

# Flexibility Concept: Facilitating Post-Sale Changes In Online Reservation Systems

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**Abstract** — The implementation concept of virtual intermediate, so called intelligent systems, to Business to Consumer (B2C) applications enhances the flexibility of B2C systems up to a certain level. This paper raises the question if the current intermediate systems are flexible enough? Current intelligent intermediate systems provide flexibility only in terms of general information, which could be more useful in taking decisions with respect to pre-sale flexibility. Actual replacement of human agent with a virtual intermediate system could be attainable in a post-sale flexibility scenario, if it is really supported in terms of ‘flexibility’. In this paper we propose how to deal post-sale flexibility in online airline reservation systems. This is achieved with the help of different scenarios related to customer service life cycle. This paper proposes incorporation of missing stages within the customer service life cycle, intended to enhance the functionality of existing systems.

**Keywords** – B2C, Intelligent Systems, Post-sale Flexibility, Airline Reservation Systems.

## I. INTRODUCTION

For any Airline, an efficient reservation system acts like its backbone. For this purpose, airline industry is bound to implement dynamic solutions that work on state of the art technologies and manage their flight reservations on a flexible platform.

Secure and stable systems are vital to the airline industry that is why many companies have years in designing an architecture specifically suited to the nature of the airline industry that often requires 10’s of 1000’s of users to access and use the system simultaneously [1].

### A. Airline Industry Revenue Earning & Expenditure Trends

According to [2], Revenue received from International Tourism in 2007 amounted to the tune of US \$ 856 Billion and from Global Commercial Aviation US \$ 165 Billion. The detailed table is reproduced below (see Table 1):

Estimation given by Travel Industry Association of America (TIA) show total U.S. travel expenditures \$775.9 billion in 2008, \$739.4 billion in 2007 and \$699.8 in 2006.

World Travel				
International Tourism Revenue	856	Billion US\$	2007	UNWTO
International Tourism Arrivals	903	Billion	2007	UNWTO
Global Commercial Aviation Revenues	165	Billion US\$	2007	UNWTO
Global Commercial Aviation Net Profit (Estimated)	-2.3	Billion US\$	2008	IATA

Table 1: Airline Industry Revenue Earning [2]

### B. Role of Ecommerce in Online Reservation Systems

The advent of electronic commerce (e-commerce) has opened new sources of products and a greater choice for consumers paralleling efficiencies achieved by businesses [3], e-commerce:

- is an evolution of traditional business practices to take advantage of the new technologies of the internet age [4].
- has such well documented advantages that if a business does not engage in doing so, one must question the wisdom of management [5].

Moreover, availability of low cost internet and affordable hardware has risen an opportunity for users for making transactions online [6]. Nearly a quarter of the world’s population – roughly 1.4 billion people – will use the Internet on a regular basis in 2008. This number is expected to surpass 1.9 billion unique users, or 30% of the world’s population, in 2012, according to IDC [7].

E-commerce continues to play an extremely important role in the travel sector, making booking convenient for consumers and more cost-effective for travel providers. Many companies have implemented B2C systems upon their legacy systems to handle rapidly growing business competitions [8]. This is achieved through Web interface which provides liberty to the customers to use the systems as used by the intermediates earlier [9]. The implementation of B2C is suitable in many systems and this has become an important strategy for many

organizations [10]. If we take an example of airline booking system, we just need to provide a Web-interface that is connected to the database providing a link at business-side. However, electronic customer and supplier interaction must be seamlessly integrated with existing business processes [11]. With little effort, user can book his/her flight while sitting at home, using a credit card for payment ([12], [13]). Today, airlines and hotel chains are offering their own powerful online reservation systems, with rich features, multiple levels of photos and descriptions, and the ability to earn and manage frequent flyer awards. Consumers often find the lowest prices on sites operated directly by airlines and hotels [2].

Nearly half of all Internet users will make online purchases in 2008. By 2012, there will be more than 1 billion online buyer's worldwide making Business to Consumer (B2C) transactions worth \$1.2 trillion. Business to Business (B2B) eCommerce will be ten times larger, totaling \$12.4 trillion worldwide in 2012 [7].

We have already discussed and justified the importance of internet and the e-commerce in the promotion of the business-boom in airline industry. This, however, does not come without its demerits. There are people who are either satisfied with the services provided by e-commerce systems or not. Therefore, we can assume that, at one side, many companies have adopted e-commerce successfully in their businesses and on other side many have failed [14]. Our research voyage is based on the gap created by booking systems that could possibly be more flexible in terms of providing after sale services. To justify our motive, we may refer to the report of US DOT that came in June 2008 and highlighted major delays caused by flights in various categories: there were 10.16% to flights were caused by aviation system delays, 8.86% were caused by late-arriving aircraft, 6.78% were caused by problems within airlines' control, 1.14% were caused by extreme weather and 0.05% were caused by security problems [15].

B2C systems were considered not very flexible as mentioned by Olsen & Malizia ([12], [13]) in terms of handling more open requests that could not be possibly mapped directly into the formalized terms offered by the Web-interface. They would work for simple closed requests, i.e., a request that could be mapped directly into formalized terms or pre-defined parameters such as dates, airports, flights, etc. The system could break down for more complex closed requests, i.e., where the customer is flexible with regards to attributes such as destination and dates ([12], [13]). Olsen & Malizia has recommended an information system, as an intermediate between a customer and booking system, that would provide the user with all the necessary data and support, on a mere button-click, after the initial data has been fed into the system, see Figure 1.

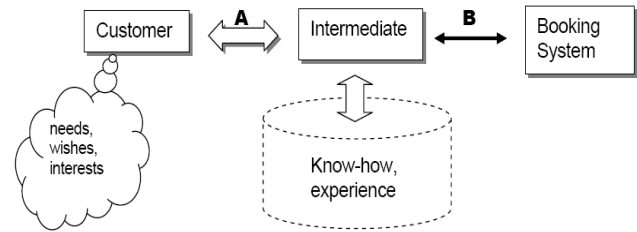


Figure 1: Ticket Reservation through Intermediate [12]

The role of intermediate system would be to provide detail information to the user which could be useful in making good decisions ([12], [13]). Therefore, the intermediate information systems will serve the purpose of human agents in order to map formalized terms into closed requests. However, they only cover pre-sales flexibility [16]. The term "flexibility" here should not only be related with the booking of a ticket in case of online booking system. Problems arise when a traveler changes his/her mind or if the airline decides to make changes with regards to times, dates, destinations, after receiving a final confirmation of the booking. If we say, our booking/reservation system is flexible then ideally speaking, it should also support flexibility with regards to change in times, dates, destinations, even after the buy-button has been pressed.

In this paper we propose how to deal post-sale flexibility in online airline reservation systems with the help of different scenarios related to customer service life cycle. This paper proposes incorporation of missing stages by Ives and Learmonth [17] named as; Stewardship and Retirement, from their Customer Service Life Cycle (CSLC) model to enhance the functionality of existing systems. Section 2 deals with the need aspect for providing post-sale flexibility and Section 3 incorporates Stewardship and Retirement in reservation systems using different scenarios. In Section 4 we discussed major findings and analysis. Section 5, 6 and 7 provide conclusion, highlight possible areas for future work, and references respectively.

## II. CONCEPT OF POST SALE FLEXIBILITY

In 1984, Ives and Learmonth [17] presented CSLC as a framework for creating behavioral awareness among customers regarding buying cycle. CSLC lays a foundation of a complete process that revolves around getting a resource from a supplier to its disposal. The life cycle involves need establishment, followed by acquisition of resource, its usage and finally the retirement of resource. The concept of CSLC is driven from IBM's four-stage Systems Planning Process [18] and Burnstine's [19] 11- stage resource life cycle. IBM's four-stage Systems Planning Process; comprised of (i) Requirements, (ii) Acquisitions, (iii) Stewardship and (iv) Retirement. The Burnstine, however, has given 11- stage resource life cycle model that provides extended details to the aforesaid four stages and the activities carried out during a given stage [20].

Ives and Learmonth [17] collaborated the two models to suggest ‘Customer Resource Life Cycle’ where they added two dimensions of Pay and Acquire to create an overall 13 dimensions. Similarly, Ives and Mason [21] further improved upon the model and added two dimensions of Training and Evaluating to create a 15 dimensional service life cycle.

The CSLC provides supporting structure to Information Technology and has made significant contributions in the MIS literature. It has further played pivotal role in customer-focused applications [22]. Recently, a lot more importance is given to the concept of inter-organizational information systems whereby companies are allowed to transact electronically with other organizations [23]. This drastic change in transaction practices has called for a different perspective. This perspective is well accounted for in the CSLC Model / Framework. Therefore, as a basis for application development, CSLC proves to be a strategic starting point due to its perspective change in focus of resources. Moreover, while the CSLC has been given due importance in the information systems literature since 1984, empirical work done to develop measures of its constructs of interest are still far less [20].

Suppliers have the incentive to focus their resources around the life cycle framework in order to meet market competition and at the same time secure greater market share. This turns out to be a complex process due to extensive dealing with customers throughout acquisition to post-transaction support services. Therefore, it is dire need of every supplier to develop a customized approach that could set new trends for competition and is difficult to replicate by the competitors [24].

Now we shall focus on the solution recommended by Malizia for adding flexibility to B2C booking systems. The proposed strategy is explicitly based on the first two stages of CSLC model as mentioned earlier.

Campos in a survey conducted for assessing satisfaction and quality of service provided by suppliers mentioned that attribute “aftersales service” (damage, exchanges, returns, complaints) provided by the supplier is ranked second highest (2nd) among total 16 identified attributes, with respect to their importance for the consumer [25]. The above survey emphasizes on the fact that if we want to attain a high level of customer satisfaction, then the aspect of after-sale services could not be possibly neglected. This further implies that instead of focusing on the only first two stages of CSLC model, we may consider the incorporation of the other two stages in our research, while adding flexibility to the concept of B2C booking systems.

### III. INCORPORATION OF STEWARDSHIP AND RETIREMENT PHASES IN B2C SYSTEMS

According to Ives and Learmonth 13 dimensions model, the stage related to Stewardship in CSLC includes; (a) integration of resources to an existing inventory, (b) control of resource, (c) up-gradation of resource (if condition changes) and (d) to maintain a resource. The stage related to Retirement in CSLC includes; (a) moving, returning or disposing off of resource and (b) to keep track of how much has been spent on a resource.

In order to enhance the functionality of existing intermediate systems by adding post-sale flexibility, it is proposed to develop modules that would incorporate all missing attributes of Stewardship and Retirement stages, as discussed earlier. New proposed modules could be integrated into the existing intermediate system, making it more flexible in terms of post-sale flexibility. Integration of proposed modules with existing intermediate system would require development of interfaces as indicated below (see Figure 2).

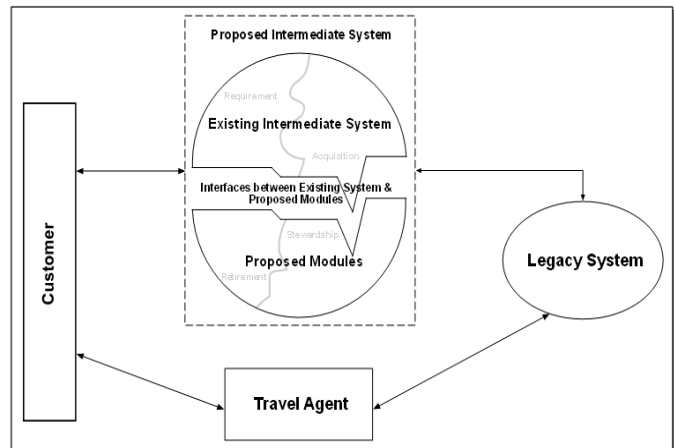


Figure 2: Proposed Intermediate System

In order to elaborate upon (i) assessing the need for providing post-sale flexibility (ii) and tasks required for adding proposed post-sale flexibility in line with aforesaid stewardship as well as retirement stages; we may consider the following scenarios:

*Tariq a final year student at Universiti Teknologi PETRONAS (UTP), has just completed his degree requirements for Master of Science (MSc) and will receive his degree at the next convocation to be held at the end of this month, say June 26, 2009. Tariq plans to go to his home-land after having received his degree and therefore, has booked a ticket for 30<sup>th</sup> June 2009 on a suitable XYZ airline.*

#### A. Scenario 1

Due to some unforeseen reasons, the University postpones the convocation, leaving Tariq with no option but to change his

flight schedule accordingly, “Upgrade Plan” (see Table 2 {7.1}).

**B. Scenario 2**

Tariq has made some typographical errors while making reservations online. The system should be flexible enough, in case Tariq wants to re-do or adjust/modify such errors, “Maintain Plan” (see Table 2 {7.2}).

**C. Scenario 3**

Tariq has changed his mind to visit his home-land and decided to secure enrollment in post graduate studies. He intends to transfer his ticket to his batch fellow Jamil, who is more than happy to travel on Tariq’s itinerary, “Transfer Plan” (see Table 2 {7.3}).

**D. Scenario 4**

Tariq has decided to cancel the trip due to the unpredictable convocation dates. No other person is ready to purchase his ticket and to fly on the booked dates. Therefore, he wants to cancel the ticket. He meets the cancellation conditions set by airline (e.g. cancellation at least 10 days before the departure date) and is ready to pay the penalty charges (some portion of the amount as a penalty may be deducted from the amount which is already been paid through credit card at time of ticket booking), “Cancel Plan” (see Table 2 {7.4}).

In the aforesaid scenarios, if the system was sufficiently flexible to cater post-sales transaction changes, Tariq could have been able to make changes by following simple steps (see Table 2):

Possible Steps	Description of user actions and system response
1	Visit airline’s online reservation website used for booking a ticket earlier (user action)
2	Enter information of issued plan (user action)
3	Show status of issued plan (system response)
4	Click on Change Plan (user action)
5	Ask pin code and password of the credit card used to book the ticket (system response)
6	Enter pin code and password (user action)

7	Show window giving the following possible change options to the user to choose (system response):
	<b>7.1 Upgrade Plan</b>
	7.1.1 Show possible travel plan (e.g. flights, seats, dates) of existing airline (system response)
	7.1.2 Show statistics of penalties (system response)
	7.1.3 Select new plan (user action)
	7.1.4 Ask for payment (system response)
	7.1.5 Make payment (user action)
	7.1.6 Reserve new plan (system response)
	7.1.7 Change the status of previous plan to available (system response)
	7.1.8 Issue new e-ticket upon confirmation (system response)
	<b>7.2 Maintain Plan</b>
	7.2.1 Modify the typographical errors such as name spellings, address etc. (user action)
	7.2.2 Save changes upon confirmation (system response)
	7.2.3 Issue new e-ticket upon confirmation (system response)
	<b>7.3 Transfer Plan</b>
	7.3.1 Enter information of a person to whom the ticket will be transferred (user action)
	7.3.2 Transfer ticket to the new person while changing the credentials of ticket (system response)
	7.3.3 Issue new e-ticket upon confirmation (system response)
	<b>7.4 Cancel Plan</b>
	7.4.1 Show penalty charges in case of cancellation (system response)
7.4.2 Change the status of ticket upon cancellation confirmation (system response)	
7.4.3 Request to finance department to release the payment made for ticket after the deduction of the penalty charges (system response)	
7.4.4 Issue receipt of cancellation confirmation (system response)	

**Table 2:** Possible steps to manage post-sale flexibility

**IV. FINDINGS AND ANALYSIS**

From the above scenarios, description of user actions and system response given in Table 2, Step 4 to 7 explicitly deals with post-sale flexibility. Step 7.1 (Upgrade Plan), 7.2 (Maintain Plan), 7.3 (Transfer Plan) and 7.4 (Cancel Plan) are very important because at present they are not incorporated by existing online reservation systems. Therefore, we can draw the following set of functional requirements (see Table 3 and Table 4).

The concept of functional requirements is derived after merging CSLC model table given by Ives and Learmonth [17] with Requirements & Acquisition Phases table given by Olsen & Malizia ([12], [13]). The left most sides of Table 3 and Table 4 show extended model of Stewardship and Retirement stages in CSLC model. The other three columns describe requirements to adopt extended model for online reservation

systems, description of the needed requirements and the possible ways to implement those requirements.

Stewardship			
Extended model	Functional Requirements	Description	Implementation
<b>Integrate</b> (To add to an existing inventory)	Add available resource in existing travel package	Updating travel packages on availability of resources	Real time change in status of all cancelled bookings
<b>Monitor</b> (To control access and use of a resource)	Keep track of issued travel package	Monitoring the access and use of issued travel package	Mining and summarizing of issued travel packages until their expiry
<b>Upgrade</b> (To upgrade a resource if conditions change)	Change plan of issued travel package	Making changes with regards to times / dates / destinations	Provision of change plan module attaching a link in existing online systems
	Finding travel packages of existing airline	Providing data on user needs, requirements, interests from existing airline	Online search from existing airlines based on the data provided by the user
	Describe travel packages	Giving the user an overall picture of the results with the additional penalty charges	Statistical information on: availability, price differences, departure / arrival dates, etc.
<b>Maintain</b> (To repair a resource, if necessary)	Provide option of modify plan	Provision of modify module to modify issued travel package	Provision of modify plan module attaching a link in existing online systems

**Table 3:** Functional Requirements for Stewardship Phase of Airline Reservation System

Retirement			
Extended model	Functional Requirements	Description	Implementation
<b>Transfer or dispose</b> (To move, return, or dispose of inventory)	Provide option of transfer plan	Making changes with regards to name / address / date of birth / passport number and other contact information	Provision of transfer plan module attaching a link in existing online systems
	Return travel package	Allowing users to return the ticket within certain period of time	Provision of return ticket module attaching a link in existing online systems and providing a link to the finance system
	Describe cancellation possibilities	Giving the user an overall picture of the penalty charges	Statistical information on penalty amount
<b>Account for</b> (To monitor where and how much is spent on a resource)	Keep track of the amount	Giving the user an overall picture of penalty charges / taxes / surcharge etc.	Summarizing Statistical information of customer amount

**Table 4:** Functional Requirements for Retirement Phase of Airline Reservation System

**A. Integrate**

The purpose of “Integrate” in CSLC model (see Table 3) was “to add to an existing inventory”. In case of online reservation system, if the system could facilitate online cancellation then these changes should be real-time changes and the cancelled tickets may be reflected immediately showing their status “available” for consideration to other customers.

**B. Monitor**

The concept of “Monitor” in CSLC model (see Table 3) is “to control access and use of a resource”. Current online reservation systems provide management of issued plans but here the purpose of monitoring is continuous listening to the upcoming change requests of customers on issued plans.

### C. Upgrade

“Upgrade” in CSLC model (see Table 3) means “to upgrade a resource if conditions change”. Up-gradation of plan would require a separate module attached to the existing online portals. Search of new plans would be limited to the existing airline and require explanation of new searched plans with additional penalty charges.

### D. Maintain

The role of “Maintain” in CSLC model (see Table 3) is “to repair a resource, if necessary”. In case of minor changes such as typographical errors, a module would be dedicated to upgrade the existing database entries.

### E. Transfer or Dispose

“Transfer or dispose” in CSLC model (see Table 4) of Retirement stage refers “to move, return, or dispose of inventory”. In case of transfer, some major data entries need to be updated. A module is required that would allow customers to fetch their data entries and to make new entries. This would require information of both parties (transferee and transferor) to be saved and printed on the plan.

Similarly, allowing users to return the ticket (within certain period of time may be) could be attained after receiving customer’s request. This would require describing the penalty charges, in case of cancellation. Furthermore, an automated request to the finance department may be sent to release the payment made by customers after deducting the penalty charges.

### F. Account for

Lastly, “Account for” in CSLC model (see Table 4) was intended “to monitor where and how much is spent on a resource?”. A record would be maintained summarizing statistical information of customer amount and giving the user an overall picture of penalty charges/ taxes/surcharge etc.

## V. CONCLUSION

The highest level of satisfaction can not only be acquired after delivering product or services to customers. It is sum of services provided by a supplier to his/her client before and after delivery or task completion.

Thus the definition given by Otto Koppius, Wouter Speelman, Oliver Stulp, Bart Verhoef, and Eric van Heck [26] “The satisfaction with the service is explained by the confirmation of pre-purchase expectations as well as the quality of the website” can be modified to:

*“The satisfaction with the service is explained by the confirmation of pre-and-post-purchased expectations as well as the quality of the website.”*

In case of online reservation systems, after sale services are often given less significance. For this purpose it is proposed to inculcate post-sale flexibility in airline reservation systems. This is proposed to be achieved with the help of CSLC model given by Ives and Learmonth [17]. The Stewardship and Retirement stages of aforesaid model, deals with the issues that are related to activities needed for handling ‘post-buying’ any particular product.

Hence, this paper recommends that while making any online reservation systems; Stewardship and Retirement Stages may be treated at par with Requirement and Acquisition Stages to enhance the functionality of existing intermediate systems in terms of post-sale flexibility.

## VI. FUTURE WORK

In this paper we have focused on to how to handle post-sale flexibility from user’s point of view. This concept could be further extended to manage flexibility from service provider/supplier side and how to inform users, if airline makes changes in their boarding plan.

Other aspect could be to allow user to switch to any other airline and to handle the payment from one airline to other airline.

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