Transforming the point of sale to point of service - applying SOA in the Indian retail scenario

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Abstract

Unorganized retailing is by far the prevalent form of trade in India – Constituting 98% of total trade, while organized trade accounts only for the remaining 2%. The retail industry in India is of late often being hailed as one of the sunrise sectors in the economy.

However, in order to find its feet in the Indian environment a lot needs to be done in terms of efficiency enhancement. This case study is an attempt in exploring the benefits of applying Service Oriented Architecture (SOA) in the organized retail industry, for achieving business efficiency by transforming the point – of – sale into a point – of – service through SOA and thus ensuring maximum customer satisfaction.

The discussion is divided into three parts; firstly the introduction which gives an idea about the retail sector and SOA. The second part deals with the areas of improvement for the Indian region in case of retail through information technology. The third part deals with the SOA based suggestions for the mentioned problems. The conclusion sums up the effective use of SOA in retail.

Introduction

Retailing in India is gradually inching its way to becoming the next boom industry. The whole concept of shopping has altered in terms of format and consumer buying behavior, ushering in a revolution in shopping. Modern retail has entered India as seen in sprawling shopping centres, multi-storeyed malls and huge complexes that offer shopping, entertainment and food all under one roof.

Retail is undergoing a massive transformation, driven by unprecedented customer expectations of instant and personalized response. The future is promising; the market is growing, government policies are becoming more favorable and emerging technologies are facilitating operations.

The ability to share and update information throughout the retail enterprise, from planner to customer, is a key determiner of profit in today's competitive environment.

By implementing an SOA (Service Oriented Architecture), a retail organization can align people, processes, and data through consolidated applications and shared information services -- even though the people access distinctly different systems, from mainframes to cash registers

to customer kiosks to online stores. By orchestrating consistent data sources across previously incompatible systems, retailers can harvest better sales data, strengthen loss prevention, reduce in-store pricing errors, improve promotion personalization and timing, and deliver more in-depth product information directly to customers and sales associates.

SOA is also the best way to integrate the benefits of RFID tagging into the retail process. With an RFID network in an SOA implementation, you can track every item in a shipment as it passes out the doors of your warehouse, into the retail loading dock, and off the shelf down to the unit, down to the second.

With SOA, retailers are squeezing new efficiencies from existing processes and systems, one step at a time.

Literature review

The application of Service Oriented Architecture in retail is an area of interest as is evident from the research literature available as listed below.

1.1 a) Paper Trends 2006:Retail IT highlights how different aging POS platforms need upgradation and architecture investments will pay off in the end. http://whitepapers.techrepublic.com.com/abstract.aspx?docid=166761

1.1 b) An Overview of Service Oriented Architecture in Retail , a white paper published by TechRepublic looks at the challenges faced by retailers and benefits of SOA to the retail enterprise. . http://whitepapers.techrepublic.com.com/abstract.aspx?docid=288870

1.1 c) Creating Sustainable Retail Solutions with SOA studies the process of designing the right scale and content of services that are reusable in multiple business experiences. http://whitepapers.techrepublic.com.com/abstract.aspx?docid=287120&promo=100511

1.1 d) SOA –the Architecture of choice for demand driven retail takes a look at enhancing global supply chain network,operational excellence and comments on flexible business processes and practices. http://whitepapers.techrepublic.com.com/abstract.aspx? docid=361116&promo=100511

1.1 e) Driving Innovation in retail with SOA emphasizes on enhancing supply chain relationships through effective management of complexity and uncertainty through use of SOA(March 2008). http://www.retailsolutionsonline.com/article.mvc/Driving-Innovation-In-Retail-With-SOA-0004.

This paper also takes into consideration the challenges faced by the retail sector but in the Indian context and highlights the application of SOA to providing the customer with value, variety and volume.

Trends in retailing and scope for information technology

The Indian retailing sector is at an inflexion point where the growth of organized retail and growth in the consumption by Indians is going to adopt a higher growth trajectory. The Indian population is witnessing a significant change in its demographics. A large young working population with median age of 24 years, nuclear families in urban areas, along with increasing working-women population and emerging opportunities in the services sector are

going to be the key growth drivers of the organized retail sector. However, the growth path is not hurdle free. Procurement is a vital cog in the retail wheel. Fragmented sourcing, unpredictable availability, daily fluctuating prices as against **consumer expectations** are issues that retailers have to fight. Trained human resources are another challenge

India is a trillion dollar economy of which retail accounts for about 40%. Indian consumers are extremely value conscious. Value for them is not just price but 'Quality, convenience and trust'

Besides, only three percent of Indian retail is organized. When shifting consumers from their existing shopping behavior (from mom and pop stores) into a different shopping behavior, it is also testing the new format. Retail in India is hence at the crossroads.

All these trends and developments present a great business opportunity for software and hardware vendors from across the globe. Indian solution providers are targeting this segment have reason to rejoice because things are poised for change.

In spite of the prospects being good things the scenario on awareness of IT systems isn't very promising. In most cases, organized retailers in India have installed solutions that help them automate transactional systems.

With the retail sector in India undergoing a transformation due to the entry of large corporate houses, IT managers and CIOs are now looking forward to know how IT can help them achieve the business goals of their organizations.

Standards-based architecture and software support all kinds of mission-critical IT applications for enabling greater efficiency, significant cost savings, and new business value. The critical activities that can be handled by IT are finance and accounting, business intelligence, vendor development and management, supply chain management, merchandising and inventory management, facilities management, stores management, customer relationship management, branding, marketing, sales promotion and HR.

Like any other vertical, retail also stands to benefit from elaborate IT set-ups. However, this is subject to the scale and size of the organization, as well as an objective assessment of its requirements. Key common challenges that can be tackled through IT implementations include accurate merchandising, improved planning, increasing profitability, enhancing customer experience, strengthening store operations, improved workforce management, and improving the supply chain. This is in fact one of the key imperatives facing retailers in India, to have a robust and scalable supply chain that will facilitate rapid growth.

Since a basic objective is to make data available to users and customers, proper IT implementation and superior IT infrastructure ensure that in spite of getting minimal details, the retailer captures the right information, which flows to everyone from the back office staff to the head office managers. The entire information flow must be seamless. A retail business works on a network environment because the stores connect to one another as well as to supplier sites. This is because in the retail business quick response is the key to success. Proper IT implementation also ensures that investment in retail reduces substantially. The various aspects involved in such retail activities are mentioned in the following section.

Support and Business Development [Ref 2]

Customer support and business development are tools for retaining customer, reinforcement of brand loyalty and growth of business from existing as well as new clientele. The focus is to have timely information and customizability of support functions.

The various applications on the customer support and business development include:
- After sales service
- Customer segmentation and direct sales
- Customer Information System
- Customer Loyalty
- Marketing Management
- Product and applications knowledgebase
- Data Warehouse
- Business Intelligence and Analytics
- Data Feed
- International Sales
- Vendor Marketing
- Marketing   Web   services

The various applications work together for the smooth and efficient functioning of the retail activities, thereby providing service to the customer at the counter which is known as the point of sale.

Point of sale (POS)

The point of sale can mean a retail shop, a checkout counter in a shop, or the location where a transaction occurs. By synecdoche point of sale often refers to a POS terminal or more generally to the hardware and software used for checkouts – the equivalent of an electronic cash register. Point of sale systems are used in supermarkets, restaurants, hotels, stadiums, and casinos, as well as almost any type of retail establishment.

POS or POS software - stands for Point Of Sale or Point Of Service. This can mean a retail shop, a restaurant cash register, a checkout counter in a shop, or any location where a transaction occurs. POS or POS System is also a commonly used system in millions of businesses around the globe. There are different POS software programs available on the market. Some of them very simple while the other very complex. The ones that are simple are limited. However the more complex, can be very difficult to operate.

Service Oriented Architecture

IT departments are managing increasingly complex IT portfolios. Yet as business needs change, these departments must still ensure that their technologies remain aligned with business goals. Failure to do so compromises organizational agility.

The problem for IT departments is typically not insufficient functionality; rather, it is that critical business systems such as customer relationship management (CRM) and enterprise resource planning (ERP) operate in isolation from other critical business systems—despite the fact that business processes often span multiple applications. To obtain an end-to-end view of a complex business process necessitates integration of information and process silos. In the past,

this has been accomplished either though time-consuming manual interventions, or through hard-coded solutions that are difficult to maintain.

Service orientation is an approach to organizing distributed IT resources into an integrated solution that breaks down information silos and maximizes business agility. Service orientation modularizes IT resources, creating loosely coupled business processes that integrate information across business systems. Critical to a well-designed service-oriented architecture is producing business process solutions that are relatively free from the constraints of the underlying IT infrastructure, because this enables the greater agility that businesses are seeking.

Service Oriented Architecture ultimately enables the delivery of a new generation of dynamic applications (sometimes called composite applications). These applications provide end users with more accurate and comprehensive information and insight into processes, as well as the flexibility to access it in the most suitable form and presentation factor, whether through the Web or through a rich client or mobile device. Dynamic applications are what enable businesses to improve and automate manual tasks, to realize a consistent view of customers and partner relations, and to orchestrate business processes that comply with internal mandates and external regulations. The net result is that these businesses are able to gain the agility necessary for superior marketplace performance.

Service orientation is a means for integrating across diverse systems. Each IT resource, whether an application, system, or trading partner, can be accessed as a service. These capabilities are available through interfaces; complexity arises when service providers differ in their operating system or communication protocols, resulting in inoperability[Ref 8].

> **The World Wide Web Consortium (W3C) for example refers to SOA as '***A set of   components which can be invoked, and whose interface descriptions can be published and discovered'***.

Service orientation uses standard protocols and conventional interfaces—usually Web services—to facilitate access to business logic and information among diverse services. Specifically, SOA allows the underlying service capabilities and interfaces to be composed into processes. Each process is itself a service, one that now offers up a new, aggregated capability. Because each new process is exposed through a standardized interface, the underlying implementation of the individual service providers is free to change without impacting how the service is consumed.

Need for SOA

Complex, distributed IT resources are a concern for businesses. Too frequently, the existing IT portfolio does not adequately meet specific business needs, is costly to manage and maintain, and is inflexible in the face of business growth and change. The solution, however, is not to rip and replace systems or applications, nor to completely renovate them, but rather to find a way to leverage existing IT investments so that overall organizational goals are effectively supported.

Service orientation helps to accomplish these goals by making systems more responsive to business needs, simpler to develop, and easier to maintain and manage. Implementing a solution architecture based upon service orientation helps organizations plan ahead for change, rather than responding reactively.

The SOA life cycle

The core IT assets of any organization include its data, legacy systems, line-of-business applications, packaged applications, and trading partners. Each of these resources is a service provider responsible for producing numerous highly specific outputs, such as inventories and customer data.

Service orientation ties together these disparate and autonomous sources of information, bridging a wide range of operating systems, technologies, and communication protocols. The process by which it does this is an iterative one of creating ("exposing") new services, aggregating ("composing") these services into larger composite applications, and making the outputs available for consumption by the business user.
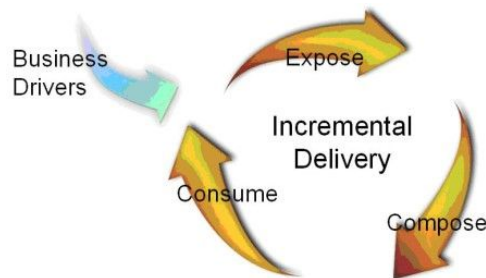

Fig 3: *The SOA Lifecycle*

The expose phase of the SOA approach focuses on which services to create from the underlying applications and data. Service creation can be fine-grained (a single service that maps to a single business process) or coarse-grained (multiple services come together to perform a related set of business functions). The expose phase is also concerned with how the services are implemented. The functionality of underlying IT resources can be made available natively if they already speak Web services, or can be made available as Web services though the use of an adapter.

Once services are created, they can be combined into more complex services, applications, or cross-functional business processes. Because services exist independently of one another as well as of the underlying IT infrastructure, they can be combined and reused with maximum flexibility. And as business processes evolve, business rules and practices can be adjusted without constraint from the limitations of the underlying applications.

Once a new application or business process has been created, that functionality must be made available for access (consumption) by either other IT systems or by end users. The goal of the consumption process is to deliver new, dynamic applications that enable increased productivity and enhanced insight into business performance.

The Benefits of SOA

Service-oriented architecture is, first and foremost, a means of attaining greater business agility from existing IT investments. SOA-based solutions connect systems and thereby automate previously manual information-transfer processes whether the goal is to develop new applications; to connect systems, workgroups, or geographically distributed subsidiaries; or to collaborate with trading partners. At the same time, SOA solutions build in the essential services required to ensure that the appropriate resources are accessed by the appropriate users.

SOA benefits accrue for the organization at two different levels, that of the IT organization and that of the business user; in the end, all benefits add up to a dramatic increase in agility and productivity.

From the IT department's point of view, SOA-based integration simplifies management of distributed resources across multiple platforms, requires less hardware, is more reliable, is standards-based, and is less costly.

From the business point of view, SOA enables development of a new generation of dynamic applications addressing a number of top-level business concerns that are central to growth and competitiveness. SOA solutions promote:

- Stronger connections with customers and suppliers.
- Enhanced business decision making.
- Greater employee productivity.

Areas of Improvement

The organized retail industry in India is faced with stiff competition from the unorganized sector. Dealing with the competition can be achieved by ensuring maximum customer satisfaction for ensuring customer sustainability. The problems associated with customer satisfaction can be overcome by converting the point of sale into a point of service.

The current, point of sale concept leaves the customer dissatisfied due to the following reasons.

Inconsistencies in the prices of goods.

The prices of items during special offer days or seasonal discounts or shopping festival offers may vary from day 1 to day n. Dynamic pricing policy for handling stock. This calls for a SOA approach for the local server to dynamically interact with the centralized database to get the latest pricing for products as per the demand and supply leading to dynamic pricing policy for the stock. The following case study helps in understanding the sales person and customers' problems.

> **"Bad Experience for Customer and Salesperson"**
> Mr Anand Shukla reached the retail mall well in time to avoid the rush of the Diwali season and headed straight for the apparels section to buy a list of items that he had prepared in advance. To his delight, he found a number of schemes applicable to the desired items. He felt happy to have got a good bargain and went home satisfied.
>
> After 2 days, he again went back to get similar items as gifts for his visiting guests. He was glad to see a fresh stock of items and started putting them in the shopping cart. He bought the same set of bed sheets but with different packaging dates. And to his dismay found the prices different.
>
> On complaining to the salesperson, he was assured of the problem being sorted out. The salesperson in turn, had to check the system for the prices and found that the old item price list had not been updated as per the fresh stock of items. The problem was due to the large stock coming to the mall on occasion of the festival.
>
> The salesperson had a talk with the manager to sort out the problem and all this time, the queue of customers increasing in length and getting more and more agitated. The

whole episode of inconsistencies in prices was frustrating for the salesperson and the customer too.

No summary of free item list

Customers going for products having certain free items may not remember a list of such free products. These situations can occur for most of the schemes which are mentioned on the products but cannot be verified by the customer. Enhancing the customer experience by providing this desired information of summary of free items, ensures the customer happiness. A summary always helps. The following case study helps in understanding the customer's problem.

"Bad Experience for Customer"

Mrs Anita K, a housewife and mother of a 6 year old child, went to the retail mall to buy a few grocery items. She bought a packet of biscuits on her kids demand. The child wanted a particular brand of biscuit only, due to a free gift offer.

She gave in to the child's demand and put the biscuit pack into her shopping trolley. She was completely exhausted by the time she had finished shopping for everything on her shopping list. Mrs.Anita then headed for the billing counter (Point-of-sale) The sales person at the counter made the appropriate invoice and asked Mrs Anita K to go to the customer service counter to collect her free gift(s).

At the free gift counter, the salesperson took the invoice and out of 50 items, circled a few items eligible for the schemes and handed them the gifts. After coming home, the kid could not find his free item on the packet of biscuit and the poor housewife had to make a choice between going back to the mall or answering the child's queries to the missing gift.

Such incidents are common and retailers handle them with the Customer Grievance Counter. The problem may solve for the customer on going to the mall again but the feeling of dissatisfaction and complaint, creeps in. From financial point of view it is a very small incident, but it is of immense importance as per the customer experience is to be viewed. The retail mall could have avoided such problems with a very simple solution of providing such free item information to the customer.

SOA based Suggestions

From the above discussion, it is found that retail management has evolved into the current situation through the use of IT and its various customized applications. The existing situation though shows two areas of improvement that can be considered for some SOA based solutions in order to achieve better customer satisfaction. The SOA based approach needs to be considered for two different situations; one in which the existing POS software is based on SOA to which a new service needs to be incorporated and second case where the existing POS software is to be incrementally converted into a SOA based software along with the incorporation of the new service.

SOA based suggestion for "Inconsistencies in the prices of goods".

The inconsistencies in the prices of goods results due to the database not being updated with the latest prices of items. This problem can be dealt with a SOA based solution where in a

new service can be incorporated in the existing retail management software. There are two possibilities in the consistency of prices, first the new stock item price is less than the old stock item price and second the new stock item price is more than the old stock item price. Both the prices can be maintained provided the database is designed to hold the old as well as new item prices. The proposed service can then be invoked during situations when there is a problem of inconsistency of prices. The new service takes the item code for which the prices are to be compared and finally displays the lesser of the two prices. The lesser price needs to be displayed because of the fact that customers will grumble and not buy an item if the old stock item and new stock item is incorrectly priced. A minor amount of money compromise (if needed) by the retailer will ensure the movement of old stock as well as customer satisfaction

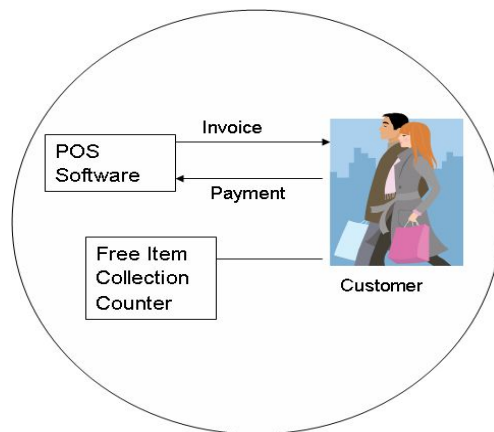## SOA based suggestion for "No summary of free item list".

Fig 3.1 Current Situation at POS

Fig 3.1 *shows the current situation at POS where the customer, after making the necessary purchases, goes to the point of sale counter for invoice generation and later on makes the payment. The customer is then directed to the free item collection counter for collecting the free items as applicable on the products mentioned in the invoice.*
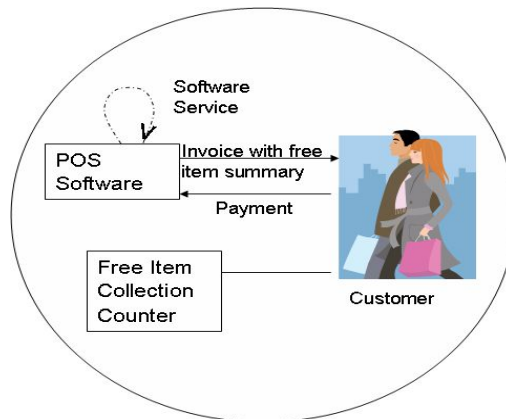

Fig 3.2 SOA based Suggestion no. 1

Fig 3.2 *discusses a SOA based suggestion to convert the point of sale to point of service by invoking a new service at the time of invoice generation and identifying the items eligible for free gift items. This can be implemented by the service by connecting to the database for getting the*

desired information. The customer now gets an invoice with the identified items eligible for free gifts and then makes the payment. The customer is then directed to the free gift collection counter and on showing the invoice to the person at the counter gets the free gifts and verifies them against those identified in the invoice.
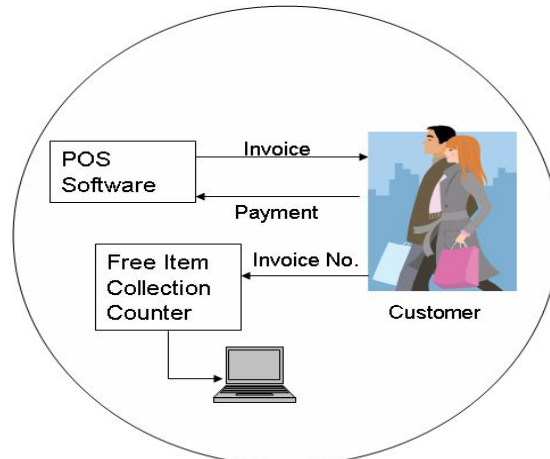

Fig 3.3 SOA based Suggestion No 2

Fig 3.3 *is another SOA based suggestion for ensuring customer satisfaction. In this case, the retail mall needs to install a system at the free item collection counter. The person at this counter takes the invoice number from the customer and gives it to the software as an input. The software then invokes a service which identifies the list of free items from the database as applicable for the customer and displays the list on the screen of the system. The sales person then hands over the applicable items to the customer. The screen of this system may be kept visible to the customer for verification of the free items.*

Both the approaches try to ensure maximum customer satisfaction and thus convert the point of sale into a point of service.

Conclusions

The paper aptly addresses the various aspects involved in retail and the IT support needed in its efficient functioning. It also shows the need for the IT related additional services in the current retail scenario by considering two supporting case studies and the possible solutions for taking care of the problems stated by the case studies.

Customer sustainability and customer satisfaction can be achieved by combining the Information Technology related SOA concept with the Retail Management concept and converting the point-of-sale to point-of-service. The existing applications that are used by most of the retail outlets, need not be changed but only needs to incorporate new service(s) for handling the problems of customers and salespersons and ensuring smooth functioning of the mall/outlet for a better customer experience. A better customer experience will ensure customer sustainability which in turn boosts the

profitability of the business venture. In the long run, such an approach goes on to attract more and more customers.

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