Challenges and opportunities of silent commerce - applying Radio Frequency Identification technology

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Abstract

This research paper investigates applications of Radio Frequency Technology (RFID) as an application of ubiquitous commerce. RFID has a wide application in the supply chain but still is very limited for customer support. This study introduces the concept of the Silent CRM (s-CRM) which is an application of RFID to proactively support customer needs. Challenges of RFID application within companies, outside of companies and about the technology itself are discussed as well.

Organizations have made impressive efforts to change the way they conduct business and the approach to reach new markets. Ubiquitous commerce (u-commerce) is the latest channel which promises success but it is still in the infant stage. U-commerce comprises five types of commerce: e-commerce, wireless commerce, voice commerce, television commerce and silent commerce. Each independently introduce new opportunities and challenges. All five types of u-commerce are bringing fundamental changes in the way business and consumers communicate to provide the services, enable new class of services, and access the services. It is making possible that the customers' location becomes the companies' location and support awareness of what customer's want, accessibility at the point of service, and interaction to satisfy customer' needs (Fano & GershMan, 2002).

Silent commerce is considered the most advance type of u-commerce which is supported by silent technology (Accenture, 2001). Silent technology is considered as an emerging technology which makes everyday objects intelligent and interactive. It is possible to gain extensive amount of information about the business partners and customers at the moment of purchase and track down the products in their full cycle (maintenance, repairs, damages, and up to the recycle). This data helps companies to better understand spending habits of the customers, customize the promotion and product features, improve inventory and demand forecasting, and bring predictive analysis in the real time. The data granularity provided by silent technology is unmatched with previous technologies and is able to provide suggestions and predictions in many applications in company such as, SCM, ERP, CRM, etc (Rogalski, 2003).

Silent commerce has shown tremendous opportunities to transform supply chain procedures across participating companies. An effective supply chain system requires each participant to depend on timely, reliably and accurately information about products as they are sorted, stored, picked and transported. Radio Frequency Identification (RFID) technology increases the visibility into the entire retail supply chain. By attaching RFID tags on the pallets and cases shipped from the manufacturer through the entire supply chain, companies are able to access information about where the products are, when they have arrived at the distribution centers, what items are within each pallet, who are the manufacturers of the items and parts of the items, how the items are moving within the distribution centers, how they are stocked in the shelves, whether the item is out of stock, etc. This visibility helps in stock reduction of every participant within the supply chain. On the other side the visibility increases the forecasting accuracy and makes possible a better incorporation of customer demands into the forecasting process.

Another benefit in the supply chain is related to the promotion and introduction of new items. Procter & Gamble (P&G) has successfully used RFID to access information on when is the best time to introduce a new item and when the advertising is about to break. This information is considered as important because it will affect the image of the new product throughout the entire product life cycle. This information is accessed by applying "pulled" approach when the manufacturer (P&G) requires information only about the stores or locations where the inventory of the new item promotion is below the approved limit. The "pulled" approach creates the benefit of not being overloaded with unnecessary data from retailers' location with successful promotion and allows an improvement of retailers' behavior to accurately promote the new products in locations where promotion is below the accepted limits.

Other benefits are related to improve business operations within the company. Operations efficiency is improved by reading and inventorying the whole pallets or carts instantly without being close to RFID readers and without opening them. A smart tag can be read within a distance and not being in the sight of view (Ferguson, 2002). The RFID technology has made possible to reduce errors in mixed shipments, where a pallet contains more than one type of product. The accuracy of the delivery is especially important for overseas deliveries in Asia, Europe and Latin America. A summary of silent technology application in supply chain and companies that uses them is presented at Table 1.

Focus	Silent Commerce Applications		
Supply Chain	Efficiency at Distribution Centers	Procter & Gamble Hewlett Packard Boeing	RFID reduce the time to inspect pallets and cases as they leave manufacturing sites to distribution centers. By having readers at the dock doors eliminated manual scanning of pallets.
	Supply chain visibility	Gillette Metro Group	Visibility of the inventory in the warehouse, out-of stock merchandising, the items in each case, when and where the products are shipped.
	Inventory efficiency	Ford Company King's Daughter Hospital, KY	Monitoring inventory and manage the assembly line process.
	Predictive analysis	SAS retail intelligent solution TrueDemand	Improves inventory and demand forecasting by using predicting analytics at the real time.
	Descriptive analysis	Proctor & Gamble	Uses descriptive data to analyze the capital equipment spending and decide to operate them effectively.
	Product quality	Ford Company Seagate Cracker Barrel	Identify the quality of processes accomplished by previous production lines.
	Security within SCM	San Francisco Int'l U.S. Department of Defense	Security issues related to bomb and other hazard detection. US Department of Defense requires all the major suppliers to use RFID tags for the products shipped to Persian Gulf.

Table 1: Silent technologies and its applications in supply chain.

Challenges of RFID applications in Supply Chain and Customer Service

For this study, three companies were interviewed who have applied RFID in three different perspectives: supply chain user, which has applied the RFID technology in the last 2.5 years in many brands that they produce, customer service user, which has applied RFID in 2001 to monitor products in the store; and integrator, which has been implementing RFID technology to many retailers the last 3 years.

Onsite interviews were held with experts on RFID implementation and integration and a review of literature on these issues highlight many challenges that those companies are facing in integrating silent technology. These issues are related to:

Within company

- Back end applications: readiness to receive high volume of data; data in PML format.
- Other enterprise systems: data synchronization with multiple internal systems; databases are not designed to capture, aggregate, and distribute RFID data.
- Management: RFID data are not appropriate to write business logic, business applications need to start with more meaningful statement of "what, when, and where"; expensive RFID readers; ROI is still unclear.

Outside company

- Business partners: quality of data flowing between trading partners; lack of standardization across business users and across continents.
- Customers: invasion of privacy; security.

RFID technology

- Reliability: lack of reliability and accuracy of RFID versus bar code technology; limitation of technology applied to specific environment (noisy) or material dependent (does not read well through water).

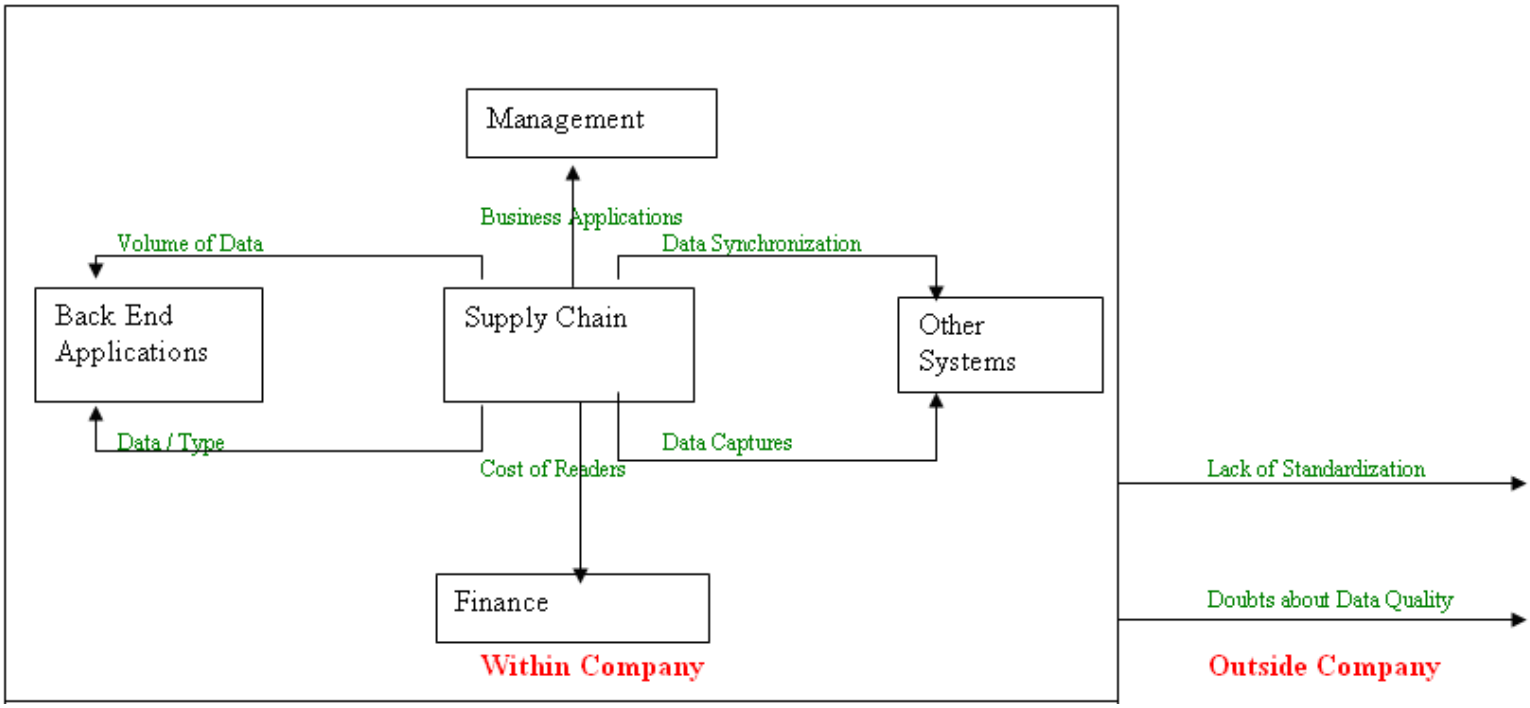

Figure 1: Challenges of RFID Technology

Opportunities of RFID on creating new levels of customer service

The silent technology by using object-to-object communication holds unforeseen opportunities for improving and enhancing the current internal systems. What is now considered as silent commerce can be clarified and enriched in different levels of existing enterprise systems based in the area of silent technology application. Silent commerce presents the opportunities that RFID technology creates to support and facilitate existing commercial business of the company supported before through bar code or other technologies. What we are looking for other opportunities that silent commerce can bring to customer support and service.

The most popular term to support customers in their relationship with the company has been the term Customer Relationship Management (CRM) and other terms related to CRM such electronic-CRM (e-CRM) or mobile-CRM (m-CRM). CRM is an integrated strategic approach that seeks to maximize the value of current customers by using the proprietary customers' information effectively. The knowledge about customers allows the companies to support them in two basic modes: reactive (where customers approach the company for their questions, or complains by using 800 phone numbers, fax, e-mail communication, chat or other solutions) and proactive (company do not wait for customers to contact the company, but try to establish a contact and dialog with them anticipating customer's needs, prior the customers may complain or need to contact the firm) (Winer, 2001).

So far, few attempts have been to integrate RFID with the CRM applications. Part of the reason is that traditionally, companies have been very passive on understanding and interacting with customers in order in enhance their experience. The main focus had been on improving the customer service levels in reactive mode and/or rewarding customers based on loyalty cards. Both approaches address customer issues too late in the purchasing transaction, at the point of sale or after point of sale. CRM initiative can be totally transformed by integrating RFID. RFID integration will allow them to initiate an early interaction with customers before or early stages of purchasing transaction. Proactive mode, which allows anticipating customer's needs, forecast and diagnose potential problems of part replacement, maintenance, and service alert before they are aware of that type of service. Other applications include product customization and personalization, which allows companies to customize products, prices, services based on previous customer purchasing history, product preferences, preferred brands, previous sale associates, and previous customer's behavior.

Results of the interviews with the three companies that participated in this study suggests very limited applications on improving the check out process in the store and customer satisfaction to deliver the right product to the right customer. The companies interviewed were not considering applying silent technology widely for customer support. On the other side, a review of literature of RFID applications identifies many separate and promising applications of the silent technology to improve customer support and service (table 2). These applications potentially allow companies to better recognize the demand, behavior, habits, individualities and preferences of business partners and individual customers (Xavier, 2003; Accenture, 2001; Accenture, 2000).

Focus	Silent Commerce Applications		
Reactive	Customer Insight	Ichiran restaurant (Japan) Maitre D	RFID tags provide information about buying history, and product (food) preferences .
	Interactive products	e-Ink	RFID will communicate with product package and change information (dynamic pricing) from one person to the other, recent shelf activity or product features.
	Product warranty and service	FedEx DHL	RFID helps in easier product registration, lost and found protection, warranty and return services.
	Smart shelves	Gillette Tesco	Shelf readers track down any movements of the product on the shelves. Companies precisely evaluate customer' demand and manage better inventory of the items, and efficiently promote the item to the customers.
	Personalization of services	Amsterdam Airport	Travelers are identified and communicate with representatives individually as they pass through airport.
	Continuous interactivity	Sainsbury	Continuous communication between customers, employees and everyday objects at retailers stores.
	Customer service	Finnair	RFID tags embedded at boarding cards. At the gate, passengers are able to board faster and saves time on printing boarding cards
		ExxonMobile	Convenient purchasing process by making the process faster.
		Shell	Provide faster access to customer loyalty programs such as AirMiles and deepening customer relationships. The customer care is extended even to other partners (Shell and Swatch) who uses the same chip to the partner' point of service.
		Rehoboth beach, Delaware	Reduce customer uncertainties on the travel, time schedules, and bus stops in transportation service.
		Figleaves.com	Reduces wrong product delivery to customers' order made online.
Proactive	Supermarket applications	Multichannel Retail (UK)	Smart shopping by suggesting additional brands, if products match the customer's diet, discount items, etc.
	Telematics	OEM CMMS Metro St Louis	Manufacturers/dealers anticipate potential problems of replacement parts, predict maintenance, alert services, build special products (cars based on travel habits).

Table 2: Silent technologies and its applications in customer support

Conclusions

Silent technology has introduced new opportunities for enriching the enterprise systems with new ways to operate efficiently and better address the demands of business customers and individual consumers. The opportunities are recognized and accepted from companies. However, there are still two major issues with application of the silent technology:

These applications are currently in the first phase of development, as stand alone applications, and are not integrated or totally integrated with existing enterprise systems in the organizations such as data warehouse management, supply chain, customer relationship management, enterprise resource planning, etc.

Furthermore, significant attempts are made to integrate the silent technology with business partners or supply chain activities, which had been particularly stimulated by Wal Mart and Department of Defense initiatives to integrate RFID in their supply chain. Integration of technology with other applications such as CRM, asset management, material management etc. are still in very early adoption stages.

RFID technology provides a tremendous opportunity to support customer relationship in the preemptive mode, which is a mode not well developed nowadays. The current Customer Relationship Management applications support customers better on customer complaints, tracking down the customer order, creating customer virtual profile based on their previous purchasing history, etc. Unfortunately, companies are not able to predict and help the customers in the real time, and furthermore, they are not considering such applications.

Previous development of CRM has added value to customer service. Electronic CRM (e-CRM) included Internet technology to enrich communication with the customers via e-mail, chat and increased the degree of communication established between Internet and database marketing applications (O'Leary, 2004). The next development, mobile technology, enhanced the functionality of CRM (m-CRM) by adding mobile elements in the relationship with the customers, such as special bids, customized packages and handling presentations to customers (Jeffery, 1996). Silent technology is a further development in the attempts to better communicate and help customers. It is time to consider a new level of development of CRM, called silent CRM (s-CRM) which in a silent mode will be able to personalize the products, support customer service, increase customer interactivity and add value to forecast customer demand and be able to suggest them the products/services appropriate to them.

References

Accenture (2000). Silent commerce offers new insights for high performance, accessed at: http://www.accenture.com/xdoc/en/services/technology/vision/tech_pov_insights.pdf

Accenture (2001). The unexpected eEurope, accessed at: www.accenture.com/xdoc/en/ideas/eeurope2001/Full_Survey.pdf

Fano, A. & Gersham, A. (2002). The future of business services in the age of ubiquitous computing, Communications of the ACM, 45(12), 83-87.

Ferguson, G. T. (2002). Have your objects call my objects, Harvard Business Review, 80(6), 138-144.

Jeffery, B. (1996). Getting to know the customer through a customer information system, Information Strategy: The Executive's Journal, 13(1), 26-37.

O'Leary, C., Rao, S., & Perry, C. (2004). Improving customer relationship management through database/internet marketing, European Journal of Marketing, 38 (3-4), 338-354.

Winer, R. S. (2001). A framework for customer relationship management, California Management Review, 43(4), 89-105.

Xavier, M. J. (2003). Customer insight and intimacy in the silent commerce era, IIMB Management Review, 15(3), 93-98.

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