

## Developing an Electronic Commerce System for Shipping Business Based on the All-in-one Model\*

Tae-Woo Lee\*\* · Nam-Kyu Park\*\*\* · Chae-Uk Song\*\*\*\*

### I. INTRODUCTION

This paper aims to suggest the architecture of the e-commerce system for shipping business. Of course, it can be extended to port logistics. In so doing, it seeks to find an optimal transaction method that can be applied to the following business: ship sale and purchase, ship maintenance and repair, and ship stores. The optimal solution for a bid and negotiation model may be essential for accepting new transaction method in the future.

Although the advantage of e-commerce system is, among others, to reduce communication cost, we are to focus on value creation by introducing supply chain method (SCM) through the application of the system. The SCM can not only overcome the limits of traditional marketing dependent on sales manager but also reduce logistics costs including a lead time. By accepting bid and negotiation method of transaction,

the e-commerce system may enable its users' to reduce service cost. The output of the study has followed standards of IDEF0, IDEF3, and IDEFIX (ERD).

### II. BRIEF OVERVIEW OF ON-LINE TRANSACTION MECHANISMS

A recent paper<sup>1)</sup> summarized a three stage evolution of the all-in-one market<sup>2)</sup>, showing on-line transaction mechanisms. (See Table 1.) In Stage one, many companies were involved in a great deal of innovation in on-line transaction mechanisms. For example, iBeauty.com introduced continuous replenishment to the on-line health and beauty business, enabling automatic reordering of fragrances and cosmetics. Priceline.com introduced the world to the demand collection system where buyers post the price they are willing to pay and invite sellers to either accept or decline the business.

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\*\* Professor, Korea Maritime University, Busan Korea

\*\*\* Associate Professor, Tongmyung University of Information and Technology, Busan Korea

\*\*\*\* Assistant Professor Korea Maritime University, Busan, Korea

1) Paul Nunes, Diane Wilson, and Ajit Kambi(2000), "The All-in-One Market", *Harvard Business Reviews*, May-June, pp.19-20.

2) The all-in-one market offers, side-by-side, alternative ways for buyers and sellers to transact business.

In Stage two, many efforts were made to combine transaction approaches on companies' Web sites. Of the 320 leading e-commerce sites, two-thirds already employ multiple transaction mechanisms, and 30% support three or more mechanisms.<sup>3)</sup> Nunes *et al*<sup>4)</sup> argue that we are entering Stage three: the aggregation of many sellers onto the sites that already feature more than one selling mechanism, taking Travelocity.com as an early leader in this trend. Travelocity combines several transaction mechanisms. Unlike American Airlines, it provides access to travel services from a range of airlines, hotels, and rental car agencies. That is a good example of all-in-one markets.

It is expected that the demand for the all-in-one market is increasing in the near future. Having said that, by applying the concept of the all-in-one markets to shipping e-commerce, we may enable frictionless movement among ways of doing shipping business such as sale and purchase of ship, repair and maintenance, and transactions of ship stores. The next section is concerned with exploring any possibility to design a shipping e-commerce based on the all-in-one market and developing a model.

### III. PROBLEMS INHERENT IN CURRENT SHIPPING BUSINESS

Comprehensive interviews and survey with shipping companies, ship repair yards, shipping agents, ship brokers in Korea were carried out

Table 1 On-Line Transaction Mechanisms

Mechanism	Definition
Static call	On-line catalog with fixed prices.
Dynamic call	On line catalog with continuously updated prices and features.
Product tailored	Offerings are tailored to meet individual customer specifications.
Price tailored	Prices change based on purchase history or loyalty.
Reverse	Buyer posts desired price for seller acceptance.
Spot	Buyers and sellers bids clear instantly.
Negotiation	Bargaining between one buyer and one seller.
Seller auction	Buyers bids determine final price of sellers offerings.
Buyer auction	Buyers request price quotes from multiple sellers.
Barter	Buyer and seller exchange goods.
Continuous replenishment	On-going fulfillment of orders under preset terms.
Bundled	Seller combines multiple products into a prepackaged offering.
Bulletin board/clearance	Offerings limited by availability of product or by discount.
Partnership	Integration of buyer and seller processes.
Referral	Link to non-owned mechanism/ commercial Web site.

Source: Paul Nunes, Diane Wilson, and Ajit Kambit (2000), p.20.

3) *Ibid.*, p.20.

4) *Ibid.*, p.20.

to identify ineffective and inefficient practices in the shipping transactions such as sale and purchase of ship repairing, and purchase of ship stores in Korea from 1 March to 15 August 2001. In this section, some problems inherent in such transactions are drawn from the above interviews and survey carried out by the authors, showing three diagrams to grasp transaction procedures by business item.

1. Transaction Flows by Major Shipping Business Item

Transaction of Ship Repair

Ship repairing is mainly done by two practices. One is done by direct transaction between a shipping company and a ship repair yard, while the other by indirect transaction between an agent for a shipowner and a ship repair yard. This study is dealt with the former, in which transaction procedures can be shown in Fig. 1. The numbers in the parentheses show order of transactions flow, while an arrow indicates direction of each transaction.

Shipping Company  (1) Repair request	(2) Price quotation request →	Repairing Yard  (5) Repairing work
	← (3) Quotation letter	
	(4) Repair order letter →	
	← (6) Repair completion letter	
	(7) Settlement of repairing claims →	
	← (8) Negotiation →	
	← (9) Invoice	

Fig. 1 Transactions Flow of Ship Repair

Transaction of ship stores

Shipping Company  (1) Request of ship stores from a ship	(2) Quotation request →	Ship Agent  (10) Collection & packing  (12) Delivery	(3) Quotation request →	Supplier of ship stores  Or Maker
	← (5) Quotation letter & negotiation		← (4) Quotation letter	
	(6) Order →		(7) Purchase order →	
	← (9) Notice of readiness to delivery		← (8) Delivery	
	(11) Order to delivery →			
	← (12) Invoice			

Fig. 2 Transactions Flow of Ship Stores

Transaction of Ship Sale and Purchase

Buyer	(1) Purchase request →	Ship Broker  (2) Database search at second-hand market  (3) Information exchange of ship particulars  (4) Arrangement for ship survey	← (1) Sale request	Seller
	(5) Ship survey →			
	(6) Negotiation with seller →		← (6) Negotiation with buyer	
	(7) Purchase contract →		← (7) Sale contract	
	(8) Ship take-over		← (8) Ship delivery	
	(9) Ship registration			

Fig. 3 Transactions Flow of Ship Sale and Purchase

2. Some Problems Occurred in Current Shipping Transactions

The interviews and surveys we had in Korea show the following problems compared to the all-in-one market:

- It takes long time and causes high indirect costs because a great deal of communication, mainly by fax and telephone, is required to complete a whole business procedures as shown in the above diagrams

between supplier and buyer.

- In case that transactions such as price quotation and job scope and details are done by fax or telephone, it causes duplicate works or delay of information delivery or/and loss of the documents.
- A supplier of service or ship stores has to advertise his business through face-to-face contacts so that it tends to increase costs of his service or goods.
- As can be seen in the above diagrams, a great deal of paper works is required.
- Current transactions cannot efficiently provide auction, bidding, counter-bidding procedures.
- Buyers cannot request price quotes from multiple sellers at the one site.
- On-line catalog with continuously updated prices and features cannot be available within the current transaction mechanisms.
- Buyers within current mechanisms in Korea cannot combine multiple ship stores or service into a prepackaged offering.

It can be said that the above problems provide sound ground and motive to design e-commerce system, employing the concept and mechanism of all-in-one market.

#### IV. SHIPPING E-COMMERCE SYSTEM BASED ON BID-NEGOTIATION TRANSACTION

This section is to focus on the transaction of ship stores in association with ship repair yards as an initial step to develop shipping e-commerce system based on bid-negotiation transaction. The transaction of ship stores consists of two parts: forward transaction and backward

one. The former is concerned with transactions between a shipping company and a ship agent, while the latter with those between a ship agent and supplier of ship stores.

##### 1. Suggestion of a Bid-Negotiation Model for Shipping E-Commerce System

The following figure shows a flow chart of transactions of stores in association with ship repair yards.

##### 2. Features of the Suggested Model and Factors to be Tackled

A shipping company has selected suppliers of ship stores and ship repairers by telephone or fax. As already mentioned above, it caused to increase waste of time as well as costs. The model suggested in this study is a more comprehensive in that it can easily integrate existing e-commerce systems. The benefits or advantages a shipping company and suppliers of services or goods may expect from the suggested bid-negotiation model are as follows:

- To highly reduce communication costs: As will be appreciated, the number of items and sizes of items required for a ship runs into thousands. That is to say, supplying ships involves considerable detail and this in itself should be controlled. Having identified the items required to run the ship, the items themselves should not be allowed to increase without very careful consideration. As has been seen, similarly it happens in the ship repairing work. Having said that, in case of using currently available internet, it is expected that the model can reduce communication cost by 40%.
- To promote advertisement of small-or

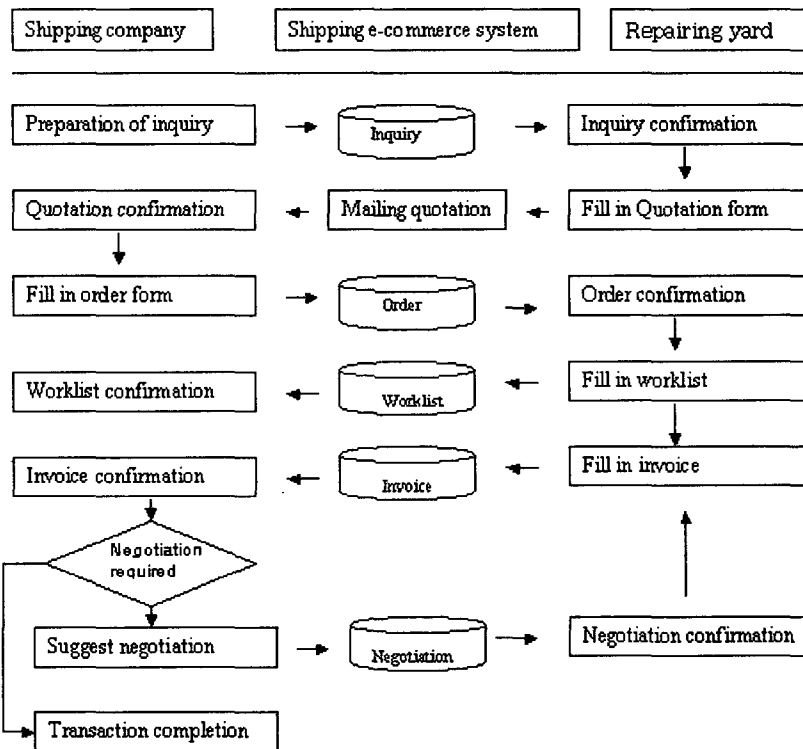


Fig. 4 Flow Chart of Bid-Negotiation Model for Shipping e-commerce

medium-sized ship repair yards and supplier of ship stores, not being dependent upon ship agents.

- To lessen users' resistance to cyber transaction because current transaction procedures are transferred to the model as they are, keeping business secrecy in their transactions.

Despite that the model suggested in this study has the above merits, it has some points to be tackled as follows:

- To require high R&D expenditure because the model is designed to maximise users' conveniences.
- To develop the revenue model to recover the investments

- To assure business secrecy, eg supplier's quotations within the cyber transactions at a perfect level.
- To make sure that the all-in-one system suggested in this study is designed to be flexible enough to integrate other future system
- To induce the legend user to cyber space

## V. CONCLUDING REMARKS

It is necessary to note that the wide reach and low transaction costs of the internet would encourage and promote all transactions toward a single mechanism, ie open-market price competition. Bearing that in mind, shipping e-com-

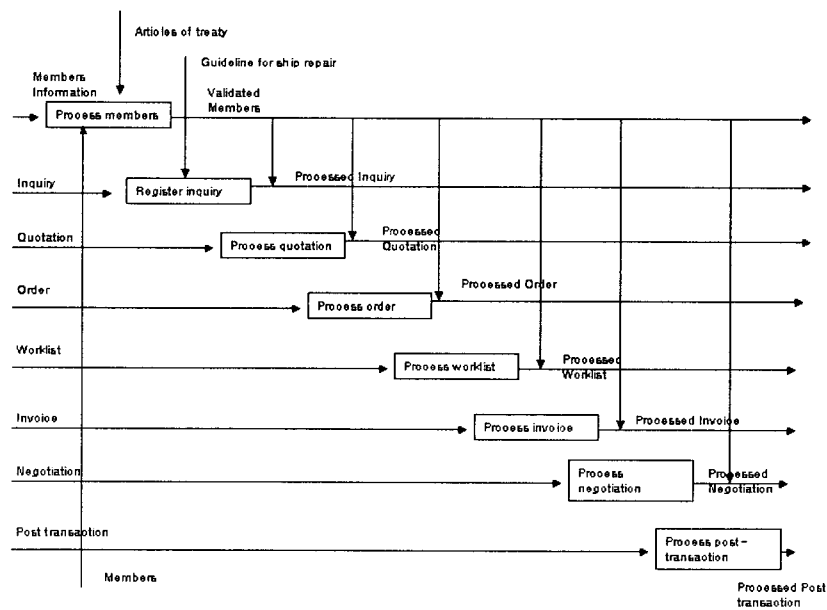
merce system based on bid-negotiation transaction has been suggested, which may be essential for accepting a new transaction method in the future. Although its advantages are, among others, to reduce communication cost and to have flexibility to integrate other systems, we are to be concerned with tackling points suggested in this study. In addition, it is to focus on value creation by introducing supply chain method (SCM) through the application of the system.

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[APPENDIX 1] IDEF0



[APPENDIX 2] IDEF1X

