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Changing Transaction Visibility by Information Technologies: A New Framework for E-business

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Abstract

Firms can create additional customer values by changing the visibility characteristic of business transactions. Both visible and invisible transactions can provide distinctive values to the customers. Visible transactions are those that are open to the customer: the customer can see the detailed logic of the transaction and may manipulate specific variables to control the transaction process. Invisible transactions mean that customers have little ability to control the transaction flow and may even be insulated from seeing the transaction.

This paper pursues finding out the contingencies of successful transaction visibility change by answering to the following question; “when does increasing (or decreasing) transaction visibility make sense to customers?” This archival case study finds out that transaction visibility change should fit to the need and capabilities of customers. Increasing transaction visibility makes sense when customers need a certain supplier’s performance and have a confidence in the capabilities of executing the performance. And, decreasing transaction visibility makes sense when customers have substantial troubles in conducting their current transaction actions or when customers don’t feel it necessary to conduct them separately because they can be derived from other action.

1. Introduction

Computers have taken large part in facilitating business transactions. Electronic commerce has evolved in various physical forms from automatic teller machine, to electronic data interchange, and to World Wide Web over Internet. The big change caused by recent Internet-based electronic commerce is the lethargy of traditional intermediaries (travel agents, car dealers, stock-brokers, and industrial-parts distribution). Their turf has been intimidated by the birth of new Web-savvy middleman (like Amazon.com, Buy.com, etc.) and the direct connection has been promoted between end-customers and producers. Hamel & Sampler [12] argued that Internet is shaping re-intermediation not dis-intermediation of retailing industry and asked retailers

to move close to their customers instead of awaiting customers to move to them.

This study proposes a new perspective regarding the role of visibility characteristic of electronic transactions, which has substantial implications for new roles of intermediaries in the electronic environment. The customers come to possess different visibility on new transactions using new electronic media: customers can see more of what they want to bother with during transactions, and also customers can pass to their counterparts what they don’t want to bother with during transactions.

This study makes a couple of contributions. First, this study calls attention to the fact that, during visualizing the underlying actions, information technology can also make some relevant actions invisible. For example, by exposing sales record to vendors, grocery stores can eliminate some transaction actions like writing purchase order or making calls to order. So, people can garner two different (actually, opposite) benefits from the visualizing forte of information technologies. Second, if information technology has double-faced forte regarding visibility, we may well investigate the appropriate conditions for successful transaction visibility change (i.e., increasing or decreasing visibility). Our research question is “when does increasing (or decreasing) transaction visibility make sense to customers?” The answer to this question can help the business organizations “implement” successfully their plans to increase customer values by changing transaction visibility.

2. Theoretical Background

2.1 Transaction

Transaction can be defined as “the act of doing business” (The American Heritage Dictionary, 2nd edition). People conduct a transaction when they need certain performances of others in achieving desirable outcomes because they don’t have enough capacity to conduct these performances by themselves. From the perspective of transaction cost economics [18][19], transaction is not

necessarily confined to the moment when two counterparts conduct the economic exchange.

2.2 Transaction Visibility

Visible transactions are those that are open to the customer: the customer can see the detailed logic of the transaction and may manipulate specific variables to control the transaction process [1]. *Invisible* transactions are those that customers have little ability to control the transaction flow and may even be insulated from seeing the transaction. These invisible transactions will be taken care of only by suppliers, and be regarded as an aspect of suppliers' performances. Thus, transaction visibility can be defined as the degree to which the detailed logic of transactions is open to view and subject to manipulation of customers. It determines not only the amount of *information* about processes, but also the *capability for interacting* with these processes.

2.3 Changing Transaction Visibility

Chatterjee [5] argues that by changing the visibility of business processes from the standpoint of customers, organizations can provide distinct values to their customers, and improve their competitive advantage. Changing visibility from the customer's standpoint takes only two "binomial" forms at the level of transaction components. However, visibility change at the whole business process level is "continuum": i.e., the visibility of the whole business processes can be *increased or decreased* by *making* some components of the processes *visible or invisible*.

Making transactions *visible* invites customers' participation, empowers the customer, and thereby facilitates the customers' self-fulfillment. According to the concept of encapsulation in the object-oriented perspective, *making visible* means moving some of the supplier's implementation activities into the interface of customers (making the scope of interface wider). An example of making visible is Toyota's (in Japan) IS by which customers choose and specify the attributes of their cars as if designing them. Making transactions *invisible* relieves the customer from participation and thereby delivers a sense of freedom to customers. From the perspective of object-orientation, *making invisible* means transferring some portions of the interface to the implementation domain of suppliers.

Two different types of making invisible were identified: connecting the relevant or subsequent services, and eliminating the contact point function from customer's standpoint. The first pattern of making invisible is connecting relevant or subsequent services to the customers' contact point processes by "packaging" some activities within a visible activity. Therefore, if certain transaction actions are related to other actions as derivatives, those derivative actions may well be embedded into the primary actions. For example, filing purchasing orders is a

derivative action when inventory goes down below a certain level. However, inventory level can be calculated derivatively from sales record and purchasing record. Connecting all these relevant actions and minimizing separate transaction actions are the key art of this type of making invisible. The second way of making invisible is more aggressive. It relocates the contact point with the customer further up-stream in the process and eliminates day-to-day customer involvement completely. A typical example is the inventory management system linking Proctor & Gamble (P&G) and Wal-Mart.

3. Influential Factors on Transaction Visibility Change

According to the theory of self-efficacy [2], people take action when they expect given actions to produce desirable outcomes and believe that they can conduct those actions [2, p.24). This theory provides two "conditions" for customers to accept more visibility in transactions: 1) customers' *need for supplier performances*, and 2) customers' *capabilities* in those *supplier performances*. If both of these conditions are satisfied, customers could be better off by being provided more information or by being allowed more participation in what suppliers do. If customers do not need certain supplier performances, customers may not want to bother with transactions. Besides, it may not be appreciated to customers if suppliers try to increase visibility of their performances that challenge customers' current capabilities.

3.1 Customers' Need for Supplier Performances

Why do customers need certain supplier's performances? A performance is desperately needed by customers when the outcome from it is *desirable*, especially when the outcome is critical for customers' overall business. If people believe some information is critical for their businesses, they may intend to even pay money for it. This kind of information can be sold unlike the information that just supports on-line trade [9].

Another reason why customers need a certain performance is that it is very *likely to produce* the desirable outcome [2]. There is no single relationship between performance and outcomes: it depends on how tightly contingencies between performances and outcomes are structured [2, p.23]. If outcomes are not responsive to performances, people turn to protest social practices or to be apathy to such an outcome.

In short, customers may need certain suppliers' performances if customers believe suppliers' performances are critical for their survival, and that those performances are sure to produce desirable outcomes. If anyone of these two conditions is not met, customers may be hesitantly in need of such performances.

3.2 Customers' Capabilities in Supplier Performances

Psychological involvement triggered by necessity does not necessarily mean physical participation, as Barki and Hartwick [3][4] called attention to distinguish between involvement and participation. Bandura's [2] theory of self-efficacy applies here. According to the self-efficacy theory, action occurs when people have high self-efficacy that means the confidence in one's ability to organize and execute given types of actions [2, p. 21]. Asking incapable customers for more participation can work adversely because it only increases customers' frustration with transactions. In this case, suppliers can reduce customers' uncertainties and frustrations by relieving them of the burden of performing those actions. However, if customers have enough capabilities in certain actions, suppliers can improve customers' satisfaction by allowing them more interactions to manipulate and customize the products. A couple of issues need to be elaborated to clarify the concept of the capability in performances.

First, in the context of mutual relationship, the capability in performances should be judged in the *relative* terms: i.e., who is more capable, supplier or customer? It means not just who can do it, but also who can do better. The concept of core competency [11] may fit to this issue. Second, if customers have to endure huge cost inefficiencies in getting new access to supplier performances, they may not believe they possess enough capabilities to run the new change. Therefore, capability is a comprehensive concept that contains various economic concerns in the *present* and *future*.

The following proposition relates to the conditions of increasing visibility.

Proposition 1. It makes sense to increase visibility of the supplier performance actions, when customers need supplier's performances and also when customers have capabilities in those supplier's performances.

Proposition 2. It makes sense to decrease visibility of the transaction actions that customers do not have enough capabilities or that they do not need.

In general, the model suggests that increasing transaction visibility may be a preferred mode. The main reason is that knowledge emerges as the critical asset in an organization's survival and progress [15], and that knowledge acquisition or sharing can be facilitated by making transactions more visible.

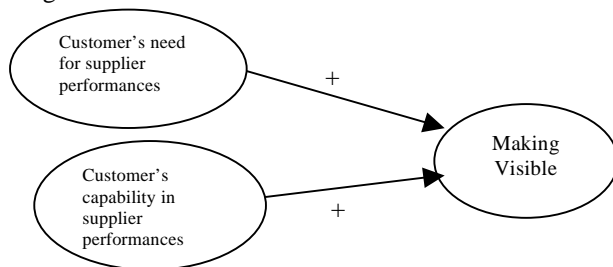


Figure 1. Research Model:

4. Research Methodology

This study takes the case study method to test the propositions generated in the previous section. The cases will be addressed in the narrative forms, so-called in linear-analytic structure. Linear-analytic structure [21] is the standard narrative presentation, which is providing model, hypotheses, and analysis of pattern-matching.

For the number of cases, Yin[21] recommends multiple cases unless a single case is available which is critical, extreme or unique, or previously inaccessible. Through literature review of ABI/Inform and Lexis/Nexus databases, 12 cases were chosen. These 12 cases have been regarded as representative successful SIS cases. They have been reported, cited, and updated extensively through many publications.

Pattern-matching is the most fundamental and powerful strategy for the analysis of case evidences [20, 21]. Pattern-matching compares an empirical pattern with a predicted one (or with several alternative predictions). Ideally, the comparison between rival theories is the most convincing strategy because most case studies eventually aim at identifying which rival theory can explain best the empirical patterns. Rival theories can be either a null hypothesis or an alternative theory. The rival theory of this study is the null hypothesis which means that visibility change occurs by luck or without any regularities. Pattern-matching will be conducted in a valid way, minimizing personal subjectivity in interpretation.

For the sake of valid data interpretation, five more people were hired to make judgments about the propositions at each case. All of them were MBA students at a management school of New England area who have majored in MIS for the last two semesters. Three of them were males of mid-thirties (one Korean, one American, and one Mexican), and two of them were female Chinese students of mid-twenties. Each student was assigned to each one of the five different cases. They were given the brief illustration of research model, and had enough conversations with the first co-author to clear their understanding of the model. And then, cases were given to them with brief explanation of each case. This workshop took about 20 minutes for each person. They were asked to read those cases very carefully, and to assess each proposition at each case. All of those five MBA students were allowed to have a week before we get together to have intense discussions.

Meetings with each student occurred between 7-10 days later, and lasted for about 40 minutes in average. Discussions were focused on the evidences that help assess the propositions of each case. This discussion is expected to decrease the subjective or ungrounded arguments about the support of each proposition.

5. Case Profiles

5.1 Cases of Increasing Visibility

5.1.1 Airline Reservation Systems

The airline reservation systems provide a case of increasing visibility, which opened the internal management information of airline companies to their customers, travel agencies. Travel agents needed to streamline their transactions with airline companies because they had to deal with abundant air-flight information in a very efficient way. Due to the Airline Deregulation Act of 1978, travel agents could not maintain their conventional ways of transaction practices for airline reservation because the Deregulation opened up pricing competition and made travel agencies swamped with too much information about airfares and schedules. Effective and real-time reservation of air-flight seats became critical for the business of travel agency. Even after the Deregulation rule, travel agencies were still familiar with what airline companies were providing over the information systems. In other words, travel agencies could still give consults or connect flights for their patrons to satisfy idiosyncratic travel schedules and styles. Travel agencies just needed some efficient instrument that helps deal with abundant air-flight information and reserve air-flight seats. Airline companies were able to satisfy these needs of travel agencies by exposing their internal management information of air-flights to travel agencies.

5.1.2 The Union Bank Of Finland (UBF)

UBF launched the first electronic banking system (EBS) in Finland, which covered the entire range of banking operations. Using a chare card, customers could access from any terminal linked to the public banking services network. Through electronic banking, it was possible at any time to pay bills, transfer funds from one account to another, and monitor the status of accounts. After banking hours, information could also be accessed regarding the status of loans. Stocks and shares services were also available, including the instructions for buying or selling, and the real-time access to share indexes and company information. For the personal clients, ATM (Automatic Teller Machine) services can also take some credit in improving business efficiency. Collaboration among the Finnish banks in the use of ATMs was also progressing: by 1990, all the banking chains in Finland joined a single network.

The UBF case provides an example of increasing visibility, which allowed patrons to manage various financial accounts and financial transactions in person. The patrons of UBF used to go through intermediary clerks in conducting transactions. UBF recognized the reengineering the entire operating processes by information technologies could help the organization not only by reducing its operating costs, but also by improving its service to customers. The new reengineered process was to replace

manual works of staffs with computerized self-account maintenance by customers. Customers could benefit from this change because they needed banking services anytime (even after banks are closed) and effectively. Customers already knew where to use their money (such as on stock investment and on various other financial products), and how to manage their account (such as balance management, paying money by gyro). To these customers, it made sense to pass the responsibility of managing account from UBF to customers.

5.1.3 Federal Express

FedEx Ship allowed customers to complete entire shipping transactions electronically from their desktop PCs, including printing out the shipping labels. In November 1994, FedEx launched its Internet home page (<http://www.fedex.com>) on the World Wide Web that allowed customers to check the status of a FedEx package over the web. In 1996, the company introduced FedEx InterNetShip, the first automated shipping transaction available on the Internet. By entering a valid FedEx account number, customers could complete the entire shipping function directly from the Web page. That included preparing all paperwork on-line, printing a bar-coded label, scheduling a courier pick-up, and uploading the billing information to FedEx. The site also enabled users to download FedEx software such as FedEx Ship, FedEx Tracking software, or FedEx Document Preparation software.

The FedEx case provides an example of increasing visibility, which allowed FedEx's patrons to check out the package delivery status. Since the inception of its business, FedEx managed to check the delivery status at every node of logistics chain for internal management purposes using sophisticated information systems. Capabilities required for this transaction (i.e., checking out the delivery status by getting access to information systems) are not that hard for customers: i.e., they just had to remember their delivery service ID number. Therefore, it really made sense to customers if they are allowed to access to the delivery information systems directly.

5.1.4 Dun & Bradstreet (D&B)

D&B began developing electronic delivery systems in 1976 to give customers direct access to the data-base and to increase revenue. In 1978, the company announced the first of these services, DunsDial. DunsDial allowed subscribers to call an 800 number and get on-line access to the database through an operator. To bring the electronic message directly to users' desk-top computers, D&B developed DunsNet, a packet-switched telecommunications network that became available in March 1985. The system originally targeted financial departments. Using this network, subscribers could pull reports from the D&B's mainframe to the remote terminals through DunsPrint.

The D&B case provides an example of increasing visibility, which allowed their patrons to get in and manipulate their data. Patrons depended on D&B for business credit and financial information. They appreciated the data mines that D&B stored, but not the ways D&B reported to its patrons. D&B used to satisfy their customers by collecting huge amount of data and generating report in a certain format. Customers just received the report that they wanted, but the contents and format were decided by D&B. Customers, most of whom were financial departments, already knew what kind of data they needed. Therefore, the best way to resolve their dissatisfaction was to allow direct access and manipulation of data. To maximize its change, D&B itemized data rather than bundling data at the report level.

5.1.5 National Bicycle Industrial Company (NBIC)

The first mass customization factory was built in 1987 and named the Panasonic Ordering System (POS). This factory was directly linked to customers via retail outlets. The factory directly received a customer's selection of options, colors, patterns, and models. The firm estimated that a customer could choose from about eight million possible variations based on model types, color, frame size, and other features. In this factory, the production process began only after the arrival of the customer's order and specifications. Craftsmen on the factory floor were very agile in setting up each machine required to complete each order. Customer service, appropriate pricing, and extensive communication had to be all an integral part of the NBIC's mass-customization strategy.

The NBIC case provides an example of increasing visibility, which allowed their customers to design bicycles in person. Customers needed to purchase bicycles that fit to their preferences in terms of style, color, size, and features. Some proficient customers had to shop around the market or spend substantial amount of time by intense searching until they could find what they wanted. NBIC did not lose this niche and developed an information system that allowed customers to design what they wanted. This new business process was not possible if NBIC was not equipped with flexible manufacturing capabilities to deliver the item in 2 weeks. NBIC had manufacturing capabilities, and customers knew what they wanted. The new business process was arranged to take advantage of relative strengths of both sides. Therefore, it made sense to open designing module to customers.

5.1.6 Netscape: Software Giveaway

Netscape announced that it would post the Communicator source code on the Web under the aegis of a Netscape developer group known as Mozilla.org. on January 22, 1998. Netscape's giveaway had only one major condition: Anyone who downloads the code and modifies it has to make his or her modifications available to Netscape and the world. Developers would now be able to

modify Netscape's code and incorporate it into their own products. In return, they would be required to submit all modifications to Netscape so that Netscape could decide which changes to be incorporated into the next official Communicator release. The software giveaway was a bold effort to stave off failure by tapping the energy of tens of thousands of technologists, inside and outside the company, who were loyal to Netscape's products.

To manage the process of incorporating outside work, Netscape set up an internal team called Mozilla and posted its source code on the mozilla.org Web site. In mid 1998, the group consisted of eight engineers (six developers, one IT person, and one tester) and one customer support person. Most contributions from outside developers were features or bug fixes on existing features. In those cases, the Mozilla team consulted with the original Netscape developer or the current Netscape person overseeing that area for the check-in. Three senior developers on the Mozilla team made most of the final decisions on whether or not to accept an outside contribution to the code.

Netscape retained the rights to the Netscape, Navigator, and Communicator brand names and logos, as well as the rights to distribute future products based on the code. But others could now build or distribute their own browsers based on Netscape's source code. And unlike most other free software, Netscape allowed companies to sell products based on the modified or unmodified code. The Mozilla Public License was free forever.

Software developers apparently welcomed this move, downloading some 250,000 copies of the Communicator 5.0 source in the first month. Moreover, Microsoft's decision to tie Internet Explorer more tightly to the Windows operating system in 1998 made it virtually impossible for Microsoft to respond in kind. If Microsoft revealed its source code for Internet Explorer, it would risk undermining its proprietary technology in Windows.

The Netscape case provides an example of increasing visibility, which opened the source programs and allowed patrons to customize the programs. There were many computer geeks who love to manipulate the source programs to customize them to their applications or systems. A couple of well-known cases (Apache and Linux) encouraged Netscape to open their source programs of Communicator 5.0. Customers already appreciated the innovation of Netscape, and had enough capability to customize the programs. Therefore, Netscape's decision to open the source codes off Communicator 5.0 was welcome by the customers. This new business process cannot succeed if patrons do not have enough capabilities to customize the source codes of Web browser.

5.2 Cases of Decreasing Visibility

5.2.1 ASAP (Analytic Systems Automatic Purchasing)

AHSC (American Hospital Supply Corporation) was a health-care distributor company and ran the ASAP system (Analytic Systems Automatic Purchasing). ASAP was

initially developed in the 1960s to solve AHSC's operational problems, such as incomplete orders and late delivery, especially with one of its major customers, Stanford Medical Center. By 1980, a quarter of the company's incoming purchase orders came through ASAP. After Baxter bought out AHSC in 1985, Baxter transformed ASAP to a multi-vendor universal distribution system and competed with other electronic distribution channels. The ASAP system eventually transformed into strategic collaboration with its customers, redefining the conventional relationship with customers.

This strategic transformation was marked by the deployment of Baxter's ValueLink program in 1990. The focus of information systems shifted from the efficient distribution of products through automated order entry toward the integrated materials management service to guarantee product availability and information-based logistics services. Previously, customers of Baxter (i.e., hospitals) had to check out inventories, search for appropriate items over the market (or computerized ordering systems), make orders, and wait for deliveries. All these transaction actions became eliminated by JIT (Just-in-Time) inventory systems of Baxter. Baxter committed to providing a 100 percent fill rate and to lowering inventory levels, associated operating, and fixed costs by developing customized delivery procedures to each user department (e.g., operating rooms, laboratories, X-ray units, etc.).

ASAP provides a case of decreasing visibility, which passed the burden of inventory management of certain brands to the supplier, Baxter. The customers of ASAP, hospitals, still concerned about inventory management, but did not sway a good command of it. They had to deal with too much information of products after many rivals of Baxter (such as Abbott, 3M, and Johnson & Johnson) withdrew from ASAP and launched open-protocol information systems. The economic logic for the inventory management had shifted from economies of scale (i.e., automating the purchasing order activity) to economies of scope (i.e., customized materials management), which required more intensive information searching and management. In addition, hospital did not feel the value in traditional ways of inventory management such as checking out inventory levels, writing and mailing purchase orders, and inquiring order status. Those transaction actions were regarded cumbersome, time-consuming, and non value-added. Hospitals were lack of capabilities to manage inventories in new business environment but also could not sustain the old methods. By the new change, inventory management was passed from hospitals to their supplier, Baxter.

5.2.2 McKesson Corporation

Economost was launched in 1976, and was the genesis of McKesson's family of information systems. It was an electronic system for direct customer order entry, but also helped pharmacists and drugstore operators keep track of

current selling records, reorder the right time, and have their orders delivered with the price and shelf location tagged on the products.

Customers of Economost systems made orders by a hand-held order entry device, noting from the available stock on his shelves. Customers transmitted the order information in hand-held device to McKesson's national data center. The same or following day, McKesson delivered the items ordered. The requested items were delivered in cartons that matched the aisle arrangement and major departments of the drug store, so no sorting was required and the shelves were restocked with a single pass. Electronic order entry was extremely welcome by McKesson's retail customers, well evidenced by the fact that more than 99% of McKesson's orders came in electronically.

The more dramatic improvement was opening McKesson's up-to-date sales information to its suppliers. McKesson recognized that the up-to-date sales information had immense value to the manufacturers. They used it to make more timely shipments to McKesson in much the same way as McKesson had done with the drugstores. Meanwhile, suppliers could schedule production more efficiently and streamline their inventories. This new system eliminated previous transaction actions of McKesson's customers (drug-stores): checking out inventories, making purchasing orders, and inquiring delivery status.

McKesson provides a case of decreasing visibility, which passed the burden of inventory management and insurance claim from McKesson's customers to McKesson's suppliers. Customers of McKesson – independent retail drugstores – did not feel the value in traditional ways of those two processes.

The more capable approach for inventory management came from McKesson's JIT (Just-in-Time) that restocks products at the last minutes when customers' inventory was almost gone. This new system could be completed by the involvement of McKesson's suppliers because it is McKesson's suppliers who actually manufacture and deliver products. McKesson's suppliers used to be segregated from their end-consumers (independent retail drugstores), and could only reach them by the mediation of McKesson.

5.2.3 Wal-Mart and Procter & Gamble (P&G)

1987 was the big year for both Wal-Mart and P&G to launch this remarkable project for streamlined inventory management systems. In the early 1990s, the project was finished and started to produce tangible benefits to both companies. EDI took an important part in P&G's strategy of CRP. But EDI alone could not take the whole credit in improving this process because the organizational linkage was much tighter than the relationship with non-CRP customers using EDI. In 1992, Wal-Mart declared to do business only with vendors that invested in customized EDI

(electronic data interchange) technology and put bar codes on their products. Because of the volume and growth Walmart delivered, manufacturers had little choice but to fall into line. The combined changes in systems, strategy, organization, and policies also resulted in a dramatic improvement in total order quality at P&G. Billing errors decreased by more than 50% from 1992 to 1994, and the percentage of billing disputes resolved to P&G's favor increased by more than 300% during the same period.

The Wal-Mart and P&G case provides an example of decreasing visibility, which passed the burden of inventory management from Wal-Mart to P&G. In 1987 when Wal-Mart and P&G started to discuss and embark on their JIT inventory systems, Wal-Mart did not possess such a fabulous inventory systems. Eventually, Wal-Mart could improve their inventory management system by asking P&G to take over this responsibility. Until 1987, P&G was only reactive to the request of Wal-Mart. To implement JIT successfully with Wal-Mart, however, P&G needed access to the sales and inventory information of Wal-Mart.

5.2.4 Saturn

The Saturn Dealer Information Systems is a network of several subsystems: SALESLINE, SERVICELINE, and various transaction processing systems. With SALESLINE, the salesperson can use a microcomputer to connect to other dealerships computers and search their inventories for the desirable car and features. SERVICELINE allows customers to promptly receive information about anything that has to do with the car: new or used cars that the customer may want to purchase; service for the current vehicle; the availability of a car with specific features; and the availability of a certain part.

SALESLINE also provides the dealers with inventory management services similar to MRP. The dealers can carry only minimum levels of parts for serviced cars, because they can connect directly to the parts factory via satellite. Through the inventory information systems connected directly to suppliers, dealers could place replacement orders automatically when those parts were running low. Suppliers received daily electronic transmissions regarding how many parts had been used in completed cars, and once a month received payment over the electronic network. The formula of the system was simple: no purchase orders, no invoices, no checks, lots of trust. There was huge cost saving such as no receiving department and no clerks to handle purchase orders, invoices, and billing. And with everything done electronically, audits were simplified. By such partnership, Saturn could reduce the purchasing cost by 5% annually.

The Saturn case provides an example of decreasing visibility, which passed the burden of inventory management from Saturn to its suppliers. U.S. car manufacturers needed the function of inventory management, but did not like the traditional ways of inventory management. In other words, car manufacturers

could not maintain robust inventory management systems with the traditional capabilities. They learned from Japanese companies that JIT (just-in-time) technique can improve the inventory management function substantially.

5.2.5 CMA (Cash Management Account)

Merrill Lynch offers a broad range of services to meet the financial and investment needs of individuals, corporations, and institutions. Merrill Lynch made an arrangement with Banc One Corp. in 1976, a processor of Visa card, to expand and diversify its business domains. In 1977, Merrill Lynch announced its innovative Cash Management Account (CMA), an information-system-based product that provided under one umbrella three appealing services to investors: credit service through a standard margin account; cash loan by check or Visa debit card; and stock investment for dividends and transaction margins. This product can relieve patrons from the traditional transactions for financial account management: withdrawing and depositing money clumsily and repeatedly.

This one-stop account let a qualified person, who could afford to open an account with \$20,000, enjoy a combined checkbook and securities margin account. For \$4.17 a month, an account holder could buy and sell stocks, write checks with no minimum, and use a supplied credit card under the CMA umbrella. CMA account holders were given checks with a Banc One code number, even though they did not actually have an account there. CMA account holders could have their checks processed by Banc One. But it was not the bank that actually cancelled the checks, only Merrill Lynch did for Banc One. Merrill Lynch maintained a zero-balance account by borrowing money daily to cancel the millions of dollars of checks. All transactions appeared on one monthly statement. And all cash in the account earned money-market rates. The computer swept daily through the received card charges, checks, securities, and deposits to deliver an updated credit limit for each account holder.

The CMA case provides an example of decreasing visibility, which passed the burden of money account management from customers to Merrill Lynch. There was a couple of attractiveness in CMA. First, Merrill Lynch recognized that their customers do not want to bother with redundant and cumbersome transaction actions for financial account management. For that purpose, Merrill Lynch planned to provide the flexible money movement services between checking account, credit account, and stock investment account. Therefore, the burden of account management was passed from customers to Merrill Lynch. Second, CMA clients could take advantage of both high interest rates in the money market, and investment in stocks: i.e., they could benefit from both stock market and high interest rates just by CMA. The burden of moving money for better investment was removed from individual customers.

5.3 Cases of Both Increased & Decreased Transaction Visibility

5.3.1 MSAS Cargo International

MSAS provided air and sea forwarding services for international trade. Since the mid 1980s, MSAS recognized the world-widely increasing challenges of the cost pressure from both carriers and shippers, the increased competition triggered by the collapse of the boundaries between trade-related transportation businesses, the consolidation of freight forwarding industry, and increasing partnership of forwarders.

To handle with these changes effectively, MSAS started to develop UNITEL 21 since 1991, new integrated information system for managing airfreight operations UNITEL 21 automatically documented 16 different control points for each airfreight shipment. As the shipment moved through a control point, information on the system was updated automatically or by station personnel. If there was any delay in the shipment, MSAS could immediately notify the customer why the delay occurred. Everyone was able to know the location of every item of freight at any time: i.e., the system permitted clients to track specific shipments, a task that used to be very difficult even for MSAS personnel. The system could also make it possible to accept initial bookings automatically, schedule the transportation automatically, and obtain customs preclearance on the documents before the merchandise arrived at its destination. There were useful accounting features as well. For example, because of its global operations, MSAS used 45 different currencies. The new system automatically translated all currency transactions into a common company standard. Therefore, at any point in the shipment process, MSAS could see how much that shipment cost.

The MSAS Cargo case provides an example of decreasing visibility, which reduces all the various contacts with many different transportation-related companies (such as customs brokerage, consolidation, packing, currency hedging, insurance, labeling) to a single contact point with MSAS Cargo. To make orders and check out delivery status, cargo entrusting companies needed to contact each of transportation companies. It was such a cumbersome job to contact all the relevant transportation companies individually. MSAS Cargo realized it could create substantial values by working as a close partner of customers by providing a comprehensive package of transportation services across all the value chains of its clients' business activities (from receiving orders to delivery to the final destination). Thanks to this comprehensive service, cargo entrusting companies were able to reduce lots of inefficient bottlenecks in international transportation (such as insurance, declaration, and mis-carriage).

This case also relates to the increased transaction visibility because MSAS's patrons got direct access to the delivery status information without intermediaries. MSAS

Cargo could increase customer values by taking over the cumbersome job of coordinating all the transportation activities, and providing direct access to the information of package delivery status. This new comprehensive service made visible the package delivery status, and also made invisible all the chores of contacting each transportation company.

6. Discussion

Proposition 1 is supported by all the seven cases of making visible. So, we can conclude that it makes sense to increase visibility of the supplier performance actions, when customers need supplier's performances and also when customers have capabilities in those supplier's performances. Proposition 2 is related to the case of making invisible. The proposition is supported by all the six cases of making invisible. So, we can conclude that it makes sense to decrease visibility of the transaction actions that customers do not have enough capabilities or that they do not need.

The same kind of problems can be resolved either way of increasing visibility or decreasing visibility. The choice of solution depends on the context, which is the need and capability of customers. For example, in helping customers deal with information overload, airline companies took the approach of increasing visibility, whereas Baxter (ASAP) decreased visibility using JIT technology. In designing a new financial accounts management systems, Merrill Lynch and UBF also took opposite approaches: CMA of Merrill Lynch relates to decreasing visibility, whereas EBS of UBF relates to increasing visibility. The key difference in each pair is whether customers had need and capability for certain actions in dealing with the problems. Travel agencies needed air-flight information, but was swamped with too much information because they did not have an appropriate instrument to deal with it. They had a capability to understand air-flight information. In that case, exposing air-flight information on line to travel agencies made sense. Meanwhile, hospitals did not have enough capability to improve their inventory management because there were too many different products in the market. Rather than being provided with more market information, hospitals could be better off by passing the inventory management to Baxter. Merrill Lynch could successfully liberate customers from financial account management efforts because customers were sick of such chores. On the other hand, UBF could successfully implement EBS because their patrons knew how and where to use their money and to manage their accounts.

7. Conclusion

When does changing transaction visibility make sense? As for this question, customer's need and capability were

found important: i.e., making visible makes sense when customers have need and capability for supplier performance, and making invisible makes sense when customers do not have need and capability for their own transaction actions.

This study produces important implications for electronic commerce over Internet. The first implication is that retailing is not displaced, but will be more important in electronic commerce. Retailing companies can produce added-value by changing visibility of the supplier or product information. Sony's web site, where customers only can buy Sony CDs, languishes, whereas CDNow.com, which offers 250,000 titles from all five major labels, grows because customers have more choices of CD products [12]. PcOrder.com, Inc. allowed PC dealers to scan and choose 600,000 different parts from 1,000 manufacturers, considering availability and price. PC dealers then electronically pass the order to the distributor, and eventually their orders will be forwarded to the PC maker. This system made a surprising success because PC dealers can get the computers that they want to sell [15].

Both success stories (Cdnw.com and PcOrder.com) provide the examples of increased visibility, by which customers can collect and use more information from more sources. In both cases, customers needed suppliers (for CD and PC manufacturing), and also possessed substantial knowledge about these products. In this case, increased visibility can be an attractive feature in transactions between customers and suppliers. Hagel & Singer [10] expected the burgeoning of new type distribution channel, *infomediary* (meaning the information intermediary). They anticipated this new distribution channel will replace the existing middle-men. The above rules of this study can give a hint regarding what are the niches for infomediarities and how they should run business.

Another implication to electronic commerce is that there should be some considerations in interface to embrace diverse levels of users' capabilities. For example, instead of just letting customers access to a certain web site, computer interface can provide intelligent agents that help customers filter information and support decision making. In this case, the interactivity at interface should be allowed to users as much as they can handle. For others, let the intelligent agent take care. Comparing the success of AOL and the demise of Netscape, Cusumano & Yoffie [7] concluded Netscape missed huge amount of gap existing between web browser and end-users, which was filled in by AOL. PcOrder.com contains artificial intelligence inside that recognizes which of the thousands of computer parts will work together best [13]. Various technical frills may well be supplied as options so that customers can adjust their current capabilities in conducting electronic commerce.

The third implication to electronic commerce is that the concern of visibility should not be confined to the contents of information, but be extended to the structure or organization of information. Information accessibility is

regarded as one of the important features of successful information systems [8][20][21]. However, information does not just mean the contents of some topics, but also includes the index of those contents. Accessibility of those indices would improve customer's overall satisfaction over the contents of information. For example, customers of Farcast can use a search engine named "droids" to search a variety of information sources. Farcast's value is not just showing web-sites but rather organizing an index for the web-sites to visit. Farcast sells this service for about \$13 a month. The Farcast case tells well that sometimes the content is free but the organization is valuable [16].

Visibility can also work as a new perspective in identifying strategic opportunities by information technologies. Especially, changing visibility can be used for business process reengineering. Business reengineering is related to changing visibility because it is actually reshuffling the location of actions between customer domain and supplier domain. Reengineering requires adaptation of traditional internal processes to the new system, which must cause substantial costs [14]. Therefore, reengineering with visibility change relates to the change in coordination mechanisms between customers and suppliers [6]. Again, the same rules apply: "Suppliers release some of their functions if customers want and can conduct them. Suppliers take over the customer's functions if customers do not need them, or cannot perform properly."

There are limitations in this study. First, only successful cases have been considered in this study. All the 12 cases are the successful anecdotes of using information technologies for competitive advantage. But, those 12 cases may not be large enough. The difficulty of collecting data was aggravated because the failure cases are hard to get in general. Using only published data could be a problem, too. Any extra interviews or unpublished data were not included in this study.

Second, only the representative case of each organization was reviewed. For example, Wal-Mart must have implemented many similar transaction visibility changes with other organizations. However, only the case with Procter & Gamble was discussed in this study.

The transaction visibility model will be continuously developed in the future study. The biggest challenge is to test whether changing visibility helps organizations improve. Success measures have been defined differently in many studies: profit, revenue, psychological measure of customer satisfaction, usage of information systems, to name a few. Different success measures may have different causal factors. More detailed break-down of success measures and causal factors may well be considered in the future study. Another agenda is to apply transaction visibility onto knowledge management: e.g., what kind of knowledge emerges visible, and what kind of knowledge tends to disappear as organizations learn.

Capability in actions can be a candidate for future research, because it is an important factor in changing

visibility. Bandura[2] put more emphasis on the confidence in capabilities rather than capability itself. Recent TV commercial of Excite.com promotes Internet usage by introducing nutty Internet users. That commercial could increase the self-confidence of TV viewers in Internet if they believe they must be better than such nutty people. Capabilities may not necessarily mean the absolute amount of knowledge or experience embodied in people: rather, it's a matter of attitude. Therefore, an insightful study could be produced if theories of attitude are combined with studies of self-efficacy in figuring out how to improve capabilities.

Last, relational factors can be included to give a better explanation of transaction visibility change. Especially, trust must work critically in the case of making invisible. Customers may not allow to pass their activities in their authority to their counterpart unless they have enough trust. If more comprehensive factors are included in the model, the possible clash or trade-off between factors need to be investigated as well.

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