rel1 | Rel4 | .905 | 4.148 | .881 |
| Relation | Rel1 | Rel5 | .879 |
| Relation | Rel1 | Rel2 | .732 |
| Relation | Rel1 | Rel1 | .675 |
| Relation | Rel1 | Rel6 | .671 |
| Relation | Rel2 | Rel7 | .951 |
| Relation | Rel2 | Rel8 | .764 |
| Environments | Ef1 | E11 | .865 | 4.947 | .881 |
As shown in Table 3, values of Cronbach’s $\alpha$, which is measuring average inter-item correlation among the items, i.e., resource, relation, environments, value and performance. The Cronbach’s $\alpha$ coefficients range from 0.690 to 0.908, which are higher than the cutoff value of 0.600 suggested in the literature (Nunnally and Bernstein, 1994). The Cronbach’s $\alpha$ is coefficient of reliability (or consistency), shows high internal validity.

Note: Factor analysis - principle axis factoring and Oblimin rotation with Kaiser normalization; factor loadings below 0.5 are not shown; primary loading is shown in bold.
In this result, the resource was divided by 2 factors as Rf1 and Rf2. The Rf1 factor is consist with R3, R4, R5, R6, R7, and R8. Hence, Rf1 means the manufacturing goal resource. RF 2 means a specific resource. Relf1 is family relationship, Relf2 is contract relationship. The Environment variables are consist with 11 variables except E5 variable and extract 3 factors such as Ef1, Ef2 and Ef3. Ef1 means a rapidly change of logistics environment, Ef2 is a consensus community environments and Ef3 is a similar manufacturing environment. Vf1 means a buyer’s ability which suppliers want to be supported, Vf2 is a system-ability, and Vf3 is a ability of cost reduction.

4.2 First-order factor analysis : for sub-factors of the SCM strategic factors

After exploratory factor analysis was analyses, the items were executed by confirmatory factor analysis using AMOS 6.0 in order to use measure of four factors. Since the value of composite reliability and average variance extracted 10 factors are above than 0.7 and 0.5, respectively (Hair et al., 1998), the reliability and uni-dimensionality of the measures are confirmed (Table 4).

Next, construct validity was tested. Construct validity can be broken down into two sub-categories; convergent validity and discriminant validity. Convergent validity is the actual general agreement among ratings, gathered independently of one another, where measures should be theoretically related. In Table 4., the value of p for chi-square of model is above the minimum level of 0.05, and GFI, RMSEA, IFI, TLI, and CFI are in acceptable ranges, which provides evidence of having measures for one construct overlap the conceptual territory of another construct. This is assessed by comparing the variance shared by constructs, as measure by squared correlation between them with the average variance extracted (AVE) by each construct’s measurement items. Average variance extracted by the measure of each factor is larger than squared correlation of that factor’s measure with all measures of other factors in the model (Fornell and Larcker, 1981). In other words, the latent construct should be demonstrably closer to its measurement items than to any other construct. In Table 5., for this model, in all cases, the variance shared by constructs was much less than the AVE for any one of the construct’s measurement items. Thus, we can conclude that the factors exhibit discriminant validity.
Table 4  
Result of confirmatory factor analysis of the SCM strategic factors

| Factor | Sub-Factor | Measurements | Estimate | t-value | CR² | AVEᵇ |
|--------|------------|--------------|----------|---------|-----|------|
|        |            | Init. | Final |        |      |       |       |
| Resource | Rf1 | 6 | 4 | 0.863 | - | 0.831 | 0.624 |
|         |       | r7    | 0.722 | 8.631 |     |      |       |
|         |       | r6    | 0.745 | 7.889 |     |      |       |
|         |       | r4    | 0.622 | 7.205 |     |      |       |
|         | Rf2 | 4 | 4 | 0.707 | - | 0.794 | 0.579 |
|         |       | r10   | 0.778 | 7.327 |     |      |       |
|         |       | r9    | 0.63  | 6.07  |     |      |       |
|         |       | r1    | 0.681 | 6.623 |     |      |       |
| Relation | Relf1 | 5 | 5 | 0.669 | - | 0.86  | 0.624 |
|         |       | rel6  | 0.771 | 8.794 |     |      |       |
|         |       | rel5  | 0.815 | 7.723 |     |      |       |
|         |       | rel4  | 0.734 | 6.936 |     |      |       |
|         |       | rel2  | 0.72  | 6.683 |     |      |       |
|         | Relf2 | 2 | 2 | 0.956 | - | 0.816 | 0.73  |
|         |       | rel8  | 0.69  | 7.979 |     |      |       |
|         |       | rel7  |       |       |     |      |       |
| Environment | Ef1 | 4 | 4 | 0.799 | - | 0.892 | 0.717 |
|         |       | e12   | 0.874 | 9.769 |     |      |       |
|         |       | e11   | 0.916 | 8.573 |     |      |       |
|         |       | e10   | 0.684 | 7.464 |     |      |       |
|         | Ef2 | 3 | 3 | 0.792 | 7.966 | 0.775 | 0.611 |
|         |       | e6    | 0.617 | 6.199 |     |      |       |
|         |       | e8    | 0.776 | -     |     |      |       |
|         | Ef3 | 4 | 2 | 0.761 | - | 0.641 | 0.566 |
|         |       | e3    | 0.609 | 6.404 |     |      |       |
|         |       | e2    |       |       |     |      |       |
| Value   | Vf1 | 4 | 3 | 0.638 | - | 0.783 | 0.621 |
|         |       | v6    | 0.757 | 6.423 |     |      |       |
|         |       | v3    | 0.817 | 7.094 |     |      |       |
|         | Vf2 | 4 | 4 | 0.792 | - | 0.855 | 0.657 |
|         |       | v11   | 0.833 | 8.531 |     |      |       |
|         |       | v10   | 0.839 | 7.056 |     |      |       |
|         |       | v9    | 0.609 | 6.475 |     |      |       |
|         | Vf3 | 3 | 2 | 0.707 | - | 0.651 | 0.574 |
|         |       | v7    | 0.683 | 6.284 |     |      |       |
|         |       | v5    |       |       |     |      |       |

χ²=429.33, df=408, p=0.224, GFI=0.815, RMSEA=0.023, IFI=0.990, TLI=0.986, CFI=0.989

Notes:  
a. Composite Reliability  
b. Average Variance Extracted
Table 5
Correlation matrix and AVE\(^a\) in the SCM strategic factors

|       | Rf1 | Rf2 | Relf1 | Relf2 | Ef1 | Ef2 | Ef3 | Vf1 | Vf2 | Vf3 |
|-------|-----|-----|-------|-------|-----|-----|-----|-----|-----|-----|
| Rf1   | 0.624 |     |       |       |     |     |     |     |     |     |
| Rf2   | .623** | 0.579 |       |       |     |     |     |     |     |     |
| Relf1 | .392** | .451** | 0.624 |       |     |     |     |     |     |     |
| Relf2 | .328** | .458** | .566** | 0.74  |     |     |     |     |     |     |
| Ef1   | .479** | .502** | .440** | .495** | 0.717 |     |     |     |     |     |
| Ef2   | .377** | .389** | .542** | .435** | .444** | 0.611 |     |     |     |     |
| Ef3   | .378** | .345** | .313** | .575** | .617** | .510** | 0.566 |     |     |     |
| Vf1   | .482** | .446** | .457** | .290** | .297** | .421** | .208** | 0.621 |     |     |
| Vf2   | .491** | .451** | .528** | .315** | .329** | .418** | .305** | .557** | 0.657 |     |
| Vf3   | .506** | .492** | .490** | .441** | .372** | .542** | .318** | .610** | .542** | 0.574 |

**Note:** a. AVE is in italics on the Diagonal
**:** correlations is significant at p<0.01, *: correlations is significant at p<0.05

4.3 Second-order factor analysis

First of all, in order to assess the reliability and validity of all the exogenous constructs, we performed second-order factor analysis. However, since no measure in four factors (resource, relation, environment, value), second-factor, we used two-step approach using the average of the measure scores for each sub-factors confirmed at first-order factor analysis (Anderson and Gerbing, 1988).

The last time, confirmatory factor analysis was executed with all the latent constructs of this study. The results are noted below and in Table 6 and Table 7. On the whole, model fit indices indicate an acceptable fit of the measurement model to the data considering to given the small sample size.

Table 6
Result of confirmatory factor analysis of the SCM strategic factors

| Exogenous Variables | Factor | Measurement | Estimate | t     | CR\(^a\) | AVE\(^b\) |
|---------------------|--------|-------------|----------|-------|----------|-----------|
| Resource            | Rf2    | 0.753       | -        |       | 0.772    | 0.681     |
|                     | Rf1    | 0.832       | 7.41     |       |          |           |
| Relation            | Relf2  | 0.709       | -        |       | 0.74     | 0.65      |
|                     | Relf1  | 0.821       | 7.661    |       |          |           |
| Environment         | Ef1    | 0.732       | 6.803    |       | 0.759    | 0.594     |
|                     | Ef3    | 0.723       | 6.439    |       |          |           |
|                     | Ef2    | 0.691       | -        |       |          |           |
### Table 7
Correlation matrix and AVE\(^a\) in all the latent constructs

|                | (1)  | (2)  | (3)  | (4)  | (5)  | (6)  |
|----------------|------|------|------|------|------|------|
| Resource(1)    | 0.681|      |      |      |      |      |
| Relation(2)    | .513**| 0.65 |      |      |      |      |
| Environment(3) | .558**| .641**| 0.594|      |      |      |
| Value(4)       | .627**| .555**| .509**| 0.748|      |      |
| Process(5)     | .524**| .660**| .557**| .547**| 0.639|      |
| Customer(6)    | .478**| .563**| .485**| .574**| .672**| 0.707|

Note a: AVE are in italics on the Diagonal

**.: correlations is significant at p<0.01, *: correlations is significant at p<0.05

### 4.4 Result of SEM analysis

To assess relationship among all the latent constructs, we used AMOS 6.0. Structural equation modeling(SEM) is a multivariate statistical tool that essentially combines multiple regression and factor analysis to simultaneously test a series of dependent relationships(Hair et al., 1992).
The results of the test of the overall fit of the model in Fig-1 are provides below and in table 8. The structural model was estimated by Maximum Likelihood using the AMOS 6.0. The results indicate that the proposed structural model could be an acceptable fit regarding to small size sampling of this research. The final fit statistics for the proposed model, presented in Table 8. is $\chi^2=160.70$, with df=144 (p=0.162); GFI=0.876, IFI=0.988; TLI=0.982; PNFI=0.614, CFI=0.987. Overall goodness-of-fit indices an acceptable fit of the study and small-size sampling of this research. Many researchers note that the needs to multiple fit criteria are presented to rule out measuring biases inherent in the various measures(Hair et al., 1998), thus several are presented. Bentler and Bonett’s Non-normed Index(TLI) and Bentler’s Comparative Fit Indices(CFI) are both above the desired 0.9 level(Hair et al., 1998) and thus indicate good fit. James et al.(1982) proposed the PNFI(parsimonious normed fit index) can be available to small size sampling relatively. The PNFI value of 0.614 is above the desired 0.60 level and thus indicates a good fit. The ration of $\chi^2$ to degrees of freedom is 1.166(=160.70/144), which is below the recommended 3.0 threshold(Hair et al., 1998), which indicates a good fit.
Table 8
Correlation matrix and AVE$^a$ in all the latent constructs

| Path       | Estimate | C.R. | P  |
|------------|----------|------|----|
| resource ($\xi_1$) | -0.078  | -0.811 | 0.417 |
| relation ($\xi_2$)  | 0.398   | 1.903$^1$ | 0.057 |
| Environment ($\xi_3$) | 0.507   | 4.213$^{***}$ | *** |
| value ($\xi_4$)     | 0.428   | 3.447$^{***}$ | *** |
| resource ($\xi_1$) | -0.136  | -0.976 | 0.329 |
| relation ($\xi_2$)  | 0.308   | 2.916$^{**}$ | 0.004 |
| Environment ($\xi_3$) | 0.581   | 3.915$^{***}$ | *** |
| value ($\xi_4$)     | 0.28    | 1.811$^1$  | 0.07  |

$\chi^2$=160.70, df=144, p=0.162, GFI=0.876, RMSEA=0.034, IFI=0.988, TLI=0.982, PNFI=0.614, CFI=0.987

Note: a. standardized estimate, $^1$: significant at p<0.1,
**: correlations is significant at p<0.01, $^{***}$: correlations is significant at p<0.001

5. Conclusions and limitation

This paper defined the concepts of supply chain and supply chain management and several supply chain initiatives at companies were described which indicate the competitive advantages and importance of linking supply chain to overall business strategy.

Based on the empirical results of this study, at first, we achieved 10 factors about structure of
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strategic SCM by using 41 variables. These 10 factors are consist with 2 resource factors (manufacturing goal factor and specific assets factor), 2 relationship factors (family relationship and contract relationship factor), 3 environmental factors (rapidly change of logistics, consensus community, and similar manufacturing environments), and 3 value factors (support ability, system-ability, cost reduction ability.

At second, we could divide two performance factors by using 12 variables. One of them is process performance between supplier and buyer, and anther is customer performance with customer satisfaction.

Third finding is that 3 factors -relation, environment, and value- influences significantly to performances of SCM strategy such as processing and customer’s satisfaction, but resource factor isn’t.

In fourth result of this study, we make clear to be differentiated factors which influence to strategic SCM structure. Exactly, the value factor caused more effect than the relation factor in the process-oriented SCM strategy, and there are appeared opposite result in customer-oriented. This result presented to have a different strategic structure by SCM strategy types.

However, this study has some weakness of research methodology such as limitation of geographic data, focused vendor companies in Korean automobile industry. Especially, our research has limitation that did not find right cause about the resources affects significant process and customer performance up to now.

Furthermore, this study could not present factors what influence to each SCM performance by SCM strategy types. So, we are preparing other research in this point and expect the related one’s studies.

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References

Ahn, Hyeon-Soo, Hee-Don Jung, Byong-Hun Ahn and Seung-Kyu Rhee. 1999. Supply chain competitiveness and capabilities of constituent firms: an exploratory study of the Korean home appliance industry. Supply Chain Management: An International Journal. 4(5): 242-253.

Anderson, J. and Gerving D.W. 1988. Structural Equation Modeling in Practice: A Review and
Recommended Two-Step Approach. *Psychological Bulletin*. 103(3): 411-423.

Cox, J. F., Blackstone, J.H. and Spencer, M.S., eds. 1995. *APICS Dictionary (8th ed.)*. American Production and Inventory Control Society, Falls Church, VA.

Cox, A. 1997a. *Business Success*. Earlsgate Press, Boston, UK.

Cox, A. 1997b. On power, appropriateness and procurement competence. *Supply Management* 2(October).

Cox A. 1999. Power, value and supply chain management. *Supply Chain Management: An International Journal*. 4(4): 167-175.

Cox, A. 1998. Clarifying complexity. *Supply Management* 28(January).

Cox, A. 1999. *Improving procurement and supply competence*, in Lamming, R. and Cox, A. eds., Strategic Procurement Management: Concepts and Cases. Earlsgate Press, Boston, UK.

Cox, A. and Townsend, M. 1998. *Strategic Procurement in Construction*. Thomas Telford, London.

Cox, A., Ireland, P., Lonsdale, C., Sanderson, J. and Watson, G. 2000. *Critical Assets and Entrepreneurial Power: Business Strategies for Supply Chains and Markets*. Forthcoming.

Davis, D. 1995. State of a new art: manufacturers and trading partners learn as they go. *Manufacturing Systems*. 13(8): 2-10.

Dyer, R. 1994. *The emergence of supply chain management in the North America*. Excerpt from a speech to suppliers of Procter and Gamble Co., October.

Ellram, L. and Cooper, M. 1993. Characteristics of supply chain management and the implications for purchasing and logistics strategy. *International Journal of Logistics Management*. 4(2): 1-10.

Fornell, C., and Larcker, D. F. 1981. Evaluating Structural Equation models with unobservable variables and measurement error. *Journal of Marketing Research*. 18(Feb): 39-50.

Forrester, J. W. 1961. *Industrial Dynamics*. MIT Press, NY.

Hair, J. F., Anderson, R.E., Tatham, R. L. and Black, W.C. 1998. *Multivariate Data Analysis Fifth Edition*. Prentice-Hall.

Heikkila, J. 2002. From supply to demand chain management: efficiency and customer satisfaction. *Journal of Operations Management*. 20(6): 747-767.

Jap, S. M. 1999. Pie-expansion efforts: collaboration processes in buyer-supplier relationships. *Journal of Marketing Research*. 36(4): 461-475.

Lummus, R.R. and Alber, K.L. 1997. *Supply Chain Management: Balancing the Supply Chain with Customer Demand*. The Educational and Resource Foundation of APICS, Falls Church, VA.

Monczka, R. M. and Morgan, J. 1997. What’s wrong with supply chain management?. *Purchasing*. 122(1): 69-73.

Moody, P. E. 1933. *Breakthrough Partnering: Creating a Collective Enterprise Advantage*. Omneo, Essex Junction, UK.

Nunnally, J.C. and Bernstein, I. 1994. *Psychometric Theory*. New York: McGraw Hill. NY.

Quinn, F.J. 1997. What’s the buzz. *Logistics Management*. 36(2): 43-47.
The Supply Chain Council. 1997. Website. http://www.supply-chain.com/info/faq.html, 11/20/97.

Vollmann, R.E., Cordon, C. and Keikkila, J. 2000. Teaching supply chain management to business executives, *Production and Operations Management*. 9(1): 81-90.

Towill, D. R., Maim, M.M. and Wikner, J. 1992. Industrial dynamics simulation models in the design of supply chains. *International Journal of Physical Distribution and Logistics Management*. 22(6): 613-627.

Williamson, O.E. 1985. Hierarchies, markets and power in the economy: an economic perspective, *Industrial and Corporate Change*. 4(1).

Woods, J. 2002. The demand chain. Gartner Symposium ITXPO.
