Abstract: - This paper suggests a cooperative commerce model under the situation that a purchaser residence area is different from a receiver’s one. The cooperative companies can integrate their business processes for sales and delivery using the product taxonomy table. We also suggest a product matching algorithm to compose the product taxonomy table. Using the algorithm we can get utility values of two companies’ products within a same category and find similar products with about the same utility values. The main idea of the proposed algorithm is to find the utility range of products in a product class of the companies and register them as exchangeable similar products. The companies then allow consumer to shop and purchase the products at their own residence site and deliver them to another sites.

Keywords: Business model, Product matching, Product taxonomy, Utility, Electronic commerce

1. Introduction
Internet business can enable commercial exchanges that across physical, temporal, cultural, and legal boundary on a scale that was technically infeasible. Internet business can help companies strengthen the links between suppliers as well as customers and suppliers. Many companies have attempted to develop Internet business systems to create innovative virtual companies, markets, and trading communities. Successful players in the new electronic economy leverage Internet technologies in every aspect of their business operations [16].

But with electronic commerce, the business of getting goods from suppliers to customers is even more complicated than usual. That is because of the nature of e-commerce transactions. For starters or small and medium-sized companies, orders and shipments are much smaller because end users are the ones who are doing the ordering over the Internet and there are fewer middlemen buying in bulk. Order are not only smaller, they are more frequent. And they are also more time-sensitive. Under the circumstance, companies have to lay out a strategy to prepare their global supply chains for the future. This strategy involves integration of the three primary flows of commerce of goods, information, and funds [17].

This paper is related with the flows of goods and information between cooperative companies. We present a cooperative global sales and delivery model enabling shared business processes between the cooperative companies. The companies integrate their business processes for sales and delivery using the product taxonomy table. The companies share the table that contains product matching lists at same classes. We also suggest an interactive algorithm for finding similar products. A company has its product map that registers similar products to ones being on sale by another cooperative company. They can be exchangeable between the companies. The main idea of the proposed algorithm is to find the utility range of products in a product class of the companies and register them as exchangeable similar products. The companies then allow consumer to shop and purchase the products at their own residence site and deliver them to another sites.

2. Previous Researches
Electronic commerce is an Internet application and it depends on key infrastructures such as information technology and telecommunications, social/cultural, commercial, and government/legal. In particular cultural elements such as language, education level, belief and value systems influence technological innovations and entrepreneurial spirit. An online survey conducted by IDC suggests that over 76 percent of Chinese respondents prefer to browse the Internet in their local language, and not in English. When viewed as a global distribution system, international social/cultural barriers remain. Just as many companies have made serious blunders when marketing in other countries, the lack of boundaries and the complexity of global consumer access magnify these complexities beyond anything previously encountered [11]. Cultural factors inhibit
the diffusion of electronic commerce. They comment that cultural values, including different traditions and habits of trading will impact the speed of e-commerce diffusion. Clearly, cultural issues including beliefs, languages, and value systems seem to present barriers to information sharing [21]. In order that companies targeting global consumers overcome the barriers, they allow the consumers to browse the Internet in their local language. Local companies need to have a cooperative strategy of performing vicarious delivery transaction for ordered goods at another area.

Grieger [7] suggested that there are different types of relationship within different internet-based electronic marketplaces (EM) categories. While there are myriad aspects within a relationship among trading partners in an EM, three broad categories have been identified: transactional, information-sharing, and collaborative relationships [2, 9, 13]. This paper is related with suggestion of a similar product finding algorithm based process to enable two trading partners to have an information-sharing relationship. Internet-based electronic product catalogs are one of the most important parts of EM. Schmid [18] and Slabeva and Schmid [20] suggested that the electronic product catalogs support product representation, search and classification and have interfaces to other market services as negotiation, ordering, and payment.

In this research we suggest a business process for collaboration between companies. This focuses on sales and delivery processes. Business opportunities are in managing the product information. It is important to register similar products among the cooperative companies. There are a little researches related to the similar product registration and the research of comparison shopping agent is similar to this research [6, 10, 22]. BargainFinder and Jango are the examples of first-stage comparison shoppers that specify the functions that agents must have in order to be applied to Electronic Commerce, and both employ the manual rule extraction method. Shopbot suggested an automatic rule extraction technique by analyzing and learning the shopping malls. Shopbot was unable to learn a shopping mall that did not conform to these strong biases. To overcome this difficulty, Yang and et al. [22] proposed a more scalable comparison shopping agent that adopts an intelligent learning algorithm. By contrast, the only bias of their method is that the result of a product search should be displayed in a semi-structured way, that is, each product description unit has the same output format. They have pointed that PersonaLogic is a comparison shopping system that compares not the shopping malls but the product itself. Kasbah, AuctionBot, and Tete-a-Tete are negotiable mediators with which the user can buy and sell products based on negotiation strategies between agents in the virtual marketplace.

3. A Global Cooperative Commerce Model

3.1 A Cooperative Business Model
The electronic markets offering full support for all market transactions provide the following services or phases: knowledge exchange, articulation and management of intentions, negotiation and contracting and settlement in the form of payment and delivery [7, 18, 19, 20]. Our model is based on the services and specifies the negotiation and contracting step when a purchaser area is different from a receiver’s one and the selling agent is different from a delivery one. Usually the online shopping takes place within a same country. When a consumer who lives in Korea wants to buy a product at Internet shopping mall and present it to a relative who live in America, there are two ways to do. First way is to access a Korean online shopping website that is written in Korean and to make the company deliver to America. If the consumer who lives at Korea orders the items at the Korean merchant’s WWW page and makes the merchant ship the goods to America, he or she must pay for the extra shipping cost [12]. The merchant has to perform such business processes as delivery by airline or ship. Second way is to access an American website at his or her relative’s area and to make the company deliver it within the same country. The consumer doesn’t need to pay for extra delivery from Korea to America. In order to use the web site at another country, there are such limitations as language, shopping culture, and so on [11, 21].

The global cooperative commerce has been growing rapidly keeping the pace with web. We suggest a cooperative global cooperative commerce model under the situation that a purchaser’s residence area is different from receiver’s one. This model is based on a shared product map that defines similar products between the cooperative companies. The following procedure for the global cooperative commerce is performed. Firstly, an user who wants to purchase a product at Internet shopping mall accesses an website at his or her own residence areas. The user finds the product with which he
satisfies and the user would provide the mall with his
information. If the delivery site is different from his
or her residence area, the mall searches similar
products with the selected product at the cooperative
company in the receiver’s area. When the consumer
satisfies with the suggested product, the cooperative
company performs a delivery process and the
transaction is terminated. The detailed process for
this business model is presented in next section.

3.2 Cooperative Commerce Process
In this paper, a detailed process will be presented
under the situation that a company at receiver’s area
delivers products to reduce delivery time and cost if
a purchaser’s residence area is different from
receiver’s one. For the knowledge exchange and
intention services of EM transaction services,
purchaser’s search and order processes for seller’s
product will be performed. The receiver information
entry and product matching steps are for negotiating
a desired product. Finally, transaction loading step is
similar to processes for delivery and payment
services. The detail process in this paper consists of
4 steps, purchaser’s search and order entry, receiver
information entry, product recommendation, and
transaction loading steps.

**Step 1: Search and Order Entry**
This step includes search and discovery for a set of
products capable of meeting customer requirements.
An user who wants to give a present at Internet
shopping mall accesses an website at his or her own
residence areas. The user surf the web and find a
product in a product catalog. If the user searches for
the desired product, the user would provide the mall
with his information. The information includes
selected product information as well as the
purchaser’s demographic and credit information.

**Step 2: Receiver Information Entry**
The purchaser selects a delivery address type of
whether a receiving address is within the residence
area. If the receiver address is within the purchaser
country, a current delivery process is performed. If
the purchaser country isn’t same as receiver one and
is delivered to another country, a transaction server
find a cooperative company close to the receiver
address and search a same product among the
catalog of the company. The server finds companies
in the nearest order.

![Cooperative Commerce Model](image)

**Step 3: Product Recommendation**
This step includes search and discovery for a
selected or similar product from the cooperative
company based on product specification values and
inquiry of purchaser’s acceptance. If the merchant at
the company fails to find the same product that the
purchaser has selected and ordered, the transaction
server search similar products at the product map of
a shared product database. The product map is a
product relationship matrix that defines the
exchangeable relations between products that has
been produced at the areas of order placement and
product receipt in the situation that the area of order
placement is different from one of product receipt.
We suggest it as a mean of enabling a shared
business process between cooperative companies.
They share orderable products and their customer
orders any product among their shard products. The
product map makes the company is able to drive
down delivery cost and reduce prices to its customer.
Furthermore, it increases cooperation between the
companies as they strive for quick deliveries and low inventories. The product map registers products similar to a product at a shared product database. A detail algorithm for finding the similar product is presented at next section.

The server shows the user a list of similar products to the item he/she has just selected. If the user doesn’t satisfy with anything of interest, he or she doesn’t purchase it on-line and the transaction is finished. If the user does find alternative product of interest, he or she elect to purchase it on-line, make an order and provide payment information. The consumer selects the means of payment. The different means of payment include digital cash, electronic checks, or credit cards.

**Step 4: Transaction Loading**

The consumer sends the merchant a complete order including receiver’s address. The merchant requests payment authorization from the consumer’s bank and sends the customer a confirmation of the order shipment and payment. The merchant save the transaction and make the cooperative company at the receiver area ship the goods to the recorded address. The server saves the transaction. The company at the receiver’s area ships the goods in the shipment way requested by the purchase.

However, we need to consider the following issues in developing the above business processes. First of all, the cooperative company clearly sets up profit or cost sharing rules with their partners. It can be solved by a current physical profit sharing method. The second issue is how to select similar product. An algorithm suggested at next section deals with this issue.

## 4. Product matching Procedure

### 4.1 Product Taxonomy

In most Internet shopping malls, product taxonomy is available. A product taxonomy is practically represented as a tree that classifies a set of products at a low level into a more general product at a higher level. The leaves of the tree denote the product instances, SKUs (Stock Keeping Units) in retail jargon, and non-leaf nodes denote product classes obtained by combining several nodes at a lower level into one parent node. The product taxonomy can be used to identify similar products and to group them together since it represents domain specific knowledge of Internet shopping malls. The formal use of product taxonomy as one of background knowledge is introduced by Han, Cai and Cercone [8]. Brew [3] has shown that taxonomies are important in knowledge representation and reasoning. Adomavicius and Tuzhilin [1] proposed a useful way for the domain expert to examine multiple rules at a time by grouping similar rules together on given product taxonomy. Lawrence et al. [15] and Cho et al. [4] used the product taxonomy to capture the affinity between different products in developing a product recommender system.

### 4.2 A Product matching Procedure

This paper suggests an interactive procedure for finding similar products among products classified into level 2 of figure 2. The procedure is based on an utility range concept that an utility of a product can be represented by a range [3, 14]. A product utility value of a specification can be computed by the normalization formula (1). The weights of specification within a same class are in the form of constraints given by users. And the aggregated product utility range of all specifications is computed by solving LP models having the constraints about the importance relationship between product specifications. Suppose that a company has totally K classes at level 2 of figure 2. Each class is characterized by a set of product specifications. Then a new product is assigned to a class having a same set of product specifications. The product at the kth class has a set of M product specifications. We define the following terminologies.

\[ I = \{ i \}_{i=1,N} : \text{a set of N products at kth class} \]

\[ J = \{ j \}_{j=1,M} : \text{a set of M product specifications at kth class} \]

\[ w_i : \text{importance of } i^{th} \text{ specification} \]

\[ v_{ij} : j^{th} \text{ specification value of } i^{th} \text{ product} \]

Our procedure for finding similar products is composed of the following 4 sub-steps.

#### Step 3.1: Compute product utility by each specification

In this step, a product manager gathers information of specification values of the products at level 2. We define the utility of a product specification as the normalized value computed by following formula and the utility is between 0 and 1.

\[ u_j = \begin{cases} 
\frac{\max_i v_{ij} - \min_j v_{ij}}{\max_i v_{ij} - \min_j v_{ij}} & \text{for specification } j \text{ with better for larger} \\
\frac{\min_i v_{ij} - \max_j v_{ij}}{\min_i v_{ij} - \max_j v_{ij}} & \text{for specification } j \text{ with better for smaller} 
\end{cases} \]

(1)
Step 3.2: Compute the utility ranges of current products
This step is to compute the utility range of products at kth level. The utility of ith product is the weighted sum over all specification utilities, that is, $\sum_{j=1}^{M} w_j u_{ij}$. It is very difficult to find exact weight values and compute the product utility. Kim and Choi [14] have proposed an interactive procedure for finding utility values using the weights relationship information. The information represents the relationship between specification weights with the 5 forms of incomplete information provided by a user. We define the relationship set as $\Phi_w$ which is a set derived from the user’s incomplete information regarding the relative importance of specifications. We can get the utility ranges of ith product, $[u_i(\text{min}), u_i(\text{max})]$, by following formula.

$$u_i(\text{min}) = \min \sum_{j=1}^{M} w_j u_{ij} / u_i(\text{max}) = \max \sum_{j=1}^{M} w_j u_{ij}$$
subject to $\Phi_w$  \hspace{1cm} (2)

Finally we can get the expected utility, $E[u_i]$, by computing an average value of $u_i(\text{min})$ and $u_i(\text{max})$.

Step 3.3: Classify the products by the utility ranges
In this step we subdivide the products at same class into similar product classes using the expected utilities of products. From the expected utilities, it is obtained the abstract difference values, $DE[u_i]$, between products. If the value is equal to or less than threshold value, $\delta$, then ith and jth products are registered into product table as a similar product class. This procedure is performed over all products pairs. After having the similar product pairs, the sub-classes at kth class are identified.

Step 3.4: Determine the sub-class of a new product
Based on the current product taxonomy and catalog, the product manager registers a new product. He/She gathers the specification values for the new product and performs the above classification steps through three steps. If all specification values of the new product are between current minimum and maximum values, it is classified into one among the pre-specified sub-classes. If it has a new minimum or maximum specification value, the utility values of all product specifications are changed and current sub-classes are changed.

5. Conclusion and Further study
In this paper, we suggest a global electronic business model under the situation that a purchaser residence area is different from a receiver’s one. In order to perform that business model, we suggest an interactive algorithm for finding similar products. This algorithm is based on the user’s utility ranges of products. The users can easily enter his/her preferences of products. They apply this algorithm to the real world product taxonomy and classify their products in detail. They can suggest the similar products at the same sub-class when they cannot provide a product with their consumers.

After completing the integration of product categories among cooperative trading partners, the cooperative business process suggested in this paper can be preformed. This process is to specifically classify products of trading partners into similar product sub-classes based on their specification values. This model helps local companies to perform a cooperative strategy of performing vicarious delivery transaction for ordered goods at another area. The business model suggested in this research makes the companies that are difficult to set up physical branches at every corner of the world enable to cooperate with another companies at the sites in a cost efficient way. The cooperative companies can extend globally their cooperative commerce business without a heavy facility investment. The companies are able to give the customer easy access to their own country and save the delivery cost.

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