A Pervasive Comparison Shopping Business Model for Integrating Offline and Online Marketplace

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ABSTRACT
In always-online environment that allows consumers to be online anytime, anyplace, the next step will be the integration of online and offline markets and there is a possibility that the role of offline retailers shifts to that of a displayer. When this occurs, appropriate technological devices and business models should be explored so that both displayers and retailers can benefit. To this end, this paper proposes an Auto-Identification technology (e.g. RFID)-based pervasive comparison shopping business model. The auto-identification technology will allow consumers to be seamlessly connected to the network, and the advent of a new shopping network will enable an incentive mechanism between displayers and retailers. Ultimately, a new shopping network will enable consumers to be engaged in seamless commerce.

Categories and Subject Descriptors
J.1 [Computer Applications]: Administrative Data Processing – Business; H.4.2 [Information Systems Applications]: Types of Systems---decision support

Keywords
Comparison Shopping, Auto-Identification, RFID, Ubiquitous Computing, Seamlessness, U-Commerce, Business Model[1]

1. Introduction
The development of the Internet has greatly changed people's shopping patterns. In the traditional commercial transaction, people are required to visit shops to make a purchase. Now, thanks to the Internet, consumers can choose to use the Internet shopping instead of physically visiting stores. In addition, comparison shopping agents reduce search costs of consumers online (Krulwich 1996: Kushmerich et al 1997: Yuan et al 2000). Comparison shopping helps consumers make wiser purchase decisions (Yuan 2002) and reduce search costs (Crowston 2001). However, in the current shopping environment, consumers are still faced with dilemmas: offline consumers cannot be sure whether they are getting a good price, while online consumers cannot be assured of the quality/design of the product they are getting or the credibility of the merchant selling the product. In brick and mortar commerce, shoppers must visit several stores to compare prices and other terms, while comparison shopping has emerged as a solution in the case of online shopping. Nevertheless, Internet-enabled comparison shopping only searches among online retailers rather than the offline market. In addition, though online comparison shopping services notably curtailed search costs, there remain issues such as the lack of opportunity to actually see and touch products and the credibility of online merchants. Nevertheless, these two markets remain divided, with each constituting a distinct one. The only way to make comparisons between online and offline markets is to learn about the transaction terms of the offline market and then perform a search online or vice versa. Up to the present, there are some attempts including Webstickers (Ljungstrand et al 2000) and QueryLens (Konomi 2002) to integrate online market place with offline market place.

Pocket BargainFinder (Brody et al 1999) is a research on the world where consumer visits the physical store to confirm the product and then turn to on-line to find the best price and transaction conditions. This enables the consumer to browse in the physical store and then buy from the retailer of cyberspace. Pocket BargainFinder consists of a barcode scanner and the portability of a PDA. Those can bring a convergence of physical and cyber commerce called 'augmented commerce'. The authors claim that the result that consumers become able to search the best price

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and transaction conditions lets the physical retailer left at a disadvantage.

Scanning Objects in the Wild (Brush et al 2005) is the challenge that has been linking physical objects and relevant online information, which conducted experiment with twenty participants over five weeks with a ARUA system that is commercially available pocket computers. But this study also has a limitation that considers only the convenience of consumer rather than offline seller.

The formation of a ubiquitous computing environment will allow these two divided markets to be integrated. This paper presents how the online and offline markets would be integrated in an always-online environment, possible consequential problems that might arise in the market, and business models for overcoming those problems.

2. Shopping in always on-line Environment

What will happen to the comparison shopping environment when the always-online IT infrastructure and services are widespread, for example through Portable Internet (Wibro) and HSDPA (High Speed Downlink Packet Access)?

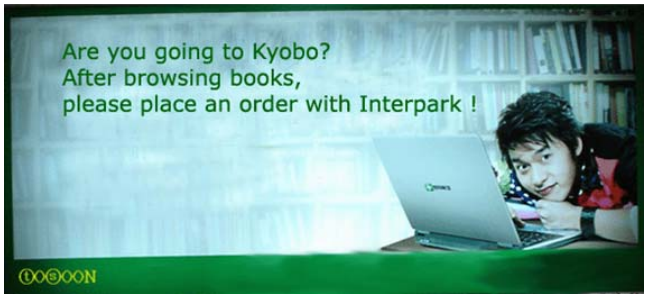

Figure 1 Real world advertising

(Kyobo is one of the biggest offline bookstores and Interpark is the one of the biggest online shopping malls in Korea.)

The Figure 1 shows what could happen to physical retailers when the always-online environment becomes prevalent. The commercialization of always-online technologies such as WiBro will make possible the two inherent characteristics of ubiquitousness; that is, anytime and anyplace computing. People will be able to connect to the network anytime, anyplace (Holtjona et al 2004). It will integrate online and offline markets that are currently separate, and, more specifically, enable a market where consumers can use always-online services in physical spaces. Against this backdrop, online and offline markets will no longer be distinct as they are now, and will have to compete with each other in a single integrated arena.

Until now, the retailers in the offline market have had an advantage in terms of information, and consumers have been generally passive in accepting whatever terms they suggest. To overcome this disadvantage, consumers have employed such methods as physically visiting stores, comparing transaction terms, or trying to obtain a discount through negotiation. The tables will be turned in the always-online environment and consumers will be able to proactively respond to transaction terms through searching and comparison. They will no longer have to accommodate the terms vendors offer without any effort to make them more favorable to themselves. They will be able to purchase products or services as closely in accordance as possible with the terms set by them. However these two markets are mutually complementary and both of them must exist for consumers. In this sense, a new market structure is required where markets can be both successful.

The pervasive comparison shopping model converts the As-IS scenario into the To-Be scenario as follows.

As-Is Scenario: Before Pervasive Comparison Shopping

Tom, who owns a digital camera shop downtown, has recently been concerned. The number of consumers visiting his shop has not decreased, but the number of visits leading to actual purchases has dropped sharply. His operating cost is still the same, and reduced sales make it difficult to remain in business. People come to a shop to view products and ask relevant questions. Even those with the intention to make a purchase just browse products at physical shops and use online devices to comparison shop and ultimately purchase from another retailer offering a better deal than Tom. As a consequence, Tom has lost any drive to keep his store afloat and is not making any genuine effort to answer shoppers' questions.

To-Be Scenario: With the Pervasive Comparison Shopping

James, who owns a shop in a downtown shopping center, makes a genuine effort to explain about the products in his store to the many consumers who visit his shop. Most consumers ask detailed questions, but make their purchase through RFID scan-enabled comparison shopping. He introduces the new fall products to a female consumer, and she evaluates and buys a product through comparison shopping. After the purchase is completed, the online shopping mall from which the female customer bought the product deposits a payment in James' bank account. Before RFID-based comparison shopping, James put great efforts into acquiring products at a lower price, needed a warehouse in which to store his stock, and bore logistics costs to maintain them. Now he is relieved of all these incidental expenses and all he has to do is to acquire and display products.

3. Pervasive Comparison Shopping Process

This section demonstrates a process wherein the issues introduced in section 2 can be resolved using RFID technology and an appropriate business model. Offline stores have to deal with consumer traffic, which requires them to pay a considerable expense. Offline stores that have to bear such expense should be given incentive to allow the initiation of an RFID-based comparison shopping model. In the pervasive comparison shopping business model, both physical retailers and displayers can benefit.

3.1 Economic Parties

Consumer: Consumers are engaged in comparison shopping in physical spaces using RFID scanning. Under such circumstances, the cost borne by consumers to search prices and services shrinks. Furthermore, seamless networking is made possible as the search method changes from keyword-based to RFID scanning.

Displayer: Without RFID technology, retailers' sales volumes diminish in contrast to their costs as consumers move away from brick and mortar stores through comparison shopping. When a comparison shopping network based on RFID takes root, they can receive incentives from other retailers, and it will change the focus of their business from sales to marketing.

Retailer: Once they are registered with a comparison shopping network and post information on their products, they can concentrate their efforts on sales without having to handle marketing. They can be offline retailers that enjoy relatively low maintenance costs thanks to low traffic or they can be online retailers.

Shopping network: Site to support RFID-enabled search and to connect physical product retailers and virtual product vendors displayed on the consumer terminal.

3.2 System Architecture and Processes

This section demonstrates a process that can be resolved using RFID technology and seamless networking. Figure 2 shows the system architecture and how business processes flow.

3.2.1 Membership Registration

In steps ① and ①-1, a shopping network recruits member companies before it commences service to ensure the smooth operation of its incentive system.

3.2.2 Product Registration by Displayer

An interface between displayer and shopping network has the process that inputs and revises product information and price information. However, this menu cost will notably decrease in 'pervasive comparison shopping business model' with the following three steps.

- After connecting to SN, displayer moves to his/her own page to register their products.
- With a cursor located in product section of his/her page, displayer simply scans the product.
- Information of product and displayer is stored in the data base.

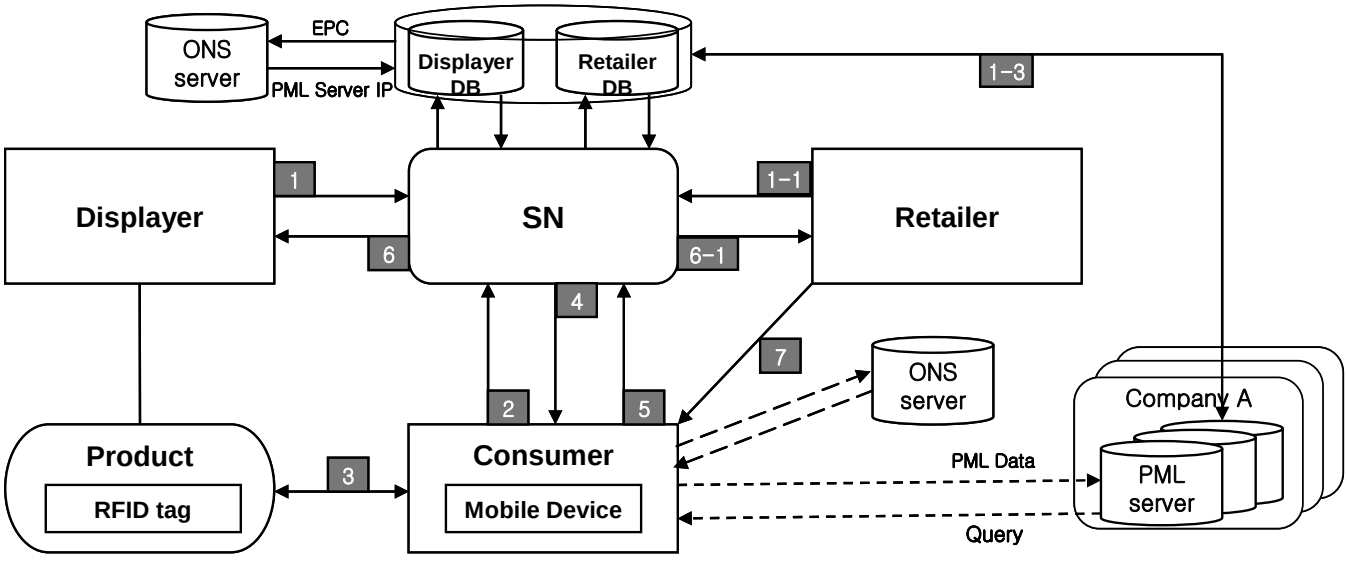

Figure 2. System Architecture and Process

3.2.3 Product Registration by Retailer

To do online shopping business, it needs a lot of the initial cost and the operating cost such as creating and managing web site. In 'pervasive comparison shopping business model', retailers do not need the web site cost. The product registration cost and process are similar to those of displayer except for the efforts uploading price and delivery information.

3.2.4 Connection to Shopping Network

When consumer connects to SN, there are two options. One is that there is a URL linking to SN in the tag and the other is that consumer connects to SN and scans a product.

In case that there is the SN's URL in the tag

In step ③, consumer simply scans the tag attached to a product. At this time, consumer gets an automatic and reliable connection to the shopping network. With the URL, consumer can connect to SN seamlessly in step ②.

In case that there is not the SN's URL in the tag

In step ②, consumer connects to SN and in step ③, consumer scans the tag. This process is less seamless than case that there is a URL linking to SN in the tag.

3.2.5 Purchase and Payment

In steps ④, consumers are logged onto the shopping network and receive a sorted list of retailers that meet the search criteria. After consumer decides what to buy, consumer pays full payment in step ⑤. Before the step ⑥, shopping network server finds displayer matched with EPC through searching displayer data base. SN gives incentive to displayer in step ⑥ and gives full payment with incentive to retailer. Finally, retailer delivers the product to consumer in step ⑦.

3.3 User Interaction and Interface

The shopping using mobile device has limited display compared with the shopping using personal computer. In the 'pervasive comparison shopping' where customer sees and touches a real product in offline store, the detail product information does not have to be described in the limited display. Figure 3 illustrates a user interface in the pervasive comparison shopping. If consumer clicks ①, the display shows the product information that customer scans. If consumer clicks ②, the display shows a bundle of products, price discount, and payment options, etc. If ③, it shows retailer reputation, inventory, and other products which the merchant sells. If ④, it shows additional delivery cost and the period of delivery etc.

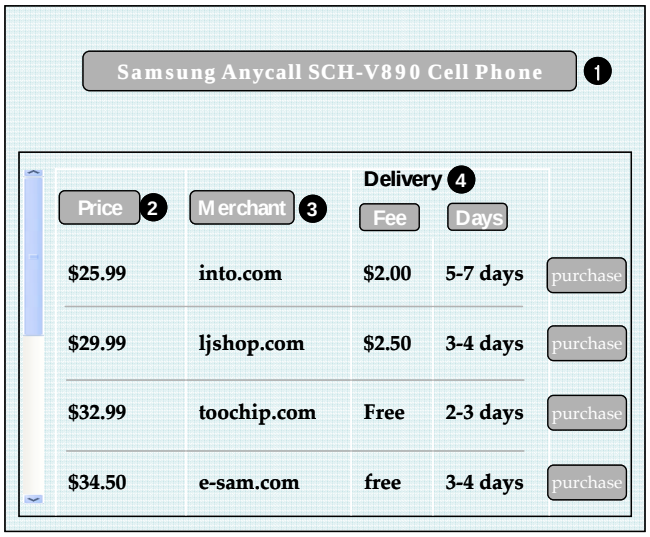

Figure 3. Main Screen

Product information displayed by mobile device includes manufacturer, brand, product name, and other characteristics as seen in Figure 4.

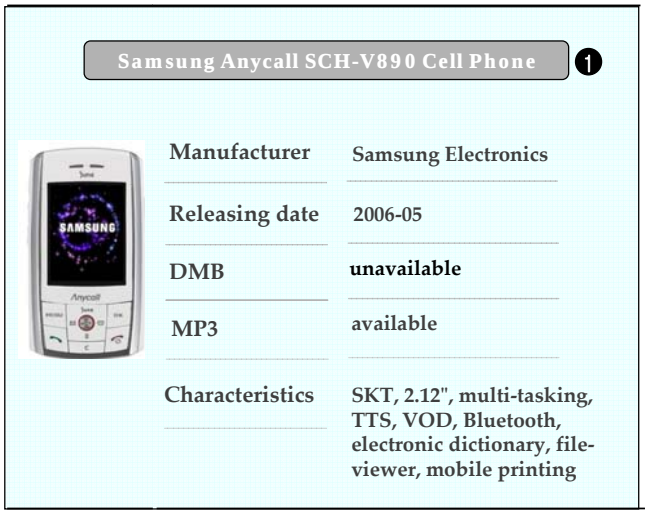

Figure 4. Product information

4. Conditions for the Business Model

Several preconditions are required to work the pervasive comparison shopping business model. In this section, we will find some conditions for SN-registered sellers competing with SN-unregistered sellers while cooperating with displayers (i.e. offline sellers). SN-registered sellers are those who register the pervasive comparison shopping network (SN) and SN-unregistered sellers are the sellers who do not have the shopping network membership.

Notations

- $Cost_{OFF}$: The product unit cost of offline seller reflecting shop operating cost etc.
- $Cost_{UN}$: The product unit cost of SN-unregistered seller reflecting marketing cost, web site operating cost and delivery cost etc.
- $Cost_{SN}$: The product unit cost of SN-registered seller reflecting SN registration fee and delivery cost etc.
- INCEN: The money (incentive) that SN-registered seller pays to Displayer (offline seller) when a transaction occurs by the shopping network.
- SC_{OFF}: Shopping cost[2] incurred to a consumer who is currently in front of the displayer when the consumer buys directly from the offline seller including delivery cost etc.
- SC_{SN}: Shopping cost incurred to the consumer when the consumer buys from SN-registered seller including delivery delay cost and seller trust cost etc.

The minimum price of SN-registered seller is $Cost_{SN}$ + INCEN and the minimum price of offline seller is $Cost_{OFF}$ + INCEN. If offline sellers set the price less than $Cost_{OFF}$ + INCEN, they can sell products but they get less money than INCEN. So they tend to set the price more than ($Cost_{OFF}$ + INCEN). If SN-registered sellers set the price less than that of offline seller, offline sellers are hard to sell products, but offline seller can get profit as much as the incentive. In the real world, there is a probability that SN-registered sellers have to compete with other online sellers which are not registered to SN. The minimum price of SN-unregistered seller is just CostUN, because the SN-unregistered seller does not have to pay anything to offline seller.

From the consumer side, the minimum price slightly changes due to the shopping cost difference. The minimum price that consumer feels from the SN-registered seller becomes $Cost_{SN}$ + INCEN + SC_{SN} and the minimum price that consumer feels from the SN-unregistered seller becomes $Cost_{UN}$ + SC_{UN}. The minimum price that consumer feels from the SN-unregistered seller becomes $Cost_{UN}$ + SC_{UN}. If we assume that the three parties have the perfect information on each other, then each party will be able to set the maximum price using the other party's information.

With the pervasive comparison shopping business model, offline seller gets his/her profit as much as an incentive. In addition, SN-registered seller and SN-unregistered seller get their profits as much as their price difference. The analysis is summarized in Table 1.

Table 1. Comparison of the price and profit

	Offline seller	SN-registered seller	SN-unregistered seller
Minimum price of seller	$Cost_{OFF}$ + INCEN	$Cost_{SN}$ + INCEN	$Cost_{UN}$
Minimum price that consumer feels	$Cost_{OFF}$ + INCEN + SC_{OFF}	$Cost_{SN}$ + INCEN + SC_{SN}	$Cost_{UN}$ + SC_{UN}
Profit of seller	INCEN	MAX($Cost_{UN}$ + SC_{UN}) – ($Cost_{SN}$ + INCEN + SC_{SN})	MAX($Cost_{SN}$ + INCEN + SC_{SN}) – ($Cost_{UN}$ + SC_{UN})

We can deduce some conditions to work this business model.

4.1.1 The condition for SN-registered seller competing with SN-unregistered seller

For a SN-registered seller to compete with SN-unregistered seller, the profit of the SN-registered seller should be higher than zero. So, the condition is ($Cost_{UN}$ + SC_{UN}) > ($Cost_{SN}$ + INCEN + SC_{SN}).

4.1.2 Incentive condition

To make win-win business model between offline seller and SN-registered seller, their profit should be the same. So, incentive condition is INCEN = ($Cost_{UN}$ + SC_{UN}) - ($Cost_{SN}$ + INCEN + SC_{SN}). With this formula, we can conclude the final incentive condition that is INCEN = [($Cost_{UN}$ + SC_{UN}) - ($Cost_{SN}$ + SC_{SN})]/2.

5. Conclusion

In e-commerce, comparison shopping is divided into online and offline markets. Ubiquitous computing will allow consumers to be connected to the Internet anytime, anyplace, and will consequently lead to the integration of these two markets. The resultant intensification of competition will call for a new business model, and this paper responds to this call with a RFID-based model. Until now, RFID research has focused primarily on supplier management or consumers' simple usage of information provided by RFID. Unlike its predecessors, this paper discusses the changes experienced by each economic player in the always-online environment, uses RFID technology as a solution to the issues brought about by these changes, and offers a new business model that enables seamless networking. An incentive-based model in which each relevant party can participate is required to allow seamless networking in ubiquitous commerce. It will be a wholly different business model and new spaces can be created through its expansion.

[2] Shopping Cost is invisible cost that consumers always consider when they do shopping.

6. Acknowledgments

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