SYSTEM FOR CONCURRENT OPTIMIZATION OF BUSINESS ECONOMICS AND CUSTOMER VALUE

FIELD OF INVENTION

This invention relates to a system and method for matching customer preferences with vendor products and services in any industry, and then dynamically managing the on-demand and optimally customized delivery of such business services or products. More particularly, it relates to methods and systems for customizing and optimizing a company's products and services to individual customers in way that concurrently enhances customer value and overall business performance.

BACKGROUND

Historically, "companies" (a term defined below) and their customers often have done business across a gap, so to speak. Product or service offerings by a company and the customers' desired product or service do not fully match. In part, this gap is a manifestation of the facts that (1) companies have an incomplete grasp of customer needs, their relative preferences and the pricing utilities customers attach to those preferences (which utilities, equating to the customer's willingness to pay, are dynamic) and (2) a company's costs, profits and inventory (which may control what it can offer on a timely basis) are also dynamic. However, it is also in major part a manifestation of the lack of information technology tools, which can close the gap. To collect dynamic customer and company data and then employ those dynamic data to close the gap is a complex technical problem.

Generally, the customer is treated as an individual and sales terms are customized only when the cost of negotiation is justified – for very large transactions. Many products and services, though, represent complex, multi-faceted offerings and customers weigh their preferences for product features differently at different times. A customer might care more about cost one day and more about availability or delivery time or warranty if queried a few days or weeks later, to use some basic trade-offs as examples.

Generally, a company's product consists of many value elements, (explained later) all of which are bundled together to be sold as a single product. But, not every customer values all the aspects of a product equally or needs all. Every customer places a different value (which may be a function of time and situation) on each aspect of a product. With features bundled together in a product, companies end up either incurring costs to sell something to a customer that he does want or lose a customer because the extra undesired value elements forced the product price too high for the customer.

The underlying problem is both that customer demands are incompletely understood and that such demands can change quickly, whereas a company's productive capacity or service often does not have the same dynamic time frame and is supported by a relatively fixed (in the short term) capacity and supply chain.

Consider a situation that affects an interaction between the customer and the company. While buying products, many times, customers are unsure of their exact needs or expect their needs to change (after purchase and/or before they utilize the product). In such cases, customers may prefer to have flexibility to alter their purchases to accommodate their needs. In several industries, customers have to select and confirm the products at the time of purchase. Some industries do allow customers to return or change their purchased orders and/or its features within a defined time frame and with or without penalties. For industries where products sold are of high value and/or perishable nature, change penalties are quite high or changes are not allowed. For example, airline ticket booking, hotel reservation, car rental, automobile sales, special events, real estate and so forth.

In the airline industry, customers usually buy tickets one to four weeks in advance (of the premeditated travel date) and are often unsure of their exact travel plans at the time of purchase. But, customers may not want to wait until the last minute (or till they determine their exact plans) to book flights as the flights may become unaffordable or unavailable as the departure date approaches. So, customers try to make the purchase decisions based on their best estimate of travel plans, and hope that their reservations

would match their eventual travel needs. Such guess work often creates problems, as needs change and customers end up with bookings at variance with their desires.

On the other side of the screen, often, companies face unequal supply-demand proposition for their products. For many products, the supply keeps ahead of the demand even after all sorts of advertisements and marketing strategies. Companies are not able to efficiently utilize the surplus supply (especially in case of products and/or services that are perishable or prone to quick obsolescence), causing millions of dollars in lost opportunity and costs. Continuing with the airline example, most US airlines experience an average load factor of about 80% or only about 80% of the seats get used. The rest 20% seats fly empty and contribute almost nothing (if any) to the incoming revenue. A significant portion of this surplus capacity could be used to satisfy the un-fulfilled flexibility needs of at least some customers, who may have wanted to alter their bookings to include one or more flight that had a surplus capacity. However, today, travelers who want to change their flights are unable, hesitant or unhappy to do so because of efforts required, change fees, higher fares, unavailability of desired flights (or fares) or any combination of such factors. A good chunk of these customers would be willing to pay more (as per their needs) to get desired seats. But the entire change process creates an embarrassing situation for a customer and seldom drives a satisfactory experience. This represents a mismatch in customers' needs and airline's offering. In a nutshell, airline has perishable seats that customers desire but the current system does not allow the customer to get that seat at a price that would benefit both.

From the above discussion, it is clear that the surplus capacity of the company may be mapped or utilized to satisfy customers' desire or preference for flexibility. In the context of the airline industry, the surplus capacity in flights may be mapped or utilized to satisfy customers' desire for travel flexibility. But so far, there is no existing system and method, which can allow a company to accomplish this optimally.

Today, airlines do not have any mechanism to allow such flexibility or changes in customer tickets at an individual level at conditions that would optimally satisfy both the

parties. Instead, airlines try to deal with all such customers in a rather mechanistic way (or one cancellation/change policy) leading to unsatisfied customer demand and unused airline capacity. Besides the airline industry, there are several other industries (as mentioned above) that either do not allow flexibility or follow processes that involve high costs and/or demand significant efforts on the customer's end.

What is needed is a mechanism that allows customers to satisfy their need for flexibility at terms that concurrently benefit at least two of companies, their customers and any other entity. Indeed, there is no system or method available that can be applied to all the above industries, and many more, and help companies to match the availability of their products to their customers' preferences, let alone while concurrently maximizing the benefits to at least two of the company, its customers and any other entity involved in the transaction.

A technology platform (i.e., system) and methodology thus are needed for customizing, in an optimal way, a match between a company's cost and ability to provide flexibility to customers in buying products/services with the individual customers' relative preferences and utilities. In the airline industry example, a technology platform (i.e., system) and methodology thus are needed for customizing, in an optimal way, a match between an airline's cost and ability to provide travel flexibility to customers with the individual customer's preferences and utilities for travel flexibility.

More particularly, a system and methodology are needed which support optimal customization of service offerings in the airline and similar industries. If such a match could be made, both company and customer would benefit. The customer would be more satisfied and the company (both in short term and long term) will be more profitable. A win-win scenario is created rather than a zero sum game.

SUMMARY

In response to recognition of this need, shown herein a system and method that allows businesses to determine their customers' preferences (implicitly or explicitly, in advance or in quasi-real-time) and to dynamically integrate these preferences with internal company economics to concurrently maximize value for both customers (i.e., their purchase utilities) and the company (i.e., its profitability).

A framework of systems and methods are shown that allows businesses to determine their customers' preferences (implicitly or explicitly, in advance or in quasi-real-time) for flexibility in purchasing products and to dynamically integrate these preferences with internal company operations to concurrently maximize value for at least two of the customers (individually or as a group, their purchase utilities), the company (i.e., its profitability) and any other entity involved.

In general, it is an aspect of the system and method that a business determines a customer's preferences (flexibilities and associated relative utilities) in great detail and in real-time or quasi-real-time from direct inquiries (explicitly) and/or past interaction (implicitly), before or while engaging in a sales transaction. When a sales transaction is executed, those preferences are then integrated with internal company operations and economics (costs, capacities, constraints, inventories, etc.). Values are then determined for product or service options to be offered to the customer based on integrated (i.e., aggregated) customer preferences and company economics. On one hand, these value options allow companies to reward or charge customers for their flexibilities with respect to preferences. On the other hand, these value options enable companies to maximize their revenues and/or profitability by unbundling their products and services, and best matching the offerings with a customer's expressed preference/cost tradeoffs. Since the customer gets something matching more closely his or her preferences than a "one size fits all" or small, fixed choice approach, customer purchase utility is increased and the customer is pleased to receive a product or service tailored to the customer's preferences. A company may charge for the purchase of some product options. So, customers pay for

options made available to them and the company does not have to invest in offering everyone features that only a minority of customers want.

Accordingly, there is shown a system for collecting such customer preference information and pricing corresponding options and presenting options to the customer, receiving customer choices, and completing a sale. The collection steps may be implemented over the global Internet and its World Wide Web. However, other communication media may be used, as well, for all or part of the system or steps. For example, customer information may be taken over the phone or in person or via any other means. And a sale can similarly be completed by telephone or in person.

The system may also provide after-sale follow-up and implement execution of option terms purchased by the customer. An engine may be provided for this purpose. The engine may be a processor(s) that is programmed to execute a suitable event response algorithm. Each procedure for event response (related to a purchased option) may be custom programmed to implement the desired operations of the company or there may be provided a library of procedures generally applicable to an industry. The library procedures may be used by the company with or without customization. The detection of the contingency triggering the procedure may in some instances be made automatic, as by interconnection with the company's information management systems, or it may be externally or manually supplied.

The APO VOF can concurrently create benefits for at least two of the company, the customers and any other entity involved or any combination thereof. One aspect of the invention consists a computer-implemented system and method for a company to provide options on products where in a computer-implemented service is operated that provides a data store containing data representing, with respect to at least one product, at least one option offered by a company and operating a computer-implemented system that delivers to a customer an option to utilize up to n of m selected products, where n is less than m. Information pertaining to said option is recorded in a data store. In addition, a system is operated to define each of the n *Chosen Products,* whereby after

each of the n *Chosen Products* is defined, the customer can utilize said *Chosen Product*. The information pertaining to said defined products is recorded in a data store.

Another aspect of invention relates to implementation of APO VOF in conjunction with other VOFs. The grouping may enhance customers' experience, and may comprise of operating a system that delivers a first option to at least a "first customer" to utilize up to n of m selected products for said first customer, where n is less than or equal to m; operating a system that delivers a second option to at least a "second customer" to utilize up to k of p selected products, where k is less than or equal to p; recording the information pertaining to said options in a data store; operating a system to define each of the k *Chosen Products*, whereby after each of the k *Chosen Products* is defined, said "second customer" can utilize said *Chosen Product*; operating a system wherein a company defines t *Chosen Product*(s) for said "first customer" after each of said k *Chosen Products* is defined, wherein after each of said t products is defined, said first customer can utilize said defined product, where t is less than or equal to n and recording the information pertaining to said defined products in a data store. It is another aspect of the invention that the company may not be the seller of any of said products. In another implementation, the company may not be the seller of any of said options. In yet another implementation, the company may offer at least one of said options. In above invention, the company may operate at least one of said systems. However, it is possible that at least one entity other than said company operates at least one of said systems. The systems for first and second options may operate independently. The systems for first and second options may also operate in conjunction with each other. The above mentioned acts may be performed for a multiplicity of at least one of said first or second customers and further includes combining together at least one of each of said first and second customers to formulate at least one group with at least one complementary set of options. After delivery of any of said first or second options, at least one of said m or p products may be available for use by the company. At least one of said m or p products may also be available for use by an entity other than said company. The company or an entity other than said company may define, at one or more times, at least one of said k *Chosen Products*. The second customer may also define, at one or more times, at least

one of said k *Chosen Products*. The company or an entity other than said company may select, at one or more times, at least one of said m or p products. However, the first customer may select, one or more times, at least one of said m products and/or the second customer may select, one or more times, at least one of said p products. At least one of the company or an entity other than said company delivers to at least one of said first or second customers, at one or more times, one or more terms and conditions associated with the first or second options, respectively. It is also possible that the company may receive from at least one of the first or second customers, at one or more times, an indication of one or more terms and conditions associated with said first or second options, respectively. In another implementation, said first or second customers may be same. In yet another implementation, none of the options may include a notification deadline condition. However, in another implementation, at least one of said options may include at least one notification deadline condition. The notification deadline condition may be different for said first and second options. The company may allocate at least one product to at least one entity other than said company, and said entity delivers at least one of said first or second options on at least one of said allocated products. It is another aspect of the invention that at least one of said n or k *Chosen Products* may include at least one product other than said m or p products, respectively. No payment transaction may be executed between the company and any of said first or second customer in connection with the option and the selected products. In another implementation of the invention, however, at least one payment transaction may be executed between the company and at least one of said first or second customer and said payment transaction may include a soft value. In some implementations of the invention, at least one of said m or k products may be released for reuse by the company.

Another aspect of the invention consists of a computer-implemented system and method for a company to define customer preferences whereby a data store is provided including relevant information regarding products; operating a computer-implemented system that defines customer preferences regarding at least utilizing up to n of m selected products, where n is less than m and recording the information pertaining to said preferences in a data store. A computer-implemented system is operated that enables use

of said preferences to optimize value for at least one of customers, company and an entity other than said company. The preferences may be utilized in delivering at least one option to a customer to utilize up to n of m selected products, where n is less than m and operating a system to define each of said n *Chosen Products*, whereby after each of said n *Chosen Products* is defined by the company, the customer can utilize said Chosen Product and recording the information pertaining to at least one of said option or said defined products in a data store. The preferences may be defined implicitly. The preferences may be also be defined explicitly by either of the customer or the company or both. The preferences may be taken at any time during the purchase of the product, prior to and/or after the product has been purchased. The optimization of value may be for at least one customer other than the customers whose preferences are received. The optimization may also include concurrent optimization of value for at least two of the customers, said company and at least one entity other than said company.

In yet another aspect of the invention, a computer-implemented system and method for a company to provide options on products wherein a computer-implemented service allows a customer to receive an option to utilize each of the m selected products including at least one practically constrained product, where m is greater than or equal to 2, said m products are selected in the course of related transaction(s); it will not be possible for the customer to utilize all said m products due to said practical constraints and recording the information pertaining to said option in a data store, is dealt with. The practical constraints may include the timing constraints and/or the location constraints. The related transaction may be at least one transaction. The customer may not be able to utilize only one product due to practical constraints. However, it is another aspect of the invention that the customer may not be able to utilize more than one product due to practical constraints.

Another aspect of the invention comprises of a computer-implemented system and method for a company to provide options on products wherein a computer-implemented service allows a customer to receive an option to utilize up to n of m selected products, where is greater than or equal to 2 and n is less than m and recording

the information pertaining to said option in a data store; operating a system, whereby the company may allow the customer to utilize all the m products provided specified conditions are satisfied, said conditions including that the products are received in the course of related transaction(s) and there is at least one payment transaction between the company and the customer related to said products wherein such payment is made after said option has been granted. The information is recorded pertaining to said m products in a data store. The customer may select said m products together. The customer may also select the products prior to utilizing the penultimate product. The company may reserve the right to limit the customer to n products on a stated notification date. The payment transaction may consists of one or more transactions apart from the initial interaction if said customer utilizes all the awarded products.

One more aspect of the invention consists of a computer-implemented system and method for a company to provide options on products wherein a computer-implemented service allows a customer to receive an option to utilize up to n of m selected products, provided specified conditions are satisfied, said conditions including that the company may notify the customer, on a stated notification date, that the customer is limited to utilize n out of said m products; wherein n is less than m and recording the information pertaining to said option in a data store; operating a system to define each of said n products, whereby after each of said n products is defined, the customer has the right to utilize said defined product. The information is recorded pertaining to said defined products in a data store. The company may allow the customer to define said n products on or before a stated date. The company may also reserve the right to take back any m minus n products after the stated date. The company may also limit the customer to n products once the customer expresses his/her preference for said n products. Said on a stated notification date includes on and before the stated notification date. However, said on a stated notification date may also include on and after the stated notification date. The company may or may not limit the customer to said n products on the notification date. In case the company limits the customer, said limitation is on at least one product. There may be at least one notification date and the customer and/or the company may determine said notification date.

In the above mentioned different aspects of the invention and in other aspects of the invention not mentioned above, delivering said option may occur in relation to a customer purchasing at least one product. In another aspect of the invention, the product purchase may be for a product other than a product for which an option is delivered. Said delivery of option may be an electronic delivery of option. After delivery of said option, at least one of said m products may be available for use by the company. At least one of said m products may be available for use by an entity other than said company. Said m products may be selected in at least one transaction. The company mentioned above may include more than one entity. The company may select at least one of said m products for the customer. In another aspect of the invention, at least one of said m products may be from more than one company. The n products (mentioned above) may be defined in at least one transaction and it may be possible that said n products may be defined after the option is delivered to the customer. The n *Chosen Products* may include at least one product other than said m products. In another implementation of the invention, at least one of said m products is released for reuse by the company. The *Released Product* may be utilized to generate revenue or other value without reusing said *Released Product.*

It is another aspect of the invention that at least one of the company or an entity other than said company may deliver to the customer, at one or more times, one or more terms and conditions associated with the option. Another aspect of the invention may include that the company may receive from the customer, at one or more times, an indication of one or more terms and conditions associated with the option. The company may define, at one or more times, one or more of the n *Chosen Products.* The customer may also define, at one or more times, one or more of the n *Chosen Products.* The company may identify to the customer at least one eligible product for the option and allows the customer to select at least one of said m products from the eligible products.

In some implementations, there may be no payment transaction executed between the company and the customer in connection with the option and the selected products. However, in another implementation, at least one payment transaction may be executed

between the company and the customer and said payment transaction may include a soft value. In some implementations, the option may not include a notification deadline condition. However, in some other implementations of the APO VOF, the option may include at least one notification deadline condition. If the customer fails to satisfy a stated notification deadline condition, at least one of said m products may be defined as the *Chosen Product*. The customer may receive the option included in the Product Price that does not separately identify a price for the inclusion of said option within the total Product Price.

It is another aspect of the invention, that in case the company has allocated one or more products to another entity apart from said company, said entity may sell back at least one allocated product to said company or to at least one entity other than the company or both. The entity other than said company may deliver the option on at least one of said allocated products. The allocation of products may include at least one condition requiring return of one or more products.

In one or more implementations of the APO VOF, the above said systems may be same and at least one company may operate at least one of said systems. The customer may interact with the service via at least one web site and/or the customer may interact with the system assisted by at least one operator. The customer may also interact with another entity operating the system other than the company.

APO VOF may be implemented in any industry, for example, let us consider the airline industry. One of the implementations of the invention in the airline industry consists of a computer-implemented system and method for an airline to provide options on flights where in a computer-implemented service is operated that provides a data store containing data representing, with respect to at least one flight, at least one option offered by an airline and operating a computer-implemented system that delivers to a customer an option to utilize up to n of m selected flights, where n is less than m. Information is recorded in a data store, pertaining to said option. In addition, a system is operated to define each of the n *Chosen Flights*, whereby after each of the n *Chosen*

Flights is defined, the customer can utilize said *Chosen Flight.* The information pertaining to said defined flights is recorded in a data store.

Another example of implementation of APO VOF in the airline industry comprises of operating a system that delivers a first option to at least a "first customer" to utilize up to n of m selected flights for said first customer, where n is less than or equal to m; operating a system that delivers a second option to at least a "second customer" to utilize up to k of p selected flights, where k is less than or equal to p; recording the information pertaining to said options in a data store; operating a system to define each of the k *Chosen Flights*, whereby after each of the k *Chosen Flights* is defined, said "second customer" can utilize said *Chosen Flight*; operating a system wherein an airline defines t *Chosen Flight*(s) for said "first customer" after each of said k *Chosen Flights* is defined, wherein after each of said t flights is defined, said first customer can utilize said defined flight, where t is less than or equal to n and recording the information pertaining to said defined flights in a data store.

In all the cases and aspects of the invention mentioned herein, the company may be, for example, an airline, a hotel, a car rental company, travel company and the product may, for example, correspond to a flight, a room, a Car and a Travel Package, respectively. The APO VOF may be implemented in any industry including, but not limited to, the airline, hotel, car rental, travel, media entertainment, cruise, real estate, financial services, automobile sales, computer and other retail sales. Another aspect of the invention is that one or more aspects or elements or examples mentioned herein of the invention may be combined in one or more ways to utilize the invention.

Also shown are a number of novel systems generated by the disclosed methodology, and related algorithms which may be implemented on the disclosed platform or any other suitable platform, thus constituting new methods and systems. Only a few value option frameworks (VOFs) and their associated methods and systems for delivery of these VOFs are presented in detail, as those skilled in the art will readily appreciate how to implementother VOFs from these teachings. Other features and

advantages of the invention will be apparent from the following description and the appended claims, and those skilled in the art will appreciate that the various elements and limitations shown herein may be combined in ways other than those shown in the specifically illustrated examples, which are not intended to be limiting. The disclosure is intended to convey that the inventors contemplate and intend to protect these various combinations and permutations of the elements which are shown, as though each of the arrangements of elements were specifically depicted.

BRIEF DESCRIPTION OF THE DRAWING

Fig. 1 is a diagrammatic illustration, in a high-level flow chart, of a method of achieving the optionally customized sale of products;

Fig. 2 is a block diagram of a system for practicing the discussed method;

Fig. 3 is a flow chart of a method to create a value options framework showing collection of industry and customer dynamics;

Fig. 4 and 5 are diagrammatic illustrations of the relationship between overall product utility and contributions as perceived by a customer;

Fig. 6 is a diagrammatic illustration of the perceived utilities of a product by four customers;

Fig. 7 is a flow chart illustrating optimization of a value option framework;

Fig. 8 is a partially-diagrammatic, partially-flow diagram representing the steps of a process for creating a value option framework;

Fig. 9 is a diagrammatic representation of the generic structure of a value options framework;

Fig. 10 is a diagrammatic illustration showing creation of a value option framework indicating how cost, revenue, utility and service functions;

Fig. 11 is a flow chart of a process to implement value options framework;

Fig. 12 is a diagrammatic illustration showing generally how an event is processed by the system and method shown, to fulfill a company's obligations to its customers as shown herein, delivering optimized results to the company and the customers;

Fig. 13 is a flow chart expanding Act 1280 of Fig. 12;

Fig. 13A is a diagrammatic illustration of various business models;

Fig. 13B is a diagrammatic illustration of one of ways of interaction between the customer and the OA and/or the company;

Fig. 13C is a diagrammatic illustration of one of the network system to implement the system;

Fig. 13D is a diagrammatic illustration of implementation of one of the stages of a value option framework as a system;

Fig. 13E is a diagrammatic illustration of implementation of event optimizer stage of a value option framework as a system;

Fig. 14 is a diagrammatic illustration of an exemplary set of value segments and their value elements in the context of APO-VOF;

Fig. 15 is a diagrammatic illustration of company economic factors and mapping between customer dynamics and company economic factors;

Fig. 16 is a partially-diagrammatic, partially-flow diagram representing the structure for creating an APO Value Option Framework;

Fig. 17 is a diagrammatic representation of *APO Products* and *Initial Transaction* associated with an example of APO (2, 1) instance;

Fig. 18 is a diagrammatic representation of various scenarios depicting different terms and conditions associated with an example of APO (2, 1) instance;

Fig. 19 is a diagrammatic illustration, in a high level flowchart, of a process for APO VOF implementation;

Fig. 20 is a flowchart that expands Act 100 of Fig. 19, illustrating a high level algorithm for the "Sequential Buy APO" process;

Fig. 21 is a flowchart that expands Act 120 of Fig. 19, illustrating an algorithm to search for *APO Products* (or Option Product Sets);

Fig. 22 is a flowchart of an algorithm for the "Concurrent Buy APO" process, an alternative process to Fig. 20;

Fig. 23 is a flowchart that expands Act 200 of Fig. 19, illustrating an algorithm for the "Customer Notification" process;

Fig. 24 is a flowchart illustrating an example of an algorithm to implement grouping of A and Y type of customers;

Fig. 25 is a flowchart illustrating an example of an algorithm to implement grouping of A and U type of customers;

Fig. 26 is a diagrammatic illustration of an exemplary set of value segments and their value elements in the context of ARO-VOF in the hotel industry;

Fig. 27 is a diagrammatic illustration of hotel economic factors and mapping between customer dynamics and hotel economic factors;

Fig. 28 is a partially-diagrammatic, partially-flow diagram representing the structure for creating an ARO Value Option Framework;

Fig. 29 is a diagrammatic representation of *ARO Rooms* and *Initial Transaction* associated with an example of ARO (2, 1) instance;

Fig. 30 is a diagrammatic representation of various scenarios depicting different terms and conditions associated with an example of ARO (2, 1) instance;

Fig. 31 is a diagrammatic illustration, in a high level flowchart, of a process for ARO VOF implementation;

Fig. 32 is a diagrammatic representation of ARO implementation at the Room Product Level;

Fig. 33 is a diagrammatic representation of ARO implementation at the Room Set Level;

Fig. 34, 35, 36 and 37 are simulated screen shots of four web screens illustrating how Initial Interaction between a hotel and a customer may take place in the ARO VOF;

Fig. 38 is a flowchart that expands Act 100 of Fig. 31, illustrating a high level algorithm for the "Sequential Buy ARO" process;

Fig. 39 is a flowchart that expands Act 120 of Fig. 38, illustrating an algorithm to search for *ARO Rooms* (or Option Room Sets);

Fig. 40 is a flowchart of an algorithm for the "Concurrent Buy ARO" process, an alternative process to Fig. 38;

Fig. 41 is a flowchart that expands Act 200 of Fig. 31, illustrating an algorithm for the "Customer Notification" process;

Fig. 42 is a flowchart illustrating an example of an algorithm to implement grouping of A and Y type of customers in context of the hotel industry;

Fig. 43 is a flowchart illustrating an example of an algorithm to implement grouping of A and U type of customers in context of the hotel industry;

There are no Figs. 44-75;

Fig. 76 is a diagrammatic illustration of an exemplary set of value segments and their value elements in the context of AFO-VOF in the airline industry;

Fig. 77 is a diagrammatic illustration of airline economic factors and mapping between customer dynamics and airline economic factors;

Fig. 78 is a partially-diagrammatic, partially-flow diagram representing the structure for creating an AFO Value Option Framework;

Fig. 79 is a diagrammatic representation of *AFO Flights* and *Initial Transaction* associated with an example of AFO (2, 1) instance;

Fig. 80 is a diagrammatic representation of various scenarios depicting different terms and conditions associated with an example of AFO (2, 1) instance;

Fig. 81 is a diagrammatic illustration, in a high level flowchart, of a process for AFO VOF implementation;

Fig. 82 is a diagrammatic representation of AFO implementation at the Itinerary Level;

Fig. 83 is a diagrammatic representation of AFO implementation at the Segment Level;

Fig. 84 is a diagrammatic representation of AFO implementation at the Leg level;

Fig. 85, 86, 87 and 88 are simulated screen shots of four web screens illustrating how Initial Interaction between an airline and a customer may take place in the AFO VOF;

Fig. 89 is a flowchart that expands Act 100 of Fig. 81, illustrating a high level algorithm for the "Sequential Buy AFO" process;

Fig. 90 is a flowchart that expands Act 120 of Fig. 89, illustrating an algorithm to search for *AFO Flights* (or Option Flight Segments);

Fig. 91 is a flowchart of an algorithm for the "Concurrent Buy AFO" process, an alternative process to Fig. 89;

Fig. 92 is a flowchart that expands Act 200 of Fig. 81, illustrating an algorithm for the "Customer Notification" process;

Fig. 93 is a flowchart illustrating an example of an algorithm to implement grouping of A and Y type of customers in context of the airline industry; and

Fig. 94 is a flowchart illustrating an example of an algorithm to implement grouping of A and U type of customers in context of the airline industry.

DETAILED DESCRIPTION

Selected illustrative embodiments according to the invention will now be described in detail, as the inventive concepts are further amplified and explicated. These embodiments are presented by way of examples only. In the following description, numerous specific details are set forth in order to provide enough context to convey a thorough understanding of the invention and of these embodiments. It will be apparent, however, to one skilled in the art, that the invention may be practiced without some or all of these specific details. In other instances, well-known features and/or process steps have not been described in detail in order to not unnecessarily obscure the invention. One should not confuse the invention with the examples used to illustrate and explain the invention. The features and advantages of the invention may be better understood with reference to the drawings and discussions that follow.

The terms and definitions given below are needed to understand the following sections. Some of the key terms used in the description have been put in italics to enhance the readability.

The method and system taught herein connect customers directly to a manufacturer or service provider and the rest of the supply chain, herein referred to as "channel partners." The term "manufacturer" is intended to include vendors of services as well as vendor of goods. Hereafter, the manufacturer and channel partners will be collectively referred to as a "company" or "companies" and all of those terms will be appreciated to include sole proprietorships, partnerships, corporations, Option

Aggregators or any other legal entity or combination thereof. The term "entity" includes the singular and plural and will include individual(s), group of individuals, company, companies, sole proprietorships, partnerships, corporations or any other legal entity or combination or consortium thereof.

The term "Option Aggregator" or "Option Aggregators" or "OA" may include, but is not limited to, a company, a group and/or consortium of companies, more than one entity, any entity formed by company(s) (whether or not solely for this purpose), any other entity or any combination thereof that offers options on its own products and/or other company products.

The term "airline" or "airlines" includes, but is not limited to, an airline, an airline's business partner, an entity which deals with an airline or an airline's business partner, a travel agent, an Option Aggregator and any entity forming a part of the chain of commerce related to airline and/or travel industry, or any combination of any two or more of the above.

The term "hotel" or "hotels" includes, but is not limited to, hotel, apartment hotel, bed and breakfast, capsule hotel, caravanserai, casa particular, flophouse, choultry, garden hotels, condo-hotel, holiday cottage, hostel, ice hotel, trailer home, roadhouse, ryokan, turbaza, boarding house, bungalow, condominium, dharamshalas, dormitory, inn, resorts, a group or chain of hotels, a hotel's business partner, an entity which deals with a hotel or a hotel's business partner, a travel agent, an Option Aggregator, any entity forming a part of the chain of commerce related to hotel and/or travel industry, or any combination of any two or more of the above. A hotel may be referred to as an entity that provides space for hire.

The term "car rental company" or "car rental companies" includes, but is not limited to, a car rental company, a group of car rental companies, a car rental company's business partner, an entity which deals with a car rental company or a car rental company's business partner, a travel agent, an Option Aggregator, any entity forming a

part of the chain of commerce related to car rental industry and/or travel industry, or any combination of any two or more of the above.

The term "travel company" or "travel companies" includes, but is not limited to, any entity forming a part of the chain of commerce related to the travel industry, a company, a group of companies, a travel company's business partner, an entity which deals with a travel company or a travel company's business partner, a travel agent, an Option Aggregator, or any combination of any two or more of the above. A travel company may refer to a group of one or more entities providing one or more services (same and/or different) for a single or multiple travel packages through a single or multiple channels.

The term "Product" refers to a product or service provided by a manufacturer or an entity. The term "Products" or "Product" may also refer to "Product Set" or "Product Sets" or "Product Order" or "Product Orders" or any combination thereof, as and when the context requires and are used interchangeably. The term "customer" here implies an entity buying or entering into a contract to buy a company's product or service. The term "optimize" is not intended to require achievement of a mathematical minimum or maximum, but to refer to enhancement.

The term "flight" refers to a single flight, a group of flights, flights with zero or more stops or any combination of the above. The term "Flights" or "Flight" may also sometime refer to one or more seats on said flight(s), when the context requires. The terms "flight" and "seat" are interchangeable as and when the context requires. The term "Flight" or "Flights" may also refer to a Flight Leg, a Flight Segment, an Itinerary, any combination of two or more flights or any combination of the above, when the context requires.

The term "Room" or "Rooms" in context of the hotel industry may refer to a single room, a room with zero or more facilities and/or services, only facilities or services offered by the hotel. A room may be referred to as a given space for a given

duration of time and for a given set of one or more associated services or characteristics or any combination thereof. In the context of the hotel industry, the term "Room" and "seat" are interchangeable, as and when the context requires. For example, one may refer to a reserved seat for a show in a hotel as a reserved room.

The term "Car" or "Cars" refers to any means of transportation including, but not limited to, cars, vans, mini-vans, buses, trucks, trailers, pick-up trucks, scooters, motor cycles, bikes, trains, trams, boats, ships, steamers, jets, helicopters and so on, any variation or model of said means of transportation and/or services, equipments associated with it or any combination(s) thereof, for a given time unit.

The term "Travel Package" or "Travel Packages" or "Package" or "Packages" may refer to combination of one or more services related to travel including, but not limited to, transportation, accommodation, various facilities and so forth. Transportation may include, but is not limited to, travel by flight, train, bus, car, cruise, boat, steamer and so forth. "Accommodation" may include, but is not limited to, stay in hotel or any location and services associated with it. Said "various facilities" include, but are not limited to, sight seeing, city tours, river-rafting, mountaineering, para-gliding, food and so forth. The terms "travel package" or "travel" or "travel packages" or "package" or "packages" have been used interchangeably as and when context requires.

The term "Itinerary" refers to a list of flights included in a single travel trip of a customer. An Itinerary may consist of one or more "Segments" (defined below). An Itinerary can be a one-way trip (one Segment), a round-trip (two Segments) or a multi-city trip (two or more Segments). A round-trip Itinerary has two Segments back and forth between two places (e.g., a trip from A to B and then back from B to A). A One-Way Itinerary has only one Segment (such as travel from A to B). A Multi-City Itinerary refers to an Itinerary with two or more Segments across two or more places (e.g., a trip from A to B and then from B to C).

The term "Flight Segment" (or "Segment", in short) refers to a part of an Itinerary between a customer's intended origin and destination. A Segment may consist of one or more "Flight Legs". The term "Flight Leg" (or "Leg", in short) is the most fundamental unit of an Itinerary and is defined by a single takeoff and landing of a flight. In a round-trip Itinerary (A to B and B to A), there may be 2 Flight Legs from A to B (customer flies from A to C and then C to B, two connecting flights), and similarly two Flight Legs from B to A (customer flies from B to D and then D to A, two connecting flights). When a customer flies from A to B and the plane takes a stop in between at C, it is still considered to be two Flight Legs (A-to-C and C-to-B) even though the customer may/may not change planes between A and B and/or an airline may or may not use the same flight number to refer to the entire Segment from A to B.

The term "Product Price" of a Product (in reference to one or more VOFs) refers to the price a company would charge for a Product in the absence of implementation of said VOFs on said product. In the context of the airline industry, the term "Ticket Price" (in reference to one or more VOFs) refers to the price that an airline would charge in the absence of implementation of said VOFs on said flight. In the context of the hotel industry, the term "Room Price" of a room (in reference to one or more VOFs) refers to the price that a hotel would charge for a room in the absence of implementation of said VOFs on said room. In the context of the car rental industry, the term "Car Rental Price" of a car (in reference to one or more VOFs) refers to the price that a car rental company would charge for a car in the absence of implementation of said VOFs on said car. In the context of the travel industry, the term "Travel Package Price" of a travel package (in reference to one or more VOFs) refers to the price that a travel company would charge for a travel package in the absence of implementation of said VOFs on said travel package.

The term "transaction" here implies to do, to carry or to conduct an agreement or exchange. The exchange may or may not involve a price in terms of monetary or non–monetary value. The parties participating in the transaction may have obligation(s) from

various terms and conditions. In other words, transaction may also imply an action or activity involving two or more parties that reciprocally affect or influence each other.

In the context of an airline industry, the term "schedule" refers to the characteristics of a flight including, but not limited to, airline related parameters, departure/arrival parameters, service and other miscellaneous parameters. The airline related parameters may include, but are not limited to, operating carrier entity (i.e, the airline that operates the flight), marketing carrier (an airline that sells the flight), any other carrier or intra/inter-carrier flight groups associated with the flight or any combination of the above. The departure/arrival parameters may include, but are not limited to, an airport and its location (city, state, country), date and time, seasonality, weather and other operational conditions, number of stops/connections, and so forth. The service and other miscellaneous parameters may include, but are not limited to, type of aircraft, flight duration, in-flight or other services such as number of cabins, types of seats, meal selection, check-in and luggage options, airport lounges and other facilities, and so forth.

The term "schedule" in the context of car rental industry, refers to the characteristics of a car including, but not limited to, car rental company related parameters, pick-up/drop-off times, service and other miscellaneous parameters. The car rental company related parameters may include, but are not limited to, operating car rental company entity (i.e. the car rental company that operates the car), owner of the car, marketing car rental company (a car rental company that rents out the car), any other car rental company or intra/inter-car rental company groups associated with the car rental or any combination of the above. The pick-up/drop-off parameters may include, but are not limited to, a pick-up/drop-off location (area or street, landmark, city, state, country), date and time, seasonality and other operational conditions, and so forth. The service and other miscellaneous parameters may include, but are not limited to, type of car, car rental duration, or other services, car rental company services such as insurance, additional driver, child seats, and other equipments, and so forth.

The term "schedule" in context of a travel package refers to the characteristics of a travel package including, but not limited to, travel company related parameters, start/end date time, service and other miscellaneous parameters including travel company related parameters. The travel company related parameters may include, but are not limited to, operating travel company (i.e. the travel company that operates the package), marketing travel company (a travel company that sells the travel package), any other travel company or intra/inter-travel company groups associated with the package or any combination of the above. The start/end parameters may include, but are not limited to, a destination location (area or street, landmark, city, state, country), date and time, seasonality, weather and other operational conditions, and so forth. The service and other miscellaneous parameters may include, but are not limited to, type of flight, car, room, cruise, travel duration, or other services, travel company services such as insurance, flight services, car special equipments, hotel services, cruise services, other facilities, and so forth.

The term "related transactions" here refers to one or more transactions that are related to each other. In a Value Option Framework, the successful interaction between the participants may happen through a number of transactions in sequence, where each of the transactions in the sequence may (or may not) depend upon the outcome of the previous transaction, and this may create a chain of "related transactions". However, at least one transaction in a set of related transactions must be related to all the other transactions. The connection or reference between the transactions may be direct or indirect and/or implicit or explicit. The related transactions may be contingent to each other or rely or require the aid of the other to support. The transactions may be fully and/or partly related to each other to be construed as related transactions. For example, the price of a transaction may be modified if the customer has already bought a product in a previous transaction, which makes the two transaction related to each other. In another example, the customer is given availability in a flight since he or she has already purchased a ticket in another flight; which makes both the transactions related to each other. For the transactions to be called as related transactions, some dependency and/or

nexus between the transactions has to be established. The transactions may become related transaction in one or more transactions.

The term "utilize" or "utilization" or "utilizing" includes, but is not limited to, putting to use, without limitation, a product or any of the possible combinations of the possible constituents of a product, any possible attached feature of a product, information, a process, preferences. It may also include, without limitation, to use, reuse of any product, consumption of one or more products, allocation of one or more products to other entity, relinquishing right to use one or more products, for selecting one or more other products on behalf of one or more earlier selected products.

The term "default" here implies a situation or condition that turns up in the absence of active intervention from the entities in a contract. In such situation, a particular setting or value (termed "Default Settings" or "Default Value") for one/more exchange variables is/are assigned automatically. These Default Settings/ Default Values remain in effect unless intervened.

The term "payment" here implies the act of paying or the state of being paid. The term "payment" here implies an amount of money or any other consideration paid at a given time or which has been received in the past but for which the benefit of the same is realized now, may be in part or in totality. "Payment" may also refer to a transfer of something of value to compensate for products or services that have been, or will be, received. Payment may be made in cash, on credit or any other consideration. The payment may have monetary or non-monetary (soft) value. The payment can be from company and/or any other entity to customer or from customer to company and/or any other entity or both.

The term "significant period of time" here implies a time period that is large enough with respect to the total utility time for the customer that it may affect the behavior of a transaction.

The term "selected" or "select" or "selects" refers to, without limitation, selecting, selecting and purchasing, purchasing or any combination thereof. The term "receiving" or "receives" here refers to, without limitation, purchasing, utilizing, receiving for free, receiving without requirement of a physical delivery or any combination thereof. The phrase "selecting a Product" for option purposes includes selecting one or more products within the same or a different product level (or a section or compartment) within the same product category. In the context of the airline industry, the phrase "selecting a flight" for option purposes includes selecting one or more seats within the same or a different cabin (or a section or compartment) within the same flight. In the context of the hotel industry, the phrase "selecting a Room" for option purposes includes, but not limited to, selecting one or more rooms within the same or a different hotel or any combination thereof. In the context of a car rental company, the phrase "selecting a Car" or "renting a Car" or "purchasing a Car" for option purposes includes, but not limited to, selecting one or more cars or car types or equipments associated with the car from the same or a different car rental company or any combination thereof. In context of travel industry, the phrase "selecting a Travel Package" for option purposes includes, but not limited to, selecting one or more travel packages within the same or a different travel company or any combination thereof.

The terms "Set" and "Product Set" refers to a collection of Products and are used interchangeably. A Set may have one or more Products. In the airline industry context, a Flight Segment is equivalent to a Set and each Leg within a Segment is equivalent to a Product. A Segment may consist of one or more Flight Legs (Products). In the hotel industry context, a Room Set is equivalent to a Set and each Room Product within a Room Set is equivalent to a Product. A Room Set may consist of one or more Room Products. In context of car rental industry, a Car Set is equivalent to a Set and each Car Product within a Car Set is equivalent to a Car Product. A Car Set may consist of one or more Car Products. In context of travel industry, a Travel Package Set is equivalent to a Set and each Travel Package Product within a Travel Package Set is equivalent to a Product. A Travel Package Set may consist of one or more Travel Package Products. A

company may (or may not) impose a restriction that all the Products of a Set must be used together unless a change is made to the Order.

The term "Order" may consist of one or more Sets, where each Set may consist of one or more Products. In the context of the airline industry, an Itinerary is equivalent to an Order. In context of hotel industry, a Room Order is equivalent to an Order. In context of car rental industry, a Car Order is equivalent to an Order. In context of travel industry, a Travel Package Order is equivalent to an Order.

The term "Initial Product Set" (or IPS, in short) refers to a Set purchased by a customer. For example, in the airline industry context, the term Initial Flight Segment (defined below) is equivalent to IPS. The term "Initial Flight Segment" (or IFS, in short) refers to a flight Segment purchased by a customer. For example, consider an itinerary with two Segments, A to B and B to A. Each of the two segments is referred to as IFS. In context of hotel industry, "Initial Room Set" is equivalent to IPS. The term "Initial Room Set" (or IRS, in short) refers to a Room Set purchased by a customer. In context of car rental industry, "Initial Car Set" is equivalent to IPS. The term "Initial Car Set" (or ICS, in short) refers to a Car Set purchased by a customer. In context of travel industry, "Initial Travel Package Set" is equivalent to IPS. The term "Initial Travel Package Set" (or ITS, in short) refers to a Travel Package Set purchased by a customer.

The term "Option Product Set" (or OPS, in short) refers to a Set received by the customer as part of a APO. In the airline industry context, OFS is equivalent to OPS. The term "Option Flight Segment" (or OFS, in short) refers to a flight Segment selected as part of an APO option on a given IFS. There can be one or more OFS for a specific IFS. In the hotel industry context, ORS is equivalent to OPS. The term "Option Room Set" (or ORS, in short) refers to a Room Set selected as part of an ARO option on a given IRS. There can be one or more ORS for a specific IRS. In the car rental industry context, OCS is equivalent to OPS. The term "Option Car Set" (or OCS, in short) refers to a Car Set selected as part of an ACO option on a given ICS. There can be one or more OCS for a specific ICS. In the travel industry context, OTS is equivalent to OPS. The

term "Option Travel Package Set" (or OTS, in short) refers to a Travel Package Set selected as part of an ATO option on a given ITS. There can be one or more OTS for a specific ITS.

The term "processor" includes, without limitation, any one or more devices for processing information. Specifically, a processor may include a distributed processing mechanism. Without limitation, a processor may include hardware, software, or combinations thereof; general purpose digital computing elements and special purpose digital computing elements and likewise included. A single processor may perform numerous functions and may be considered a separate processor when implementing each function. The terms "database" and "data store" may have been used interchangeably as and when the context requires and both may refer to any form of storing the data, including but not limited to, storing the data in a structured form, storing the data in an unstructured form and so forth.

General Method Description: Kernel

Referring now to Fig. 1, there is shown a high-level flow-chart style diagram of a method to achieve the optimally customized sale of products to "close the gap." It involves the following steps or acts: In Act 1.110, certain inputs are captured, including customer dynamics and important value segments, their demand, preferences, flexibilities and associated relative utilities. Company economics and important economic factors such as, for example, costs, capacities and constraints are captured in Act 1.120. The customer information from Act 1.110 and the company economics from Act 1.120 are then in Act 1.130, "integrated" in a way that will permit optimization of value for both the company (i.e., its profitability) and customers (i.e., their individual and collective purchase utilities). In Act 1.140, value options are formulated that permit the capturing of individual customer preferences in a way that can be used in the optimal customization of the sale process illustrated. These same steps can be used in one or more permutations or combinations or iteratively.

At a high level, the system is operated and the method of Fig. 1 is executed to (1) to dynamically interact with the customers to determine detailed customer demand for the product and options, (2) receive a real-time assessment of company economics, i.e., capacities, constraints, and costs, (3) optimize across demands and preferences of all customers, and company economics, and (4) formulate value options for customers.

To take advantage of this system, a company has to obtain information about customer demand and preferences before (and/or during) a purchase, in a structured manner that can be easily understood and translated into satisfaction for customers and also can be used to optimize internal operations for companies. This data can then be integrated with the company's internal resources and capacities to enhance and improve its operations. A company can "optimally customize" its products and processes to enhance the value for customers, while simultaneously maximizing its business profitability. Customers also benefit from the fact that they spend less time researching products, can be assured that their priorities are known in case of change or contingency events occurring, can enhance their purchased products/services and get more perceived value for their purchase price. A company may develop reward/insurance incentive programs with its customers that permit optimization of company operations, using one or more reward or payment programs in a way that increases the company's internal profitability as well as satisfies customer preferences.

At a high level, a block diagram of a typical system for implementing this methodology is shown in Fig. 2. The data for driving the system, from both the customer side and the company side, is stored in a database shown in Box 2.210 (or multiple databases), which may be of any suitable database design and may be a commercially available database product configured for this application. The "heart" of the system is a platform, typically one or more servers, shown in Box 2.220, which provides the processing capability to implement three modules, shown in Boxes 2.230, 2.240 and 2.250. The Customer Engine module (shown in Box 2.230) controls the interfacing with the customer via whatever media are selected by the company. For example, the company may use one or more of a web site (shown in Box 2.232), a call center (shown

in Box 2.234) and/or live customer service "counter" personnel (shown in Box 2.236) (e.g., at a point-of-sale location). The Value Option Creator module (shown in Box 2.240) is a software program(s) that performs the functions of allowing a company to design, create and configure different value option frameworks and corresponding value options that can be offered to customers to capture their needs and preferences in detail and in a way that can be used to optimize across company operations. The Event Optimizer module (shown in Box 2.250) comprises a program or programs that (a) monitor company business performance and provide information about business data (such as available capacities, costs, sales, inventory and so forth) as well as other relevant factors that may vary from installation to installation; and (b) monitor for the occurrence of events related to the value options which customers have bought, and which then execute pre-designed protocols when a related event occurs (e.g., a re-booking algorithm is activated when a flight cancellation event occurs).

Process to use the new system and method in an industry

The following sections describe in detail how this system and method may be used in any particular industry. Industries and companies best suited to use and benefit from the invention are those with large number of customers and wherein those customers would have varied utilities for aspects of a product offering, especially if those aspects were unbundled and some made optional.

To get maximum benefit from the herein disclosed system and method requires the use of human judgment. It should be emphasized, therefore, that there is shown a "platform" technology and a variety of non-exhaustive ways of using the platform. Those who make use of this platform in their companies will make decisions and exercise their judgment so that each instantiation or practice is likely to be unique, at least to a degree. In addition to disclosing the platform, via the given examples we also disclose certain instantiations of the system and method which themselves are believed to have value but the system and method are not intended to be limited to these instantiations except as they may be expressly claimed.

Using the discussed system and method in any industry involves a two-staged approach. The selection of an industry is assumed. The industry provides a context. Starting in Fig. 3, in the first stage of the method, a set of value options frameworks (to be associated with a company's offerings) is created. It is immaterial, for the current discussion, how one obtains the information used to construct a value option framework. Implicitly or explicitly, a value options framework reflects some sort of analysis of customer dynamics and company economics. Thus, to construct a value option framework for a particular type of transaction, one needs to arrive (however one chooses) at a list of components the customer may select when buying a product, and their prices. For example, in a simple case there may be delivery options and warranty options and maybe training options. Each option is assigned a price, whether statically, quasi-statically, or dynamically. Static pricing is assigned at very infrequent intervals. Dynamic pricing (determined by an algorithm invoked by the Event Optimizer is assigned either on an on-demand basis for a particular transaction or at frequent intervals so as to yield pricing based on near (i.e., quasi) real time company performance data. Quasi-static pricing would be somewhere between the former two situations, such as pricing done quarterly or monthly based on then-current information about the company. Pricing may involve running financial analysis based on known data to optimally set the conditions and pricing in the value option framework associated with the company offerings.

The second stage, as depicted in Fig. 11, involves a detailed interaction with the customer who has approached the company (Act 11.1110). Approaching the company may involve accessing a web site or calling a call center or any other way of commencing a transaction. The interaction (Act 11.1120) occurs in a structured format to capture the customer's expressed needs, preferences, flexibilities and relative utilities. As a preliminary matter, it is possible the customer may previously have registered a profile containing default selections of needs, preferences, etc. So, the database 2.210 is interrogated to determine whether a profile exists and, if so, to retrieve it (Act 11.1120A). The customer is presented with questions and/or value options (Act

11.1120B) and in response he/she supplies answers and select options that suit him/her (Act 11.1120C).

The second Act in the second stage is executed by the Event Optimizer module 2.250. A summary of the algorithmic flow of the Event Optimizer presented in Box 11.1130. The Event Optimizer is alerted to, or detects, the occurrence of an event (shown in Box 11.1132 and 11.1134) for which an event-response procedure (program) has been pre-stored. Each event-response procedure is designed by the company to effect selected action(s) in response to detection of its corresponding event. Depending on the nature of the event, an event-response procedure may invoke an optimization algorithm (shown in Box 11.1140), assess the company operations (possibly in real time) and analyze, across company operations (shown in Box 11.1138) and customer information (shown in Box 11.1136), potential results to determine results that concurrently maximize the benefits for the company and the customer. The optimization may or may not modify the company product offerings to better suit the customer while simultaneously maximizing the company operations (shown in Box 11.1150). Both of the stages and the steps involved will now be discussed in detail.

First Stage: Formulation of Value Option Framework

Turning to Fig. 3, it will be assumed that the inventive method and system are to be adapted to a particular industry or company. One may develop a generic instance for an industry or particularize it to an individual company. Some considerations will inherently be generic to an industry. Thus, to formulate a value option framework, one begins by selecting the industry. Act 3.310. Next, the customer and company dynamics are captured. Act 3.320. To capture customer dynamics, one needs to understand the value segments and value elements that are important for the customer. To assess company dynamics, one needs to assess the economic factors that are crucial to the company's profitability and performance.

(1) Capturing Customer Dynamics – Act 3.320A

A customer derives certain utility by purchasing a particular product. The purchase utility value, typically, can be separated into many value segments. Customers value these segments (which include core qualities of the offering as well as options and contingent options i.e., options dependent on options) from the perspective of what is important to the customer through the whole buying and usage experience, starting from, searching for a product, placing a particular order and using the product throughout its lifecycle. To go further, it will be helpful to define two terms: value segment and value element. A "value element" is a distinct aspect/characteristic of a product's buying and usage experience that may affect the utility of the product to the customer. A "value segment" is a particular category of such value elements. While value segments may vary from industry to industry and will have to be selected by the individual or team that implements a particular instance of this system and method, for many industries, the four most important value segments are (a) product design value, (b) product delivery value, (c) product price value, and (d) service value. There may be one or more other value segments. See boxes 3.320B to 3.320F. These value elements are shown in Figs. 4 and 5, which are simply alternative views of the same information and will be discussed below. It should be noted, however, that these value segments are just provided for illustration purposes. Industries that can benefit from the system and method of the invention may have more or fewer than the listed value segments and/or a different list of value segments. Each value segment may have one or more value elements. Further, the actual number of value elements in each value segment may vary with the industry, the level of detail in the business model, and even the customers. The system implementer can choose the number of value elements in each value segment.

Total Value for Customers:

A customer derives unique value from each value segment; the total utility value of the product to a customer (shown in Figs. 4 and 5) is the combination of values derived from each of the value segments. A customer would benefit the most if the total

expected value of his/her utility were maximized. Another important aspect to note is that every customer also has an acceptable range (e.g., equals, exceeds, or disappoints, minimum or maximum) for each individual parameter value. Even if a particular product has high overall value, a customer may not desire the product if it scores below the minimum level (i.e., low enough to reject the product) for any one or more of the value segments or value element. A company may use any method for calculating utility.

Concept of Tiered Value Perception:

Different customers may derive different utility from different aspects of the same product. As shown in Fig. 6, four different customers 610A – 610D may compute to the same (total) overall utility even though they assign different utility values to each of the value segments. For example, a human resource manager, who has scheduled interviews with candidates, would value the timely ticket to his destination much more than a vacationer, who may be flexible. Consequently, the company needs, in some way, to define and learn about these value parameters for individual customers, along with relative preferences and utilities associated with each parameter. This will be illustrated below using the previously listed value segments. A web-based questionnaire is one excellent way to collect this information. The collected information is then stored in a customer profile or Itinerary in a database, such as database 2.210.

(a) **Product Design Value:**

The "product design" segment refers to the value elements relating to the design features and characteristics of a product that the customer actually buys. Each customer places his or her own values on these different design value elements.

(b) **Product Delivery Value:**

The "product delivery" segment refers to the value elements relating delivery or time-frame related aspects like, for example, lead-time and delivery schedule from the

time the customer places an order. Again, each customer may place his or her own values on each of these value elements. The company collects detailed information on the product delivery needs of the customers.

(c) **Product Price Value:**

The "product price" segment refers to the groups of value elements related to the price a customer pays to buy/use a product. Value elements in this segment may include total product price, delivery costs, warranty or after-sales service costs, and any other relevant costs incurred by the customer in buying and using the product. Some times, addition of all these price elements is also termed total cost of ownership (TCO). A customer derives maximum price value by paying the most desired price for a product. Any price paid either lower or higher than the desired price may change the value the customer gets from the price of the product. The company collects information on the product price needs of the customers.

(d) **Service Value:**

The "service value" segment refers to a group of value elements related to the service a customer receives from pre-sales and post-sales services offered by the company to facilitate the use of the products sold. Pre-sales services include services provided by a company to help its customers decide and choose products based on their requirements. Post-sales or after-sales service refers to the warranty, product support, maintenance support and other relevant activities that may help a customer to use the product effectively. A customer will derive maximum service value from a product if the services provided by the company completely match or exceed those desired by the customer. The company utilizing the invention collects information not only on the service needs of its customers, but also on customer preferences on different possible events that might occur during or after the purchase.

Summary of Capturing Customer Dynamics:

Based on the method described above, the first Act for a company is to establish the value segments and value elements it will present to the customer for the customer's decision. It may establish these value segments and value elements in any way it chooses. A company may want to use market research or other mechanisms to analyze the value segments and value elements that are important to customers. An industry expert may choose to avoid such research and, instead to rely on experience.

(2) Assessment of company economics:

The next Act in the first stage, as shown in Fig. 3, is to assess the crucial economic factors that affect the bottom-line and top-line of the company, Act 3.330A. For example, these factors may include but are not limited to revenues, fixed costs, inventory, available and scheduled capacity, constraints on product availability and total and marginal values for current direct and indirect product (and/or services) costs. For illustration purposes only, Fig. 3 shows the grouping of such factors into five major categories 3.330B-F, including costs, revenue, service, competition and other.

It might be beneficial if a company utilizing the inventive system and method were able to express cost elements in a real-time or quasi-real-time (i.e., up to date) dynamic fashion so that such information can then be used to assess the profitability or contribution of each product sale opportunity, and to facilitate the operation of the Event Optimizer (so that offers and actions can be based on real-time or near-real-time information). Certainly that is not always required and would not be required in an industry where there is little change in cost elements over a significant time interval.

(3) Integration of Customer dynamics with company economic factors:

A third Act, shown in Box 340 of Fig. 3, is to take the information collected from the previous two steps, analyze this data and find important value segments and elements

that directly affect the crucial economic factors for the company. This operation involves creating a mapping between company factors and customer value segments, to establish direct and indirect relationships between the two.

(4) Formation of value options framework:

The formation of a value options framework involves certain steps illustrated in Fig. 8. The value option framework is formed around important mapped value elements, allowing capture of detailed individual, customer-level data expressing needs, preferences, flexibilities and relative utilities so as to positively impact the company operations, while simultaneously enhancing the overall product utility for the customer. A value option framework (VOF) must allow the company to capture a customer's demand, preferences, flexibilities and relative utilities at an individual level in a format that can allow that information to be used to produce a cost savings or revenue enhancement for company operations while concurrently enhancing customer utility. The structure of a value option framework is defined in detail later.

The process to create a value option framework is shown in greater detail in Fig. 8. In Act 8.810, the process starts from that list. From this list, the company may select a list of mapped value elements which fulfill the criteria listed above, Act 8.820, and a value option framework is built around those value elements. One could build a value option framework around almost every mapped relationship, so the decision criteria to chose or reject any such relationship is simply pragmatics. It is probably to be desired to limit the number of relationships to keep the value option framework manageable, computationally and otherwise. In Fig. 8, there are three VOFs shown at 8.830, namely A, B and C. The number of value option frameworks shown is for illustration purposes only and could be fewer or more, depending on factors such as the industry selected and user discretion. As explained in detail later, each value option framework is related to a corresponding value element and one or more related event(s). For illustration purpose, in the Box 8.840, value option framework A is related to a value element V_A and two related events, E_{A1} and E_{A2}. In most situations, after the *Initial Interaction* between the

customer and company related to a particular value element, one or more related events (or a series of events) would take place. The structure of a value option framework is defined below in detail.

Structure of a Value Option Framework:

Fig. 9 defines the structure of a Value Option Framework. The Box 9.910 shows a value option framework A. Every value option framework may be related to one or more value elements. As show in the Box 9.910, value option framework A is related to value element V_A. One can create one or more instances of a value option framework as shown by the two value options (A_1 and A_2). The Box 9.920 shows the *Initial Interaction* between the customer and company where the company offers the value option A_1 to the customer. Every value option has an initial costs/savings and other benefits and conditions to the customer; and revenue/costs and other benefits and conditions to the company. The *Initial Transaction* is successful if the customer selects the given value option. Every successful transaction may be succeeded by one or more related events (or a series of events as shown by the Boxes 9.930 (Level 1 events) and 9.940 (Level 2 events). Just like the *Initial Transaction*, each event may also have costs/savings and benefits and conditions to the customer, and revenue/costs and benefits and conditions to the company, as shown by the linked arrows from Event E_{A3} to both the customer and company.

The *Initial Transaction* may consist of one or more acts including, but not limited to, an interaction between the customer and the company, selecting, receiving and/or purchasing of a product and/or option, any other act or any combination thereof. One or more products may be selected, at one or more times, before, after, during the *Initial Transaction*, or any combination thereof. The *Initial Transaction* or any of the following events may have terms and conditions applicable to the customer, the company, another entity or any combination thereof. These terms and conditions may be set, preferably, to concurrently benefit at least two parties (the company, its customers and any other entity involved).

Consider, again, the process of formulating a value option framework. For each value option framework, the company-user also preferably categorizes its population of customers into one or more segments based on one or more criteria. Customer segmentation is based on customer behavior and needs. Individual customers are not necessarily segmented or grouped; a particular customer may fall within different customer segments at different times. It is the customer behaviors and needs that are segmented. To provide an example, in the Box 860 in Fig. 8, all of the company customers are categorized into three customer segments, namely, C^1_A, C^2_A, C^3_A for the value option framework A. The number of customer segments could vary depending on the industry and value option framework, and this method does not put a limit on the number of customer segments. The number of customer segments shown is for illustration purposes only and could be fewer than or more depending on industry selected, value option framework and user discretion. Further, a company may segment its customers differently for different value option frameworks or they may use the same customer segmentation for a few or all value option frameworks. The customer segmentation is done because the customer behavior can be subdivided into different groups and customer showing similar behavior could be dealt in a similar fashion.

After formulating one or more sets of value option framework(s) around the selected value elements, the user creates one or more value options for each set of value option frameworks. In Fig. 8, the value option options A_1, A_2 and A_3 are created in box 8.850 for the value option framework A. The number of value options shown is for illustration purposes only and could be fewer or more depending on industry selected, value option framework and user discretion.

For each value option created, the user defines parameters for option pricing, benefits and conditions to the customer, as well as revenue, costs and option conditions to the company, under which the option would be used. If necessary, a user may also need to create a separate questionnaire to be completed by customers, pertaining to each value option.

There may or may not be any payment transaction related to the *Initial Transaction* and/or other event related to the *Initial Transaction* and/or Value Option Framework. A price may include, but is not limited to, a set of one or more Product Prices, a set of one or more option prices, any other price or any combination of the above. The price may consist of a monetary value or a soft value (e.g., benefits, coupons or exchange of another service) or other consideration. The price may be fixed or variable, with or without bounds. The company may set permissible range(s) or boundary limit(s) within which the price can vary, or it may offer the customer a set of prices to choose from. Since price conditions may depend upon various factors, which may or may not be variable, the same may be decided at anytime. The price conditions may be determined by the customer, the company, a third entity, or any combination thereof, at one or more times.

As shown in Fig. 8, the user creates value options for each particular customer segment (Act 8.870). In Fig. 8, the structure for value option conditions for Value Option A_2 tailored to customer segment C^3_A is shown in the Box 8.880. Similarly, the user creates conditions and parameter values for each value option for each customer segment.

For one type of value option, one or more parameters for different customer segments may be the same. Across multiple value options (within the same value option framework), one or more parameter values may be the same for one or more different customer segments. It is possible that one or more value options may not be valid for a particular customer segment or a sub-segment within a customer segment.

Turning to Fig. 10, for each value option created for a specific customer segment, the user creates the following functions as shown in the Box 10.1030. (The number and type of functions shown is for illustration purposes only and could be fewer than or more depending on the industry selected, the value option framework and user discretion.) First, there is a Cost Function to the company, $C_f(X)$. This function expresses the cost

elements to the company related to usage of a specific value option. For illustration purposes, Fig. 10 displays the cost function [C_f (A_2-C^3_A)] to the company when a customer (within customer segment C^3_A) selects the value option A_2. This function expresses the costs to the company initially when the user selects the value option A2, and also for each of the related events if and when those related events take place. Next, there is a Revenue Function to the company, $R_f(X)$. This function expresses the revenue elements to the company related to usage of a specific value option. For illustration purposes, Fig. 10 displays the revenue function [R_f (A_2-C^3_A)] to the company when a customer (within customer segment C^3_A) uses the value option A_2. This function expresses the revenue to the company initially when the user selects the value option A2, and also for each of the related events if and when those related events take place. Then there is a Customer Service Function to the company. This function expresses the customer service function to the company related to usage of a specific value option. For illustration purposes, Fig. 10 displays the customer service function [S_f (A_2-C^3_A)] to the company when a customer (within customer segment C^3_A) uses the value option A_2. This function expresses the customer service level a company provides initially when the user selects the value option A_2, and also for each of the related events, if and when those related event take place. Finally, there is a Utility function to the customer. This function expresses the utility to the customer from use of a specific value option. For illustration purposes, Fig. 10 displays the utility function [U_f (A_2-C^3_A)] to a customer (within customer segment C^3_A) when he or she uses the value option A_2. This function expresses the utility to a customer initially when he/she selects the value option A_2, and also for each of the related events if and when those related events take place.

To obtain the overall costs, revenue and service benefit for a particular value option framework, all the individual functions for each value option-customer segment combination are combined to determine the total overall costs and revenue benefits to the company and the service and utility benefits to customers. Benefits from all the value option frameworks can be simply added together to calculate total overall benefit values to the company.

5) **Optimization of Value Options:**

As an optional last Act in the first stage, as shown in Fig. 7, a financial analysis may be performed on the value option framework using the existing company and customer data to determine optimum pricing values and conditions of the value options. In other words, a company using the system and method can build utility functions based on cost and benefit equations of various options, and then can optimize across any one or combination of such functions. Any standard non-linear constrained optimization software tool can be used to run iterations to determine optimized pricing and benefit values for different value options. Using standard sensitivity and scenario analysis techniques, a user can run what-if scenarios to determine the robustness of the value option framework. It is not necessary to perform this optimization to generate benefit from the new method and system taught above. However, performing optimization at this level may tend to increase the benefit derived.

Second Stage: Using Value Option Framework

After completing the first stage of the method, the user has been able to create important value option frameworks and specific value options within those frameworks. The user has also segmented customers to be associated with each specific value option that may be applicable to each customer segment. The company is fully prepared now to use a structured format consisting of value options and questionnaire to interact with its customers in real time to generate benefits for both customer and company.

The second stage of the new system and method, as depicted in Fig. 11, involves using the value option framework to interact with the customer to capture his or her requirements in detail. Once the customer selects a particular option, the system moves to the Event Optimizer stage, 11.1130, where the system reacts based on the event that may take place. The Event Optimizer, depending on the event, invokes an optimization algorithm, assesses the company operations in real time and optimizes across company operations and customer information to produce results that concurrently maximize the benefits for the company and the customer. The optimization may or may not modify

the company product offerings to better suit the customer while simultaneously maximizing the company operations. Both of these steps will now be discussed in detail.

1. Dynamic Interaction to determine customer demand in detail (Act 11.1120):

In this Act, the company interacts with its customers in a structured format asking questions and/or offering value options. Preferably, this interaction occurs using a web-based data collection system. As stated above while an Internet based interaction is probably the most cost-effective approach to data collection, other methods may be employed, if preferred, or a combination of methods may be used.

On a browser, which accesses the seller's (i.e., company's) web site, a series of questions are presented to the customer and the customer supplies answers. These questions may also present value options and ask the customer to answer and select the options that suit them the best, enabling the company to determine detailed preferences and flexibilities in customer needs. The questions/value options are supplied from the database 2.210 based on the value options framework created in the first stage to deal with different customer segments.

(2) Event Optimizer:

Once the customer selects a value option, the system goes to the Event Optimizer phase where different steps are executed depending on the event that may occur. The event(s) is(are) related to the value option selected in the first Act. Turning to Fig. 12, the typical Event Optimizer architecture is shown. An Event Analyzer 12.1220 is a module that receives notifications of events and notes when a monitored event occurs. Event Optimizer 12.1210 analyzes the event and invokes an optimization algorithm specific to the event that is detected. Using that algorithm, the Event Optimizer collects the information on related customers and assesses the company operations in real time. A third Act takes the information collected from the previous two steps and uses pre-determined criteria to optimize company operations *along with* customer demand. In this

Act, the various scenarios are generated which optimize the total product value for the customer and profits and gains for the company. More details on the Event Optimizer are provided in the System Architecture section.

A user may create a value option framework, which includes a series of events. In this case, the Event Optimizer, after optimizing the result for the first event, may offer the results to the customer. The customer may or may not accept the results. If the customer does not accept the result the Event Optimizer may move on to handle other subsequent related events, and may again come back to the customer with more results. This process could be repeated several times depending on industry selected, the configuration and type of value option framework, and customer behavior.

Summary of Second stage

In the second stage of the new method and system, the company interacts with the customer in a structured format to capture customer needs, preferences, flexibilities and relative utilities in detail. The next stage involves an Event Optimizer as explained above. The customers associated with the event are enlisted and sorted by pre-defined criteria. The Event Optimizer collects customer information from the database and also assesses company operations in real time before integrating this information to produce one or more optimized results that concurrently maximize the benefits for the customer and company.

System Architecture: To use and implement an instance of the method

The system architecture as shown in Fig. 2 may be used to implement the new system and method taught above. The Value Option Creator (Box 2.240) allows the user to create and configure different value options that can be offered to the customers to capture their needs and preferences in detail and in a way that can be used to optimize across company operations. The Event Optimizer (Box 2.250) allows the company to optimize across company operations and customer needs when an event is triggered to

provide a product offering that maximizes both customer utility and company profitability. A company would use the Customer Engine (Box 2.230) to interact with its customers via different channels. Each of these three sections is defined below in detail.

Customer Engine

The Customer Engine provides different interfaces that a company maintains at different channels, which are utilized to interact with the customers. These channels may include but are not limited to the company's website via the Internet, the company's call center via phone, and the company's retail outlet via in-person. The Customer Engine enables the company to ask questions and/or offer value options to customers in a pre-configured structured format. The Customer Engine generates its interfaces based on the data stored in the database and populated by the Value Option Creator. The customers provide their responses and select value options that suit them. The Customer Engine then communicates back and stores customer responses and selections in the database. The Customer Engine also may communicate the optimized results to the customer as and when generated by the Event Optimizer.

Value Option Creator (VOC)

The Value Option Creator allows a company to design, create and configure different value option frameworks and corresponding value options that can be offered to a customer to capture his or her needs and preferences in detail and in a way that can be used to achieve optimization across company operations. A company would use the Value Option Creator module to perform some or all of the following:

- Develop various value option frameworks based on selected value elements and corresponding company economic factors.
- Segment customers by one or more criteria. A customer segment may include one or more customers.

- Develop costs, revenue and service functions based on a company's operations prior to using the herein-described system and method. The company may prefer to express cost elements in a real-time (i.e., up to date) dynamic fashion in order to be able to fully assess the profitability or contribution of each product sale opportunity.
- Develop various value options within each value option framework.
- Configure each value option differently (or keep it the same) for different customer segments. This involves choosing pricing, benefit conditions and the proper questionnaire for each value option for different customers.
- Develop costs, revenue and service functions after the user (company) has designed and configured various value option frameworks.
- To measure in real time or in quasi-real time the value benefit created for the passenger and/or company by implementing the new system and method in part or in full.
- Optimize each value option framework and associated value options to determine optimized pricing and benefit schemes for the value options, in order to maximize the benefit for both the company and customers. What-if scenarios may be run to test the robustness of the value option frameworks' models.

The Value Option Creator (VOC) intakes the cost functions (marginal and total), revenue functions, utility functions, customer segments, capacity (scheduled and available) functions and other economic factor functions of the company. The VOC can be configured to store various customer value segments on which a user may want to build value option framework and associated value options. A user can also enter the constraints and ranges to perform pricing optimization to determine optimum pricing and the benefits of various options.

Ideally, a user may be able to create a Value Option Creator that is industry-and company-independent and can be used in several industries. Due to time and resource constraints, however, it is perfectly satisfactory for a user to build a less scalable and flexible industry-specific Value Option Creator.

Event Optimizer

The Event Optimizer allows the company to optimize its "bottom line" across company operations and customer needs, when an event is triggered. This is achieved by providing a product offering that maximizes both customer utility and company profitability. A suitable system architecture (i.e., overall flow) for the Event Optimizer in shown in Fig. 12. The following describes each Act in detail:

The Event Optimizer may start its functioning when a particular event is triggered (i.e., occurs and is detected at the time of purchase or later), Act 12.1210. The Event Analyzer (12.1220) analyzes the type and category of the triggered event by matching it with the list of events listed in database 12.210. Once the event type is determined, the Event Analyzer searches the database for an optimization algorithm that is associated with the triggered event, and executes that algorithm. (Such algorithms, naturally, have been developed and stored in the database at an earlier time.) The algorithm collects from the database a list of the customers that are associated with the triggered event, Act 12.1240, and sorts them based on pre-defined criteria listed in the value option framework associated with the event, Act 12.1250. The first customer is taken from the sorted list and his or her preferences and value option selection are retrieved from the database. Act 12.1260. The algorithm then makes a real-time assessment of the company operations to get up-to-date costs, capacities and constraints. Act 12.1270. The information collected in the above two steps is then integrated (Act 12.1280) and, based on a pre-defined criteria, the algorithm optimizes across the company information and customer preferences to produce one or more results that concurrently maximize the benefit for both the company and the customer. The results are preferably communicated to the Customer Engine and to database 12.210, Act 12.1290. These steps are repeated until all the customers have been taken care of Steps12.1252, 12.1254 and 12.1295.

Fig. 13 expands the Act 12.1280 to show the detailed sub-steps. The first Act (Act 13.1310) is to search the company data, based on pre-defined criteria, to determine and store all EventResults that meet or exceed the customer conditions (based on the value option selected and other preferences). An EventResult is a potential resultant output of an event to the customer and the company. The next Act 13.1320 is to determine from the stored list, those EventResults that are most beneficial to the company. If needed, another Act (13.1330) is performed to determine from the selected EventResults from the Act 13.1320, those results that best suit the customer.

Depending on the event type and related value option framework, the event-specific algorithm may communicate optimized results to the customer one or more times, depending on the algorithm and customer behavior.

Business Model to implement Value Option Frameworks related to the invention

Different business models may be used to implement a value option framework as described in the current invention. The business models mentioned below, without limitation, may be used to implement any value option framework in any industry. As an example, a company may choose to implement a APO VOF (explained later) individually or in conjunction with one or more partners and/or other companies.

The OA and the company may engage in a business agreement to implement one or more value option frameworks. The business agreement may divide the total benefit generated by said value option framework between the two parties using any mechanism or criteria as desired. The total benefit may be shared between the two parties. The company may allocate one or more products to the OA. One or more companies may allocate only a part of or their entire product inventory to the OA to offer those products to the customers by way of regular and/or as options. In return, the OA may offer some revenue or fee to the company for all or a portion of the products allocated. This fee may be given only for the products that the OA is able to utilize or for all the allocated products. The lending fee may be a lump sum amount, may depend upon the number of

products allocated or may depend on one or more factors as desired. The agreement may include a provision where the OA may return the allocated products back to the company at a certain time and date. There may be one or more conditions associated with the return of unused options and/or regular products, including, but not limited to, returning the same product, returning a higher value product and so on. The company may allot OA at least one product and said OA may deliver option on at least one of said allocated products. The OA may or may not enter into an agreement with the company to provide such option on its products. The OA may sell back at least one allocated product to said company or to at least one entity other than the company or both.

An OA may formulate an agreement with one or more companies on one or more VOFs to offer a combination of VOFs to customers. Said VOF may include different terms and conditions. For example, a customer may receive option price only from the company even if he/she is receiving products and/or options from the OA. Similarly, the customer may receive option price only from the OA even if he or she selected the products and/or received the options from the companies. The condition may also be set for a customer to make one or more payments to the company for the products and receive one or more payments from the company for the options received from that company, and to make one or more payments to the OA for the products and receive one or more payments from the OA for the options received from that OA. The condition may allow the customer to receive partial payments from the company and the rest from the OA or vice versa, the basis of which distribution may depend upon various factors, including, but are not limited to, the factors of company's choosing, the arrangement between the OA and the company and so on. In another example, the customer may receive the option price from the third party or may receive the option price from any of the combination of the entities mentioned above.

A company may allocate some inventory of one or more products to another entity such as an OA or Option Aggregator. The term "allocation of product inventory" "allocation of product(s)" implies, without limitation, assigning one or more units of one or more products to an entity for any purpose or use by the entity either exclusively or

non-exclusively. The allocation of product may be conditional. For example, one of the conditions may require a return of at least one allocated product within a specified time period and/or other consideration(s).

The customer may receive products and/or options from one or more of the company or OA or any combination thereof. For example, the Fig. 13A displays one example where three different companies choose to allocate one or more products to another entity (i.e., OA in this example). The OA may use the allocated products to operate a service to satisfy different needs of the customers. In Fig. 13A, the companies and their products are designated as Company 1/Product c1, Company 2/Product c2 and Company 3/Product c3 as shown by the Boxes 13A.130, 13A.170, 13A.140, respectively. In another arrangement, Company 1 and Company 2 may act together to implement the value option framework and may allocate one or more products to the OA which may on its own or together with either one or both the companies and may operate the service to offer said value option framework to the customers. Box 13A.110 represents Customer 1 receiving product c1 and c2 from Company 1 and an option o1 from the OA. The Box 13A.120 represents Customer 3 receiving product c3 from Company 3 and products c1 and c2 from the OA and options o2 and o3 from Company 3. In Box 13A.160, Customer 2 receives product c1 from the OA and options o1, o2 and o3 from OA, Company 2 and Company 3 respectively. In Box 13A.150, Customer 4 receives products c2 and c3 and also option o1 from the OA. In Box 13A.180, customer receives both product c2 and option o1 from Company 2.

There may be more combinations and arrangements among one or more companies, the OA and/or the customers. The companies and the OA may, without limitation, work together as partners, joint ventures, all together separate entities, partnerships etc., to offer and implement the value option frameworks related to the novel invention. The business model may be used with all the value option frameworks of the current invention which may involve some customization for the specific value option framework.

The customers may approach OA in many different ways and the same may depend on one or more factors including, but not limited to, way of implementation, type of implementation, one or more factors of choice of the company, OA, third entity and/or any combination thereof. In one of the ways customer may approach OA through phone as shown in Box 13B.140 and Box 13B.130 of Fig. 13B to avail services from the OA. In another instance as shown in Box 13B.110, the customer may approach OA through Internet. The customer may use other ways of approaching the OA, which may include, but not limited to, fax, telex, mail and personal contact. In one of the implementations of the OA Business model, the OA may validate the Order with which a customer wishes to avail an option and it may be validated in coordination with the company from whom the customer has received said Order as shown in Boxes 13B.150 and 13B.160. Order validation process runs to validate the Order from the company server and the database may be updated accordingly as shown in the Boxes 13B.150, 13B.160 and 13B.170. The validation process may involve back and forth interaction between the database and/or servers of the OA and/or the company and/or any third party. There may be updates in the database even if the Order is not validated. The company server may also provide OA with the information of its inventory.

If the Order is validated, the process may request the customer to enter the search criteria. Search is made corresponding to the search criteria entered by the customer (Box 13B.180). The server application may be used to provide a given set of Options corresponding to the search criteria (Box 13B.190). To provide the set of options, the server application may interact back and forth with OA server and/or OA option database.

Next, if the customer opts for one or more options (Box 13B.210) and finalizes the same (Box 13B.230), various databases relating to the company, OA and/or any third party may be updated and the relevant transaction along with other information may be stored and/or updated as per Boxes 13B.170 and 13B.200. Once the databases are updated on finalization of the option, the control goes to Box 13B.300, where the process ends.

If the customer does not opt for the options presented, another test is performed to determine whether the customer wants to re-enter, modify and/or repeat the search criteria (Box 13B.220). If so, the process loops back to Box 13B.180, where the customer may be required to re-enter, modify and/or repeat the search criteria.

If the order is not validated or if the customer wishes not to re-enter/modify and/or repeat the search criteria, the control goes to Box 13B.300, where the process ends.

In one of the implementations of this business model and system, the servers and/or the databases may belong only to the company, OA, third entity and/or any combination thereof.

Information Technology System for the value option framework

A client-server architecture may be used to implement the value option framework. However, a company may use a computer hardware and software infrastructure of its choosing to implement a particular value option framework for achieving concurrent optimization.

One or more servers may be used for the system and one or more medium of communications may be used between the customer and the company and/or the OA and vice versa including, but not limited to, a highly secured VPN and Internet. There may be a cluster of servers to implement the system. One or more of such servers may be located at the premises of the company, OA, third entity and/or any combination thereof. Such premises may also be an offshore location which may or may not be accessible remotely. One or more databases may be involved and may be updated on a real time basis.

The Fig. 13C shows one of the ways by which the different entities involved and participating in the value option framework, interact and may participate in the value

option framework. There may be other ways for implementing the value option framework which may depend upon including, but not limited to, the scale of the implementation, business requirements and number of entities involved. The entities may interact through a series of hardware products and services with the OA/company server(s). The OA may or may not be different than the company and the OA server may be the same as that of the company server. One of the entities shown in Fig. 13C is customer (Box 13C.110), who uses input device (Box 13C.120) to enter the requirements. The customer inputs are processed through the CPU (Box 13C.150) and one or more Hard Disk Drives (Box 13C.160). RAM (configuration of which may depend upon different factors) is used as memory device (Box 13C.140) while processing the customer input. The customer may approach the OA and/or the company through one or more series of Routers, Internet, Firewall and other hardware (Boxes 13C.330, 13C.335, 13C.340 respectively). The interactions between the company and/or the OA and the customer may pass through one or more load balancers (Box 13C.360) that distributes load across one or more servers as shown in Boxes 13C.300, 13C.310 and 13C.320. OA servers may update one or more primary database as shown in Boxes 13C.270, 13C.280, 13C.290. There may be one or more secondary databases (Box 13C.390) that may only be in the "Read Only" form (Box 13C.400) and may be updated through one or more replication servers (Box 13C.380). Alternatively, the company may have one or more separate temporary database structure wherein the entries are updated and stored until the final update is made in one or more main databases. One the final update is done, the entries in these temporary databases may be removed.

OA may interact with the application through Internet (Box 13C.350). OA application servers may also distribute load between one or more servers of OA and/or the company through one or more load balancers. Agent (Box 13C.260) may interact through input device as shown in the Box 13C.250. Input information may be processed by the CPU as shown in the Box 13C.180 with the use of one or more RAM, Hard Disk Drives (HDD) as shown in the Box 13C.200 and 13C.170 respectively. It may interact with the company through the Intranet (Boxes 13C.210 and 13C.220). The company and

the OA may interact through a series of routers, firewalls and Internet (Boxes 13C.330, 13C.335 and 13C.340).

There may be another agent on behalf of the OA (Box 13C.410) which may input through one or more input devices (Box 13C.420). The information may be processed through the monitor, one or more hard disk drives, RAM and CPU as shown in Boxes 13C.430, 13C.440, 13C.460 and 13C.450 respectively). One of the ways in which said agent may interact with OA is through highly secured Intranet as shown in Box 13C.370.

The entire process may run at the premises of OA, company and/or any third entity or any combination thereof. It may also be possible to run a part of the system at one place and rest at one or more other places. The system may also be implemented even if one or more servers may be kept off-shore locations and may be accessed remotely. The geographical locations of one or more hardware product and/or services may be different depending upon including, but not limited to, the factors of company's choice, ease of accessibility, infrastructure facilities. The structure or the interaction architecture of the system may vary depending on factors including, but not limited to, the set up of the company, changes in the technology and with the introduction of new and better technology enhancing the interaction process.

Information technology is a part and parcel of the novel invention. The value option framework as a system may require integration with various hardware and/or network services. This is illustrated in Fig. 13D where a detailed implementation of one of the stages of value option framework is described duly integrated with the hardware products and services.

The customer inputs search criteria as shown in the Box 13D.100. The web page and/or the application may be hosted on the company's server, OA's server, any third entity's server and/or any combination thereof. Such a server may be located at the premises of the company, OA, any third entity location and/or any combination thereof and such a location may include an offshore location. The customer may approach the

web (server) application of the company through Internet and one or more Firewall etc. as shown in the Boxes 13D.110 and 13D.120. The medium by which a customer reaches (approaches) the company web (server) application may vary depending on different conditions which may include, but not limited to, the best available communication medium at a particular time, scale and type of implementation of the value option framework and factors of company's choice.

Server application runs the search algorithms (Box 13D.130) corresponding to the customer requirements in association with one or more servers of the company as shown in the Boxes 13D.150, 13D.160, 13D.170 respectively. The servers may include, but are not limited to, web servers, application servers, database servers and networking servers. Said application may be hosted internally on one or more servers and databases either by the company and/or the OA or may be hosted on any third party's server. The servers may also be the servers of the OA or the servers may be run jointly by the company, OA and/or a third entity. Load balancer (Box 13D.140) may be utilized to distribute load across one or more company servers. The search algorithm may interact back and forth with one or more database including, but not limited to, email database, option database, inventory database, customer database, company database as shown in Boxes 13D.230, 13D.240, 13D.250 and 13D.260.

A test is performed to determine whether the outcome of the search algorithm is positive as shown in the Box 13D.180. If the outcome is negative, customer may be asked to re-enter/modify the search criteria (Box 13D.210). If the outcome of the search algorithm is positive, the customer is provided with a list of options as shown in the Box 13D.190. Once the customer is provided with a list of options to choose from, another test is performed to determine whether the customer has opted for one or more options (Box 13D.200). If customer has not opted for an option, then customer may be asked to re-enter/modify the search criteria (Box 13D.210). If the customer re-enters the search criteria, the control loops back to Box 13D.130 wherein the server application runs the search algorithm on the basis of the inputs received from the customer.

If the customer opts for an option and the option is finalized, at least one payment transaction is executed (if any) (Box 13D.300) and one or more databases may be updated (Box 13D.270) through internet, firewall as shown in Box 13D.320 and 13D.330. Said updates may also be done through one or more routers, highly secured VPN Network etc. Said primary databases including, but not limited to, email database, customer database, inventory database, option database may be updated correspondingly as shown by the Boxes 13D.230, 13D.240, 13D.250 and 13D.260. There may be corresponding updates in the secondary databases also (which are in "Read Only" format) as shown in Box 13D.290 through one or more replication servers (Box 13D.280). Alternatively, the company may have one or more separate temporary database structure wherein the entries are updated and stored until the final update is made in one or more main databases. One the final update is done, the entries in these temporary databases may be removed/deleted/discarded.

The algorithm ends after the needed updates are made in one or more databases and/or one or more severs or if the customer desires not to re-enter/modify the search criteria (Box 13D.400).

Second stage in the value option framework is achieving concurrent optimization for at least two of the company, customer, OA, third entity or any combination thereof on occurrence of an event. Fig. 13E describes one of the ways of using the information network system in which interaction between OA, company and event (which may be triggered by the company, OA, customer, any third entity or any combination thereof) takes place.

Fig. 13E presents a diagrammatic representation of a chain of actions that takes place corresponding to occurrence of an event. There may be one or more different ways in which said action may take place and may depend upon the factors including, but not limited to, the arrangement between the OA and the company, factors of OA and/or company's choosing and one or more mediums of technology utilized in the system.

If an event is reported to an OA (Box 13E.110 and Box 13E.120), one or more load balancers (Box 13E.130) may be used to distribute the load across one or more servers (Boxes 13E.140, 13E.150 and 13E.160). One or more different databases (of OA, third entity, the company and/or any combination thereof) may also be updated as per the requirement and the nature of the event. Information is processed through the servers using one or more RAM, Hard Disk Drives and other hardware products and corresponding to the occurrence of the event, updates are made in one or more databases as shown by the Boxes 13E.170, 13E.180 and 13E.190. One or more company servers and databases (shown by Boxes 13E.300, 13E.310 and 13E.320 and Boxes 13E.330, 13E.340 and 13E.350 respectively) may also be updated using external communication medium/port (Box 13E.280). The servers may include, but not limited to web servers, application servers, database servers and networking servers. One or more said databases include, but are not limited to, email database, option database, customer database.

Next, a test is performed to determine whether the Event Optimization process has been triggered by the occurrence of the event as shown in the Box 13E.200. If the Event Optimization process has been triggered, the process goes to the Optimization server (Box 13E.210). If the Event Optimization process has not been triggered, the process ends at Box 13E.400.

The Optimization server interacts with one or more databases including, but not limited to, the optimization rule database and customer rule database as shown in the Boxes 13E.170, 13E.180 and 13E.190. One or more optimization algorithm may be run within the optimization server using one or more RAM, Hard Disk Drives. As a result of optimization algorithm, the Optimization server may give one or more possible optimum solutions depending on the factors and rules determined by the company, OA and/or any third entity or any combination thereof, as shown in the Box 13E.220. A set of possible optimum solutions, then, passes through one or more databases including, but not limited to, constraints rule database and constraints (or validation) database as shown by the Boxes 13E.250 and 13E.260 respectively. While interacting with said database, the OA agent may also be approached as shown in Box 13E.260.

Next, a test is performed to determine whether the constraints are fulfilled and/or payment transaction is executed (if any) (Box 13E.270). If the constraints are fulfilled and the payment transaction is also executed (if required), a series of database updates as shown by the Boxes 13E.170, 13E.180 and 13E.190 may be done. Once one or more database are updated, the Customer Notification Process (Box 13E.390) takes place, in which the customer is notified, and the algorithm then ends in Box 13E.400. If the constraints are not fulfilled and/or payment transaction (if needed) is not executed, the process ends at Box 13E.400.

One or more such kind of information technology system may be implemented for the specific value option framework. The system may be customized as per the specific requirements of the company, value option framework, OA, any third entity, customers and/or any combination thereof.

Benefit of using the system and method

Through this method, a new efficient approach is introduced for managing customer relationships, sales cycles, marketing, customer service, market research and customer feedback. It eliminates manual, time-consuming processes and replaces those with an efficient, automatic process.

By maximizing total value for its customers, a company can greatly improve its overall business prospects. The company can look to build very high customer retention rates and also increase the number of new customers gained per unit time. It can help to increase the overall sales and thus help increase the overall business value. The company may distribute a portion of additional value gained back to its customers to further strengthen its relationships with them, if it wishes.

A company may encourage customers to "opt in" to this system and provide the customer's preferences by giving rewards to customers to provide these preferences and

commit early. The value options may be created and priced to motivate customers to make choices that both satisfy their needs and simultaneously allow the company to improve its operations.

This method further adds new dimensions to business parameters like inventory. Previously, for a company, inventory was either "Committed" or "Available." This method adds a new dimension of "flexibility." With the customer preferences and needs taken beforehand, we add the dimension of flexibility to the inventory. For example, a booked flight seat would conventionally be called committed inventory. But now within the new methodology, if the ticket-holding passenger is flexible, his ticket could fall into a pool of flexible inventory availability, which could be sold to other passengers if necessary.

Another advantage is that the method creates a new type of inventory, called customer inventory. Once the method had been used for some period of time, a company, by using its powerful value option framework, would be able to capture its customers' and potential customers' future needs in advance. In other words, within the realm of company product offerings, the company would collect information on which customers want to purchase what products, when and with what specifications or parameters. Combining this individual customer data across thousands of customers would generate a customer needs and preference database with appropriate classification and parameters. The needs (and/or preferences) of this database could be classified as customer inventory wherein the items in inventory are the needs of several groups of customer with similar needs. Once the company has built such a database, they can use the customer inventory as and when needed in optimizing their internal operations to maximize value for both the company and the customers.

The method allows a company to move from a knowledge-based system to an expert system, which optimizes the decisions based on customer preferences and company economics. The method allows the companies to market a whole new paradigm of services and products surrounded around their original product offerings.

This is achieved partly by unbundling formally bundled components of existing products, into components offered to the customer and partly by building new products and services. This allows the customers to choose product features they wish to purchase and saves the company from making investments and costs in providing product components to those who don't want or desire those components.

In summary, it can be said this method accomplishes the following: (1) makes a business more attractive to customers by enabling customers to express their preferences; (2) makes a business more efficient and reduces costs; (3) allows a company to handle problems and disruptions in a quick, efficient manner to generate high customer satisfaction and keep their costs low; (4) helps a company to increase and strengthen its customer base, improve sales per customer, and customer retention, and (5) helps to increase the value customers gain from the purchased products.

The above method may be applied to several industries including, without limitation, airlines, hotels, automobiles, media, entertainment (television, radio, internet, etc.), furniture, insurance, computer hardware, travel (e.g., vacations, car rentals, cruises), events (such as theatre, movies, sports games etc.) and financial market. There may be several other industries that may benefit by using the new system and method.

Alternate Product Option (APO) Value Option Framework

The creation and utilization (in two stages or acts) of another value option framework will now be discussed. This is the Alternate Product Option (APO) VOF. A company may implement an APO VOF in any industry. The customer need for flexibility (defined below) is used as the targeted value element. A detailed demonstration of the APO VOF is presented followed by a few examples of applying the APO VOF within different industries.

The first stage in the APO VOF involves steps (or acts) of: capturing customer dynamics, assessing company operations and economic factors, integrating customer dynamics with company economic factors, formulating the VOF and optimizing the VOF. The second stage involves carrying out a dynamic interaction with the customer and then executing an Event Optimizer process. A detailed demonstration of the APO VOF is presented followed by a few examples of the APO VOF in other industries.

First Stage: Formulation of APO Value Option Framework

(1) Capturing Customer Dynamics

Fig. 14 shows an analysis of the value elements that are believed to matter to customers in relation to an APO. In the design value segment, shown in Box 14.100, important value elements may include, but are not limited to, the customers' need for flexibility and flexibility period. In the price value segment, shown in Box 14.200, important value elements may include, but are not limited to, Product Price and price for flexibility. In the delivery value segment, shown in Box 14.300, important value elements may include, but are not limited to, time before which a customer may be able to avail his or her flexibility, and how long before utilization, the product must be purchased to obtain flexibility. In the service value segment, the important value elements may include, but are not limited to, the ease of getting desired flexibility as

shown in Box 14.400. It may be important to estimate the relative preferences and utilities of these value elements to different types of customers.

The customer need for flexibility is subjective in terms of one or more parameters including, without limitation, the length of flexibility period, extent of variation in need and others. The term "flexibility period" herein refers to the time period during which a customer may enjoy the flexibility in selecting and/or purchasing products. The needs of the customer may vary within a defined range. This range is termed "extent of variation in need". Some products may offer flexibility but the products may be highly priced, and hence only a few customers can afford to buy them or may be willing to pay for them. The customers may also desire flexibility and hassle free availability of the product at desired times. Many customers would be willing to pay for such additional flexibility. However, the price they pay or are willing to pay is subjective to the individual needs of the customers and the circumstances around.

(2) Assessment of company economics

An assessment of the crucial economic factors of a company, as indicated in Box 15.100, may reveal the factors to include, but not be limited to, fixed and variable costs, increased competition from competitors across different parameters, desire to reach out for newer market segments, the broad spectrum of time period over which the products are sold, a need to develop competitive advantage, and customer attrition rate.

An assessment of the crucial economic factors of a company may be performed, to determine the factors that affect the profitability, growth and goals of the company. It might be beneficial if a company utilizing the inventive system and method were able to express cost elements in a real-time or quasi-real-time (i.e., up to date) dynamic fashion so that such information can then be used to assess the profitability or contribution of each product sale opportunity, and to facilitate the operation of the Event Optimizer (so that offers and actions can be based on real-time or near-real-time information).

(3) Integration of customer dynamics with company economic factors

Fig. 15 also illustrates an example of how a mapping can be done, between customer and company profiles, for the APO VOF in any industry. On one hand, the customers desire flexibility and are willing to pay for it accordingly. On the other hand, if a company has surplus products or capacity, that condition probably represents the loss of potential revenue (and/or opportunity cost) for that company. This is true even though no other potential customers have been turned away, simply because there may be one or more customers, who have purchased other products of the same or a different company and may be willing to switch to the unused surplus products (or capacity) at appropriate price/terms. But, today they are not able to do so for one or more reasons mentioned above. An opportunity thus exists to concurrently generate an incremental revenue benefit for the company from consumer surplus, and to maximize the purchase utilities for the customers. The APO framework is created based on a value element "Preference for flexibility". More specifically, as shown in the interaction between the Box 15.200 and Box 15.300, a mapping is performed between important customer value elements and company economic factors. The value element "Preference for flexibility" is extracted, as shown in Box 15.400 and an APO Value option framework is created.

(4) Formulating the "APO" Value Option Framework

Structure of APO Value Option Framework in Any Industry

Fig. 16 displays the structure of an APO value option framework (shown in Box 16.100) in any industry. The APO value option framework is related to the value element "Preference for flexibility", as shown in Box 16.110.

The first event in the APO VOF is referred to as "*Initial Transaction*", shown by Box 16.200, in which the customer (shown by Box 16.210) and the company (shown by Box 16.220) transact on an APO value option. There may be one or more Events (shown by Box 16.230) that follow the *Initial Transaction*.

In a successful *Initial Transaction* for an APO, a customer receives an option to choose up to 'n' out of 'm' selected products (said 'm' products termed *"APO Products"*). The 'n' products that are finally selected are termed *"Chosen Products"*. After each of the 'n' *Chosen Products* is defined (or selected or chosen), the customer has the right to utilize (or can utilize) said *Chosen Product*. Apart from the 'n' *Chosen Products*, the remaining 'm – n' products are termed *"Released Products"*. The *Released Products* (if any, that were probably held or blocked for said customer) may be sold to others or used for other purposes. The *Released Products* in relation to said option may be reused by the company before, after, at or any combination thereof, the time the *Released Products* and/or *Chosen Products* are defined (or selected).

Numerically, the value of 'm' is greater than or equal to 1 and the value of 'n' may vary from '0' to 'm' depending upon the specific implementation of the APO framework. The value of 'm' and/or 'n' may be known (or defined and/or re-defined) before, during or after the *Initial Transaction* and/or any combination thereof. The value of n may be limited to less than the value of m, or n<m (i.e., n<=m-1); however, in some situations, n may be equal to m. The value of 'n' may or may not be known (or defined or re-defined) at the time of the *Initial Transaction*. The value of 'm' and/or 'n' may be defined and/or re-defined by the company, the customer, another entity or any combination thereof. For example, the value of n may not be defined at the time of *Initial Transaction*. In case the value of m is redefined after being defined at least once before, the new value of 'm' may be greater than or less than the older value of 'm'. Similarly, if the value of 'n' is redefined after being defined at least once before, the new value of 'n' may also be greater than or less than the older value of 'n'. In some of the cases, the value of new 'n' may be even greater than the older value of 'm'.

The *Initial Transaction* may consist of one or more acts. The customer may select (or purchase) all *APO Products* concurrently (i.e., all together in one transaction) or sequentially (i.e., in multiple transactions). In the sequential case, a customer may select one or more products in one or more transactions just before or much before (a few

days/weeks/months) the *Initial Transaction* for APO begins. Said selected product(s) (let's say X number of them), thus, may be considered as part of said m *APO Products* of the APO (m, n) transaction, and the customer may select only the remaining (m - X) number of *APO Products* during the *Initial Transaction*. All the transactions used to select all the *APO Products* of an APO (m, n) instance may be related to each other, and hence, are considered as *related transactions* (as defined earlier).

In an APO VOF, the sequential process may consist of a number of *related transactions* when all the *APO Products* are purchased one after another by paying a price in each (or some or none of the) transaction(s) or act(s). The transactions may be related due to a relationship during the *Initial Transaction*, one or more of the previously executed transactions, any other transaction or any combination thereof.

The time when an *Initial Transaction* is completed (i.e., the customer receives the APO option) is referred to as the *Initial Transaction Time* (or ITT, in short). One or more of said m Products may be selected, at one or more times, before, after, during, or any combination thereof, the *Initial Transaction* and/or the time said option is delivered to the customer (or the customer receives said option) or any combination thereof.

A company may choose to create one or more instances of an APO VOF based on factors including, but not limited to, number of *APO Products*, *Chosen Products* or *Released Products*, pre-determination of a number of *Chosen Products or Released Products*, other factors or any combination of the above. For example, an APO based on a combination of the number of *APO Products* (or m) and *Chosen Products* (or n) would be APO (m, n). Some APO instances are shown in Boxes 16.120, 16.130, 16.140 and 16.150. For example, when the number of *Chosen Products* is pre-determined, the APO (4, 2) instance may imply that the customer selects 4 *APO Products*, on the condition that the customer may choose any two out of those four products as *Chosen Products*. When the number of *Chosen Products* is not pre-determined, the APO (4, 2) instance may imply that the customer selects four *APO Products*, on the condition that the customer may choose zero, one or 2 products as *Chosen Products* out of *APO Products*.

There may also be a minimum limit on n. For example, the APO (4,n) (where 1<=n<=2) instance limits the customer to choose a minimum of 1 and maximum of 2 *Chosen Products* out of the 4 selected *APO Products*.

The APO (2,1) instance, two *APO Products* and one *Chosen Product*, is used here as an example to demonstrate the details of the structure of an APO VOF. Box 16.200 refers to the *Initial Transaction* between the customer and the company, in which they transact on an APO (2, 1) value option. In a successful *Initial Transaction* for APO (2, 1), the customer selects two *APO Products* and can choose to use any 'one' of those two products. The product selected is the *Chosen Product* and the one not selected is the *Released Product*.

The *Initial Transaction* may have terms and conditions applicable to the customer or the company or both. These terms and conditions may be set, preferably, to concurrently benefit both parties. The connections between Box 16.200 and 16.220, and Box 16.200 and 16.210 refer to the terms and conditions to the company and the customer, respectively.

The APO VOF may or may not include any constraints on the *APO Products*. For example, a company may want to restrict APO applicability and availability on products that satisfy specific criteria. The two *APO Products* may or may not include practically constrained products. Practical constraints may include one or more constraints that will prevent a customer to utilize a given Product or prevent the customer from utilizing all the *APO Products*. Such practical constraints may include, but are not limited to, time constraints, location constraints and so forth. In other words, it may or may not be practically possible for a customer to utilize both the selected products due to at least one practical constraint.

The APO VOF may or may not include any constraints on the *APO Products* based on their Product Prices (defined elsewhere). For example, the company may offer only those products as *APO Products* whose Product Prices at or before the ITT are less

than a specified value, or may add a constraint on the maximum difference between the highest and the lowest Product Prices across a set of *APO Products* offered within a specific APO.

The *APO Products* may be selected by the company, the customer, another entity or any combination thereof. The APO VOF may enable a customer to have flexibility by selecting m Products and use said flexibility to satisfy his/her needs. Therefore, the customers would usually have the right to select (or define) the *Chosen Products*. However, in different implementations of APO VOF, the company, the customer, another entity or any combination thereof may select one or more of the *Chosen Products* related to an APO. The *APO Products* and the *Chosen Products* may be selected by the same entity, different entities or any combination thereof. The company may incorporate the customer information and the data related to the APO into the sales, production, inventory, other database or information system or any combination of the above. A customer may select *APO Products* in several ways; through mutual agreement (i.e., during a direct interaction such as a Product purchase), or the company may grant the *APO Products* to the customers without soliciting their interest or permission. For example, to enhance customer satisfaction or for any other purpose, a company may grant *APO Products* to customers based on the past customer behavior, interaction and so on.

The *Initial Transaction* may impose one or more conditions on the customer. A customer may be required to explicitly notify the company prior to or no later than a given date and time (referred to as the *Notify Deadline*) regarding the *Chosen Product*. For simplicity, it is assumed that whenever the term *Notify Deadline* is used in the following sections, the condition requires notification prior to the *Notify Deadline*. If there is no such explicit notification condition, the *Chosen Product* may be decided as per the terms and conditions of the option contract. In either case (explicit or implicit notification) the date and time when the *Chosen Product* is selected is referred to as the *Customer Notification Time* (or the CNT, in short). In the current discussion, the explicit notification condition is assumed unless specifically mentioned otherwise.

A company may determine one or more *Notify Deadlines* for a product at one or more times (e.g., before, during, after the *Initial Transaction* or any combination thereof) using factors including, but not limited to, customer needs, expected value of the product, company profitability goals, any other factors or a any combination of the above. Customer factors may also be considered in determining the *Notify Deadlines*, such as the flexibility periods desired by customers, picking easy times (like 6:00 pm instead of 6:32 pm) to help the customer remember the deadline(s) or any other factor that may affect the behavior of a customer.

The APO VOF may impose additional terms and conditions on the customer. A customer may or may not have to pay any price for receiving APO Products (i.e., there may or may not be any payment transaction related to the *Initial Transaction* and/or other event related to the APO). There may be one or more prices related to the APO. A customer may be required to pay a price or fee related to APO at one or more times. A price may include, but is not limited to, a set of one or more Product Prices, a set of one or more APO Prices or any combination of the above. A company may use the method of its choosing to decide on all the Product Prices for APO.

The customer may be required to pay one or more prices during the *Initial Transaction* (which payment is referred to as an Initial Price), at the CNT (which payment is referred to as an Exercise Price) and/or at any other time, which may or may not be pre-determined between the customer and the company. The price may be a function of number of *APO Products* and/or *Chosen Products*, specific products selected for *APO Products* and/or *Chosen Products*, *Notify Deadline*, one or more Product Prices, any other factors of company's choosing or any combination of the above.

The price may include, but is not limited to, a monetary value or a soft/non-monetary value (e.g., discount vouchers, coupons or exchange of another service, other benefits such as loyalty program benefits, other forms or any combination of the above) or other consideration. The APO Price may be fixed or variable, with or without bounds.

The company may set permissible range(s) or boundary limit(s) within which the APO Price can vary, or it may offer the customer a set of prices to choose from. Since price conditions may depend upon various factors, which may or may not be variable, the same may be decided at anytime. The price conditions may be determined by the customer, the company, a third entity, or any combination thereof at one or more times. One or more prices (Initial or Exercise or any other price) may be a negative value, which reflects that instead of the customer paying the company, the company shall pay a price to the customer.

Different price strategies may be implemented in the APO (2,1) instance. For example, a single Initial Price could make it attractive and easy for the customer to feel free to choose any product as the *Chosen Product* without worrying about any additional costs later. One or more of the APO prices may be embedded with the Product Price by using a special Product Price. A customer may be presumed to accept the APO offer while displaying the Product Price (that has the APO Price embedded in it). These presumptions may or may not include soliciting prior interest of the customer regarding the APO offer. In case, the APO price is merged with the Product Price, and where such price may or may not be separately identifiable, the customer may or may not be required to pay a separate price for APO.

The *Notify Deadline* may be pre-determined or may be determined later (i.e., after APO grant) by the company, the customer or mutually by both. There may be one or more *Notify Deadlines*, where each *Notify Deadline* may have a different price associated to it. There are several ways to implement this condition.. One way is given, as follows. The price associated to the first *Notify Deadline* (i.e., the earliest among the *Notify Deadlines*) may be charged if the customer notifies the company of the *Chosen Product* anytime before the first *Notify Deadline*. The price associated to the second *Notify Deadline* (i.e., the second earliest among the *Notify Deadlines*) may be charged if the customer notifies the company of the *Chosen Product* after the first *Notify Deadline* and before the second *Notify Deadline*. Similarly, different prices may be associated with other *Notify Deadlines*.

The terms and conditions of the APO VOF may not allow the customer to notify the company after the last *Notify Deadline* (i.e., the latest among the *Notify Deadlines*). This is done to facilitate the selection of the *Chosen Product* before the last *Notify Deadline*. As an operational measure, a rule may be set that if the customer fails, unintentionally or intentionally, to notify the company before the last *Notify Deadline*, then the company may treat either of the two products as the *Chosen Product*. Another approach may be (e.g., for company/customer) to designate one of the two products as a *Default Product* (during or after the APO purchase) that will be selected as the *Chosen Product* if the customer fails to notify the company of the *Chosen Product* before the last *Notify Deadline*. Any entity (e.g., the company or the customer) may (or may not) be allowed to change the *Default Product* once it is selected. The Exercise Price (if any) in the default case may or may not be equal to the Exercise Price for the *Default Product* for the last *Notify Deadline*. In the current discussion, a single *Notify Deadline* is considered.

The Exercise Price may be a function of *Notify Deadline, Chosen Product,* any other factor or any combination thereof. In such situations, a customer may have to pay a price to select a particular product as the *Chosen Product* at a given time.

The APO VOF may also include conditions imposed on or assumed by the company. For example, the company may be under a mandatory condition to hold (or block) a confirmed booking for the customer on the selected *APO Products* until the CNT passes to allow the customer to select either of the two products as the *Chosen Product*.

A company may determine customer preferences, either explicitly or implicitly, regarding utilization of up to n of m selected Products. The preferences may include, but not limited to, customer preferences for various products and services, needs, associated relative utilities, flexibilities, preferences regarding choice of Products, quality of Products, acceptable delays (relative) to receive different Products and so forth. The

company, one or more entities other than the company or any combination thereof may seek customer preferences.

A company may also offer APO options to one or more customers on the basis of customer preferences, so obtained or collected. The company may offer said APO options based on the dynamics of the company including, but not limited to, inventory, operational data, revenue management data, cost data, financial data, accounting data, any other internal data, any combination thereof and so on.

A company may seek such preferences from the customers prior, during or after the customer has purchased the Product or any combination thereof. These customer preferences may help the company to perform concurrent optimization of value for the company, the customers, one or more entities other than the company or any combination of two or more of the above. The customers may also include the customers whose preferences have not been determined or collected. The data pertaining to the company, customers, one or more entities other than the company, any combination thereof, may be integrated to concurrently optimize the value for at least any two of said entities. There may or may not be any payment transaction between the company, one or more other entities and/or the customers regarding seeking such customer preferences, delivering APO options, customer participation in APO and so on.

A company may operate one or more systems and/or services to monitor the company dynamics. Monitoring may include, but is not limited to, monitoring of capacity, days to utilization, return and/or potential return of Products, flexible inventory that may be created in relation to said obtained preferences, analyzing various cost, revenue, operational or any other internal data and so on. The company may have one or more systems and/or services to analyze such data on a real-time or quasi real-time basis and draw conclusions on the basis of such analysis. Any of the systems and/or services may be operated by the company, one or more entities other than the company or any combination thereof.

A company may operate a system that defines customer preferences regarding at least utilizing up to n of m selected products, and n is less than m, operate a system that enables use of said preferences to optimize value for at least one of customers, said company and an entity other than said company. A company may concurrently optimize value for at least two of customers, said company and at least one entity other than said company.

A company may offer APO to all customers or any selected customers, such selection may be based on any criterion including, but not limited to, such as those who have expressed their relative preferences, those who have not expressed any preferences. By integrating the company dynamics and collected customer preferences, a company may offer appropriate incentives and terms and conditions for APO to generate desired participation.

Once the *Initial Transaction* is successful, there may be at least two possible related events, as shown by Box 16.230. The two events are (1) that P1 is the *Chosen Product* (as shown by Box 16.240) and (2) that P2 is the *Chosen Product* (as shown by Box 16.250). Each of these two events may be associated with various terms and conditions on the customer and/or the company. As explained above, the events may take place in two ways: either the customer selects the *Chosen Product* according to his/her utility, or the company selects the *Chosen Product* based on pre-determined rules (e.g., if the customer fails to notify the company before the *Notify Deadline*). In both situations, once the *Chosen Product* is selected, the company is free to reuse the *Released Product* for potential revenue. The customer may have to pay an additional exercise price at the CNT depending on the terms and conditions of the option contract. Once the *Chosen Product* is selected, the company and/or the customer may not change the *Chosen Product* except within the bounds of the terms and conditions in the option contract. The company or customer may (or may not) have the right to enforce the *Chosen Product* on the other party as per the terms and conditions of the option contract.

The *Released Product* may be blocked for the period between the ITT and the CNT. This period is termed the "*Blocking Period*". If there is more than one *Notify Deadline*, the exact length of the *Blocking Period* is unknown, but the minimum and maximum lengths are known to be between the ITT and the *First Notify Deadline* and between the ITT and the *Last Notify Deadline*, respectively.

The company may offer incentives to the customers to motivate them to choose one or more products as *Chosen Products* among the *APO Products* that may be more optimal for the company. A company may formulate one or more such offer (may referred to as Chosen Product Incentive Offers) and may send them to customers who have purchased APO but not yet selected their *Chosen Product* via email, phone, mail or any other communication channel. Thus, such customers may be persuaded to select said optimal product in lieu of incentives.

The company may generate revenue from the *Released Product* without utilizing the *Released Product*. The Product Price of the *Released Product* may be varied in such a way that may increase the demand of one or more other products offered by the same company, any other entity apart from said company, or any combination thereof. The variation in the Product Price of the *Released Product* may cause a spilled demand for this product but may create a surge in demand of one or more other products in the same or different product segments of the same company, any other company apart from said company or any combination thereof.

The above terms and conditions of the APO VOF may be set in a way to concurrently benefit the customer, the company, any other entity or any combination thereof. The customer receives additional utility from the flexibility to choose a desired product from among alternatives. The company benefits from enhanced customer satisfaction (loyalty and repeat business), incremental revenue from the APO Price and selling (reusing) the released products, and other operational benefits.

An APO VOF may include a right for the customer to utilize each of the m selected *APO Products*, along with a right for the company to limit the products (to fewer than m) that the customer can utilize if the company notifies the customer on a stated *Notify Deadline*. The right may include the condition that the company may notify the customer prior to or at the, prior to the, at or after the or after the stated *Notify Deadline* (which may be determined by the company and/or or the customer during or after the *Initial Transaction*). To provide flexibility to the customers, the company may offer (or allow) the customer to express their preferences regarding the *Chosen Product(s)* before the stated *Notify Deadline*. If the customer fails to do so, the company may or may not exercise their right to limit the customer to utilize fewer than (for example, at least one less) the earlier selected products (i.e., m products). The right may include the condition that the company may limit the customer after the customer expresses his/her preference for the *Chosen Products*. There may be a condition imposed on the customer to make at least one payment to the company when the customer expresses his or her preferences for the *Chosen Products*.

An APO VOF may include an option for the customer to utilize up to n of the m selected *APO Products*, where n<m, along with a condition that the customer may be able to utilize all the m selected products if there is at least one payment transaction between the company and customer in relation said APO grant, and that such payment is made after the APO is granted to the customer. This may provide additional flexibility to the customer. The customer may be limited to take the decision regarding utilizing all the m products before the utilization of the penultimate product. Said payment may be made in a separate transaction executed at any time after the *Initial Transaction*. The timing of said payment may be pre-determined. The customer may be able to select all the m products together in one transaction.

The costs, revenues, benefits, terms and conditions shown here are for illustration purposes only and actual values could be different depending upon specific values selected by the company for value options, customer behavior, company characteristics, *Notify Deadline(s)* and other relevant factors.

Thus, the APO concurrently optimizes value for at least two of the company, its customers, any other entity or any combination thereof. The customers receive enhanced flexibility in utilizing a product and utility in terms of guaranteed availability of alternate products at a (presumably low) known price with no hassles, whereas the company receives a significant incoming revenue benefit from consumer surplus. The company gets to know the relative preferences and utilities of a customer for various products as some customers take this option and others don't. The presumption here is that customers make a logical decision to choose the APO value option framework if they prefer to have alternate product flexibility in utilizing one or more products and can afford to pay the APO Price(s) (initial and exercise if any). The company also benefits from higher customer loyalty as customers receive higher satisfaction from using the company services, and can optimize its profitability by reusing/reselling the *Released Products*. The structure presented below for the APO (2,1) instance may be extended to implement other instances.

Example of APO VOF (2, 1) structure

Figures 17 and 18 demonstrate an illustrative practical example of using the APO (2, 1) instance in any industry. Consider a customer who interacts with a company to get APO. Per Act 16.200, an *Initial Transaction* takes place between the company and the customer. Fig. 17 displays some of the details of the *Initial Transaction*. The customer selects two *APO Products*, P1 (shown in Box 17.100) and P2 (shown in Box 17.200), and can choose to utilize either of them but not both (i.e., select either of them as the *Chosen Product)*. The company is under the condition to hold confirmed booking for the customer on both P1 and P2 until the *Chosen Product* is selected.

The customer pays an amount of $45 as the Initial APO Price and $500 as the Product Price to the company as part of the *Initial Transaction*. The *Initial Transaction* takes place on the 14th day of April (i.e., the ITT, shown in the second row of the Box

17.300). There is an explicit notification condition and the customer has to pick and notify the company regarding the *Chosen Product.*

The following text presents different cases to illustrate different types of terms and conditions that may be associated with the purchased APO. Four different scenarios are considered with different conditions (shown in Fig. 18). In all the scenarios, the *Notify Deadline* is expressed in terms of the number of days to utilization (DTU).

The first scenario, as demonstrated in the Box 18.100, displays a condition of the explicit notification without any exercise price. The customer needs to notify the company regarding the *Chosen Product* before 7 DTU (as shown by the *Notify Deadline*). The APO Price charged during the *Initial Transaction* serves as the total direct incremental revenue for the company and as the direct cost to the customer. There is no exercise price if the customer defaults.

The second scenario, as demonstrated by Box 18.200, displays a condition of the explicit notification with an exercise price that is a function of the *Chosen Product*. The *Notify Deadline* is 7 DTU. If P1 is the *Chosen Product*, then customer has to pay $10 as the exercise price, as shown in the second column of the second row in the Box 18.200. If P2 is the *Chosen Product*, then the customer has to pay $20 as the exercise price, as shown in the second column of the third row in the Box 18.200. P1 is the Default Product and the exercise price in the Default case is $20. The total APO Price charged to the customer (i.e., the direct incremental revenue to company) may turn out to be $55 or $65 depending on the *Chosen Product*.

The third scenario, as demonstrated in the Box 18.300, displays a condition of the explicit notification with an exercise price that is a function of the *Notify Deadline*. There are four *Notify Deadlines* associated with the APO. The exercise price increases from $0 (for the *First Notify Deadline* of 30 DTU) to $40 (for the *Last Notify Deadline* of 1 DTU). If the CNT is before 30 DTU, then the customer pays nothing more to the company as shown in the second column of the second row in the Box 18.300. If the

CNT is after 30 DTU and before 7 DTU, then the customer pays $20 as the exercise price (shown in the third column of the second row in Box 18.300). Similarly, the customer pays an exercise price of $30, if the CNT is after 7 DTU and before 3 DTU, and an exercise price of $40, if the CNT is after 3 DTU and before 1 DTU (as shown by the next two cells in the Box 18.300). If the customer fails to notify before 1 DTU (the *Last Notify Deadline*), then the Default Product P1 (shown in Box 18.300) will be selected as the *Chosen Product* at an exercise price of $40.

The fourth scenario, as demonstrated by Box 18.400, displays a condition of the explicit notification with an exercise price that is a function of both the *Notify Deadline* and the *Chosen Product*. Here, all the *Notify Deadlines* used in the third scenario are used in this scenario as well. If the CNT is before the *First Notify Deadline*, then the customer pays nothing more to the company if the *Chosen Product* is P1, and pays $10 as the exercise price if the *Chosen Product* is P2, as shown in the second column of the second and third rows in the Box 18.400, respectively. If the CNT is after the *First Notify Deadline* and before the *Second Notify Deadline*, then the customer pays an exercise price of $20 or $25 if the *Chosen Product* is P1 or P2, respectively, as shown in the third column of the second and the third rows, respectively in the Box 18.400. Similarly, the customer pays an exercise price of $30 for P1 or $35 for P2, if the CNT is after 7 DTU and before 3 DTU, and $40 for P1 or $50 for P2, if the CNT is after 3 DTU and before 1 DTU, as shown in the fourth and fifth columns of the second and the third rows in the Box 18.400, respectively. If the customer fails to notify before the *Last Notify Deadline* (i.e., 1 DTU), then the Default Product, P2 (as shown in the Box 18.400), will be selected as the *Chosen Product*. The exercise price is $50 in the Default case.

Per Act 16.230, either of the two events may take place; either P1 is the *Chosen Product* or P2 is the *Chosen Product*. Let us assume that the customer chooses the product P1 as the *Chosen Product* and notifies the company with the CNT of 8 DTU in both the first and second scenarios and the CNT of 4 DTU in the third scenario. And in the fourth scenario, the customer fails to provide a timely notification.

In the first three scenarios, P1 is selected as the *Chosen Product*, and the P2 is released by the company to be used for further sales or other purposes. In the first scenario, the customer pays nothing more to the company. In the second scenario, the customer pays $10 as the exercise price, and thus, a total of $55 as the total APO Price to the company. In the third scenario, the customer pays $30 as the exercise price, and thus, a total of $75 as the total APO Price to the company.

In the fourth scenario, the customer fails to notify the company and hence, the Default Product (i.e., P2) is selected to be the *Chosen Product*. The customer pays $50 more as the exercise price and thus, a total of $95 is paid to the company as the total APO Price.

Model to analyze APO applicability and pricing dynamics in any industry

The model presented below may be applied for the APO VOF in any industry to study and analyze the dynamics of applying APO to a given set of products. In general, the Expected Value of a product (EV) implies the revenue (or other value, e.g., costs savings or revenue plus costs savings) expected, on average, by selling and/or using the product for any other purpose. Companies use different types of pricing mechanisms to price their products in order to generate value greater than or equal to the expected value of their products. The calculation of EV and Product Price is not discussed or presented here. A company may use a method of its choosing to calculate EV and Product Prices.

The following model presents a set of equations for the generic APO (m, n) instance. The company, customer, any other entity or any combination thereof selects m products and can choose any n products out of those m. The *Chosen Products* may be selected in many ways, where each such combination of *Chosen Products* along with associated conditions is termed "Chosen Product Group". A Chosen Product Group may include the combinations which may have the same exact set of products but may differ in terms of one or more associated conditions such as price, *Notify Deadline(s)* or others.

For example, two combinations would be different when the *Chosen Products* are the same but the CNTs are different, leading to different Exercise Prices.

The following inequality is presented as a general function for the t^{th} Chosen Product Group.

$$Si + \sum_{j=1}^{n} Pe(j,t) + \sum_{i=1}^{m} \Delta EVBP(i,t) >= 0$$

where,

k = total number of Chosen Product Groups,

Si = Sum of the all prices paid prior to or at the ITT, including all Product Prices and APO Prices,

Pe(j,t) = Exercise Price paid for selecting the product 'j' as the *Chosen Product* within the t^{th} Chosen Product Group, and

$\Delta EVBP(i,t)$ = change in the EV of Product 'i' across the *Blocking Period,* within the t^{th} Chosen Product Group.

A set of k number of inequalities may be created, for each of the Chosen Product Groups (i.e., from 1 to k), which would together represent the APO dynamics. A company may then use and solve a system of k inequalities to determine optimal price, notify deadline, capacity and other conditions for the APO VOF.

A company may use the model provided above to decide on the terms and conditions of an APO VOF that would make the APO offer a valuable proposition for both the customer and the company. *Notify Deadlines*, APO Prices, Product Prices, APO availability on products and other terms and conditions may be decided based on an analysis done using the above model.

5) Optimization of APO VOF

As mentioned earlier (shown in Fig. 7), in the form of an optional last step in the first stage, a financial analysis may be performed using the existing company and customer data to determine the optimal terms and conditions of the APO VOF. 'What-if' scenarios may be executed to determine an optimal pricing strategy. The company may want to divide customers using one or more criteria and design separate APO VOF for each customer segment.

Second Stage: Using the APO Value Option Framework

After completing the first stage of the method, the company has created an APO VOF and specific options within that framework. The company may have also segmented customers and designed options accordingly. The company is fully prepared to use a structured format consisting of one or more APO value options to interact with its customers in real time to generate benefits for both the company and its customers. The second stage of the APO VOF is now presented.

The implementation of the APO VOF between the company and its customer takes place through two high level acts, as shown in Fig. 19. In Act 19.100, the 'Buy APO' process, an interactive event between the customer and the company's web server, runs to carry out the *Initial Transaction* of the APO VOF. In this Act, a number of algorithms may be executed (e.g., availability, APO Price, Product Price and *Notify Deadlines*) on the company's server to optimally calculate the terms and conditions of the APO VOF to concurrently benefit the company, the customer, any other entity and/or any combination thereof. In Act 19.200, the *customer notification* process (explained later) is executed. In this process, the customer selects the *Chosen Product*. The process may also consist of one or more event optimizer algorithms that may help to optimally select the *Chosen Product* and/or to optimally reuse the *Released Product*.

As explained above, the Buy APO process may be implemented via the Sequential (shown in Fig. 20) or the Concurrent (shown in Fig. 22) process. There are

many ways to do the Sequential process. As an example of the Sequential process, a customer may have already purchased a Product/Set/Order before the *Initial Transaction* begins. In such situations, said Product/Set/Order may be referred to as Initial Product/Initial Set/Initial Order or IP/IS/IO, in short, respectively. The Initial Set is also referred to as Initial Product Set (or IPS, in short). A customer may get an APO, i.e., get one or more APO Products/Sets/Orders on an IP/IPS/IO, respectively. An APO Product/Set/Order is also referred to as Option Product/Option Set/Option Order, or OP/OS/OO, in short, respectively. An Option Set is also referred to as Option Product Set (or OPS, in short). The terms "APO Product"/"APO Set"/"APO Order", "Initial Product"/"Initial Set"/"Initial Order" and "Option Product"/"Option Set"/"Option Order", respectively, have been used interchangeably as and when context requires. The two events (one for the Initial Product and the other for the *Initial Transaction*) may be executed with a minimal (one just after another) or a significant time gap (e.g., few minutes, hours, days and so forth) in between them.

The APO VOF may be implemented at different levels including, but not limited to, Product, Set and Order. Few illustrations of implementation of these levels are presented later, along with the detailed discussions on specific industries since selection of an industry provides a context and makes the understanding smoother and easier.

A company may choose to implement an APO at any level(s). In a specific APO interaction between a customer and the company, the implementation level should be the same for all *APO Products*, *Chosen Products* and *Released Products*. For example, if APO is implemented at the Order level, then all the *APO Products* would refer to *APO Orders*; *Chosen Products* would refer to *Chosen Orders;* and *Released Products* would refer to *Released Orders*.

1. 'Buy APO' - Dynamic interaction to capture customer demand

In the Buy APO process, a customer interacts with the company's server to buy an APO. The interaction may take place, for example, via phone, in-person or on a

website. The Sequential Buy APO Process is presented first along with its detailed algorithms; followed by a short summary of the Concurrent Buy APO Process.

Sequential Buy APO Process

There are several ways to implement the Sequential process. Few examples of implementation of the Sequential process are presented in reference with specific industries later, along with the detailed discussions on those industries since selection of an industry provides a context and makes the understanding smoother and easier.

The following presents an algorithmic illustration of the Sequential Buy APO process mentioned above. Consider Fig. 20. In Act 20.100, the customer selects (and/or purchases) an Order (with one or more IPS). Next, in Act 20.110, the customer reaches an interactive interface of the company's web server to a Buy APO page, where the customer selects an IPS (referred to as Target_IPS) on which an APO is desired. Next, the customer inputs the OPS search criteria for the current Target_IPS in Act 20.115.

Next, on clicking the "Search *APO Products*" button, control goes to Act 20.120, where the OPS search algorithm is executed to search for an OPS. The OPS search algorithm returns a list of valid OPSs, along with a list of Comb_NDs (*defined elsewhere*) and associated APO Prices. The details of the OPS search algorithm are presented later. Next, the search results are displayed for the customer, who then selects the desired OPS and one or more associated Comb_ND(s)/APO Price(s), as shown in Act 20.130.

Next, in Act 20.140, a test is performed to determine whether the customer wants to select more OPSs on the current Target_IPS or on another IPS. If the customer wants to get an OPS on another IPS, control loops back to Act 20.110, where the customer selects another IPS as the Target_IPS, and then the process is repeated again for the new Target_IPS. If the customer wants to get more OPSs on the current Target_IPS, control loops back to Act 20.115, where the customer enters the OPS search criteria, and then the process is repeated for the new OPS search criteria. If the customer does not want to

buy any more OPSs, control goes to Act 20.150, where a payment transaction (if needed) may be executed. For example, a customer may need to pay a price for the Product after taking into consideration the Initial APO Price (if any) using a credit card, direct bank account debit or any other payment transaction mechanism. Next, the algorithm ends in Box 20.200. The computation may be performed using a processor that may calculate results in optimal time.

OPS Search

The following algorithm (shown in Fig. 21) determines and validates an OPS for a given set of conditions including, but not limited to, availability, *Notify Deadline* and price. Said algorithm has already been discussed above in a more generic sense along with one of the ways of its implementation along with various information technology and networking tools including, but not limited to, one or more servers, database, load balancers, firewall, routers, Internet, highly secured VPN, Intranet, RAM, hard disk drives, CPUs, monitors as shown by Fig. 13D.

In Act 21.100, the number of customers (IC), IPS_Set (containing all the IPS in the Initial Order, and all the OPSs, (if any) already selected/purchased along with Comb_ND_Set(s) and Comb_OP_Set(s), for each IPS), Target_IPS and the OPS Search parameters are input to the system. The definitions and details on Comb_ND_Set and Comb_OP_Set are provided later. The OPS search parameters may include, but are not limited to, date, time and location, number of Products per Set, *Notify Deadline*, APO Price and so forth as appropriate for a given product in a given industry. A customer may be allowed to input *Notify Deadline* and/or APO Price on the basis of which valid OPSs (that satisfy the given criteria of *Notify Deadline* and/or APO Price) may be searched for and displayed for the customer. In another example, a customer may be asked to input one or more product related parameters, and then a set of Notify Deadlines and APO Prices may be computed for the Products that match the given criteria. In yet another example, a customer may input both product related parameters and *Notify Deadline* and/or APO Price inputs and then a search may be performed for valid OPSs.

In another example, a customer may input to the system, one or more Products, and/or inputs to search for one or more additional products (e.g., price etc.) to search for OPS that may be combined with one or more input products (by the customer) to constitute the total set of products for an APO. In such situations, a company may also validate the products input by the customer to determine if said products are eligible to be *APO Products*.

Next, control goes to Act 21.110, where an OPS Search is performed for the given criteria. The search may be best performed using a processor that may calculate results in optimal time. The order in which search parameters are executed may be optimized to reduce the search time, however, it may or may not affect the final outcome. A company may select any order of its choosing. In Act 21.110, Product Sets are determined that match the search criteria and the resulting Sets are added to a list termed LIST_OPS.

Next, in Act 21.120, a list of OPS validation rules is obtained from the company's APO VOF database and the rules are used to validate all the Sets in the LIST_OPS list. Sets that do not satisfy the rules are discarded. Validation rules may include, but are not limited to, a Maximum Number of Products per Set Rule, a Maximum Product Price Rule and so forth. For example, a Maximum Number of Products per Set Rule discards the Sets that have more Products than specified. A company may implement any validation rule of its choosing to further qualify the Sets in the LIST_OPS list. As a last Act in Act 21.120, the first element in the updated LIST_OPS list is designated as the Current_OPS.

Next, control goes to Act 21.130, where a group of Comb_NDs is computed for the combination of the Target_IPS, all the existing OPS of the Target_IPS and the Current_OPS, and added to a set called Comb_ND_Set. Next, in Act 21.135, a test is performed to determine whether the Comb_ND_Set obtained in the previous Act is Null. If so, control goes to Act 21.155. If not, control goes to Act 21.140, where the APO availability and APO Price for the Comb_ND_Set are determined. Next, in Act 21.150,

another test is performed to determine whether the APO Availability or the APO Price is Null. If so, control goes to Act 21.155. If not, control goes to Act 21.160.

In Act 21.155, the Current_OPS is discarded from the LIST_OPS list, and control goes to Act 21.160, where a test is performed to determine if more elements are left in the LIST_OPS list. If so, control goes to Act 21.165. If not, control goes to Act 21.170.

In Act 21.165, the next element in the LIST_OPS list is designated as the Current_OPS and control loops back to Act 21.130 to repeat the process for the new Current_OPS. In Act 21.170, the updated LIST_OPS list is returned as the search result, and then the algorithm ends in Box 21.200.

Computation of *Notify Deadlines*

A company may set one or more *Notify Deadlines* of its choosing for its Products. Once the *Notify Deadlines* have been set for each Product, the next Act is to create a framework to compute the *Notify Deadlines* for a group of Products (such as a Set, an Order or any other group). The following sections present an example of a framework that may be used to obtain a set of *Notify Deadlines* applicable to a group of Products. A company may use any framework and algorithm of its choosing to obtain the same.

A set of *Notify Deadlines* associated with a Product, a Set and a combination of two or more Sets is called Product_ND_Set, Set_ND_Set and Comb_ND_Set, respectively. Each element in the Product_ND_Set, Set_ND_Set and Comb_ND_Set is termed Product_ND, Set_ND and Comb_ND, respectively. The Comb_ND_Set may be computed by combining the Set_ND_Sets of all the given Sets. A Set_ND_Set may be computed by combining the Product_ND_Sets of all the Products under that Set. The *Notify Deadlines* may be computed based on various parameters and factors of the company choosing. One example to compute a Comb_ND_Set is as follows. First compute Set_ND_Set for all Sets. A Set_ND_Set is computed by first selecting earliest of the *Notify Deadlines* of each Product within the concerned Set, and then picking the

latest of those Deadlines, and noting that as the Target_Deadline. Next step is to pick all those *Notify Deadlines* that fall after the Target_Deadline. *Notify Deadlines* thus obtained may be validated using various validation rules based on company factors such as customer utility, product parameters and so forth. Similarly, the Comb_ND_Set may thus be computed by repeating the above process for Set_ND_Sets, thus obtained for each Set.

Available Capacity Check

The APO available capacity for an OPS may depend on one or more factors including, but not limited to, *Notify Deadline*, APO Prices, expected Product value and so forth. A company may use any method of its choosing to determine APO capacity of a product. For example, a company may choose to have a fixed APO capacity for one or more of its products.

An instance to compute APO capacity is discussed below. Consider the case, when APO Capacity is dependent on *Notify Deadline*. In such situation, the objective is to determine those Comb_NDs within the Comb_ND_Set on which APO is available for the given OPS. The APO Capacity and the Used APO Capacity (the total number of Products on which APO has been sold but not exercised) may be calculated for each Comb_ND within the Comb_ND_Set. Available Capacity (AC) would then be the difference of APO Capacity and Used APO Capacity for the given Product. If the AC is greater than or equal to the number of incoming customers desiring a APO, then the APO capacity is available at a given Comb_ND for the given OPS. The process may be repeated for all *Notify Deadlines* within Comb_ND_Sets. APO may be made available on a given OPS for a given Comb_ND, if APO is available on all the Products of OPS for the given Comb_ND.

APO Price Calculation

An company may set APO Prices for a Product using any method of company's choosing. Once the APO Prices have been set for each product, the next Act is to create a framework to compute APO Prices for a group of Products (such as a Set, an Order or any other group) by using APO Prices for each of the Products in the group.

The parameters Product_OP refer to an APO Price (and may or may not be corresponding to a *Notify Deadline)* associated with a Product. Similarly, Set_OP and Comb_OP refer to APO Price (may or may not be corresponding to a *Notify Deadline*) associated with a Set and a combination of two or more Sets, respectively. A set of Product_OPs, Set_OPs and Comb_OPs is termed Product_OP_Set, Set_OP_Set and Comb_OP_Set, respectively. The Comb_OP_Set is computed by combining the Set_OP_Sets of the IPS and all the OPSs (existing and new). A Set_OP_Set is computed by combining the Product_OP_Sets of all the Products under that Set.

One or more Set_OP_Rules may be read from the company's database and applied to calculate Set_OP_Set for each input Segment (IPS and all OPSs) using the Product_OP_Sets of all the Products of said Set. A company may use any Set_OP_Set Rule of its choosing. Set_OP_Rules may be defined to calculate Set_OP as the sum, average, highest, lowest or any other function of Product_OPs of all the Products at a given Comb_ND. Similarly, a Comb_OP_Set consists of one or more Comb_OPs, and is calculated using one of the pre-determined rules, termed Comb_OP_Rules, to combine the Set_OPs of all the Sets in the combination. A company may use a Comb_OP_Rule of its choosing. Comb_OP_Rules may be defined similar to the Set_OP_Rules.

Concurrent Buy APO Process

As explained above, in the Concurrent Buy APO process, a customer selects all the *APO Products* concurrently in one transaction. An algorithmic illustration of an example of the Concurrent Buy APO process is displayed in Fig. 22. The APO (2,1) instance is assumed here as an example. Consider a customer who wants flexibility in

his trip and wants two *APO Product Sets*. In Act 22.100, the customer needs for APO are input, including, but not limited to, a search criteria for two Product Sets according to customer's utility (may be similar to the search criteria defined above for the Sequential Buy APO process).

Next, in Act 22.110, the APO algorithm is run to determine the combinations of two Product Sets that satisfy inputs. A list of such search results is displayed for the customer along with the associated terms and conditions including, but not limited to, *Notify Deadlines*, APO Price and Product Price for each such combination. The APO algorithms for the Sequential Buy APO (defined above) process may also be used for the Concurrent Buy APO process.

Next, in Act 22.120, the customer selects a desired combination of two Sets and the associated conditions such as APO Price/*Notify Deadline*. Next, in Act 22.130, a payment transaction is executed, if needed. For example, the customer pays the Product Price for APO (if any) using a credit card, direct bank account debit or any other payment transaction mechanism. Next, the algorithm ends in Box 22.200. The computation may be performed using a processor that may calculate results in optimal time.

(2) Event Optimizer

After the completion of the Buy APO process, the next stage is the Event Optimizer. In this stage, the *customer notification* (or CN, in short) process as shown in Act 19.200 is executed. In this process, a customer selects a *Chosen Product*. The process may also consist of one or more event optimizer algorithms that may help to optimally select the *Chosen Product* and/or to optimally reuse the *Released Product*. One of the ways of implementation of Event Optimizer stage with the help of information technology tools has already been discussed above in a more generic fashion wherein said tools include, but are not limited to, one or more servers, database, load balancers,

firewall, routers, Internet, highly secured VPN, Intranet, RAM, hard disk drives, CPUs, monitors as shown by Fig. 13E.

APO Exercise Process

In the Customer Notification (or CN, in short) process, a customer interacts with a company's server to select the *Chosen Product*. The interaction may take place (for example) via phone, in-person, on a website or via any other communication mechanism. The Customer Notification process may be performed using any rule/method as desired.

Customer Notification (or CN) process

The primary objective of the CN process is to select (or define) the *Chosen Product*. In the CN process, a decision for the *Chosen Product* is notified to the company. As mentioned earlier, the *Chosen Product* may be defined by the company, the customer, another entity or any combination thereof. The customer interacts with an company server that runs the CN process, to select the *Chosen Product*. If the customer fails to notify the company of the *Chosen Product* before the *Notify Deadline*, the *Chosen Product* is decided based on the terms and conditions set before in the *Initial Transaction* of the APO purchased by the customer.

Fig. 23 depicts an example of an algorithm that may be used to execute the *Customer Notification* process. In Act 23.100, a customer enters input parameters, such as order confirmation number, last name, purchase date and so forth to retrieve the data from the company database for the purchased Product Order and *APO Products*. Next, in Act 23.110, a test is performed to determine whether the *Notify Deadline* has expired or not. If so, then control goes to Act 23.120. If not, then control goes to Act 23.140.

In Act 23.120, a Default Rule is read from the company's database. A Default Rule defines a criteria to select the *Chosen Product* if the customer fails to provide a timely notification (i.e. before the *Notify Deadline)* to the company regarding his/her

decision of the *Chosen Product*. A company may use a Default Rule of company's choosing. A company may use a rule to choose a product with the lower expected value, earlier departure date, lower sales volume or any other factor. Next, in Act 23.130, the Default Rule, thus obtained, is used to select the *Chosen Product Set*, and then control goes to Act 23.150. In Act 23.140, the customer selects the desired *Chosen Product*. Next, control goes to Act 23.150.

In Act 23.150, a payment transaction (if any) is executed, and then the *Chosen Product* is displayed to the customer. The payment transaction may be related to the APO purchased by the customer (such as a payment of an APO Exercise Price). The algorithm, then ends in Box 23.200. The computation may be performed using a processor that may calculate results in optimal time.

Implementation of APO VOF in conjunction with other VOFs

APO VOF may be used in conjunction with one or more other VOFs, for example, the FRO (Flexibility Reward Option) VOF. A customer who receives an APO is termed "A" type of customer. A company may form a group of one or more APO customers and one or more FRO customers, where the options (APO and FRO) obtained by the group members are complimentary in nature. As an example, consider an A customer who bought an APO to choose either of P1 and P2 as the *Chosen Product*, and consider a Y customer who received a FRO and is flexible to take any of P1 and P2 as the *Chosen Product*. Thus, if A decides to choose P1 as the *Chosen Product*, the company may assign P2 as the *Chosen Product* for Y, and vice versa. The customers A and Y have taken complimentary options and may form a group. The company may need to hold only one unit of inventory in P1 and P2 to satisfy the needs of both A and Y (assuming each A and Y only need one unit of product). Such a combination of complimentary options or VOFs may improve efficiency and concurrently enhance value for all the parties involved (in the context of the current example, enhance value for A, Y and the company).

The implementation of the grouping of A type and Y type of customers may be done in one or more ways. One way to implement such grouping is to first have one or more Y type of customers and based on such customer(s), the company may offer complimentary APOs to customers to make groups. In another implementation, the company may first offer APO and based on such APO customer(s), company offers complimentary FROs to customers to make groups. In yet another implementation, the company may offer APO and FRO separately and then define a process to make complimentary groups of A and Y customers (such groups termed "AY_Groups").

A company may choose to create AY_Groups at various group levels such as implementation of grouping at Level 1, Level 2 and so on. In Level 1 grouping, an AY_Group involves one each of A and Y type of customers. An example of Level 1 grouping has already been given above (the two customer, A and Y, example).

In Level 2 grouping, the grouping involves making complimentary groups for more than 2 customers. As an example, consider an A customer who bought an APO to choose either of P1 and P3 as the *Chosen Product*, a Y1 customer who received a FRO and is flexible to take any of P1 and P2 as the *Chosen Product* and a Y2 customer who has also received a FRO and is flexible to take any of P2 and P3 as the *Chosen Product*. A notation A-Y1-Y2 represents this example. Thus, if A decides to choose P1 as the *Chosen Product*, the company may assign P2 as the *Chosen Product* for Y1 and P3 as the *Chosen Product* for Y2. Alternatively, if A decides to choose P3 as the *Chosen Product*, the company may assign P1 and P2 as the *Chosen Products* for Y1 and Y2, respectively.

It is assumed that a "unit" represents one unit of product (or product capacity) and each customer needs only one unit of a product. Continuing with the above example, if the company were to not consider the complimentary nature of options obtained by A, Y1 and Y2 customers, the company may need to hold (or block) a total of 4 units of capacity to ensure complete satisfaction of needs of A, Y1 and Y2, i.e., 2 units for A (1 unit each of P1 and P3 as A could choose any product), 1 unit for Y1 (of either

P1 or P2) and 1 unit for Y2 (of either P2 or P3). This implies, to satisfy a total need of 3 units of products, the company may need to hold (or block) 4 units of product capacity, creating a redundant capacity of 1 unit that the company may not be able to use otherwise. By creating a complimentary group of A-Y1-Y2, the company needs to only hold (or block) 3 units of capacity (1 unit each in P1, P2 and P3), thus, freeing up 1 unit of redundant capacity. Thus, an AY_Group mechanism may create an efficient structure with minimal holding (and/or blocking) of capacity to satisfy the needs of all the concerned customers.

The grouping may also be implemented at higher levels such as Level 3 grouping, Level 4 grouping, Level 5 grouping and so on. An example of the Level 3 grouping may be A1-Y1-Y2-Y3.

A company may choose to implement grouping at various product levels such as Product, Set and Order. A company may also change terms and conditions of one or more option contracts of one or more FRO and/or APO customers (for e.g., price, notify deadline and so on) to solicit customer participation in FRO/APO to create more AY_Groups. The company may also offer incentives to customers to choose complimentary FRO/APO offerings to enable the company to create more AY_Groups. The implementation methods mentioned above for grouping are for illustration purposes only and a company may choose to implement grouping in one or more other ways or by combining above said methods or by combining one or more other ways along with one or more above said methods.

Fig. 24 displays a flow chart that illustrates one way of implementing grouping of A and Y type of customers. In Act 24.100, sets of A and Y customers are taken as input. Next, in Act 24.110, a set of one or more Grouping Rules is read from the company's database (24.210). A grouping rule may depend upon the number of A and/or Y type of customers, desired capacity redundancy in the system, the permissible time factor to create AY_Groups, any other rule of company choosing, any combination thereof and so on. For example, a company may choose a Grouping Rule whereby new groups are

created by first ungrouping one or more of the AY_Groups (created earlier but unexercised, for example, groups for which the customer has not been notified, or if notified, the customer has not utilized the Product and the terms of option contract allows for a change in the *Chosen Product*). A Grouping Rule may create groups of only those A and Y type of customers who have yet to be grouped and discarding all A/Y customers, which have already been grouped. A company may implement any Grouping Rule to formulate AY_Groups. The choice to Grouping rules may enhance the overall value for the company (for example, reduce the total capacity required to satisfy product needs for all A and Y customers). Theoretically, the number of units of the Product required (or blocked) should be equal to the number of customers buying the Product (assuming each customer wants one unit of product). Thus, by implementing the grouping and with the help of appropriate Grouping Rules, the company may attempt to achieve such theoretical minima.

Next, in Act 24.120, the Grouping Rules, so obtained from the company's database, are used to make AY_Groups. Next, in Act 24.130, the AY_Groups so created are returned along with ungrouped A/Y, if any, and the process then ends in Box 24.200.

The grouping may enhance customers' experience, and may comprise operating a system that delivers a FRO to at least a "first customer" to utilize up to n of m selected products for said first customer, and n is less than or equal to m; operating a system that delivers an APO to at least a "second customer" to utilize up to k of p selected products, and k is less than or equal to p; operating a system to define each of the k *Chosen Products*, whereby after each of the k *Chosen Products* is defined, said "second customer" can utilize said *Chosen Product*; operating a system wherein a company defines t *Chosen Product*(s) for said "first customer" after each of said k *Chosen Products* is defined, wherein after each of said t products is defined, said first customer can utilize said defined product, where t is less than or equal to n. Said t products may be a subset of n products, m products or both. Said t products or n products or both may also include one or more products not included in said m selected products. Similarly, k products may be a subset of p products, or may include one or more products other than

said p products. The grouping may be performed for a multiplicity of at least one of said first or second customers and may combine together at least one of each of said first and second customers to formulate at least one group with at least one complementary set of options. The grouping may enable a company to utilize at least one of said m or p products at least after delivery of any of said first or second options.

APO VOF may be used in conjunction with one or more other VOFs, for example, the UPO (Upgrade Product Option) VOF. A customer who received an APO is termed "A" type of customer. A company may form a group of one or more APO customers and one or more UPO customers, where the options (APO and UPO) obtained by the group members are complimentary in nature. As an example, consider two customers A(P1, P2) and U[up(P2), base(P1)]. The notation A(P1, P2) implies a customer A who has received an APO and has the flexibility to choose either of P1 or P2 as the *Chosen Product*. The notation U[up(P2), base(P1)] implies a customer U who received a UPO and wishes to get an upgrade from P1 (i.e., the base product) to P2 (i.e., the up product). Thus, if A decides to choose P1 as the *Chosen Product*, the company may upgrade U to P2. If A decides to choose P2 as the *Chosen Product*, the company may not upgrade U and hence U gets P1. The customers A and U have taken complimentary options and may form a group. The company may need to hold only one unit of inventory in P1 and P2 to satisfy the needs of both A and U (assuming each A and U only need one unit of product). Such a combination of complimentary options or VOFs may improve efficiency and concurrently enhance value for all the parties involved (in the context of the current example, enhance value for A, U and the company).

The implementation of the grouping of A type and U type of customers may be done in one or more ways. One way to implement such grouping is to first offer and secure one or more U type of customers and based on such customer(s), the company may offer complimentary APOs to customers to make groups. In another implementation, the company may first offer and secure APO customers and based on such APO customer(s), company offers complimentary UPOs to customers to make groups. In yet another implementation, the company may offer APO and UPO

separately and then define a process to make complimentary groups of A and U customers (such groups termed "AU_Groups").

A company may choose to create AU_Groups at various group levels such as implementation of grouping at Level 1, Level 2 and so on. In Level 1 grouping, an AU_Group involves one each of A and U type of customers. An example of Level 1 grouping has already been given above (the two customer, A and U, example).

In Level 2 grouping, the grouping involves making complimentary groups for more than 2 customers. As an example, consider three customers A(P1, P2, P3), U1[up(P2, P3), base(P1)] and U2[up(P1, P3), base(P2)]. The notation A(P1, P2, P3) implies a customer A who received an APO on P1, P2 and P3 (flexibility to choose any one of P1, P2 or P3 as the *Chosen Product).* The notation U1[up(P2, P3), base(P1)] implies a customer U1 who received a UPO and wishes to get an upgrade from P1 (base product) to either P2 or P3 (any of the two up products), and U2[up(P1, P3), base(P2)] implies a customer U2 who received a UPO and wishes to get an upgrade from P2 (base product) to either P1 or P3 (any of the two up products). A company may group these three customers together. If A decides to choose P1 as the *Chosen Product*, the company may upgrade U1 to P2 and U2 to R3. Alternatively, if A decides to choose P2 as the *Chosen Product*, the company may upgrade U1 to P3 and U2 to P1. In the third case, if A decides to choose P3 as the *Chosen Product,* the company may upgrade U1 to P2 and U2 to P1. Thus by grouping them together, the company needed to hold only one unit of inventory in each of the three products P1, P2 and P3 to satisfy needs for all three customers in all different situations.

It is assumed that a "unit" represents one unit of product (or product capacity) and each customer needs only one unit of a product. Continuing with the above example, if the company were to not consider the complimentary nature of options obtained by A, U1 and U2 customers, the company may need to hold (or block) a total of 5 units of capacity to ensure complete satisfaction of needs of A, U1 and U2, i.e., 3 units for A (1 unit each of P1, P2 and P3 as A could choose any product), 1 unit for U1 in P1

(base product) and 1 unit for U2 in P2. Even by blocking (or holding) 5 units of space, there may be no guarantee that the company would be able to satisfy upgrade needs for U1 or U2 (in the event they are not grouped together). This implies, to satisfy a total need of 3 units of products, the company may need to hold (or block) 5 units of product capacity, creating a redundant capacity of 2 units that the company may not be able to use otherwise. By creating a complimentary group of A-U1-U2, the company needs to only hold (or block) 3 units of capacity (1 unit each in P1, P2 and P3), thus, freeing up 2 units of redundant capacity. Thus, an AU_Group mechanism may create an efficient structure with minimal holding (and/or blocking) of capacity to satisfy the needs of all the concerned customers.

The grouping may also be implemented at higher levels such as Level 3 grouping, Level 4 grouping, Level 5 grouping and so on. An example of the Level 3 grouping may be A1-U1-U2-U3.

A company may choose to implement grouping at various product levels such as Product, Set and Order. A company may also change terms and conditions of one or more option contracts of one or more UPO and/or APO customers (for e.g., price, notify deadline and so on) to solicit customer participation in UPO/APO to create more AU_Groups. The company may also offer incentives to customers to choose complimentary UPO/APO offerings to enable the company to create more AU_Groups. The implementation methods mentioned above for grouping are for illustration purposes only and a company may choose to implement grouping in one or more other ways or by combining above said methods or by combining one or more other ways along with one or more above said methods.

Fig. 25 displays a flow chart that illustrates one way of implementing grouping of A and U type of customers. In Act 25.100, sets of A and U customers are taken as input. Next, in Act 25.110, a set of one or more Grouping Rules is read from the company's database (25.210). A grouping rule may depend upon the number of A and/or U type of customers, desired capacity redundancy in the system, the permissible time factor to

create AU_Groups, any other rule of company choosing, any combination thereof and so on. For example, a company may choose a Grouping Rule whereby new groups are created by first ungrouping one or more of the AU_Groups (created earlier but unexercised, for example, groups for which the customer has not been notified, or if notified, the customer has not utilized the Product and the terms of option contract allows for a change in the *Chosen Product*). In another example, a Grouping Rule may create groups of only those A and U type of customers who are yet to be grouped and discarding all A/U customers, which have already been grouped. A company may implement any Grouping Rule to formulate AU_Groups. The choice to Grouping rules may enhance the overall value for the company (for example, reduce the total capacity required to satisfy product needs for all A and U customers). Theoretically, the number of units of the Product required (or blocked) should be equal to the number of units the customers shall be eventually utilizing. Thus, by implementing the grouping and with the help of appropriate Grouping Rules, the company may attempt to achieve such theoretical minima.

Next, in Act 25.120, the Grouping Rules, so obtained from the company's database, are used to make AU_Groups. Next, in Act 25.130, the AU_Groups so created are returned along with ungrouped A/U, if any, and the process then ends in Box 25.200.

The grouping may enhance customers' experience, and may comprise operating a system that delivers a UPO to at least a "first customer" to utilize up to n of m selected products for said first customer, where n is less than or equal to m; operating a system that delivers an APO to at least a "second customer" to utilize up to k of p selected products, where k is less than or equal to p; operating a system to define each of the k *Chosen Products*, whereby after each of the k *Chosen Products* is defined, said "second customer" can utilize said *Chosen Product*; operating a system wherein a company defines t *Chosen Product*(s) for said "first customer" after each of said k *Chosen Products* is defined, wherein after each of said t products is defined, said first customer can utilize said defined product, where t is less than or equal to n. Said t products may be a subset of n products, m products or both. Said t products or n products or both may

also include one or more products not included in said m selected products. Similarly, k products may be a subset of p products, or may include one or more products other than said p products. The grouping may be performed for a multiplicity of at least one of said first or second customers and may combine together at least one of each of said first and second customers to formulate at least one group with at least one complementary set of options. The grouping may enable a company to utilize at least one of said m or p products at least after delivery of any of said first or second options.

Business Model to implement APO

Different business models may be used to implement an APO VOF. The business models mentioned below, without limitation, may be used to implement the APO VOF in any industry. For example, a company may choose to implement an APO VOF individually or in conjunction with one or more partners and/or other companies.

As mentioned in section above, in another implementation of APO, a company may allocate product inventory to another entity. The term "allocation of inventory or product inventory" or "allocation of product(s)" implies, without limitation, assigning one or more units of one or more product(s) to an entity for any purpose or use by the entity either exclusively or non-exclusively. For example, an entity may use the allocated products to offer APO to customers and/or to sell the products as regular products. An allocation of product may be conditional. For example, one of the conditions may require a return of at least one allocated product after a specified time period and/or other consideration(s).

The customer may select or purchase one or more products from the company or/and said entity and then interact with said entity to purchase one or more *APO Products* in relation to said (already purchased) products. Said entity may also receive product allocation from more than one company, and thus, offer products from multiple companies to a single customer during the *Initial Transaction* for APO.

The OA may use those products and operate a service to offer APOs to the company customers. As explained above in Fig. 13A, a customer may select one or more products from the OA, and then receive an APO on those selected products from the OA. Another approach would be for a customer to select one or more products from the company and then receive the APO option on those selected products from the OA. In another example, a customer may select one or more products from both the company and the OA, and then receive the APO option on those selected products from the OA. It is also possible that the customer receives an APO from the company or both from the company and the OA on a given set of selected products.

The OA and the company may simultaneously offer APOs to the customers, i.e., a customer may either approach the company or the OA to receive an APO on desired products. In another model, the OA may operate as the sole provider of the APO to all the customers of an company. In a yet another model, the OA and the company may choose to work together and jointly offer APOs to the company customers. The OA or the company may offer and sell APOs to customers using either or both of the Sequential or the Concurrent Buy APO processes.

As explained in Fig. 13A above, an OA may be able to offer APO on products from one or multiple companies. An OA may receive allocation of product from two or more companies. A customer may purchase one or more products from one or more companies and/or from the OA, and then receive an APO option on those selected products from the OA. Even if the OA may not be entitled to or does not receive product allocation from a company, it may still be able to formulate an agreement with that company to offer APOs on the products of that company. Thus, a customer may be able to receive an APO on products from multiple companies, giving the customer more flexibility and variety to choose from. For example, a customer may receive an APO on two products from two different companies and can choose to utilize either of them within the terms and conditions of the option contract. This may provide a lot of flexibility for the customers, especially when the customer desires products which are available with only few companies. An OA may be able to thus create a multi-company

APO VOF Framework, which may tremendously enhance the flexibility for the customers. All the participating companies that allocate products to and/or partner with the OA to offer APO may also gain from an overall increase in the total spending by the consumers, enhanced overall customer satisfaction and/or other operational benefits. Either or both of the OA and the company may process the Chosen Products associated with an APO purchased by the customer. A customer may receive products related to the APO grant from the OA or the company. An entity (the OA and the company) may process the products offered only by that entity or by either of the two entities.

The OA and the company may engage in a business agreement to implement an APO program. The business agreement may divide the total benefit generated by the APO program between the two parties using any mechanism or criteria as desired. The total APO Revenue Benefit may be shared between the two parties. The company may allocate products to the OA. One or more companies may allocate only few or may allocate their entire inventory to the OA to offer those products to the customers by way of regular and/or APO products. The OA may offer those products as APO Products to customers. In return, the OA may offer a lending revenue or fee to the company for all or a portion of the products allocated. This lending fee may be given only for the products that the OA is able to utilize or for all the allocated products. The lending fee may be a lump sum amount, may depend upon the number of products allocated or may depend on one or more factors as desired. The agreement may include a provision where the OA may return the allocated products back to the company at a certain time and date. There may be one or more conditions associated with the return of unused APO Products and/or the *Released Products*, including, but not limited to, returning the same product, returning a higher value product and so on.

The APO VOF may include different conditions imposed on the customer regarding the payments related to the APO. For example, a customer may be asked to make payments only to the company even if he/she is receiving products and/or options from the OA. Similarly, the customer may be required only to pay to the OA even if he or she has selected the products and/or received the options from the companies. The

condition may also be set to ask a customer to make one or more payments to the company for the products and/or options received from that company, and to make one or more payments to the OA for the products and/or options received from that OA. The condition may allow the customer to make partial payments to the company and the rest to the OA or vice versa, the basis of which distribution may depend upon various factors, including, but are not limited to, the factors of company's choosing, the arrangement between the OA and the company and so on. In another example, the customer may be required to pay to a third party or may be required to pay to any of the combination of the entities mentioned above.

Information Technology System for APO

A client-server architecture may be used to implement the APO VOF. However, a company may use a computer hardware and software infrastructure of its choosing to implement an APO VOF.

The APO VOF may be best implemented using one or more computer-implemented methods to operate a computer-implemented service to offer APOs to the customers, that includes, but not limited to, recording the information pertaining to the offered and/or sold APOs in a database. It may also include operating a computer-implemented service (and/or system) or other service (and/or system) to define the *Chosen Products*, and recording said *Chosen Products* (or defined products) and all the products related to an APO in a database.

For the stage one (i.e., to formulate the APO VOF), an application server may be used along with a database (e.g., a relational database) that stores all the information relevant to the company and the customer. The database may include all the relevant information sufficient to identify products the company chooses to make eligible for APO. One or more users (e.g., a business analyst or manager) may have full access to this server through Intranet or highly secured VPN environment to design an optimal value option framework. The database shall also store all the information pertaining to all the acts (in stage one) used by a company while formulating the APO VOF.

A similar or a different application server and/or a cluster of application servers (functioning concurrently) along with one or more web servers and a set of one or more database servers may be used for the Buy APO as explained in Fig. 13D above and CN (Customer Notification) processes in the stage two of the APO VOF. The application server communicates with a web server and the database (e.g., a relational database either the same database used for stage one or a different one). This database (for stage two) stores all the relevant information pertaining to all the acts executed during and in relation to the processes and algorithms run for stage two. All the algorithms mentioned earlier for both the Buy APO process and the CN process may be computer-implemented as explained and discussed above in Fig. 13D and 13E. All the customer interactions and the related information such as customer needs, inputs, payment transactions etc. are stored in this database, including information pertaining to the interactions with those customers who may not purchase and/or receive APO. The systems for stage two and stage one may be maintained in a synchronized environment so that each system has access to the most current information and can communicate with each other.

As discussed above, there may be other ways for implementing the APO VOF which may depend upon including, but not limited to, the scale of the implementation, business requirements and number of entities involved. The entities may interact through a series of hardware products and services with the OA/company server(s). The OA may or may not be different than the company and the OA server may be the same as that of the company server. The information technology and network system to implement APO VOF may include tools, without limitation, such as one or more CPUs, Hard Disk Drives, RAM, one or more series of Routers, Internet, Firewall, highly secured VPN, Intranet, load balancers, servers, primary databases, secondary databases and so forth.

As discussed and explained above, there may be one or more secondary databases that may only be in the "Read Only" form and may be updated through one or more replication servers. Alternatively, the company may have one or more separate temporary database structure wherein the entries are updated and stored until the final

update is made in one or more main databases. One the final update is done, the entries in these temporary databases may be removed.

The entire system may run at the premises of OA, company and/or any third entity or any combination thereof. It may also be possible to run a part of the system at one place and rest at one or more other places. The system may also be implemented even if one or more servers may be kept off-shore locations and may be accessed remotely. The geographical locations of one or more hardware product and/or services may be different depending upon including, but not limited to, the factors of company's choice, ease of accessibility, infrastructure facilities. The structure or the interaction architecture of the system may vary depending on factors including, but not limited to, the set up of the company, changes in the technology and with the introduction of new and better technology enhancing the interaction process.

A customer may interact with the Buy APO and/or the CN process either directly or indirectly using a local or a remote terminal (e.g., a computer with a browser and an access to the Internet) that is able to access the web server(s) that host the Buy APO and CN processes. A customer may also interact with an operator (or a computer operator) using any communication mechanism (e.g., in-person, phone, using email, Internet chat, text messaging system) who then communicates with the web server through the Intranet and/or Internet.

The system for the stage one may be hosted and run by a company, an OA, a third party service provider or any combination of the above. Similarly, the system for the stage two may be hosted by a company, an OA, a third party service provider or any combination of the above. In the model, where the OA receives product allocation from the company and offers APO to the customers directly, the web server, application server and database for both stage one and stage two shall be managed by the OA. The OA may also have partial (or complete) access to the company database and systems through a highly secured environment (for example, a virtual private network). In the model, when an OA and a company tie-up together to provide APO, all the computer hardware

and software infrastructure for both stage one and stage two may be hosted by and/or property of either or both (mutually) of the sides depending upon the business agreement between them.

Alternate Room Option (ARO) Value Option Framework in Hotel Industry

As explained above, an APO VOF can be implemented in any industry. The implementation of APO in hotel industry is discussed herein. Within the hotel industry, the customer need for accommodation flexibility (defined below) is used as the targeted value element. With respect to the selected value element (i.e., customer need for accommodation flexibility) in the hotel industry, the APO VOF may be appropriately termed Alternate Room Option (ARO) VOF.

The first stage in the ARO VOF involves steps (or acts) of: capturing customer dynamics, assessing hotel operations and economic factors, integrating customer dynamics with hotel economic factors, formulating the VOF and optimizing the VOF. The second stage involves carrying out a dynamic interaction with the customer and then executing an Event Optimizer process. The specific detailed steps with respect to the ARO VOF will now be discussed.

First Stage: Formulation of ARO Value Option Framework in the Hotel Industry

(1) Capturing Customer Dynamics

Fig. 26 shows an analysis of the value elements that are believed to matter to customers in relation to an ARO in the hotel industry. In the design value segment, shown in Box 26.100, important value elements may include, but are not limited to, need for accommodation flexibility, check-in date and/or time flexibility, stay period flexibility and number of alternate accommodations available and compromise(s) a customer may have to make with regard to various preferences in the alternate accommodation. In the price value segment, shown in Box 26.200, important value

elements may include, but are not limited to, Room Price and price for accommodation flexibility. In the delivery value segment, shown in Box 26.300, important value elements may include, but are not limited to, how close to scheduled check-in the customer may edit his/her reservation easily and favorably, and how long before check-in the reservation must be made to obtain flexibility. In the service value segment, the important value elements may include, but are not limited to, the ease of getting desired flexibility as shown in Box 26.400. It may be important to estimate the relative preferences and utilities of these value elements to different types of customers.

The customer need for accommodation flexibility is subjective in terms of one or more parameters including, without limitation, the length of the "flexibility period", extent of stay plan variation in need and others. The term "flexibility period" refers to the time period during which a customer wants to keep his plans flexible. Some customers may desire a flexibility period that extends up to a few hours before the check-in, whereas, some others may only want it up to a few days before the desired check-in. The term "stay plan variation" refers to the extent to which a customer expects the accommodation plan to change. It may be expressed in terms of potential time periods for check-in, check-out and stay, range of properties in which a customer may prefer to stay (for e.g, a hotel near the airport or in the downtown), various hotel services/amenities needed during accommodation such as parking, food/restaurant availability, exercise room, Internet, business facilities, Saturday night/entertainment shows and so forth. Customers are concerned about change/cancellation fees, unavailability of desired accommodation, the efforts required and the hassles involved in making reservation changes. Many customers would be willing to pay for flexibility. However, the price a customer can pay or is willing to pay is subjective and may differ from customer to customer; or even for the same customer, may differ from one trip (or circumstance) to another.

(2) Assessment of hotel economics

An assessment of the crucial economic factors of a hotel, as indicated in Box 27.100, may reveal the factors to include, but not be limited to, high fixed costs, lower and fluctuating occupancy rates, the perishable nature of the rooms (or room nights), the expected value of different rooms at different times within the same property or across difference properties, the broad spectrum of time period over which the rooms in a hotel are sold, increased competition from budget hotels, high customer attrition rate, and fragmentation in the hotel industry.

An assessment of the crucial economic factors of a hotel may be performed, to determine the factors that affect the profitability, growth and goals of the hotel. It might be beneficial if a hotel utilizing the inventive system and method were able to express cost elements in a real-time or quasi-real-time (i.e., up to date) dynamic fashion so that such information can then be used to assess the profitability or contribution of each product sale opportunity, and to facilitate the operation of the Event Optimizer (so that offers and actions can be based on real-time or near-real-time information).

(3) Integration of customer dynamics with hotel economic factors

Fig. 27 also illustrates an example of how a mapping can be done, between customer and hotel profiles, for the ARO VOF in the hotel industry. On one hand, there is a preference for accommodation flexibility among customers. On the other hand, once a day passes with one or more unutilized rooms, that condition probably represents the loss of potential revenue for that hotel. This is true even though no other potential customers have been turned away, simply because there may be one or more customers willing to take those unfilled rooms in that hotel (in question) at appropriate price/terms. But, today they are not able to do so for one or more reasons mentioned above. An opportunity thus exists to concurrently generate an incremental revenue benefit for the hotel from consumer surplus, and to maximize the purchase utilities for the customers. The ARO framework is created based on a value element "Preference for

accommodation flexibility". More specifically, as shown in the interaction between the Box 27.200 and Box 27.300, a mapping is performed between important customer value elements and hotel economic factors. The value element "Preference for accommodation flexibility" is extracted, as shown in Box 27.400 and an ARO Value option framework is created.

(4) Formulating the "ARO" Value Option Framework in the Hotel Industry

Structure of ARO Value Option Framework in the Hotel Industry

Fig. 28 displays the structure of an ARO value option framework (shown in Box 28.100) in the hotel industry. The ARO value option framework is related to the value element "Preference for accommodation flexibility", as shown in Box 28.110.

The first event in the ARO VOF is referred to as *"Initial Transaction"*, shown by Box 28.200, in which the customer (shown by Box 28.210) and the hotel (shown by Box 28.220) transact on an ARO value option. There may be one or more Events (shown by Box 28.230) that follow the *Initial Transaction.*

In a successful *Initial Transaction* for an ARO, the customer receives an option to choose up to 'n' out of 'm' selected rooms (said 'm' rooms termed *"ARO Rooms"*). The 'n' rooms that are finally selected are termed *"Chosen Rooms"*. After each of the 'n' *Chosen Rooms* is defined (or selected or chosen), the customer has the right to utilize (or can utilize) said *Chosen Room*. Apart from the 'n' *Chosen Rooms*, the remaining 'm – n' rooms are termed *"Released Rooms"*. The *Released Rooms* (if any, that were probably held or blocked for said customer) may be sold to others or used for other purposes. The *Released Rooms* in relation to said option may be reused by the hotel before, after, at or any combination thereof, the time the *Released Rooms* and/or *Chosen Rooms* are defined (or selected).

Numerically, the value of 'm' is greater than or equal to 1 and the value of 'n' may vary from '0' to 'm' depending upon the specific implementation of the ARO framework. The value of 'm' and/or 'n' may be known (or defined and/or re-defined) before, during or after the *Initial Transaction* and/or any combination thereof. The value of n may be limited to less than the value of m, or n<m (i.e., n<=m-1); however, in some situations, n may be equal to m. The value of 'n' may or may not be known (or defined or re-defined) at the time of the *Initial Transaction*. The value of 'm' and/or 'n' may be defined and/or re-defined by the hotel, the customer, another entity or any combination thereof. For example, the value of n may not be defined at the time of *Initial Transaction*. In case the value of m is redefined after being defined at least once before, the new value of 'm' may be greater than or less than the older value of 'm'. Similarly, if the value of 'n' is redefined after being defined at least once before, the new value of 'n' may also be greater than or less than the older value of 'n'. In some of the cases, the value of new 'n' may be even greater than the older value of 'm'.

The *Initial Transaction* may consist of one or more acts. The customer may select (or purchase) all *ARO Rooms* concurrently (i.e., all together in one transaction) or sequentially (i.e., in multiple transactions). In the sequential case, a customer may select one or more rooms in one or more transactions just before or much before (a few days/weeks/months) the *Initial Transaction* for ARO begins. Said selected room(s) (let's say X number of them), thus, may be considered as part of said m *ARO Rooms* of the ARO (m, n) transaction, and the customer may select only the remaining (m - X) number of *ARO Rooms* during the *Initial Transaction*. All the transactions used to select all the *ARO Rooms* of an ARO (m, n) instance are related to each other, and hence, are considered as *related transactions* (as defined earlier).

The 'm' rooms may be dependant on one or more variables including, but not limited to, different hotel properties or locations, floors (smoking versus non smoking), room type, star ratings, accessory type, proximity to one or more modes of transportation, proximity to other facilities like shopping malls, sea shore, harbor and so on, different type of room views such as hill view, city view, pool view and so on,

number of guests in the room, other amenities such as night shows, morning shows, kids activity center, golf course, business center, health center, car parking and so on, and/or a combination of one or more of these and/or other factors.

In an ARO VOF, the sequential process may consist of a number of *related transactions* when all the *ARO Rooms* are purchased (or reserved) one after another by paying a price in each (or some or none of the) transaction(s) or act(s). The transactions may be related due to a relationship during the *Initial Transaction,* one or more of the previously executed transactions, any other transaction or any combination thereof.

The time when an *Initial Transaction* is completed (i.e., the customer receives the ARO option) is referred to as the *Initial Transaction Time* (or ITT, in short). One or more of said m rooms may be selected, at one or more times, before, after, during, or any combination thereof, the *Initial Transaction* and/or the time said option is delivered to the customer (or the customer receives said option).

A hotel may be considered as a means of accommodation for a given time unit for one or more customers. A hotel duration may be considered as the most fundamental unit. The duration may range from a few hours to one night to more than one night. For example, a customer may want to stay at a hotel for one night or more than one night or a customer may use one or more facilities (such as board rooms, meeting rooms, banquet halls, ball rooms, business centers, swimming pool area and so forth) of a hotel for one or more hours (or nights, or days, or weeks, or months or for any period of time) for one or more events such as meetings, seminars, conferences or any other event or any combination thereof. There may be one or more services or characteristics associated with the room. Said services or characteristics may be internal features or external features associated with the room or any combination thereof. Internal features associated with the room may include, but are not limited to, interior furnishing, size/number of beds, mini bar in the room, kitchen with cookware and/or tableware, crib, rollaway bed, pull out sofa bed, room with sitting area, deluxe bath amenities, wireless internet access in the room, hair dryers, iron board, safety vaults, tv-cable, in room

movies, telephones, voicemail, data ports, alarm clocks, refrigerator, coffee/tea maker, and so on. External features associated with the room may include, but are not limited to, reserved parking space, amusement shows, indoor and/or outdoor swimming pools, heated water pool, bowling, golf courses, laundry services, valet services, multi-cuisine restaurant, luggage storage, handicap accessibility facilities, automated teller, business center, casino, car rental desk, gift shop, news stand, tour desk, walking track, health center, sight seeing tours, children activities, barber shop, beauty salon, spa and/or massage centers, concierge service, and so on. Said space may include, but is not limited to, space for any purpose such as for stay, for accommodation, for holding meetings, seminars, conferences, events, space for parking of vehicle, space in the recreation hall, space in the Saturday night show and so on.

A hotel may choose to create one or more instances of an ARO VOF based on factors including, but not limited to, number of *ARO Rooms*, *Chosen Rooms* or *Released Rooms*, pre-determination of a number of *Chosen Rooms or Released Rooms*, check-in/check-out times, other factors or any combination of the above. For example, an ARO formulation based on a combination of the number of *ARO Rooms* (or m) and *Chosen Rooms* (or n) would be ARO (m, n). Some ARO instances are shown in Boxes 28.120, 28.130, 28.140 and 28.150. For example, when the number of *Chosen Rooms* is pre-determined, the ARO (4, 2) instance may imply that the customer selects 4 *ARO Rooms*, on the condition that the customer may choose any two out of those four rooms. When the number of *Chosen Rooms* is not pre-determined, the ARO (4, 2) instance may imply that the customer selects four *ARO Rooms*, on the condition that the customer may choose zero, one or 2 rooms as *Chosen Rooms*. There may also be a minimum limit on n. For example, the ARO (4, n) (where 1<=n<=2) instance limits the customer to choose a minimum of 1 and maximum of 2 *Chosen Rooms* out of the 4 selected *ARO Rooms*.

The ARO (2, 1) instance, two *ARO Rooms* and one *Chosen Room*, is used here as an example to demonstrate the details of the structure of an ARO VOF. Box 28.200 refers to the *Initial Transaction* between the customer and the hotel, in which they transact on an ARO (2, 1) value option. In a successful *Initial Transaction* for the ARO

(2, 1), the customer selects two *ARO Rooms* and can choose to utilize any 'one' of those two rooms. The room selected is the *Chosen Room* and the one not selected is the *Released Room.*

The *Initial Transaction* may have terms and conditions applicable to the customer or the hotel or both. These terms and conditions may be set, preferably, to concurrently benefit both parties. The connections between Box 28.200 and 28.220, and Box 28.200 and 28.210 refer to the terms and conditions to the hotel and the customer, respectively.

Few examples mentioned below may help in understanding various types of ARO which may be offered by the hotel. The hotel may offer different features and may combine one or more features, products and services and offer them as an ARO to the customers.

A customer may take an ARO for different check-in dates. For example, a customer buys ARO for a hotel room and gets the right to check-in on either 5th or 7th of the month, and would need to notify the hotel before 4th about his/her *Chosen Room*, i.e. in this case, the Chosen check-in date.

A customer may take an ARO for different hotel locations served by one or more hotel chains. For example, a customer may obtain ARO for two hotel properties, one located in downtown and the other one near the airport, whereby ARO provides the right to the customer to choose any of these two hotels until a given notify deadline. Now, if the customer is arriving late in the evening, he/she may prefer to have the hotel located close to the airport. But if the customer is arriving by daytime, then he/she may prefer to have the hotel located in the downtown.

A customer may also take an ARO based on the room type in the hotel. For example, a customer may take an ARO for two types of hotel room – ARO between regular room and a suite, whereby the customer gets a right to choose any of the room type and notify the hotel about his/her *Chosen Room.* If the customer were to arrive

alone, then he/she may choose a regular room and if he/she were to arrive with his/her spouse, then the customer may choose the suite as *Chosen Room*.

A customer may also take an ARO to cover up his/her uncertainty over the period of stay. For example, a customer is planning a pleasure trip to City A and City B. The customer is scheduled to arrive in City A on 3rd of the month. The customer may take an ARO for stay in City A to either stay for 3 days or 5 days since the customer may not be sure how many days he/she may spend in City A. The customer may then subsequently take an ARO for arriving in City B, i.e. either arriving on 6th or 8th of the month, depending upon the time period he/she spends in City A. The customer gets a right to notify the hotel in City A about *Chosen Room* (or *Chosen Period*) of stay and also to notify the hotel in City B about his/her arrival, up to a stipulated notify deadline. Hence, the customer is saved from the hassle and cost involved in making changes due to changes in his or her plan.

A customer may combine one or more of the above ARO features while buying ARO for a hotel room. For example, Sam is scheduled to attend a business meeting on Friday and has an original reservation in the regular room in a hotel located next to the airport for just one day. Sam is unsure about whether he would be able to attend the meeting and then spend couple of days in that city with his wife as it depends upon the schedule of his wife (Mary), which she can confirm only by Thursday. Sam does not want to have the uncertainty for the reservation till Thursday. Hence, the hotel offers Sam an ARO to take care of his uncertainty. Now, Sam has an alternate reservation for a suite with king size bed at a different hotel of the same hotel chain, which is in the downtown, with reserved parking for his car (since he would coming by his car along with his spouse), confirmed reservation for a Saturday night show in the hotel for him and his spouse for four days. Sam has to let the hotel know about his *Chosen Room* by Thursday evening, thereby doing away with the last minute uncertainty and unavailability.

A customer may take an ARO for different types of rooms for different periods. For example, a customer may take ARO giving him/her the option to choose from the regular room for first two days of his/her stay and suite for next two days or a suite for all the four days depending upon whether his/her spouse joins him/her later or arrives with him/her on the first day itself. Now the customer gets the right to notify the hotel about his/her *Chosen Room* for the *Chosen Stay Period.*

A customer may plan to visit any two out of three selected cities but is unsure as of now which cities to choose finally. The customer buys an ARO (3, 2) on hotel rooms in three different cities where in the customer has to choose two cities before a stipulated notify deadline and has to notify the hotel about the *Chosen Rooms* (or *Chosen Cities* in this case). The customer gets a right to choose any two out of the three selected city hotel rooms as *Chosen Rooms.*

A customer may like to choose between different facilities such as business centre, golf course, spa and massage centers depending on the circumstances. For example, Sam has scheduled a meeting with his client but is unsure whether the client would prefer a meeting room or a restaurant for said meeting. Sam buys an ARO whereby he has the option to notify the hotel about his *Chosen Room Product* (either meeting room or the restaurant) before a notify deadline.

A customer may require different facilities as per the hotel location and as per his/her companions. For example, Sam is to arrive in Las Vegas with his wife, a kid and his pet, if he is not going on a business trip to New York. Sam buys an ARO for the hotel rooms in Las Vegas and New York. The ARO gives Sam an option to choose either a non-smoking room in Las Vegas hotel with a baby-sitter, permission to bring in pets, onsite spa, room service and kids centre or a smoking room in New York hotel with Hi-Speed Internet access and business services. Sam has to notify the hotel about his *Chosen Room* by Thursday morning whereby enabling Sam to avoid the last minutes hassles, costs, and unavailability.

A customer may be unsure about his/her arrival time to the hotel. If the customer arrives in the morning, he/she would prefer to use the Golf course and if he/she arrives in the evening, he/she would like to watch the Saturday Night Show. The customer buys an ARO enabling him/her to choose between the two facilities and notify the hotel about his/her *Chosen Room Product* before a pre-determined notify deadline.

Consider another example. Sam wants to arrange a stay for one of his client executives. He is unsure whether the person arriving would be the top level client executive or middle level client executive as it depends on client's schedule over which Sam has no control. Sam does not want to spend extra money on the middle level executive but also wants to make sure that he provides the top level executive with the best of the facilities and full luxury, if the case be. Thus, Sam buys an ARO and gets the flexibility to book a business suite with complimentary breakfast and a regular room with no additional facilities. Sam can notify the hotel about his *Chosen Hotel (Chosen Room Set)* before the notify deadline.

The ARO VOF may or may not include any constraints on the *ARO Rooms*. For example, a hotel may want to restrict ARO applicability and availability on rooms that satisfy specific criteria.

In the context of the hotel industry, the parameters/characteristics of a room may include, but are not limited to, hotel related parameters, check-in/check-out times, services and other miscellaneous parameters. The hotel related parameters may include, but are not limited to, operating hotel entity (i.e, the hotel that operates the room), owner of the hotel property, marketing hotel (a hotel that sells/rents out the room), any other hotel or intra/inter-hotel groups associated with the room or any combination of the above. The check-in/check-out parameters may include, but are not limited to, a hotel and its location (area or street, landmark, city, state, country), date and time, seasonality, weather and other operational conditions, and so forth. The services and other miscellaneous parameters may include, but are not limited to, type of hotel, room

duration, in-room or other services, hotel services such as amusement parks, parking areas, recreation halls, shows, and other facilities, and so forth.

The two *ARO Rooms* may or may not include practically constrained rooms. Practical constraints may include one or more constraints that will prevent a customer to utilize a given room. Such practical constraints may include, but are not limited to, time constraints, location constraints and so forth. The time constraints may include, but not are limited to, constraints from check-in and/or check-out times of the two *ARO Rooms*. The location constraints may include, but are not limited to, the distance between the locations of the two hotels. In other words, it may or may not be practically possible for one customer to utilize both the selected rooms due to at least one practical constraint. For example, a customer may receive an ARO to utilize each of the m selected rooms that include at least one practically constrained room, where it may not be possible for the customer utilize all the m selected rooms. For example, the two selected rooms may or may not be in the same city.

The ARO VOF may or may not include any constraints on the *ARO Rooms* based on their Room Prices (defined elsewhere). For example, the hotel may offer only those rooms as *ARO Rooms* whose Room Prices at or before the ITT are less than a specified value, or may add a constraint on the maximum difference between the highest and the lowest Room Prices across a set of *ARO Rooms* offered within a specific ARO.

The *ARO Rooms* may be selected by the hotel, the customer, another entity or any combination thereof. The ARO VOF may enable a customer to have flexibility by selecting m Rooms and use said accommodation flexibility to satisfy his/her needs. Therefore, the customers would usually have the right to select (or define) the *Chosen Rooms*. However, in different implementations of ARO VOF, the hotel, the customer, another entity or any combination thereof may select one or more of the *Chosen Rooms* related to an ARO. The *ARO Rooms* and the *Chosen Rooms* may be selected by the same entity, different entities or any combination thereof. The hotel may incorporate the

customer information and the data related to the ARO into the sales, production, inventory, other database or information system or any combination of the above.

A customer may select *ARO Rooms* in several ways; through mutual agreement (i.e., during a direct interaction such as a room reservation), or the hotel may grant the *ARO Rooms* to the customer without soliciting their interest or permission. For example, to enhance customer satisfaction or for any other purpose, a hotel may grant *ARO Rooms* to customers based on the past customer behavior, interaction and so on.

The *Initial Transaction* may impose one or more conditions on the customer. A customer may be required to explicitly notify the hotel prior to or no later than a given date and time (referred to as the *Notify Deadline*) regarding the *Chosen Room*. If there is no such explicit notification condition, the act of the customer checking-in for either of the two rooms may serve as an implicit notification to the hotel or the *ARO Rooms* may be decided as per the terms and conditions of the option contract. In either case (explicit or implicit notification) the date and time when the *Chosen Room* is selected is referred to as the *Customer Notification Time* (or the CNT, in short). In the current discussion, the explicit notification condition is assumed unless specifically mentioned otherwise. The *Chosen Room* may be dependant on one or more variables including, but not limited to, the desired check-in date, stay period, hotel location, particular amenities, other facilities, and so forth and/or any combination of one ore more such variables.

A hotel may determine one or more *Notify Deadlines* for a room at one or more times (e.g., before, during, after the *Initial Transaction* or any combination thereof) using factors including, but not limited to, customer needs, expected room value, hotel profitability goals, any other factors or a any combination of the above. Customer factors may also be considered in determining the *Notify Deadlines*, such as the flexibility periods desired by customers, picking easy times (like 6:00 pm instead of 6:32 pm) to help the customer remember the deadline(s) or any other factor that may affect the behavior of a customer.

The hotel may offer incentives to the customers to motivate them to choose one or more products as *Chosen Rooms* among the *ARO Rooms* that may be more optimal for the hotel. A hotel may formulate one or more such offer (may referred to as Chosen Room Incentive Offers) and may send them to customers who have purchased ARO but not yet selected their *Chosen Room* via email, phone, mail or any other communication channel. Thus, such customers may be persuaded to select said optimal room in lieu of incentives.

The ARO VOF may impose additional terms and conditions on the customer. A customer may or may not have to pay any price for receiving ARO Rooms (i.e., there may or may not be any payment transaction related to the *Initial Transaction* and/or other event related to the ARO). There may be one or more prices related to the ARO. A customer may be required to pay a price or fee related to ARO at one or more times. A price may include, but is not limited to, a set of one or more Room Prices, a set of one or more ARO Prices or any combination of the above. A hotel may use the method of its choosing to decide on all the Room Prices for ARO.

The customer may be required to pay one or more prices during the *Initial Transaction* (which payment is referred to as an Initial Price), at the CNT (which payment is referred to as an Exercise Price) and/or at the time of checking-in or at any other time, which may or may not be pre-determined between the customer and the hotel. The price may be a function of number of *ARO Rooms* and/or *Chosen Rooms*, specific rooms selected for *ARO Rooms* and/or *Chosen Rooms*, *Notify Deadline*, one or more Room Prices and/or expected value of the ARO Rooms, any other factors of hotel's choosing or any combination of the above.

The price may include, but is not limited to, a monetary value or a soft/non-monetary value (e.g., discount vouchers, hotel coupons or exchange of another service, other benefits such as loyalty program bonus or benefits, other forms or any combination of the above) or other consideration. The ARO Price may be fixed or variable, with or without bounds. The hotel may set permissible range(s) or boundary limit(s) within

which the ARO Price can vary, or it may offer the customer a set of prices to choose from. Since price conditions may depend upon various factors, which may or may not be variable, the same may be decided at anytime. The price conditions may be determined by the customer, the hotel, a third entity, or any combination thereof at one or more times. One or more prices (Initial or Exercise or any other price) may be a negative value, which reflects that instead of the customer paying the hotel, the hotel shall pay a price to the customer.

Different price strategies may be implemented in the ARO (2, 1) instance. For example, a single Initial Price could make it attractive and easy for the customer to feel free to choose any room as the *Chosen Room* without worrying about any additional costs later. One or more of the ARO prices may be embedded with the Room Price by using a special Room Price or enhancing features on a currently existing pricing structure. A customer may be presumed to accept the ARO offer while displaying the Room Price (that has the ARO Price embedded in it). These presumptions may or may not include soliciting prior interest of the customer regarding the ARO offer. In case, the ARO price is merged with the Room Price, and where such price may or may not be separately identifiable, the customer may or may not be required to pay a separate price for ARO.

The *Notify Deadline* may be pre-determined or may be determined later (i.e., after ARO grant) by the hotel, the customer or mutually by both. There may be one or more *Notify Deadlines*, where each *Notify Deadline* may have a different price associated to it. There are several ways to implement this condition. One way is given, as follows. The price associated to the first *Notify Deadline* (i.e., the earliest among the *Notify Deadlines*) may be charged if the customer notifies the hotel of the *Chosen Room* anytime before the first *Notify Deadline*. The price associated to the second *Notify Deadline* (i.e., the second earliest among the *Notify Deadlines*) may be charged if the customer notifies the hotel of the *Chosen Room* after the first *Notify Deadline* and before the second *Notify Deadline*. Similarly, different prices may be associated with other *Notify Deadlines*.

The terms and conditions of the ARO VOF may not allow the customer to notify the hotel after the last *Notify Deadline* (i.e., the latest among the *Notify Deadlines*). This is done to facilitate the selection of the *Chosen Room* before the last *Notify Deadline*. As an operational measure, a condition may be imposed that if the customer fails, unintentionally or intentionally, to notify the hotel before the last *Notify Deadline*, then the hotel may treat either of the two rooms as the *Chosen Room*. Another approach may be (e.g., for hotel/customer) to designate one of the two rooms as a *Default Room* (during or after the ARO purchase) that will be selected as the *Chosen Room* if the customer fails to notify the hotel of the *Chosen Room* before the last *Notify Deadline*. Any entity (e.g., the hotel or the customer) may (or may not) be allowed to change the Default Room once it is selected. The Exercise Price (if any) in the Default case may or may not be equal to the Exercise Price for the Default Room for the last *Notify Deadline*. In the current discussion, a single *Notify Deadline* is considered.

The exercise price may be a function of the *Notify Deadline, Chosen Room,* any other factor or any combination thereof. In such situations, a customer may have to pay a unique price to select a particular room as the *Chosen Room* at a given time.

The ARO VOF may also include conditions imposed on or assumed by the hotel. For example, the hotel may be under a mandatory condition to hold a confirmed reservation for the customer on both rooms until the CNT passes to allow the customer to select either of the two rooms as the *Chosen Room*.

A hotel may determine customer preferences, either explicitly or implicitly, regarding utilization of up to n of m selected Rooms. The preferences may include, but not limited to, customer preferences for various rooms and services, needs, associated relative utilities, flexibilities, preferences regarding choice of Rooms, quality of Rooms, acceptable delays (relative) to receive different Rooms and so forth. The hotel, one or more entities other than the hotel or any combination thereof may seek customer preferences.

A hotel may also offer ARO options to one or more customers on the basis of customer preferences, so obtained or collected. The hotel may offer said ARO options based on the dynamics of the hotel including, but not limited to, inventory, operational data, revenue management data, cost data, financial data, accounting data, any other internal data, any combination thereof and so on.

A hotel may seek such preferences from the customers prior, during or after the customer has purchased the Room or any combination thereof. These customer preferences may help the hotel to perform concurrent optimization of value for the hotel, the customers, one or more entities other than the hotel or any combination of two or more of the above. The customers may also include the customers whose preferences have not been determined or collected. The data pertaining to the hotel, customers, one or more entities other than the hotel, any combination thereof, may be integrated to concurrently optimize the value for at least any two of said entities. There may or may not be any payment transaction between the hotel, one or more other entities and/or the customers regarding seeking such customer preferences, delivering ARO options, customer participation in ARO and so on.

A hotel may operate one or more systems and/or services to monitor the hotel dynamics. Monitoring may include, but is not limited to, monitoring of capacity, days to utilization, return and/or potential return of Rooms, flexible inventory that may be created in relation to said obtained preferences, analyzing various cost, revenue, operational or any other internal data and so on. The hotel may have one or more systems and/or services to analyze such data on a real-time or quasi real-time basis and draw conclusions on the basis of such analysis. Any of the systems and/or services may be operated by the hotel, one or more entities other than the hotel or any combination thereof.

A hotel may operate a system that defines customer preferences regarding at least utilizing up to n of m selected rooms, and n is less than m, operate a system that enables

use of said preferences to optimize value for at least one of customers, said hotel and an entity other than said hotel. A hotel may concurrently optimize value for at least two of customers, said hotel and at least one entity other than said hotel.

A hotel may offer ARO to all customers or any selected customers, such selection may be based on any criterion including, but not limited to, such as those who have expressed their relative preferences, those who have not expressed any preferences. By integrating the hotel dynamics and collected customer preferences, a hotel may offer appropriate incentives and terms and conditions for ARO to generate desired participation.

Once the *Initial Transaction* is successful, there may be at least two possible related events, as shown by Box 28.230. The two events are (1) that R1 is the *Chosen Room* (as shown by Box 28.240) and (2) that R2 is the *Chosen Room* (as shown by Box 28.250). Each of these two events may be associated with various terms and conditions on the customer and/or the hotel. As explained above, the events may take place in two ways: either the customer selects the *Chosen Room* according to his/her utility, or the hotel selects the *Chosen Room* based on pre-determined rules (e.g., if the customer fails to notify the hotel before the *Notify Deadline*). In both situations, once the *Chosen Room* is selected, the hotel is free to reuse the *Released Room* for potential revenue. The customer may have to pay an additional exercise price at the CNT depending on the terms and conditions of the option contract. Once the *Chosen Room* is selected, the hotel and/or the customer may not change the *Chosen Room* except within the bounds of the terms and conditions in the option contract. The hotel or customer may have the right to enforce the *Chosen Room* on the other party as per the terms and conditions of the option contract.

The *Released Room* may be blocked for the period between the ITT and the CNT. This period is termed the "*Blocking Period*". If there is more than one *Notify Deadline*, the exact length of the *Blocking Period* is unknown, but the minimum and maximum

lengths are known to be between the ITT and the first *Notify Deadline* and between the ITT and the last *Notify Deadline*, respectively.

The hotel may generate revenue from the *Released Room* without utilizing the *Released Room*. The Room Price of the *Released Room* may be varied in such a way that may increase the demand of one or more other rooms offered by the same hotel, any other entity apart from said hotel, or any combination thereof. The variation in the Room Price of the *Released Room* may cause a spilled demand for this room but may create a surge in demand of one or more other rooms in the same or different room segments of the same hotel, any other hotel apart from said hotel or any combination thereof.

The above terms and conditions of the ARO VOF may be set in a way to concurrently benefit at least two of the customer, the hotel, any other entity or any combination thereof. The customer receives additional utility from the flexibility to choose a desired room from among alternatives. The hotel benefits from enhanced customer satisfaction (loyalty and repeat business), incremental revenue from the ARO Price and selling (reusing) the released rooms, and other operational benefits.

An ARO VOF may include a right for the customer to utilize each of the m selected *ARO Rooms*, along with a right for the hotel to limit the rooms (to fewer than m) which the customer can utilize if the hotel notifies the customer on a stated *Notify Deadline*. The right may include the condition that the hotel may notify the customer prior to or at the, prior to the, at or after the or after the stated *Notify Deadline* (which may be determined by the hotel and/or the customer during or after the *Initial Transaction*). To provide flexibility to the customers, the hotel may offer (or allow) the customer to express their preferences regarding the *Chosen Room(s)* before the stated *Notify Deadline*. If the customer fails to do so, the hotel may or may not exercise their right to limit the customer to use fewer than (for example, at least one less) the earlier selected rooms (i.e., m rooms). The right may include the condition that the hotel may limit the customer after the customer expresses his/her preference for the *Chosen Rooms*.

There may be a condition imposed on the customer to make at least one payment to the hotel when the customer expresses his or her preferences for the *Chosen Rooms*.

An ARO VOF may include an option for the customer to utilize up to n of the m selected *ARO Rooms*, where n<m, along with a condition that the customer may be able to utilize all the m selected rooms if there is at least one payment transaction between the hotel and customer in relation to said ARO grant, and that such payment is made after the ARO is granted to the customer. This may provide additional flexibility to the customer. The customer may be limited to take the decision regarding utilizing all the m rooms before the check-in of the penultimate room. Said payment may be made in a separate transaction executed at any time after the *Initial Transaction*. The timing of said payment may be pre-determined. The customer may be able to select all the m rooms together in one transactions.

The costs, revenues, benefits, terms and conditions shown here are for illustration purposes only and actual values could be different depending upon specific values selected by the hotel for value options, customer behavior, hotel characteristics, *Notify Deadline(s)* and other relevant factors.

Example of ARO VOF (2, 1) structure in the Hotel Industry

Figures 29 and 30 demonstrate an illustrative practical example of using the ARO (2, 1) instance in the hotel industry. Consider a customer who interacts with a hotel to get an ARO. Per Act 28.200, an *Initial Transaction* takes place between the hotel and the customer. Fig. 29 displays some of the details of the *Initial Transaction*. The customer selects two *ARO Rooms*, R1 (shown in Box 29.100) and R2 (shown in Box 29.200), and can choose to utilize either of them but not both (i.e., select either of them as the *Chosen Room)*. The hotel is under the condition to hold confirmed booking for the customer on both R1 and R2 until the *Chosen Room* is selected.

The customer pays an amount of $25 as the Initial ARO Price and $250 as the Room Price to the hotel as part of the *Initial Transaction*. The *Initial Transaction* takes place on the 15th day of May (i.e., the ITT, shown in the second row of the Box 29.300). There is an explicit notification condition and the customer has to pick and notify the hotel regarding the *Chosen Room*.

The following text presents different cases to illustrate different types of terms and conditions that may be associated with the purchased ARO. Three different scenarios are considered with different conditions (shown in Fig 30). In all the scenarios, the *Notify Deadline* is expressed in terms of the number of days to check-in (DTC) of R1, the earlier check-in date of the two rooms.

The first scenario, as demonstrated in the Box 30.100, displays a condition of the explicit notification without any exercise price. The customer needs to notify the hotel regarding the *Chosen Room* before 3 DTC (as shown by the *Notify Deadline*). The ARO Price charged during the *Initial Transaction* serves as the total direct incremental revenue for the hotel and as the direct cost to the customer. There is no exercise price if the customer defaults.

The second scenario, as demonstrated by Box 30.200, displays a condition of the explicit notification with an exercise price that is a function of the *Chosen Room*. The *Notify Deadline* is 3 DTC. If R1 is the *Chosen Room*, then customer has to pay $10 as the exercise price, as shown in the second column of the second row in the Box 30.200. If R2 is the *Chosen Room*, then the customer has to pay $20 as the exercise price, as shown in the second column of the third row in the Box 30.200. The total ARO Price charged to the customer (i.e., the direct incremental revenue to hotel) may turn out to be $35 or $45 depending on the *Chosen Room*.

The third scenario, as demonstrated in the Box 30.300, displays a condition of the explicit notification with an exercise price that is a function of the *Notify Deadline*. There are four *Notify Deadlines* associated with the ARO. The exercise price increases

from $0 (for the *First Notify Deadline* of 5 DTC) to $20 (for the *Last Notify Deadline* of 1 DTC). If the CNT is before 5 DTC, then the customer pays nothing more to the hotel as shown in the second column of the second row in the Box 30.300. If the CNT is after 5 DTC and before 3 DTC, then the customer pays $5 as the exercise price (shown in the third column of the second row in Box 30.300). Similarly, the customer pays an exercise price of $10, if the CNT is after 3 DTC and before 2 DTC, and an exercise price of $20, if the CNT is after 2 DTC and before 1 DTC (as shown by the next two cells in the Box 30.300). If the customer fails to notify before 1 DTC (the *Last Notify Deadline*), then the Default Room R1 (shown in Box 30.300) will be selected as the *Chosen Room* at an exercise price of $20.

5) Optimization of ARO VOF in the Hotel industry

As mentioned earlier (shown in Fig. 7), in the form of an optional last step in the first stage, a financial analysis may be performed using the existing hotel and customer data to determine the optimal terms and conditions of the ARO VOF. 'What-if' scenarios may be executed to determine an optimal pricing strategy. The hotel may want to divide customers using one or more criteria and design separate ARO VOF for each customer segment.

Second Stage: Using the ARO Value Option Framework in the Hotel Industry

After completing the first stage of the method, the hotel has created an ARO VOF and specific options within that framework. The hotel may have also segmented customers and designed options accordingly. The hotel is fully prepared to use a structured format consisting of one or more ARO value options to interact with its customers in real time to generate benefits for both the hotel and its customers. The second stage of the ARO VOF is now presented. A detailed demonstration for the second stage of the APO VOF has already been presented above.

The implementation of the ARO VOF between the hotel and its customer takes place through two high level acts, as shown in Fig. 31. In Act 31.100, the 'Buy ARO' process, an interactive event between the customer and the hotel's web server, runs to carry out the *Initial Transaction* of the ARO VOF. In this Act, a number of algorithms, may be executed (e.g., availability, ARO Price, Room Price and *Notify Deadlines*) on the hotel's server to optimally calculate the terms and conditions of the ARO VOF to concurrently benefit the hotel, the customer, any other entity and/or any combination thereof. In Act 31.200, the *customer notification* process (explained later) is executed. In this process, the customer selects the *Chosen Room*. The process may also consist of one or more event optimizer algorithms that may help to optimally select the *Chosen Room* and/or to optimally reuse the *Released Room*.

As explained above, the Buy ARO process may be implemented via the Sequential (shown in Fig. 38) or the Concurrent (shown in Fig. 40) process. There are many ways to do the Sequential process. As an example of the Sequential process, a customer may select (or purchase) a Room Product/Room Set/Room Order before the *Initial Transaction* begins. In such situations, said Room Product/Room Set/Room Order may be referred to as Initial Room Product/Initial Room Set/Initial Room Order or IRP/IRS/IRO, in short, respectively. A customer may purchase an ARO i.e., purchase one or more *ARO Room Products/Room Sets/Room Orders* on an IRP/IRS/IRO, respectively. An ARO Room Product/Room Set/Room Order is also referred to as Option Room Product/Option Room Set/Option Room Order, or ORP/ORS/ORO, in short, respectively. The terms "ARO Room Product"/"ARO Room Set"/"ARO Room Order", "Initial Room Product"/"Initial Room Set"/"Initial Room Order" and "Option Room Product"/"Option Room Set"/"Option Room Order", respectively, have been used interchangeably as and when context requires. The two events (one for the Initial Room and the other for the *Initial Transaction*) may be executed with a minimal (one just after another) or a significant time gap (e.g., few minutes, hours, days and so forth) in between them.

The ARO VOF may be implemented at different levels including, but not limited to, Room Product, Room Set and Room Order. Illustration of Room Product and Room Set in the hotel industry is given as an example as shown in Figures 32 and 33 respectively.

Fig. 32 displays a practical example of ARO implementation at the Room Product level. A customer buys ARO on Room Product (i.e., Initial Room Product or IRP, in short) in a Room Set and receives one Option Room Product (or ORP, in short) on IRP, as shown in Box 32.200. The customer may select either the IRP (Meeting Room) or the ORP (Saturday Night Show) as the *Chosen Room Product* (or CRP, in short) for the Room Product in the Room Set.

Fig. 33 displays a practical example of implementing ARO (2, 1) at the Set level. A customer selects a Room Order consisting of an IRS (hotel at T square, guest room, smoking room, saturday night show) as shown in Box 33.100. The customer then buys ARO on the IRS, and receives one ORS (hotel near airport, business suite, non-smoking room, meeting room) as shown in Box 33.200. The customer may select either the IRS or the ORS, as the *Chosen Room Set* for this Room Order.

A hotel may choose to implement an ARO at any level(s). In a specific ARO interaction between a customer and the hotel, the implementation level should be the same for all *ARO Rooms*, *Chosen Rooms* and *Released Rooms*. For example, if ARO is implemented at the Room Set level, then all the *ARO Rooms* would refer to *ARO Room Sets*; *Chosen Rooms* would refer to *Chosen Room Sets;* and *Released Rooms* would refer to *Released Room Sets*.

1. 'Buy ARO' - Dynamic interaction to capture customer demand in the Hotel Industry

In the Buy ARO process, a customer interacts with a hotel's server to buy an ARO. The interaction may take place (for example) via phone, in-person or on a

website. The Sequential Buy ARO Process is presented first along with its detailed algorithms, followed by a short summary of the Concurrent Buy ARO Process.

Sequential Buy ARO Process in the Hotel Industry

There are several ways to implement the Sequential process. The following presents an example of the Sequential Buy ARO Process when an ARO is bought at the Room Set level. It is also assumed here that the customer first purchases an Initial Room Order with one or more IRS, and then opts to buy an ARO to select one or more ORS (Option Room Sets) on the desired IRS.

As an instance of the Sequential Buy ARO process, a customer has purchased a Room Order (with one or more rooms) and then selects an ARO through the interactive interface of the web pages as shown in Figures 34, 35, 36 and 37. Fig. 34 displays the summary of the purchased Room Order, which consists of a Room Set: Hotel XYZ International with guest room and special preferences (non smoking room and Saturday night show). Clicking on the marketing banner representing "Buy ARO", the customer is linked to the Web page shown in Fig. 35 and a Buy ARO interaction begins.

The series of web pages in Figures 35, 36 and 37 may (for example) be displayed in a customer's browser by a hotel's web server, to facilitate the interaction between the customer and the hotel when the customer comes to select (purchase) an ARO (during or after the Initial Room Order is purchased and/or selected). The Initial Room Order is displayed in Fig. 35. The customer may choose to purchase an ARO on the IRS by entering the search criteria for ORS in the "Search ARO Section" (shown in Fig. 35) and then clicking on the "Search *ARO Rooms*" button. After the click, the Buy ARO algorithm running "behind the scenes" on a server of the hotel qualifies the availability, applicability and price conditions on all the ORSs (Option Room Sets) available and displays them in the screen as shown in Fig. 36. For each of the ORSs, a set of one or more *Notify Deadlines* and the corresponding ARO Prices are shown in the form of "Select" buttons (shown in the "ARO *Notify Deadline*/ARO Price" section in Fig. 36).

The customer may select any desired ORS (along with the *Notify Deadline* and ARO Price) by clicking on a "Select" button associated with any of the *Notify Deadlines* displayed in the corresponding row. Once the customer clicks the "Select" button, he/she is hyperlinked to the web page as shown in Fig. 37, where the summary of the IRS and the selected ORS is shown.

Next, the customer may choose to select (purchase) more ORS on the same IRS. To purchase another ORS on the current IRS, the customer may click on "*Add more ARO Rooms*" button and the customer may repeat the ORS search process for this. Once all the desired ORSs have been selected, the customer clicks the "Save & Purchase" link (shown in Fig. 37), and a payment transaction is executed to complete the purchase.

The following presents an algorithmic illustration of the Sequential Buy ARO process mentioned above. Consider Fig. 38. In Act 38.100, the customer selects (and/or purchases) a Room Set (with one or more RP). Next, in Act 38.110, the customer reaches an interactive interface of the hotel's web server to a Buy ARO page, where the customer selects an IRS (referred to as Target_IRS) on which an ARO is desired. Next, the customer inputs the ORS search criteria (with one or more selected RP or one or more of the selected RP and one or more of other RP or any combination thereof) for the current Target_IRS in Act 38.115.

Next, on clicking the "Search *ARO Rooms*" button, control goes to Act 38.120, where the ORS search algorithm is executed to search for one or more ORS. The ORS search algorithm returns a list of valid ORSs, along with a list of Comb_NDs (*defined elsewhere*) and associated ARO Prices. The details of the ORS search algorithm are presented later. Next, the search results are displayed for the customer, who then selects the desired ORS and one or more associated Comb_ND(s)/ARO Price(s), as shown in Act 38.130.

Next, in Act 38.140, a test is performed to determine whether the customer wants to select more ORSs on the current Target_IRS or on another IRS. If the customer wants

to get an ORS on another IRS, control loops back to Act 38.110, where the customer selects another IRS as the Target_IRS, and then the process is repeated again for the new Target_IRS. If the customer wants to get more ORSs on the current Target_IRS, control loops back to Act 38.115, where the customer enters the ORS search criteria, and then the process is repeated for the new ORS search criteria. If the customer does not want to buy any more ORSs, control goes to Act 38.150, where a payment transaction (if needed) may be executed. For example, a customer may need to pay a price for the Room after taking into consideration the Initial ARO Price (if any) using a credit card, direct bank account debit or any other payment transaction mechanism. Next, the algorithm ends in Box 38.200. The computation may be performed using a processor that may calculate results in optimal time.

ORS Search

The following algorithm (shown in Fig. 39) determines and validates an ORS for a given set of conditions including, but not limited to, availability, *Notify Deadline* and ARO price. Said algorithm has already been discussed above in a more generic sense along with one of the ways of its implementation along with various information technology and networking tools including, but not limited to, one or more servers, database, load balancers, firewall, routers, Internet, highly secured VPN, Intranet, RAM, hard disk drives, CPUs, monitors as shown by Fig. 13D.

In Act 39.100, the number of customers (IC), IRS_Set (containing all the IRS in the Initial Room Order, and all the ORSs, (if any) already selected/purchased along with Comb_ND_Set(s) and Comb_OP_Set(s), for each IRS), Target_IRS and the ORS Search parameters are input to the system. The details on Comb_ND_Set and Comb_OP_Set are provided later. The ORS search parameters include, but are not limited to, date, time for check-in/check-out and location of the hotel, number of Room Products per Room Sets, *Notify Deadline*, ARO Price and so forth. A customer may be allowed to input *Notify Deadline* and/or ARO Price on the basis of which valid ORSs (that satisfy the given criteria of *Notify Deadline* and/or ARO Price) may be searched for and displayed

for the customer. In another example, a customer may input location and/or room type related parameters as inputs, and then a set of Notify Deadlines and ARO Prices may be computed for the hotels that match the given criteria. In yet another example, a customer may input both location and/or room type and *Notify Deadline* and/or ARO Price inputs and then a search may be performed for valid ORSs. In some situations, a hotel may also validate the rooms input by the customer to determine if said rooms are eligible to be *ARO Rooms*.

Next, control goes to Act 39.110, where an ORS Search is performed for the given criteria. The search may be best performed using a processor that may calculate results in optimal time. The order in which search parameters are executed may be optimized to reduce the search time, however, it may or may not affect the final outcome. A hotel may select any order of its choosing.

In Act 39.110, Room Sets are determined that match the search and the resulting Room Sets are added to a list termed LIST_ORS. Next, in Act 39.120, a list of ORS validation rules is obtained from the hotel's ARO VOF database and the rules are used to validate all the Room Sets in the LIST_ORS list. Room Sets that do not satisfy the rules are discarded. Validation rules may include, but are not limited to, a Maximum Number of Room Products per Room Set Rule, a Maximum Room Price Rule, a Time Synchronization Rule, and so forth. For example, a Maximum Number of Room Products per Room Set Rule discards the Room Sets that have more Room Products than specified. A hotel may implement any validation rule of its choosing to further qualify the Room Sets in the LIST_ORS list. As a last Act in Act 39.120, the first element in the updated LIST_ORS is designated as the Current_ORS.

Next, control goes to Act 39.130, where a group of Comb_NDs is computed for the combination of the Target_IRS, all the existing ORS of the Target_IRS and the Current_ORS, and added to a set called Comb_ND_Set. Next, in Act 39.135, a test is performed to determine whether the Comb_ND_Set obtained in the previous Act is Null. If so, control goes to Act 39.155. If not, control goes to Act 39.140, where the ARO

availability and ARO Price for the Comb_ND_Set are determined. Next, in Act 39.150, another test is performed to determine whether the ARO Availability or the ARO Price is Null. If so, control goes to Act 39.155. If not, control goes to Act 39.160.

In Act 39.155, the Current_ORS is discarded from the LIST_ORS list, and control goes to Act 39.160, where another test is performed to determine if more elements are left in the LIST_ORS list. If so, control goes to Act 39.165. If not, control goes to Act 39.170.

In Act 39.165, the next element in the LIST_ORS list is designated as the Current_ORS and control loops back to Act 39.130 to repeat the process for the new Current_ORS. In Act 39.170, the updated LIST_ORS list is returned as the search result, and the algorithm ends in Box 39.200.

Computation of *Notify Deadlines* in the Hotel Industry

A hotel may set one or more *Notify Deadlines* of its choosing for its Room Products. Once the *Notify Deadlines* have been set for each Room Product, the next Act is to create a framework to compute *Notify Deadlines* for a group of Room Products (such as a Room Set, a Room Order or any other group). The following sections present an example of a framework that may be used to obtain a set of *Notify Deadlines* applicable to a group of Room Products. A hotel may use any framework and algorithm of its choosing to obtain the same.

A set of *Notify Deadlines* associated with a Room Product, a Room Set and a combination of two or more Room Sets is called Product_ND_Set, Set_ND_Set and Comb_ND_Set, respectively. Each element in the Product_ND_Set, Set_ND_Set and Comb_ND_Set is termed Product_ND, Set_ND and Comb_ND, respectively. The Comb_ND_Set may be computed by combining the Set_ND_Sets of all the given Room Sets. A Set_ND_Set is computed by combining the Product_ND_Sets of all the Room Products under that Room Set. The *Notify Deadlines* may be computed based on various

parameters and factors of the hotel choosing. One example to compute a Comb_ND_Set is as follows. First compute Set_ND_Set for all Room Sets. A Set_ND_Set is computed by first selecting earliest of the *Notify Deadlines* of each Room Product within the concerned Room Set, and then picking the latest of those Deadlines, and noting that as the Target_Deadline. Next step is to pick all those *Notify Deadlines* that fall after the Target_Deadline. *Notify Deadlines* thus obtained may be validated using various validation rules based on hotel factors such as customer utility, room parameters and so forth. Similarly, the Comb_ND_Set may thus be computed by repeating the above process for Set_ND_Sets, thus obtained for each Room Set.

Available Capacity Check in the Hotel Industry

The ARO available capacity for an ORS may depend on one or more factors including, but not limited to, *Notify Deadline*, ARO Prices, expected room value and so forth. A hotel may use any method of its choosing to determine ARO capacity of a Room. For example, a hotel may choose to have a fixed ARO capacity for one or more of its Room Products.

An instance to compute ARO capacity is discussed below. Consider the case, when ARO Capacity is dependent on *Notify Deadline*. In such situation, the objective is to determine those Comb_NDs within the Comb_ND_Set on which ARO is available for the given ORS. The ARO Capacity and the Used ARO Capacity (the total number of Room Products on which ARO has been sold but not exercised) may be calculated for each Comb_ND within the Comb_ND_Set. Available Capacity (AC) would then be the difference of ARO Capacity and Used ARO Capacity for the given Room Product. If the AC is greater than or equal to the number of incoming customers desiring an ARO, then the ARO capacity is available at a given Comb_ND for the given ORS. The process may be repeated for all *Notify Deadlines* within Comb_ND_Sets. An ARO may be made available on a given ORS for a given Comb_ND, if ARO is available on all the Room Products of ORS for the given Comb_ND.

ARO Price Calculation

A hotel may set ARO Prices for a Room Product using any method of a hotel's choosing. Once the ARO Prices have been set for each Room Product, the next Act is to create a framework to compute ARO Prices for a group of Room Products (such as a Room Set, a Room Order or any other group) by using ARO Prices for each of the Room Products in the group.

The parameters Product_OP refer to an ARO Price (may or may not be corresponding to a *Notify Deadline)* associated with a Room Product. Similarly, Set_OP and Comb_OP refer to ARO Price (may or may not be corresponding to a *Notify Deadline*) associated with a Room Set and a combination of two or more Room Sets, respectively. A set of Product_OPs, Set_OPs and Comb_OPs is termed Product_OP_Set, Set_OP_Set and Comb_OP_Set, respectively. The Comb_OP_Set is computed by combining the Set_OP_Sets of the IRS and all the ORSs (existing and new). A Set_OP_Set is computed by combining the Product_OP_Sets of all the Room Products under that Room Set.

One or more Set_OP_Rules may be read from the hotel's database and applied to calculate Set_OP_Set for each input Room_Set (IRS and all ORSs) using the Product_OP_Sets of all the Room_Products of said Room_Set. A hotel may use any Set_OP_Set Rule of its choosing. Set_OP_Rules may be defined to calculate Set_OP as the sum, average, highest, lowest or any other function of Product_OPs of all the Room Products at a given Comb_ND. Similarly, a Comb_OP_Set consists of one or more Comb_OPs, and is calculated using one of the pre-determined rules, termed Comb_OP_Rules, to combine the Set_OPs of all the Room Sets in the combination. A hotel may use a Comb_OP_Rule of its choosing. Comb_OP_Rules may be defined similar to the Set_OP_Rules.

Concurrent Buy ARO Process in the Hotel Industry

As explained above, in the Concurrent Buy ARO process, a customer selects all the *ARO Rooms* concurrently in one transaction. An algorithmic illustration of an example of the Concurrent Buy ARO process is displayed in Fig. 40. An ARO (2, 1) instance is assumed here as an example. Consider a customer who wants accommodation flexibility in his/her trip and wants two *ARO Room Sets*. In Act 40.100, the customer needs for ARO are input, including, but not limited to, a search criteria for two Room Sets according to customer's utility (may be similar to the search criteria defined above for the Sequential Buy ARO process).

Next, in Act 40.110, the ARO algorithm is run to determine the combinations of two Room Sets that satisfy inputs. A list of such search results is displayed for the customer along with the associated terms and conditions including, but not limited to, *Notify Deadlines*, ARO Price and Room Price for each such combination. The ARO algorithms defined above for the Sequential Buy ARO process (defined above) may also be used for the Concurrent Buy ARO process.

Next, in Act 40.120, the customer selects a desired combination of two Room Sets and the associated conditions such as ARO Price/*Notify Deadline*. Next, in Act 40.130, a payment transaction is executed, if needed. For example, the customer pays the Room Price for ARO (if any) using a credit card, direct bank account debit or any other payment transaction mechanism. Next, the algorithm ends in Box 40.200. The computation may be performed using a processor that may calculate results in optimal time.

(2) Event Optimizer in the Hotel Industry

After the completion of the Buy ARO process, the next stage is the Event Optimizer. In this stage, the *customer notification* (or CN, in short) process as shown in Act 31.200 is executed. In this process, a customer selects a *Chosen Room*. The process

may also consist of one or more event optimizer algorithms that may help to optimally select the *Chosen Room* and/or to optimally reuse the *Released Room*. The details of the CN process are provided later. One of the ways of implementation of Event Optimizer stage with the help of information technology tools has already been discussed above in a more generic fashion wherein said tools include, but are not limited to, one or more servers, database, load balancers, firewall, routers, Internet, highly secured VPN, Intranet, RAM, hard disk drives, CPUs, monitors as shown by Fig. 13E.

ARO Exercise Process in the Hotel Industry

In the Customer Notification (or CN, in short) process, a customer interacts with a hotel's server to select the *Chosen Room*. The interaction may take place (for example) via phone, in-person, on a website or via any other communication mechanism. The Customer Notification process may be performed using any rule/method as desired.

Customer Notification (or CN) process in the Hotel Industry

The primary objective of the CN process is to select (or define) the *Chosen Room*. In the CN process, a decision for the *Chosen Room* is notified to the hotel. As mentioned earlier, the *Chosen Room* may be defined by the hotel, the customer, another entity or any combination thereof. The customer interacts with a hotel server that runs the CN process, to select the *Chosen Room*. If the customer fails to notify the hotel of the *Chosen Room* before the *Notify Deadline*, the *Chosen Room* is decided based on the terms and conditions set before in the *Initial Transaction* of the ARO purchased by the customer.

Fig. 41 displays an example of an algorithm that may be used to execute the *Customer Notification* process. In Act 41.100, a customer enters input parameters, such as Reservation/Confirmation Number, Last Name, purchase date and so forth to retrieve the data from the hotel database for the Initial Room Order and *ARO Rooms*. Next, in

Act 41.110, a test is performed to determine whether the *Notify Deadline* has expired or not. If so, then control goes to Act 41.120. If not, then control goes to Act 41.140.

In Act 41.120, a Default Rule is read from the hotel's database (Box 41.210). A Default Rule defines a criteria to select the *Chosen Room* if the customer fails to provide a timely notification (i.e. before the *Notify Deadline)* to the hotel regarding his/her decision of the *Chosen Room.* A hotel may use a Default Rule of hotel's choosing. A hotel may use a rule to choose a room with the lower expected value, earlier check-in date, lower occupancy rate or any other factor. Next, in Act 41.130, the Default Rule, thus obtained, is used to select the *Chosen Room Set,* and then control goes to Act 41.150. In Act 41.140, the customer selects the desired *Chosen Room.* Next, control goes to Act 41.150.

In Act 41.150, a payment transaction (if any) is executed, and then the *Chosen Room* is displayed to the customer. The payment transaction may be related to the ARO purchased by the customer (such as a payment of an ARO Exercise Price). The algorithm, then ends in Box 41.200. The computation may be performed using a processor that may calculate results in optimal time.

Implementation of ARO VOF in conjunction with other VOFs in the Hotel Industry

ARO VOF may be used in conjunction with one or more other VOFs, for example, the FRO (Flexibility Reward Option) VOF. A customer who receives an ARO is termed "A" type of customer. A hotel may form a group of one or more ARO customers and one or more FRO customers, where the options (ARO and FRO) obtained by the group members are complimentary in nature. As an example, consider an A customer who bought an ARO to choose either of room R1 or room R2 as the *Chosen Room,* and consider a Y customer who received a FRO and is flexible to take any of R1 and R2 as the *Chosen Room.* Thus, if A decides to choose R1 as the *Chosen Room,* the hotel may assign R2 as the *Chosen Room* for Y, and vice versa. The customers A and Y

have taken complimentary options and may form a group. The hotel may need to hold only one unit of inventory in R1 and R2 to satisfy the needs of both A and Y (assuming each A and Y only need one unit of room). Such a combination of complimentary options or VOFs may improve efficiency and concurrently enhance value for all the parties involved (in the context of the current example, enhance value for A, Y and the hotel).

The implementation of the grouping of A type and Y type of customers may be done in one or more ways. One way to implement such grouping is to first have one or more Y type of customers and based on such customer(s), the hotel may offer complimentary AROs to customers to make groups. In another implementation, the hotel may first offer ARO and based on such ARO customer(s), hotel offers complimentary FROs to customers to make groups. In yet another implementation, the hotel may offer ARO and FRO separately and then define a process to make complimentary groups of A and Y customers (such groups termed "AY_Groups").

A hotel may choose to create AY_Groups at various group levels such as implementation of grouping at Level 1, Level 2 and so on. In Level 1 grouping, an AY_Group involves one each of A and Y type of customers. An example of Level 1 grouping has already been given above (the two customer, A and Y, example).

In Level 2 grouping, the grouping involves making complimentary groups for more than 2 customers. As an example, consider an A customer who bought an ARO to choose either room R1 or room R3 as the *Chosen Room*, a Y1 customer who received a FRO and is flexible to take any of room R1 and room R2 as the *Chosen Room* and a Y2 customer who has also received a FRO and is flexible to take any of R2 and R3 as the *Chosen Room*. A notation A-Y1-Y2 represents this example. Thus, if A decides to choose R1 as the *Chosen Room*, the hotel may assign R2 as the *Chosen Room* for Y1 and R3 as the *Chosen Room* for Y2. Alternatively, if A decides to choose R3 as the *Chosen Room*, the hotel may assign R1 and R2 as the *Chosen Rooms* for Y1 and Y2, respectively.

It is assumed that a "unit" represents one unit of room (or room capacity) and each customer needs only one unit of a room. Continuing with the above example, if the hotel were to not consider the complimentary nature of options obtained by A, Y1 and Y2 customers, the hotel may need to hold (or block) a total of 4 units of capacity to ensure complete satisfaction of needs of A, Y1 and Y2, i.e., 2 units for A (1 unit each of R1 and R3 as A could choose any room), 1 unit for Y1 (either R1 or R2) and 1 unit for Y2 (either R2 or R3). This implies, to satisfy a total need of 3 units of rooms, the hotel may need to hold (or block) 4 units of room capacity, creating a redundant capacity of 1 unit that the hotel may not be able to use otherwise. By creating a complimentary group of A-Y1-Y2, the hotel needs to only hold (or block) 3 units of capacity (1 unit each in R1, R2 and R3), thus, freeing up 1 unit of redundant capacity. Thus, an AY_Group mechanism may create an efficient structure with minimal holding (and/or blocking) of capacity to satisfy the needs of all the concerned customers.

The grouping may also be implemented at higher levels such as Level 3 grouping, Level 4 grouping, Level 5 grouping and so on. An example of the Level 3 grouping may be A1-Y1-Y2-Y3.

A hotel may choose to implement grouping at various room levels such as Room Product, Room Set and Room Order. A hotel may also change terms and conditions of one or more option contracts of one or more FRO and/or ARO customers (for e.g., price, notify deadline and so on) to solicit customer participation in FRO/ARO to create more AY_Groups. The hotel may also offer incentives to customers to choose complimentary FRO/ARO offerings to enable the hotel to create more AY_Groups. The implementation methods mentioned above for grouping are for illustration purposes only and a hotel may choose to implement grouping in one or more other ways or by combining above said methods or by combining one or more other ways along with one or more above said methods.

Fig. 42 displays a flow chart that illustrates one way of implementing grouping of A and Y type of customers. In Act 42.100, sets of A and Y customers are taken as input. Next, in Act 42.110, a set of one or more Grouping Rules is read from the hotel's database (42.210). A grouping rule may depend upon the number of A and/or Y type of customers, desired capacity redundancy in the system, the permissible time factor to create AY_Groups, any other rule of hotel's choosing, any combination thereof and so on. For example, a hotel may choose a Grouping Rule whereby new groups are created by first ungrouping one or more of the AY_Groups (created earlier but unexercised, for example, groups for which the customer has not been notified, or if notified, the customer has not utilized the room and the terms of option contract allows for a change in the *Chosen Room*). A Grouping Rule may create groups of only those A and Y type of customers who have yet to be grouped and discarding all A/Y customers, which have already been grouped. A hotel may implement any Grouping Rule to formulate AY_Groups. The choice to Grouping rules may enhance the overall value for the hotel (for example, reduce the total capacity required to satisfy room needs for all A and Y customers). Theoretically, the number of units of the room required (or blocked) should be equal to the number of customers buying the room (assuming each customer wants one unit of room). Thus, by implementing the grouping and with the help of appropriate Grouping Rules, the hotel may attempt to achieve such theoretical minima.

Next, in Act 42.120, the Grouping Rules, so obtained from the hotel's database, are used to make AY_Groups. Next, in Act 42.130, the AY_Groups so created are returned along with ungrouped A/Y, if any, and the process then ends in Box 42.200.

The grouping may enhance customers' experience, and may comprise operating a system that delivers a FRO to at least a "first customer" to utilize up to n of m selected rooms for said first customer, and n is less than or equal to m; operating a system that delivers an ARO to at least a "second customer" to utilize up to k of p selected rooms, and k is less than or equal to p; operating a system to define each of the k *Chosen Rooms*, whereby after each of the k *Chosen Rooms* is defined, said "second customer" can utilize said *Chosen Room*; operating a system wherein a hotel defines t *Chosen Room*(s) for said

"first customer" after each of said k *Chosen Rooms* is defined, wherein after each of said t rooms is defined, said first customer can utilize said defined room, where t is less than or equal to n. Said t rooms may be a subset of n rooms, m rooms or both. Said t rooms or n rooms or both may also include one or more rooms not included in said m selected rooms. Similarly, k rooms may be a subset of p rooms, or may include one or more rooms other than said p rooms. The grouping may be performed for a multiplicity of at least one of said first or second customers and may combine together at least one of each of said first and second customers to formulate at least one group with at least one complementary set of options. The grouping may enable a hotel to utilize at least one of said m or p rooms at least after delivery of any of said first or second options.

ARO VOF may be used in conjunction with one or more other VOFs, for example, the URO (Upgrade Room Option) VOF. A customer who received an ARO is termed "A" type of customer. A hotel may form a group of one or more ARO customers and one or more URO customers, where the options (ARO and URO) obtained by the group members are complimentary in nature. As an example, consider two customers A(R1, R2) and U[up(R2), base(R1)]. The notation A(R1, R2) implies a customer A who has received an ARO and has the flexibility to choose either R1 or R2 as the *Chosen Room*. The notation U[up(R2), base(R1)] implies a customer U who received a URO and wishes to get an upgrade from R1 (i.e., the base room) to R2 (i.e., the up room). Thus, if A decides to choose R1 as the *Chosen Room*, the hotel may upgrade U to R2. If A decides to choose R2 as the *Chosen Room*, the hotel may not upgrade U and hence U gets R1. The customers A and U have taken complimentary options and may form a group. The hotel may need to hold only one unit of inventory each in R1 and R2 to satisfy the needs of both A and U (assuming each A and U only need one unit of room). Such a combination of complimentary options or VOFs may improve efficiency and concurrently enhance value for all the parties involved (i.e., in the context of the current example, enhance value for A, U and the hotel).

The implementation of the grouping of A type and U type of customers may be done in one or more ways. One way to implement such grouping is to first offer and

secure one or more U type of customers and based on such customer(s), the hotel may offer complimentary AROs to other customers to make groups. In another implementation, the hotel may first offer and secure ARO customers and based on such ARO customer(s), hotel offers complimentary UROs to other customers to make groups. In yet another implementation, the hotel may offer ARO and URO separately and then define a process to make complimentary groups of A and U customers (such groups termed "AU_Groups").

A hotel may choose to create AU_Groups at various group levels such as implementation of grouping at Level 1, Level 2 and so on. In Level 1 grouping, an AU_Group involves one each of A and U type of customers. An example of Level 1 grouping has already been given above (the two customer, A and U, example).

In Level 2 grouping, the grouping involves making complimentary groups for more than 2 customers. As an example, consider three customers A(R1, R2, R3), U1[up(R2, R3), base(R1)] and U2[up(R1, R3), base(R2)]. The notation A(R1, R2, R3) implies a customer A who received an ARO on R1, R2 and R3 (flexibility to choose any one of R1, R2 or R3 as *Chosen Room)*. The notation U1[up(R2, R3), base(R1)] implies a customer U1 who received a URO and wishes to get an upgrade from R1 (base room) to either R2 or R3 (any of the two up rooms), and U2[up(R1, R3), base(R2)] implies a customer U2 who received a URO and wishes to get an upgrade from R2 (base room) to either R1 or R3 (any of the two up rooms). A hotel may group these three customers together. If A decides to choose R1 as the *Chosen Room*, the hotel may upgrade U1 to R2 and U2 to R3. Alternatively, if A decides to choose R2 as the *Chosen Room*, the hotel may upgrade U1 to R3 and U2 to R1. In the third case, if A decides to choose R3 as the *Chosen Room*, the hotel may upgrade U1 to R2 and U2 to R1. Thus by grouping them together, the hotel needed to hold only one unit of inventory in each of the three rooms R1, R2 and R3 to satisfy needs for all three customers in all different situations.

It is assumed that a "unit" represents one unit of room (or room capacity) and each customer needs only one unit of a room. Continuing with the above example, if the

hotel were to not consider the complimentary nature of options obtained by A, U1 and U2 customers, the hotel may need to hold (or block) a total of 5 units of capacity to ensure some level of satisfaction of needs for A, U1 and U2, i.e., 3 units for A (1 unit each of R1, R2 and R3 as A could choose any room), 1 unit for U1 in R1 (base room) and 1 unit for U2 in R2. Even by blocking (or holding) 5 units of space, there may be no guarantee that the hotel would be able to satisfy upgrade needs for U1 or U2 (in the event they are not grouped together). This implies, to satisfy a total need of 3 units of rooms, the hotel may need to hold (or block) 5 units of room capacity, creating a redundant capacity of 2 units that the hotel may not be able to use otherwise. By creating a complimentary group of A-U1-U2, the hotel needs to only hold (or block) 3 units of capacity (1 unit each in R1, R2 and R3), thus, freeing up 2 units of redundant capacity. Thus, an AU_Group mechanism may create an efficient structure with minimal holding (and/or blocking) of capacity to satisfy the needs of all the concerned customers.

The grouping may also be implemented at higher levels such as Level 3 grouping, Level 4 grouping, Level 5 grouping and so on. An example of the Level 3 grouping may be A1-U1-U2-U3.

A hotel may choose to implement grouping at various room levels such as Room Product, Room Set and Room Order. A hotel may also change terms and conditions of one or more option contracts of one or more URO and/or ARO customers (for e.g., price, notify deadline and so on) to solicit customer participation in URO/ARO to create more AU_Groups. The hotel may also offer incentives to customers to choose complimentary URO/ARO offerings to enable the hotel to create more AU_Groups. The implementation methods mentioned above for grouping are for illustration purposes only and a hotel may choose to implement grouping in one or more other ways or by combining above said methods or by combining one or more other ways along with one or more above said methods.

Fig. 43 displays a flow chart that illustrates one way of implementing grouping of A and U type of customers. In Act 43.100, sets of A and U customers are taken as input.

Next, in Act 43.110, a set of one or more Grouping Rules is read from the hotel's database (43.210). A grouping rule may depend upon the number of A and/or U type of customers, desired capacity redundancy in the system, the permissible time factor to create AU_Groups, any other rule of hotel choosing, any combination thereof and so on. For example, a hotel may choose a Grouping Rule whereby new groups are created by first ungrouping one or more of the AU_Groups (created earlier but unexercised, for example, groups for which the customer has not been notified, or if notified, the customer has not utilized the room and the terms of option contract allows for a change in the *Chosen Room*). In another example, a Grouping Rule may create groups of only those A and U type of customers who are yet to be grouped and discarding all A/U customers, which have already been grouped. A hotel may implement any Grouping Rule to formulate AU_Groups. The choice to Grouping rules may enhance the overall value for the hotel (for example, reduce the total capacity required to satisfy room needs for all A and U customers). Theoretically, the number of units of the room required (or blocked) should be equal to the number of units the customers shall be eventually utilizing. Thus, by implementing the grouping and with the help of appropriate Grouping Rules, the hotel may attempt to achieve such theoretical minima.

Next, in Act 43.120, the Grouping Rules, so obtained from the hotel's database, are used to make AU_Groups. Next, in Act 43.130, the AU_Groups so created are returned along with ungrouped A/U, if any, and the process then ends in Box 43.200.

The grouping may enhance customers' experience, and may comprise operating a system that delivers a URO to at least a "first customer" to utilize up to n of m selected rooms for said first customer, and n is less than or equal to m; operating a system that delivers an ARO to at least a "second customer" to utilize up to k of p selected rooms, and k is less than or equal to p; operating a system to define each of the k *Chosen Rooms*, whereby after each of the k *Chosen Rooms* is defined, said "second customer" can utilize said *Chosen Room*; operating a system wherein a hotel defines t *Chosen Room*(s) for said "first customer" after each of said k *Chosen Rooms* is defined, wherein after each of said t rooms is defined, said first customer can utilize said defined room, where t is less than

or equal to n. Said t rooms may be a subset of n rooms, m rooms or both. Said t rooms or n rooms or both may also include one or more rooms not included in said m selected rooms. Similarly, k rooms may be a subset of p rooms, or may include one or more rooms other than said p rooms. The grouping may be performed for a multiplicity of at least one of said first or second customers and may combine together at least one of each of said first and second customers to formulate at least one group with at least one complementary set of options. The grouping may enable a hotel to utilize at least one of said m or p rooms at least after delivery of any of said first or second options.

Business Model to implement ARO in the Hotel Industry

Different business models may be used to implement an ARO VOF. For example, a hotel may choose to implement an ARO VOF individually or in conjunction with one or more partners and/or other companies. As mentioned in the sections above, in another implementation of ARO, a hotel may allocate some room inventory to another entity. The term "allocation of room(s)" or "allocation of room inventory" implies, without limitation, assigning one or more rooms of one or more hotels to an entity for any purpose or use by the entity either exclusively or non-exclusively. For example, an entity may use the allocated rooms to offer ARO to customers and/or to sell the rooms as regular rooms. The allocation of room may be conditional. For example, one of the conditions may require a return of at least one allocated room after a specified time period and/or other consideration(s).

The customer may select or purchase one or more rooms from the hotel and/or said entity and then interact with said entity to select (purchase) one or more *ARO Rooms* in relation to said (already purchased) rooms. Said entity may also receive room allocation from more than one hotel/hotel chain, and thus, offer rooms from multiple hotels/hotel chains to a single customer during the *Initial Transaction* for ARO.

The OA may use those rooms and operate a service to offer AROs to the hotel customers. As explained above in Fig. 13A, a customer may select one or more rooms

from the OA, and then receive an ARO on those selected rooms from the OA. Another approach would be for a customer to select one or more rooms from the hotel and then receive an ARO option on those selected rooms from the OA. In another example, a customer may select one or more rooms from both the hotel and the OA, and then receive the ARO option on those selected rooms from the OA. It is also possible that the customer receives an ARO from the hotel or both from the hotel and the OA on a given set of selected rooms.

The OA and the hotel may simultaneously offer AROs to the hotel customers, i.e., a customer may either approach the hotel or the OA to receive an ARO on desired rooms. In another model, the OA may operate as the sole provider of the ARO to all the customers of a hotel. In a yet another model, the OA and the hotel may choose to work together and jointly offer AROs to the hotel customers. The OA or the hotel may offer and sell AROs to customers using either or both of the Sequential or the Concurrent Buy ARO processes.

As explained in Fig. 13A above, an OA may be able to offer ARO on rooms from one or multiple hotels. An OA may receive allocation of rooms from two or more hotels. A customer may purchase one or more rooms from one or more hotels and/or from the OA, and then receive an ARO option on those selected rooms from the OA. Even if the OA may not be entitled to or does not receive room allocation from a hotel, it may still be able to formulate an agreement with that hotel to offer AROs on the rooms of that hotel. Thus, a customer may be able to receive an ARO on rooms from multiple hotels, giving the customer more flexibility and variety to choose from. For example, a customer may receive an ARO on two rooms from two different hotels and can choose to use either of them within the terms and conditions of the option contract. This may provide a lot of flexibility for the customers, especially when the customer trip includes destinations only served by a few hotels which may be preferred by the customers. An OA may be able to thus create a multi-hotel ARO VOF Framework, which may tremendously enhance the flexibility for the customers. All the participating hotels that allocate rooms to and/or partner with the OA to offer ARO may also gain from an overall

increase in the total spending by the consumers, enhanced overall customer satisfaction and/or other operational benefits. Either or both of the OA and the hotel may process the reservations for the *Chosen Rooms* associated with an ARO purchased by the customer. A customer may receive reservations from the OA or the hotel for the rooms related to the ARO grant. An entity (the OA and the hotel) may process reservations for the rooms offered only by that entity or by either of the two entities.

The OA and the hotel may engage in a business agreement to implement an ARO program. The business agreement may divide the total benefit generated by the ARO program between the two parties using any mechanism or criteria as desired. The total ARO Revenue Benefit may be shared between the two parties. The hotel may allocate rooms to the OA. One or more hotels may allocate only few or may allocate their entire room inventory to the OA to offer those rooms to the customers by way of regular and/or ARO rooms. The OA may offer those rooms as ARO Rooms to customers. In return, the OA may offer a lending revenue or fee to the hotel for all or a portion of the rooms allocated. This lending fee may be given only for the rooms that the OA is able to utilize or for all the allocated rooms. The lending fee may be a lump sum amount, may depend upon the number of rooms allocated or may depend on one or more factors as desired. The agreement may include a provision where the OA may return the allocated rooms back to the hotel at a certain time and date. There may be one or more conditions associated with the return of unused ARO rooms and/or rooms from the *Released Rooms*, including, but not limited to, returning the same room, returning a higher value room and so on.

The ARO VOF may include different conditions imposed on the customer regarding the payments related to the ARO. For example, a customer may be asked to make payments only to the hotel even if he/she is receiving rooms and/or options from the OA. Similarly, the customer may be required only to pay to the OA even if he or she selected the rooms and/or received the options from the hotels. The condition may also be set to ask a customer to make one or more payments to the hotels for the rooms and/or options received from that hotel, and to make one or more payments to the OA for the

rooms and/or options received from that OA. The condition may allow the customer to make partial payments to the hotel and the rest to the QA or vice versa, the basis of which distribution may depend upon various factors, including, but are not limited to, the factors of hotel's choosing, the arrangement between the OA and the hotel and so on. In another example, the customer may be required to pay to a third party or may be required to pay to any of the combination of the entities mentioned above.

Information Technology System for the ARO VOF in the Hotel Industry

As discussed earlier as well, a client-server architecture may be used to implement the ARO VOF. However, a hotel may use a computer hardware and software infrastructure of its choosing to implement an ARO VOF.

The ARO VOF may be best implemented using one or more computer-implemented methods to operate a computer-implemented service to offer AROs to the customers, that includes, but not limited to, recording the information pertaining to the offered and/or sold AROs in a database. It may also include operating a computer-implemented service (and/or system) or other service (and/or system) to define the *Chosen Rooms*, and recording said *Chosen Rooms* (or defined rooms) and all the rooms related to an ARO in a database.

For the stage one (i.e., to formulate the ARO VOF), an application server may be used along with a database (e.g., a relational database) that stores all the information relevant to the hotel and the customer. The database may include all the relevant information sufficient to identify rooms the hotel chooses to make eligible for ARO. One or more users (e.g., a business analyst or manager) may have full access to this server through Intranet or highly secured VPN environment to design an optimal value option framework. The database shall also store all the information pertaining to all the acts (in stage one) used by a hotel while formulating the ARO VOF.

A similar or a different application server and/or a cluster of application servers (functioning concurrently) along with one or more web servers and a set of one or more database servers may be used for the Buy ARO as explained in Fig. 13D above and CN (Customer Notification) processes in the stage two of the ARO VOF. The application server communicates with a web server and the database (e.g., a relational database either the same database used for stage one or a different one). This database (for stage two) stores all the relevant information pertaining to all the acts executed during and in relation to the processes and algorithms run for stage two. All the algorithms mentioned earlier for both the Buy ARO process and the CN process may be computer-implemented as explained and discussed above in Fig. 13D and 13E. All the customer interactions and the related information such as customer needs, inputs, payment transactions etc. are stored in this database, including information pertaining to the interactions with those customers who may not purchase and/or receive ARO. The systems for stage two and stage one may be maintained in a synchronized environment so that each system has access to the most current information and can communicate with each other.

As discussed above, there may be other ways for implementing the ARO VOF which may depend upon including, but not limited to, the scale of the implementation, business requirements and number of entities involved. The entities may interact through a series of hardware products and services with the OA/hotel server(s). The OA may or may not be different than the hotel and the OA server may be the same as that of the hotel server. The information technology and network system to implement ARO VOF may include tools, without limitation, such as one or more CPUs, Hard Disk Drives, RAM, one or more series of Routers, Internet, Firewall, highly secured VPN, Intranet, load balancers, servers, primary databases, secondary databases and so forth.

As discussed and explained above, there may be one or more secondary databases that may only be in the "Read Only" form and may be updated through one or more replication servers. Alternatively, the hotel may have one or more separate temporary database structure wherein the entries are updated and stored until the final update is

made in one or more main databases. One the final update is done, the entries in these temporary databases may be removed.

The entire system may run at the premises of OA, hotel and/or any third entity or any combination thereof. It may also be possible to run a part of the system at one place and rest at one or more other places. The system may also be implemented even if one or more servers may be kept off-shore locations and may be accessed remotely. The geographical locations of one or more hardware product and/or services may be different depending upon including, but not limited to, the factors of hotel's choice, ease of accessibility, infrastructure facilities. The structure or the interaction architecture of the system may vary depending on factors including, but not limited to, the set up of the hotel, changes in the technology and with the introduction of new and better technology enhancing the interaction process.

A customer may interact with the Buy ARO and/or the CN process either directly or indirectly using a local or a remote terminal (e.g., a computer with a browser and an access to the Internet) that is able to access the web server(s) that host the Buy ARO and CN processes. A customer may also interact with an operator (or a computer operator) using any communication mechanism (e.g., in-person, phone, using email, Internet chat, text messaging system) who then communicates with the web server through the Intranet and/or Internet.

The system for the stage one may be hosted and run by a hotel, an OA, a third party service provider or any combination of the above. Similarly, the system for the stage two may be hosted by a hotel, an OA, a third party service provider or any combination of the above. In the model, where the OA receives room allocation from the hotel and offers ARO to the customers directly, the web server, application server and database for both stage one and stage two shall be managed by the OA. The OA may also have partial (or complete) access to the hotel database and systems through a highly secured environment (for example, a virtual private network). In the model, when an OA and a hotel tie-up together to provide ARO, all the computer hardware and

software infrastructure for both stage one and stage two may be hosted by and/or property of either or both (mutually) of the sides depending upon the business agreement between them.

Alternate Flight Option (AFO) Value Option Framework in the Airline Industry

As explained above, an APO VOF can be implemented in any industry. The implementation of APO in the airline industry is discussed herein. Within the airline industry, the customer need for travel flexibility (defined below) is used as the targeted value element. With respect to the selected value element (i.e., customer need for travel flexibility) in the airline industry, the APO VOF may be appropriately termed Alternate Flight Option (AFO) VOF.

The first stage in the AFO VOF involves steps (or acts) of: capturing customer dynamics, assessing airline operations and economic factors, integrating customer dynamics with airline economic factors, formulating the VOF and optimizing the VOF. The second stage involves carrying out a dynamic interaction with the customer and then executing an Event Optimizer process. The specific detailed steps with respect to the AFO VOF will now be discussed.

First Stage: Formulation of AFO Value Option Framework in the Airline Industry

(1) Capturing Customer Dynamics

Fig. 76 shows an analysis of the value elements that are believed to matter to customers in relation to an AFO in the airline industry. In the design value segment, shown in Box 76.100, important value elements may include, but are not limited to, need for travel flexibility, time and schedule of alternate flights, flexibility period and number of alternate flights allowed on a given ticket. In the price value segment, shown in Box 76.200, important value elements may include, but are not limited to, Ticket Price and

cost to receive a desired level of flexibility. In the delivery value segment, shown in Box 76.300, important value elements may include, but are not limited to, how close to scheduled departure the customer may edit his/her Itinerary easily and favorably, and how long before departure the ticket must be purchased to obtain flexibility. In the service value segment, the important value elements may include, but are not limited to, the ease of getting desired flexibility as shown in Box 76.400. It may be important to estimate the relative preferences and utilities of these value elements to different types of customers.

The customer need for travel flexibility is subjective in terms of the length of the "flexibility period" and the "travel plan variation". The term "flexibility period" refers to the time period during which a customer wants to keep his plans flexible. Some customers may desire a flexibility period that extends up to a few hours before the earliest intended departure, whereas, some others may only want it up to a few days or weeks before the desired travel date. The term "travel plan variation" refers to the extent to which a customer expects the travel plan to change. It may be expressed in terms of potential time periods for departure, arrival and stay, range of depart and/or arrival cities, flight services/amenities needed during travel and so forth. Customers are concerned of change/cancellation fees, unavailability of desired flights, the efforts required and the hassles involved in making Itinerary changes. Full fare tickets do allow changes at no cost to the customer, but only a few customers can afford to buy them or are willing to pay for them. Also, full fares do not guarantee an alternate flight and a customer may still be constrained by unavailability of a desired other flight. Many customers would be willing to pay for flexibility. However, the price a customer can pay or is willing to pay is subjective and may differ from customer to customer; or even for the same customer, may differ from one trip (or circumstance) to another.

(2) Assessment of airline economics

An assessment of the crucial economic factors of an airline, as indicated in Box 77.100, may reveal the factors to include, but not be limited to, high fixed costs, reduced

load factors, the low capacity utilization (load factors) across a number of airline flights, the perishable nature of airline seats, the expected value of seats in different flights, the broad spectrum of time period over which the seats in a flight are sold, increased competition from low cost carriers, the need to develop competitive advantages against low cost carriers, customer attrition rate, and commoditization of the airline industry.

An assessment of the crucial economic factors of an airline may be performed, to determine the factors that affect the profitability, growth and goals of the airline. It might be beneficial if an airline utilizing the inventive system and method were able to express cost elements in a real-time or quasi-real-time (i.e., up to date) dynamic fashion so that such information can then be used to assess the profitability or contribution of each product sale opportunity, and to facilitate the operation of the Event Optimizer (so that offers and actions can be based on real-time or near-real-time information).

(3) Integration of customer dynamics with airline economic factors

Fig. 77 also illustrates an example of how a mapping can be done, between customer and airline profiles, for the AFO VOF in the airline industry. On one hand, there is a preference for travel flexibility among customers. On the other hand, if a flight takes off with one or more empty seats, that condition probably represents the loss of potential revenue for that airline. This is true even though no other potential customers have been turned away, simply because there may be one or more customers on other flights (of the same or different airline) willing to shift/switch to take those unfilled seats in the flight (in question) at appropriate price/terms. But, today they are not able to do so for one or more reasons mentioned above. An opportunity thus exists to concurrently generate an incremental revenue benefit for the airline from consumer surplus, and to maximize the purchase utilities for the customers. The AFO framework is created based on a value element "Preference for travel flexibility". More specifically, as shown in the interaction between the Box 77.200 and Box 77.300, a mapping is performed between important customer value elements and airline economic factors. The value element

"Preference for travel flexibility" is extracted, as shown in Box 77.400 and an AFO Value option framework is created.

(4) Formulating the "AFO" Value Option Framework in the Airline Industry

Structure of AFO Value Option Framework in the Airline Industry

Fig. 78 displays the structure of an AFO value option framework (shown in Box 78.100) in the airline industry. The AFO value option framework is related to the value element "Preference for travel flexibility", as shown in Box 78.110.

The first event in the AFO VOF is referred to as *"Initial Transaction"*, shown by Box 78.200, in which the customer (shown by Box 78.210) and the airline (shown by Box 78.220) transact on an AFO value option. There may be one or more Events (shown by Box 78.230) that follow the *Initial Transaction*.

In a successful *Initial Transaction* for an AFO, the customer receives an option to choose up to 'n' out of 'm' selected flights (said 'm' flights termed *"AFO Flights"*). The 'n' flights that are finally selected are termed *"Chosen Flights"*. After each of the 'n' *Chosen Flights* is defined (or selected or chosen), the customer has the right to utilize (or can utilize) said *Chosen Flight*. Apart from the 'n' *Chosen Flights*, the remaining 'm – n' flights are termed *"Released Flights"*. The *Released Flights* (if any, that were probably held or blocked for said customer) may be sold to others or used for other purposes. The *Released Flights* in relation to said option may be reused by the airline before, after, at or any combination thereof, the time the *Released Flights* and/or *Chosen Flights* are defined (or selected).

Numerically, the value of 'm' is greater than or equal to 1 and the value of 'n' may vary from '0' to 'm' depending upon the specific implementation of the AFO framework. The value of 'm' and/or 'n' may be known (or defined and/or re-defined) before, during or after the *Initial Transaction* and/or any combination thereof. The value

of n may be limited to less than the value of m, or n<m (i.e., n<=m-1); however, in some situations, n may be equal to m. The value of 'n' may or may not be known (or defined or re-defined) at the time of the *Initial Transaction*. The value of 'm' and/or 'n' may be defined and/or re-defined by the airline, the customer, another entity or any combination thereof. For example, the value of n may not be defined at the time of *Initial Transaction*. In case the value of m is redefined after being defined at least once before, the new value of 'm' may be greater than or less than the older value of 'm'. Similarly, if the value of 'n' is redefined after being defined at least once before, the new value of 'n' may also be greater than or less than the older value of 'n'. In some of the cases, the value of new 'n' may be even greater than the older value of 'm'.

The *Initial Transaction* may consist of one or more acts. The customer may select (or purchase) all *AFO Flights* concurrently (i.e., all together in one transaction) or sequentially (i.e., in multiple transactions). In the sequential case, a customer may select one or more flights in one or more transactions just before or much before (a few days/weeks/months) the *Initial Transaction* for AFO begins. Said selected flight(s) (let's say X number of them), thus, may be considered as part of said m *AFO Flights* of the AFO (m, n) transaction, and the customer may select only the remaining (m - X) number of *AFO Flights* during the *Initial Transaction*. All the transactions used to select all the *AFO Flights* of an AFO (m, n) instance are related to each other, and hence, are considered as *related transactions* (as defined earlier).

In an AFO VOF, the sequential process may consist of a number of *related transactions* when all the *AFO Flights* are purchased one after another by paying a price in each (or some) transaction(s) or act(s). The transactions may be related due to a relationship during the *Initial Transaction*, one or more of the previously executed transactions, any other transaction or any combination thereof.

The time when an *Initial Transaction* is completed (i.e., the customer receives the AFO option) is referred to as the *Initial Transaction Time* (or ITT, in short). One or more of said m flights may be selected, at one or more times, before, after, during, or any

combination thereof, the *Initial Transaction* and/or the time said option is delivered to the customer (or the customer receives said option).

An airline may choose to create one or more instances of an AFO VOF based on factors including, but not limited to, number of *AFO Flights*, *Chosen Flights* or *Released Flights*, pre-determination of a number of *Chosen Flights or Released Flights*, flight schedule, other factors or any combination of the above. For example, an AFO formulation based on a combination of the number of *AFO Flights* (or m) and *Chosen Flights* (or n) would be AFO (m, n). Some AFO instances are shown in Boxes 78.120, 78.130, 78.140 and 78.150. In case the number of *Chosen Flights* is pre-determined, the AFO (4, 2) instance may imply that the customer selects 4 *AFO Flights*, on the condition that the customer may choose any two out of those four flights. When the number of *Chosen Flights* is not pre-determined, the AFO (4, 2) instance may imply that the customer selects four *AFO Flights*, on the condition that the customer may choose zero, one or 2 flights as *Chosen Flights*. There may also be a minimum limit on n. For example, the AFO (4, n) (where 1<=n<=2) instance limits the customer to choose a minimum of 1 and maximum of 2 *Chosen Flights* out of the 4 selected *AFO Flights*.

The AFO (2, 1) instance, two *AFO Flights* and one *Chosen Flight*, is used here as an example to demonstrate the details of the structure of an AFO VOF. Box 78.200 refers to the *Initial Transaction* between the customer and the airline, in which they transact on an AFO (2, 1) value option. In a successful *Initial Transaction* for the AFO (2, 1), the customer selects two *AFO Flights* and can choose to utilize any 'one' of those two flights. The flight selected is the *Chosen Flight* and the one not selected is the *Released Flight*.

The *Initial Transaction* may have terms and conditions applicable to the customer or the airline or both. These terms and conditions may be set, preferably, to concurrently benefit both parties. The connections between Box 78.200 and 78.220, and Box 78.200 and 78.210 refer to the terms and conditions to the airline and the customer, respectively.

The AFO VOF may or may not include any constraints related to schedule or any other parameter of *AFO Flights*. For example, an airline may want to restrict AFO applicability and availability on flights that satisfy specific criteria.

In the context of the airline industry, the parameters/characteristics of a flight may include, but are not limited to, airline related parameters, departure/arrival parameters, services and other miscellaneous parameters. The airline related parameters may include, but are not limited to, operating carrier entity (i.e, the airline that operates the flight), marketing carrier (an airline that sells the flight), any other carrier or intra/inter-carrier flight groups associated with the flight or any combination of the above. The departure/arrival parameters may include, but are not limited to, an airport and its location (city, state, country), date and time, seasonality, weather and other operational conditions, number of stops/connections, and so forth. The service and other miscellaneous parameters may include, but are not limited to, type of aircraft, flight duration, in-flight or other services such as number of cabins, types of seats, meal selection, check-in and luggage options, airport lounges and other facilities, and so forth.

The two *AFO Flights* may or may not include practically constrained flights. Practical constraints may include one or more constraints that will prevent a customer to utilize a given flight. Such practical constraints may include, but are not limited to, schedule conflicts, time constraints, location constraints and so forth. The time constraints may include, but not are limited to, constraints from departure and/or arrival times of the two *AFO Flights*. The location constraints may include, but are not limited to, due to the distance between the location of the departure and/or arrival airports of the two *AFO Flights*. In other words, it may or may not be practically possible for one customer to utilize both the selected flights due to at least one practical constraint. For example, one flight may be scheduled to be airborne when the other flight is scheduled to depart, thus not allowing any customer on the former flight to take the latter flight, or the distance between the departure airports of the two flights may prevent customers from flying on both flights (that depart within hours of each other). For example, a customer may receive an AFO to utilize each of the m selected flights that include at least one

practically constrained flight, where it will not be possible for the customer to utilize all the m selected flights.

The two selected flights may or may not have the same origin and/or destination airports (or location). A customer may receive an AFO to utilize each of the m selected flights that include at least one practically constrained flight, where it may not be possible for the customer utilize all the m selected flights. For example, the two selected flights may or may not be in the same city.

The AFO VOF may or may not include any constraints on the *AFO Flights* based on their Ticket Prices. For example, the airline may offer only those flights as *AFO Flights* whose Ticket Prices at or before the ITT are less than a specified value, or may add a constraint on the maximum difference between the highest and the lowest Ticket Prices across a set of *AFO Flights* offered within a specific AFO.

The *AFO Flights* may be selected by the airline, the customer, another entity or any combination thereof. The AFO VOF may enable a customer to have flexibility by selecting m Flights and use said travel flexibility to satisfy his/her needs. Therefore, the customers would usually have the right to select (or define) the *Chosen Flights*. However, in different implementations of AFO VOF, the airline, the customer, another entity or any combination thereof may select one or more of the *Chosen Flights* related to an AFO. The *AFO Flights* and the *Chosen Flights* may be selected by the same entity, different entities or any combination thereof. The airline may incorporate the customer information and the data related to the AFO into the sales, production, inventory, other database or information system or any combination of the above.

A customer may select *AFO Flights* in several ways; through mutual agreement (i.e., during a direct interaction such as a flight reservation), or the airline may grant the *AFO Flights* to the customer without soliciting their interest or permission. For example, to enhance customer satisfaction or for any other purpose, an airline may grant *AFO Flights* to customers based on the past customer behavior, interaction and so on.

The *Initial Transaction* may impose one or more conditions on the customer. A customer may be required to explicitly notify the airline prior to or no later than a given date and time (referred to as the *Notify Deadline*) regarding the *Chosen Flight*. If there is no such explicit notification condition, the act of the customer boarding (or checking-in for) either of the two flights may serve as an implicit notification to the airline or the *AFO Flights* may be decided as per the terms and conditions of the option contract. In either case (explicit or implicit notification) the date and time when the *Chosen Flight* is selected is referred to as the *Customer Notification Time* (or the CNT, in short). In the current discussion, the explicit notification condition is assumed unless specifically mentioned otherwise.

An airline may determine one or more *Notify Deadlines* for a flight at one or more times (e.g., before, during, after the *Initial Transaction* or any combination thereof) using factors including, but not limited to, customer needs, expected seat value, airline profitability goals, any other factors or a any combination of the above. Customer factors may also be considered in determining the *Notify Deadlines*, such as the flexibility periods desired by customers, picking easy times (like 6:00 pm instead of 6:32 pm) to help the customer remember the deadline(s) or any other factor that may affect the behavior of a customer.

The AFO VOF may impose additional terms and conditions on the customer. A customer may or may not have to pay any price for receiving AFO Flights (i.e., there may or may not be any payment transaction related to the *Initial Transaction* and/or other event related to the AFO). There may be one or more prices related to the AFO. A customer may be required to pay a price or fee related to AFO at one or more times. A price may include, but is not limited to, a set of one or more Ticket Prices, a set of one or more AFO Prices or any combination of the above. An airline may use the method of its choosing to decide on all the Flight Prices for AFO.

The customer may be required to pay one or more prices during the *Initial Transaction* (which payment is referred to as an Initial Price), at the CNT (which payment is referred to as an Exercise Price) and/or at the time of checking-in or at any other time, which may or may not be pre-determined between the customer and the airline. The price may be a function of number of *AFO Flights* and/or *Chosen Flights*, specific flights selected for *AFO Flights* and/or *Chosen Flights*, *Notify Deadline*, one or more Ticket Prices and/or expected value of the AFO Flights, any other factors of airline's choosing or any combination of the above.

The price may include, but is not limited to, a monetary value or a soft/non-monetary value (e.g., discount vouchers, travel coupons or exchange of another service, other benefits such as frequent flyer miles, other forms or any combination of the above) or other consideration. The AFO Price may be fixed or variable, with or without bounds. The airline may set permissible range(s) or boundary limit(s) within which the AFO Price can vary, or it may offer the customer a set of prices to choose from. Since price conditions may depend upon various factors, which may or may not be variable, the same may be decided at anytime. The price conditions may be determined by the customer, the airline, a third entity, or any combination thereof at one or more times. One or more prices (Initial or Exercise or any other price) may be a negative value, which reflects that instead of the customer paying the airline, the airline shall pay a price to the customer.

Different price strategies may be implemented in the AFO (2, 1) instance. For example, a single Initial Price could make it attractive and easy for the customer to feel free to choose any flight as the *Chosen Flight* without worrying about any additional costs later. One or more of the AFO prices may be embedded with the Ticket Price by using a special fare class or enhancing features on a currently existing fare class. A customer may be presumed to accept the AFO offer while displaying the Ticket Price (that has the AFO Price embedded in it). These presumptions may or may not include soliciting prior interest of the customer regarding the AFO offer. In case, the AFO price

is merged with the Ticket Price, and where such price may or may not be separately identifiable, the customer may or may not be required to pay a separate price for AFO.

The *Notify Deadline* may be pre-determined or may be determined later (i.e., after AFO grant) by the airline, the customer or mutually by both. There may be one or more *Notify Deadlines*, where each *Notify Deadline* may have a different price associated to it. There are several ways to implement this condition. One way is given, as follows. The price associated to the first *Notify Deadline* (i.e., the earliest among the *Notify Deadlines*) may be charged if the customer notifies the airline of the *Chosen Flight* anytime before the first *Notify Deadline*. The price associated to the second *Notify Deadline* (i.e., the second earliest among the *Notify Deadlines*) may be charged if the customer notifies the airline of the *Chosen Flight* after the first *Notify Deadline* and before the second *Notify Deadline*. Similarly, different prices may be associated with other *Notify Deadlines*.

The terms and conditions of the AFO VOF may not allow the customer to notify the airline after the last *Notify Deadline* (i.e., the latest among the *Notify Deadlines*). This is done to facilitate the selection of the *Chosen Flight* before the last *Notify Deadline*. As an operational measure, a condition may be imposed that if the customer fails, unintentionally or intentionally, to notify the airline before the last *Notify Deadline*, then the airline may treat either of the two flights as the *Chosen Flight*. Another approach may be (e.g., for airline/customer) to designate one of the two flights as a *Default Flight* (during or after the AFO purchase) that will be selected as the *Chosen Flight* if the customer fails to notify the airline of the *Chosen Flight* before the last *Notify Deadline*. Any entity (e.g., the airline or the customer) may (or may not) be allowed to change the Default Flight once it is selected. The Exercise Price (if any) in the Default case may or may not be equal to the Exercise Price for the Default Flight for the last *Notify Deadline*. In the current discussion, a single *Notify Deadline* is considered.

The exercise price may be a function of the *Notify Deadline, Chosen Flight,* any other factor or any combination thereof. In such situations, a customer may have to pay a unique price to select a particular flight as the *Chosen Flight* at a given time.

The AFO VOF may also include conditions imposed on or assumed by the airline. For example, the airline may be under a mandatory condition to hold a confirmed booking for the customer on both flights until the CNT passes to allow the customer to select either of the two flights as the *Chosen Flight*.

An airline may determine customer preferences, either explicitly or implicitly, regarding utilization of up to n of m selected Flights. The preferences may include, but not limited to, customer preferences for various flights and services, needs, associated relative utilities, flexibilities, preferences regarding choice of Flights, quality of Flights, acceptable delays (relative) to receive different Flights and so forth. The airline, one or more entities other than the airline or any combination thereof may seek customer preferences.

An airline may also offer AFO options to one or more customers on the basis of customer preferences, so obtained or collected. The airline may offer said AFO options based on the dynamics of the airline including, but not limited to, inventory, operational data, revenue management data, cost data, financial data, accounting data, any other internal data, any combination thereof and so on.

An airline may seek such preferences from the customers prior, during or after the customer has purchased the Flight or any combination thereof. These customer preferences may help the airline to perform concurrent optimization of value for the airline, the customers, one or more entities other than the airline or any combination of two or more of the above. The customers may also include the customers whose preferences have not been determined or collected. The data pertaining to the airline, customers, one or more entities other than the airline, any combination thereof, may be integrated to concurrently optimize the value for at least any two of said entities. There

may or may not be any payment transaction between the airline, one or more other entities and/or the customers regarding seeking such customer preferences, delivering AFO options, customer participation in AFO and so on.

An airline may operate one or more systems and/or services to monitor the airline dynamics. Monitoring may include, but is not limited to, monitoring of capacity, days to utilization, return and/or potential return of Flights, flexible inventory that may be created in relation to said obtained preferences, analyzing various cost, revenue, operational or any other internal data and so on. The airline may have one or more systems and/or services to analyze such data on a real-time or quasi real-time basis and draw conclusions on the basis of such analysis. Any of the systems and/or services may be operated by the airline, one or more entities other than the airline or any combination thereof.

An airline may operate a system that defines customer preferences regarding at least utilizing up to n of m selected flights, and n is less than m, operate a system that enables use of said preferences to optimize value for at least one of customers, said airline and an entity other than said airline. An airline may concurrently optimize value for at least two of customers, said airline and at least one entity other than said airline.

An airline may offer AFO to all customers or any selected customers, such selection may be based on any criterion including, but not limited to, such as those who have expressed their relative preferences, those who have not expressed any preferences. By integrating the airline dynamics and collected customer preferences, an airline may offer appropriate incentives and terms and conditions for AFO to generate desired participation.

Once the *Initial Transaction* is successful, there may be at least two possible related events, as shown by Box 78.230. The two events are (1) that F1 is the *Chosen Flight* (as shown by Box 78.240) and (2) that F2 is the *Chosen Flight* (as shown by Box 78.250). Each of these two events may be associated with various terms and conditions

on the customer and/or the airline. As explained above, the events may take place in two ways: either the customer selects the *Chosen Flight* according to his/her utility, or the airline selects the *Chosen Flight* based on pre-determined rules (e.g., if the customer fails to notify the airline before the *Notify Deadline*). In both situations, once the *Chosen Flight* is selected, the airline is free to reuse the seat in the *Released Flight* for potential revenue. Said seat may be re-used or resold by adding them back to the airline's inventory. The airline may sell these released seats as normal seats, may again offer them as *AFO Flights* or may choose to do both or may use for any other purpose.

The airline may offer incentives to the customers to motivate them to choose one or more flights as *Chosen Flights* among the *AFO Flights* that may be more optimal for the airline. An airline may formulate one or more such offer (may referred to as Chosen Flight Incentive Offers) and may send them to customers who have purchased AFO but not yet selected their *Chosen Fight* via email, phone, mail or any other communication channel. Thus, such customers may be persuaded to select said optimal flight in lieu of incentives.

The customer may have to pay an additional exercise price at the CNT depending on the terms and conditions of the option contract. Once the *Chosen Flight* is selected, the airline and/or the customer may not change the *Chosen Flight* except within the bounds of the terms and conditions in the option contract. The airline or customer may have the right to enforce the *Chosen Flight* on the other party as per the terms and conditions of the option contract.

The seat in the *Released Flight* may be blocked for the period between the ITT and the CNT. This period is termed the "*Blocking Period*". If there is more than one *Notify Deadline*, the exact length of the *Blocking Period* is unknown, but the minimum and maximum lengths are known to be between the ITT and the first *Notify Deadline* and between the ITT and the last *Notify Deadline*, respectively.

The airline may generate revenue from the seat in the *Released Flight* without utilizing seat in the *Released Flight*. The Ticket Price of the seat in the *Released Flight* may be varied in such a way that may increase the demand of one or more other flights offered by the same airline, any other entity apart from said airline, or any combination thereof. The variation in the Ticket Price of the seat in the *Released Flight* may cause a spilled demand for this flight but may create a surge in demand of one or more other flights in the same or different flight segments of the same airline, any other airline apart from said airline or any combination thereof.

The above terms and conditions of the AFO VOF may be set in a way to concurrently benefit at least two of the customer, the airline, any other entity or any combination thereof. The customer receives additional utility from the flexibility to choose a desired flight from among alternatives. The airline benefits from enhanced customer satisfaction (loyalty and repeat business), incremental revenue from the AFO Price and selling (reusing) the *Released Flights*, and other operational benefits.

An AFO VOF may include a right for the customer to utilize each of the m selected *AFO Flights*, along with a right for the airline to limit the flights (to fewer than m) which the customer can utilize if the airline notifies the customer on a stated *Notify Deadline*. The right may include the condition that the airline may notify the customer prior to or at the, prior to the, at or after the or after the stated *Notify Deadline* (which may be determined by the airline and/or the customer during or after the *Initial Transaction*). To provide flexibility to the customers, the airline may offer (or allow) the customer to express their preferences regarding the *Chosen Flight(s)* before the stated *Notify Deadline*. If the customer fails to do so, the airline may or may not exercise their right to limit the customer to utilize fewer than (for example, at least one less) the earlier selected flights (i.e., m flights). The right may include the condition that the airline may limit the customer after the customer expresses his/her preference for the *Chosen Flights*. There may be a condition imposed on the customer to make at least one payment to the airline when the customer expresses his or her preferences for the *Chosen Flights*.

An AFO VOF may include an option for the customer to utilize up to n of the m selected *AFO Flights*, where n<m, along with a condition that the customer may be able to utilize all the m selected flights if there is at least one payment transaction between the airline and customer in relation to said AFO grant, and that such payment is made after the AFO is granted to the customer. This may provide additional flexibility to the customer. The customer may be limited to take the decision regarding utilizing all the m flights before the departure of the penultimate flight. Said payment may be made in a separate transaction executed at any time after the *Initial Transaction*. The timing of said payment may be pre-determined. The customer may be able to select all the m flights together in one transaction.

The costs, revenues, benefits, terms and conditions shown here are for illustration purposes only and actual values could be different depending upon specific values selected by the airline for value options, customer behavior, airline characteristics, *Notify Deadline(s)* and other relevant factors.

Example of AFO VOF (2, 1) structure in the Airline Industry

Figures 79 and 80 demonstrate an illustrative practical example of using the AFO (2, 1) instance in the airline industry. Consider a customer who interacts with an airline to get an AFO. Per Act 78.200, an *Initial Transaction* takes place between the airline and the customer. Fig. 79 displays some of the details of the *Initial Transaction*. The customer selects two *AFO Flights*, F1 (shown in Box 79.100) and F2 (shown in Box 79.200), and can choose to utilize either of them but not both (i.e., select either of them as the *Chosen Flight)*. The airline is under the condition to hold confirmed reservation for the customer on both F1 and F2 until the *Chosen Flight* is selected.

The customer pays an amount of $45 as the Initial AFO Price and $500 as the Ticket Price to the airline as part of the *Initial Transaction*. The *Initial Transaction* takes place on the 15th 14th day of April (i.e., the ITT, shown in the second row of the Box

79.300). There is an explicit notification condition and the customer has to pick and notify the airline regarding the *Chosen Flight.*

The following text presents different cases to illustrate different types of terms and conditions that may be associated with the purchased AFO. Three different scenarios are considered with different conditions (shown in Fig. 80). In all the scenarios, the *Notify Deadline* is expressed in terms of the number of days to departure (DTD) of F1, the earlier of the two flights.

The first scenario, as demonstrated in the Box 80.100, displays a condition of the explicit notification without any exercise price. The customer needs to notify the airline regarding the *Chosen Flight* before 3 DTD (as shown by the *Notify Deadline*). The AFO Price charged during the *Initial Transaction* serves as the total direct incremental revenue for the airline and as the direct cost to the customer. There is no exercise price if the customer defaults.

The second scenario, as demonstrated by Box 80.200, displays a condition of the explicit notification with an exercise price that is a function of the *Chosen Flight*. The *Notify Deadline* is 3 DTD. If F1 is the *Chosen Flight*, then customer has to pay $10 as the exercise price, as shown in the second column of the second row in the Box 80.200. If F2 is the *Chosen Flight*, then the customer has to pay $20 as the exercise price, as shown in the second column of the third row in the Box 80.200. The total AFO Price charged to the customer (i.e., the direct incremental revenue to airline) may turn out to be $55 or $65 depending on the *Chosen Flight.*

The third scenario, as demonstrated in the Box 80.300, displays a condition of the explicit notification with an exercise price that is a function of the *Notify Deadline.* There are four *Notify Deadlines* associated with the AFO. The exercise price increases from $0 (for the first *Notify Deadline* of 30 DTD) to $40 (for the last *Notify Deadline* of 1 DTD). If the CNT is before 30 DTD, then the customer pays nothing more to the airline as shown in the second column of the second row in the Box 80.300. If the CNT

is after 30 DTD and before 7 DTD, then the customer pays $20 as the exercise price (shown in the third column of the second row in Box 80.300). Similarly, the customer pays an exercise price of $30, if the CNT is after 7 DTD and before 3 DTD, and an exercise price of $40, if the CNT is after 3 DTD and before 1 DTD (as shown by the next two cells in the Box 80.300). If the customer fails to notify before 1 DTD (the last *Notify Deadline*), then the Default Flight F1 (shown in Box 80.300) will be selected as the *Chosen Flight* at an exercise price of $40.

5) Optimization of AFO VOF in the Airline industry

As mentioned earlier (shown in Fig. 7), in the form of an optional last step in the first stage, a financial analysis may be performed using the existing airline and customer data to determine the optimal terms and conditions of the AFO VOF. 'What-if' scenarios may be executed to determine an optimal pricing strategy. The airline may want to divide customers using one or more criteria and design separate AFO VOF for each customer segment.

Second Stage: Using the AFO Value Option Framework in the Airline Industry

After completing the first stage of the method, the airline has created an AFO VOF and specific options within that framework. The airline may have also segmented customers and designed options accordingly. The airline is fully prepared to use a structured format consisting of one or more AFO value options to interact with its customers in real time to generate benefits for both the airline and its customers. The second stage of the AFO VOF is now presented.

The implementation of the AFO VOF between the airline and its customer takes place through two high level acts, as shown in Fig. 81. In Act 81.100, the 'Buy AFO' process, an interactive event between the customer and the airline's web server, runs to carry out the *Initial Transaction* of the AFO VOF. In this Act, a number of algorithms, may be executed (e.g., availability, AFO Price, Ticket Price and *Notify Deadlines*) on the

airline's server to optimally calculate the terms and conditions of the AFO VOF to concurrently benefit at least two of the airline, the customer, any other entity and/or any combination thereof. In Act 81.200, the *customer notification* process (explained later) is executed. In this process, the customer selects the *Chosen Flight*. The process may also consist of one or more event optimizer algorithms that may help to optimally select the *Chosen Flight* and/or to optimally reuse the *Released Flight*.

As explained above, the Buy AFO process may be implemented via the Sequential (shown in Fig. 89) or the Concurrent (shown in Fig. 91) process. There are many ways to do the Sequential process. As an example of the Sequential process, a customer may select (or purchase) seat(s) on a flight or an Itinerary with one or more Segments (each with one or more Legs) before the *Initial Transaction* begins. Said flight may also be referred to as the Initial Flight. Said Itinerary may be referred to as the Initial Itinerary. The Segments within the Initial Itinerary may be referred to as the Initial Segments or the Initial Flight Segments (or IFS, in short). The Legs within each IFS may be referred to as the Initial Legs or the Initial Flight Legs (or IFL, in short). A customer may purchase an AFO (i.e., purchase one or more *AFO Flights*) on said Initial Flight. Similarly, the customer may purchase an AFO (i.e., purchase one or more AFO Itineraries) on the Initial Itinerary. The customer may purchase an AFO on any Initial Flight Segment (or IFS), i.e., purchase one or more AFO Segments (also referred to as the Option Flight Segments or OFS, in short). The customer may purchase an AFO on any Initial Flight Leg (or IFL), i.e., purchase one or more AFO Legs (also referred to as Option Flight Leg or OFL, in short). The two events (one for the Initial Flight and the other for the *Initial Transaction*) may be executed with a minimal (one just after another) or a significant time gap (e.g., few minutes, hours, days and so forth) in between them.

The AFO VOF may be implemented at different levels including, but not limited to, Itinerary, Segment and Leg. Illustration of these three levels in the airline industry is given as an example as shown in Figures 82, 83 and 84 respectively.

When implementing an AFO (2, 1) at the Itinerary level, the customer selects two separate itineraries and has the option to choose either of them as the *Chosen Itinerary* (equivalent to *Chosen Flight*). Fig. 82 displays a practical example. A customer may select two itineraries as part of an AFO, shown in Boxes 82.100 and 82.200. In AFO Itinerary 1, the customer leaves on the 2nd and returns on the 6th of May as shown in Box 82.100. In AFO Itinerary 2, the customer leaves on the 4th and returns on the 7th of May as shown in Box 82.200. The customer may choose either of the two itineraries as the *Chosen Itinerary.*

When implementing an AFO (2, 1) at the Segment level, the customer selects two separate Flight Segments and has the option to choose either of them as the *Chosen Flight Segment* (or CFS, in short, equivalent to *Chosen Flight*). Fig. 83 displays a practical example. A customer purchases a round-trip Itinerary with two IFS as shown in Boxes 83.100 and 83.200. After purchasing the ticket, the customer buys an AFO on the Onward Journey (from BOS to LAX, i.e., the first Initial Flight Segment), as shown in Box 83.120. As per the IFS, the customer departs on the 2nd of May (shown in Box 83.110), whereas in the associated OFS, the customer departs on the 3rd of May (shown in Box 83.120). So, the customer may select either the IFS or the related OFS as the *Chosen Flight Segment* for the onward journey.

When implementing an AFO at the Leg level, the customer selects two separate Flight Legs and has the option to choose either of them as the *Chosen Flight Leg* (or CFL, in short, equivalent to *Chosen Flight*). Fig. 84 displays a practical example. Consider an Itinerary with two Segments, onward journey and return journey, as shown in Boxes 84.100 and 84.300, respectively. The customer purchases an AFO (i.e., gets one OFL) on the Leg2, shown in Box 84.200, in the onward journey. The IFL for Leg2 departs at 1:00 PM and the OFL for Leg2 departs at 6:00 PM on the 2nd of May (shown in Box 84.210 and 84.220, respectively). Thus, the customer may select either the IFL or the associated OFL as the *Chosen Flight Leg* (or CFL, in short) for Leg2 in the onward journey.

An airline may choose to implement an AFO at any level(s). In a specific AFO interaction between a customer and the airline, the implementation level should be the same for all *AFO Flights*, *Chosen Flights* and *Released Flights*. For example, if AFO is implemented at the Itinerary level, then all the *AFO Flights* would refer to *AFO Itineraries*; *Chosen Flights* would refer to *Chosen Itineraries;* and *Released Flights* would refer to *Released Itineraries*.

1. 'Buy AFO' - Dynamic interaction to capture customer demand in the Airline Industry

In the Buy AFO process, a customer interacts with an airline's server to buy an AFO. The interaction may take place (for example) via phone, in-person or on a website. The Sequential Buy AFO Process is presented first along with its detailed algorithms, followed by a short summary of the Concurrent Buy AFO Process.

Sequential Buy AFO Process in the Airline Industry

There are several ways to implement the Sequential process. The following presents an example of the Sequential Buy AFO Process when an AFO is bought at the Segment level. It is also assumed here that the customer first purchases an Initial Itinerary with one or more IFS, and then opts to buy an AFO to select one or more OFS (Option Flight Segments) on the desired IFS.

As an instance of the Sequential Buy AFO process, a customer has purchased an Itinerary (with one or more flights) and then selects an AFO through the interactive interface of the web pages as shown in Figures 85, 86, 87 and 88. Fig. 85 displays the summary of the purchased Itinerary, which consists of two Segments: BOS to ATL (onward journey) and ATL to BOS (return journey). Clicking on the marketing banner representing "Buy AFO", the customer is linked to the web page shown in Fig. 86 and a Buy AFO interaction begins.

The series of web pages in Figures 86, 87 and 88 may (for example) be displayed in a customer's browser by an airline's web server, to facilitate the interaction between the customer and the airline when the customer comes to select (purchase) an AFO (during or after the Initial Itinerary is purchased and/or selected). The Initial Itinerary and two corresponding IFS are displayed in Fig. 86. The customer may choose to purchase an AFO on any IFS by entering the search criteria for OFS in the "Search AFO Section" (shown in Fig. 86) and then clicking on the "Search *AFO Flights*" button. After the click, the Buy AFO algorithm running "behind the scenes" on a server of the airline qualifies the availability, applicability and price conditions on all the OFSs (Option Flight Segments) available and displays them in the screen as shown in Fig. 87. For each of the OFSs, a set of one or more *Notify Deadlines* and the corresponding AFO Prices are shown in the form of "Select" buttons (shown in the "AFO *Notify Deadline*/AFO Price" section in Fig. 87). The customer may select any desired OFS (along with the *Notify Deadline* and AFO Price) by clicking on a "Select" button associated with any of the *Notify Deadlines* displayed in the corresponding row. Once the customer clicks the "Select" button, he/she is hyperlinked to the web page as shown in Fig. 88, where the summary of the IFS and the selected OFS is shown.

Next, the customer may choose to select (purchase) more OFS on the same IFS or to get an AFO on another IFS in the Initial Itinerary. To purchase another OFS on the current IFS, the customer may click on "*Add more AFO Flights*" button and the customer may repeat the OFS search process for this. Once all the desired OFSs have been selected, the customer clicks the "Save & Purchase" link (shown in Fig. 88), and a payment transaction is executed to complete the purchase.

The following presents an algorithmic illustration of the Sequential Buy AFO process mentioned above. Consider Fig. 89. In Act 89.100, the customer selects (and/or purchases) an Itinerary (with one or more IFS). Next, in Act 89.110, the customer reaches an interactive interface of the airline's web server to a Buy AFO page, where the customer selects an IFS (referred to as Target_IFS) on which an AFO is desired. Next, the customer inputs the OFS search criteria for the current Target_IFS in Act 89.115.

Next, on clicking the "Search *AFO Flights*" button, control goes to Act 89.120, where the OFS search algorithm is executed to search for one or more OFS. The OFS search algorithm returns a list of valid OFSs, along with a list of Comb_NDs and associated AFO Prices. The details of the OFS search algorithm are presented later. Next, the search results are displayed for the customer, who then selects the desired OFS and one or more associated Comb_ND(s)/AFO Price(s), as shown in Act 89.130.

Next, in Act 89.140, a test is performed to determine whether the customer wants to select more OFSs on the current Target_IFS or on another IFS. If the customer wants to get an OFS on another IFS, control loops back to Act 89.110, where the customer selects another IFS as the Target_IFS, and then the process is repeated again for the new Target_IFS. If the customer wants to get more OFSs on the current Target_IFS, control loops back to Act 89.115, where the customer enters the OFS search criteria, and then the process is repeated for the new OFS search criteria. If the customer does not want to buy any more OFSs, control goes to Act 89.150, where a payment transaction (if needed) may be executed. For example, a customer may need to pay a price for the Flight after taking into consideration the Initial AFO Price (if any) using a credit card, direct bank account debit or any other payment transaction mechanism. Next, the algorithm ends in Box 89.200. The computation may be performed using a processor that may calculate results in optimal time.

OFS Search

The following algorithm (shown in Fig. 90) determines and validates an OFS for a given set of conditions including, but not limited to, availability, *Notify Deadline* and AFO price. Said algorithm has already been discussed above in a more generic sense along with one of the ways of its implementation along with various information technology and networking tools including, but not limited to, one or more servers, database, load balancers, firewall, routers, Internet, highly secured VPN, Intranet, RAM, hard disk drives, CPUs, monitors as shown by Fig. 13D.

In Act 90.100, the number of customers (IP), IFS_Set (containing all the IFS in the Initial Itinerary, and all the OFSs, (if any) already selected/purchased along with Comb_ND_Set(s) and Comb_OP_Set(s), for each IFS), Target_IFS and the OFS Search parameters are input to the system. The OFS search parameters include, but are not limited to, and airport/city (location) for departure and arrival, number of connections, class of service, *Notify Deadline*, AFO Price and so forth. A customer may be allowed to input *Notify Deadline* and/or AFO Price on the basis of which valid OFSs (that satisfy the given criteria of *Notify Deadline* and/or AFO Price) may be searched for and displayed for the customer. the origin and destination related parameters, and then a set of Notify Deadlines and AFO Prices may be computed for the flights that match the given criteria. In yet another example, a customer may input both the origin and destination and *Notify Deadline* and/or AFO Price inputs and then a search may be performed for valid OFSs. In another example, a customer may input to the system, one or more flights, and/or inputs to search for one or more additional flights (e.g., origin and destination, price etc.) to search for OFS that may be combined with one or more input flights (by the customer) to constitute the total set of flights for an AFO. In some situations, an airline may also validate the flights input by the customer to determine if said flights are eligible to be *AFO Flights*.

Next, control goes to Act 90.110, where an OFS Search is performed for the given criteria. The search may be best performed using a processor that may calculate results in optimal time. The order in which search parameters are executed may be optimized to reduce the search time, however, it may or may not affect the final outcome. An airline may select any order of its choosing.

In Act 90.110, Flight Segments are determined that match the search and the resulting Flight Segments are added to a list termed LIST_OFS. Next, in Act 90.120, a list of OFS validation rules is obtained from the airline's AFO VOF database and the rules are used to validate all the Flight Sets in the LIST_OFS list. Flight Segments that do not satisfy the rules are discarded. Validation rules may include, but are not limited

to, a Maximum Connection Rule, a Maximum Ticket Price Rule, a Time Synchronization Rule, and so forth. For example, a Maximum Connection Rule discards the Segments that have more connections than specified. A Maximum Ticket Price Rule discards the Segments for which the available Ticket Prices are higher than the Ticket Price paid by the customer for the Target_IFS. A Time Synchronization Rule validates the Segments on the basis of departure and arrival times. For example, when a Target_IFS is for the onward journey of a round-trip Itinerary, this rule only validates those Segments, which arrive at least X minutes before the departure of the earliest Segment (among IFS and all associated OFS) for the return journey. An airline may implement any validation rule of its choosing to further qualify the Flight Segments in the LIST_OFS list. As a last Act in Act 90.120, the first element in the updated LIST_OFS is designated as the Current_OFS.

Next, control goes to Act 90.130, where a group of Comb_NDs is computed for the combination of the Target_IFS, all the existing OFS of the Target_IFS and the Current_OFS, and added to a set called Comb_ND_Set. Next, in Act 90.135, a test is performed to determine whether the Comb_ND_Set obtained in the previous Act is Null. If so, control goes to Act 90.155. If not, control goes to Act 90.140, where the AFO availability and AFO Price for the Comb_ND_Set are determined. Next, in Act 90.150, another test is performed to determine whether the AFO Availability or the AFO Price is Null. If so, control goes to Act 90.155. If not, control goes to Act 90.160.

In Act 90.155, the Current_OFS is discarded from the LIST_OFS list, and control goes to Act 90.160, where another test is performed to determine if more elements are left in the LIST_OFS list. If so, control goes to Act 90.165. If not, control goes to Act 90.170.

In Act 90.165, the next element in the LIST_OFS list is designated as the Current_OFS and control loops back to Act 90.130 to repeat the process for the new Current_OFS. In Act 90.170, the updated LIST_OFS list is returned as the search result, and the algorithm ends in Box 90.200.

Computation of *Notify Deadlines* in the Airline Industry

An airline may set one or more *Notify Deadlines* of its choosing for its Flight Leg. Once the *Notify Deadlines* have been set for each Flight Leg, the next Act is to create a framework to compute *Notify Deadlines* for a group of flights Products (such as a Segment, an Itinerary or any other group). The following sections present an example of a framework that may be used to obtain a set of *Notify Deadlines* applicable to a group of flights. An airline may use any framework and algorithm of its choosing to obtain the same.

A set of *Notify Deadlines* associated with a Flight Leg, a Flight Segment and a combination of two or more Flight Segments is called Leg_ND_Set, Seg_ND_Set and Comb_ND_Set, respectively. Each element in the Leg_ND_Set, Seg_ND_Set and Comb_ND_Set is termed Leg_ND, Seg_ND and Comb_ND, respectively. The Comb_ND_Set may be computed by combining the Seg_ND_Sets of all the given Flight Segments. A Seg_ND_Set is computed by combining the Leg_ND_Sets of all the Flight Legs under that Flight Segment. The *Notify Deadlines* may be computed based on various parameters and factors of the airline choosing. One example to compute a Comb_ND_Set is as follows. First compute Seg_ND_Set for all Flight Segments. A Seg_ND_Set is computed by first selecting earliest of the *Notify Deadlines* of each Flight Leg within the concerned Flight Segment, and then picking the latest of those Deadlines, and noting that as the Target_Deadline. Next step is to pick all those *Notify Deadlines* that fall after the Target_Deadline. *Notify Deadlines* thus obtained may be validated using various validation rules based on airline factors such as customer utility, flight parameters and so forth. Similarly, the Comb_ND_Set may thus be computed by repeating the above process for Seg_ND_Sets, thus obtained for each Flight Segment.

Available Capacity Check in the Airline Industry

The AFO available capacity for an OFS may depend on one or more factors including, but not limited to, *Notify Deadline*, AFO Prices, expected seat value and so forth. An airline may use any method of its choosing to determine AFO capacity of a Flight. For example, an airline may choose to have a fixed AFO capacity for one or more of its Flight Legs.

An instance to compute AFO capacity is discussed below. Consider the case, when AFO Capacity is dependent on *Notify Deadline*. In such situation, the objective is to determine those Comb_NDs within the Comb_ND_Set on which AFO is available for the given OFS. The AFO Capacity and the Used AFO Capacity (the total number of Flight Legs on which AFO has been sold but not exercised) may be calculated for each Comb_ND within the Comb_ND_Set. Available Capacity (AC) would then be the difference of AFO Capacity and Used AFO Capacity for the given Flight Leg. If the AC is greater than or equal to the number of incoming customers desiring an AFO, then the AFO capacity is available at a given Comb_ND for the given OFS. The process may be repeated for all *Notify Deadlines* within Comb_ND_Sets. An AFO may be made available on a given OFS for a given Comb_ND, if AFO is available on all the Flight Legs of OFS for the given Comb_ND.

AFO Price Calculation

An airline may set AFO Prices for a Flight Leg using any method of an airline's choosing. Once the AFO Prices have been set for each Flight Leg, the next Act is to create a framework to compute AFO Prices for a group of flights (such as a Flight Segment, an Itinerary or any other group) by using AFO Prices for each of the Flight Legs in the group.

The parameters Leg_OP refer to an AFO Price (may or may not be corresponding to a *Notify Deadline)* associated with a Flight Leg. Similarly, Seg_OP and Comb_OP

refer to AFO Price (may or may not be corresponding to a *Notify Deadline*) associated with a Segment and a combination of two or more Segments, respectively. A set of Leg_OPs, Seg_OPs and Comb_OPs is termed Leg_OP_Set, Seg_OP_Set and Comb_OP_Set, respectively. The Comb_OP_Set is computed by combining the Seg_OP_Sets of the IFS and all the OFSs (existing and new). A Seg_OP_Set is computed by combining the Leg_OP_Sets of all the Flight Legs under that Flight Segment.

One or more Seg_OP_Rules may be read from the airline's database and applied to calculate Seg_OP_Set for each input Flight_Segment (IFS and all OFSs) using the Leg_OP_Sets of all the Flight_Legs of said Flight_Segment. An airline may use any Seg_OP_Set Rule of its choosing. Seg_OP_Rules may be defined to calculate Seg_OP as the sum, average, highest, lowest or any other function of Leg_OPs of all the Flight Legs at a given Comb_ND. Similarly, a Comb_OP_Set consists of one or more Comb_OPs, and is calculated using one of the pre-determined rules, termed Comb_OP_Rules, to combine the Seg_OPs of all the Flight Segments in the combination. An airline may use a Comb_OP_Rule of its choosing. Comb_OP_Rules may be defined similar to the Seg_OP_Rules.

Concurrent Buy AFO Process in the Airline Industry

As explained above, in the Concurrent Buy AFO process, a customer selects all the *AFO Flights* concurrently in one transaction. An algorithmic illustration of an example of the Concurrent Buy AFO process is displayed in Fig. 91. An AFO (2, 1) instance is assumed here as an example. Consider a customer who wants flexibility in his/her trip and wants two *AFO Flight Segments*. In Act 91.100, the customer needs for AFO are input, including, but not limited to, search criteria for two Flight Segments according to customer's utility (may be similar to the search criteria defined above for the Sequential Buy AFO process).

Next, in Act 91.110, the AFO algorithm is run to determine the combinations of two Flight Segments that satisfy inputs. A list of such search results is displayed for the customer along with the associated terms and conditions including, but not limited to, *Notify Deadlines*, AFO Price and Ticket Price for each such combination. The AFO algorithms defined above for the Sequential Buy AFO process (defined above) may also be used for the Concurrent Buy AFO process.

Next, in Act 91.120, the customer selects a desired combination of two flights and the associated conditions such as AFO Price/*Notify Deadline*. Next, in Act 91.130, a payment transaction is executed, if needed. For example, the customer pays the Ticket Price for AFO (if any) using a credit card, direct bank account debit or any other payment transaction mechanism. Next, the algorithm ends in Box 91.200. The computation may be performed using a processor that may calculate results in optimal time.

(2) Event Optimizer in the Airline Industry

After the completion of the Buy AFO process, the next stage is the Event Optimizer. In this stage, the *customer notification* (or CN, in short) process as shown in Act 81.200 is executed. In this process, a customer selects a *Chosen Flight*. The process may also consist of one or more event optimizer algorithms that may help to optimally select the *Chosen Flight* and/or to optimally reuse the seat in the *Released Flight*. The details of the CN process are provided later. One of the ways of implementation of Event Optimizer stage with the help of information technology tools has already been discussed above in a more generic fashion wherein said tools include, but are not limited to, one or more servers, database, load balancers, firewall, routers, Internet, highly secured VPN, Intranet, RAM, hard disk drives, CPUs, monitors as shown by Fig. 13E.

AFO Exercise Process in the Airline Industry

In the Customer Notification (or CN, in short) process, a customer interacts with an airline's server to select the *Chosen Flight*. The interaction may take place (for example) via phone, in-person, on a website or via any other communication mechanism. The Customer Notification process may be performed using any rule/method as desired.

Customer Notification (or CN) process in the Airline Industry

The primary objective of the CN process is to select (or define) the *Chosen Flight*. In the CN process, a decision for the *Chosen Flight* is notified to the airline. As mentioned earlier, the *Chosen Flight* may be defined by the airline, the customer, another entity or any combination thereof. The customer interacts with an airline server that runs the CN process, to select the *Chosen Flight*. If the customer fails to notify the airline of the *Chosen Flight* before the *Notify Deadline*, the *Chosen Flight* is decided based on the terms and conditions set before in the *Initial Transaction* of the AFO purchased by the customer.

Fig. 92 displays an example of an algorithm that may be used to execute the *Customer Notification* process. In Act 92.100, a customer enters input parameters, such as PNR, Last Name, purchase date and so forth to retrieve the data from the airline database for the Initial Itinerary and *AFO Flights*. Next, in Act 92.110, a test is performed to determine whether the *Notify Deadline* has expired or not. If so, then control goes to Act 92.120. If not, then control goes to Act 92.140.

In Act 92.120, a Default Rule is read from the airline's database (Box 92.210). A Default Rule defines criteria to select the *Chosen Flight* if the customer fails to provide a timely notification (i.e. before the *Notify Deadline)* to the airline regarding his/her decision of the *Chosen Flight*. An airline may use a Default Rule of airline's choosing. An airline may use a rule to choose a flight with the lower expected value, earlier departure date, lower load factor or any other factor. Next, in Act 92.130, the Default

Rule, thus obtained, is used to select the *Chosen Flight Segment*, and then control goes to Act 92.150. In Act 92.140, the customer selects the desired *Chosen Flight*. Next, control goes to Act 92.150.

In Act 92.150, a payment transaction (if any) is executed, and then the *Chosen Flight* is displayed to the customer. The payment transaction may be related to the AFO purchased by the customer (such as a payment of an AFO Exercise Price). The algorithm, then ends in Box 92.200. The computation may be performed using a processor that may calculate results in optimal time.

Implementation of AFO VOF in conjunction with other VOFs in the Airline Industry

AFO VOF may be used in conjunction with one or more other VOFs, for example, the FRO (Flexibility Reward Option) VOF. A customer who receives an AFO is termed "A" type of customer. An airline may form a group of one or more AFO customers and one or more FRO customers, where the options (AFO and FRO) obtained by the group members are complimentary in nature. As an example, consider an A customer who bought an AFO to choose either of flight F1 or flight F2 as the *Chosen Flight*, and consider a Y customer who received a FRO and is flexible to take any of F1 and F2 as the *Chosen Flight*. Thus, if A decides to choose F1 as the *Chosen Flight*, the airline may assign F2 as the *Chosen Flight* for Y, and vice versa. The customers A and Y have taken complimentary options and may form a group. The airline may need to hold only one unit of inventory in F1 and F2 to satisfy the needs of both A and Y (assuming each A and Y only need one unit of seat). Such a combination of complimentary options or VOFs may improve efficiency and concurrently enhance value for all the parties involved (in the context of the current example, enhance value for A, Y and the airline).

The implementation of the grouping of A type and Y type of customers may be done in one or more ways. One way to implement such grouping is to first have one or

more Y type of customers and based on such customer(s), the airline may offer complimentary AFOs to customers to make groups. In another implementation, the airline may first offer AFO and based on such AFO customer(s), airline offers complimentary FROs to customers to make groups. In yet another implementation, the airline may offer AFO and FRO separately and then define a process to make complimentary groups of A and Y customers (such groups termed "AY_Groups").

An airline may choose to create AY_Groups at various group levels such as implementation of grouping at Level 1, Level 2 and so on. In Level 1 grouping, an AY_Group involves one each of A and Y type of customers. An example of Level 1 grouping has already been given above (the two customer, A and Y, example).

In Level 2 grouping, the grouping involves making complimentary groups for more than 2 customers. As an example, consider an A customer who bought an AFO to choose either flight F1 or flight F3 as the *Chosen Flight*, a Y1 customer who received a FRO and is flexible to take any of flight F1 and flight F2 as the *Chosen Flight* and a Y2 customer who has also received a FRO and is flexible to take any of F2 and F3 as the *Chosen Flight*. A notation A-Y1-Y2 represents this example. Thus, if A decides to choose F1 as the *Chosen Flight*, the airline may assign F2 as the *Chosen Flight* for Y1 and F3 as the *Chosen Flight* for Y2. Alternatively, if A decides to choose F3 as the *Chosen Flight*, the airline may assign F1 and F2 as the *Chosen Flights* for Y1 and Y2, respectively.

It is assumed that a "unit" represents one unit of seat (or flight capacity) and each customer needs only one unit of a seat. Continuing with the above example, if the airline were to not consider the complimentary nature of options obtained by A, Y1 and Y2 customers, the airline may need to hold (or block) a total of 4 units of capacity (seats) to ensure complete satisfaction of needs of A, Y1 and Y2, i.e., 2 units for A (1 unit each of F1 and F3 as A could choose any flight), 1 unit (seat) for Y1 (either F1 or F2) and 1 unit for Y2 (either F2 or F3). This implies, to satisfy a total need of 3 units of flights, the airline may need to hold (or block) 4 units (seats) of flight capacity, creating a redundant

capacity of 1 unit that the airline may not be able to use otherwise. By creating a complimentary group of A-Y1-Y2, the airline needs to only hold (or block) 3 units of capacity (1 unit each in F1, F2 and F3), thus, freeing up 1 unit of redundant capacity. Thus, an AY_Group mechanism may create an efficient structure with minimal holding (and/or blocking) of capacity to satisfy the needs of all the concerned customers.

The grouping may also be implemented at higher levels such as Level 3 grouping, Level 4 grouping, Level 5 grouping and so on. An example of the Level 3 grouping may be A1-Y1-Y2-Y3.

An airline may choose to implement grouping at various flight levels such as Flight Leg, Flight Segment and Itinerary. An airline may also change terms and conditions of one or more option contracts of one or more FRO and/or AFO customers (for e.g., price, notify deadline and so on) to solicit customer participation in FRO/AFO to create more AY_Groups. The airline may also offer incentives to customers to choose complimentary FRO/AFO offerings to enable the airline to create more AY_Groups. The implementation methods mentioned above for grouping are for illustration purposes only and an airline may choose to implement grouping in one or more other ways or by combining above said methods or by combining one or more other ways along with one or more above said methods.

Fig. 93 displays a flow chart that illustrates one way of implementing grouping of A and Y type of customers. In Act 93.100, sets of A and Y customers are taken as input. Next, in Act 93.110, a set of one or more Grouping Rules is read from the airline's database (93.210). A grouping rule may depend upon the number of A and/or Y type of customers, desired capacity redundancy in the system, the permissible time factor to create AY_Groups, any other rule of airline's choosing, any combination thereof and so on. For example, an airline may choose a Grouping Rule whereby new groups are created by first ungrouping one or more of the AY_Groups (created earlier but unexercised, for example, groups for which the customer has not been notified, or if notified, the customer has not utilized the flight and the terms of option contract allows

for a change in the *Chosen Flight*). A Grouping Rule may create groups of only those A and Y type of customers who have yet to be grouped and discarding all A/Y customers, which have already been grouped. An airline may implement any Grouping Rule to formulate AY_Groups. The choice to Grouping rules may enhance the overall value for the airline (for example, reduce the total capacity required to satisfy flight needs for all A and Y customers). Theoretically, the number of units of the seats required (or blocked) should be equal to the number of customers buying the seat (assuming each customer wants one unit of seat). Thus, by implementing the grouping and with the help of appropriate Grouping Rules, the airline may attempt to achieve such theoretical minima.

Next, in Act 93.120, the Grouping Rules, so obtained from the airline's database, are used to make AY_Groups. Next, in Act 93.130, the AY_Groups so created are returned along with ungrouped A/Y, if any, and the process then ends in Box 93.200.

The grouping may enhance customers' experience, and may comprise operating a system that delivers a FRO to at least a "first customer" to utilize up to n of m selected flights for said first customer, and n is less than or equal to m; operating a system that delivers an AFO to at least a "second customer" to utilize up to k of p selected flights, and k is less than or equal to p; operating a system to define each of the k *Chosen Flights*, whereby after each of the k *Chosen Flights* is defined, said "second customer" can utilize said *Chosen Flight*; operating a system wherein an airline defines t *Chosen Flight*(s) for said "first customer" after each of said k *Chosen Flights* is defined, wherein after each of said t flights is defined, said first customer can utilize said defined flight, where t is less than or equal to n. Said t flights may be a subset of n flights, m flights or both. Said t flights or n flights or both may also include one or more flights not included in said m selected flights. Similarly, k flights may be a subset of p flights, or may include one or more flights other than said p flights. The grouping may be performed for a multiplicity of at least one of said first or second customers and may combine together at least one of each of said first and second customers to formulate at least one group with at least one complementary set of options. The grouping may enable an airline to utilize

at least one of said m or p flights at least after delivery of any of said first or second options.

AFO VOF may be used in conjunction with one or more other VOFs, for example, the UFO (Upgrade Flight Option) VOF. A customer who received an AFO is termed "A" type of customer. An airline may form a group of one or more AFO customers and one or more UFO customers, where the options (AFO and UFO) obtained by the group members are complimentary in nature. As an example, consider two customers A(F1, F2) and U[up(F2), base(F1)]. The notation A(F1, F2) implies a customer A who has received an AFO and has the flexibility to choose either F1 or F2 as the *Chosen Flight*. The notation U[up(F2), base(F1)] implies a customer U who received a UFO and wishes to get an upgrade from F1 (i.e., the base flight) to F2 (i.e., the up flight). Thus, if A decides to choose F1 as the *Chosen Flight*, the airline may upgrade U to F2. If A decides to choose F2 as the *Chosen Flight*, the airline may not upgrade U and hence U gets F1. The customers A and U have taken complimentary options and may form a group. The airline may need to hold only one unit of inventory each in F1 and F2 to satisfy the needs of both A and U (assuming each A and U only need one unit of seat). Such a combination of complimentary options or VOFs may improve efficiency and concurrently enhance value for all the parties involved (i.e., in the context of the current example, enhance value for A, U and the airline).

The implementation of the grouping of A type and U type of customers may be done in one or more ways. One way to implement such grouping is to first offer and secure one or more U type of customers and based on such customer(s), the airline may offer complimentary AFOs to other customers to make groups. In another implementation, the airline may first offer and secure AFO customers and based on such AFO customer(s), airline offers complimentary UFOs to other customers to make groups. In yet another implementation, the airline may offer AFO and UFO separately and then define a process to make complimentary groups of A and U customers (such groups termed "AU_Groups").

An airline may choose to create AU_Groups at various group levels such as implementation of grouping at Level 1, Level 2 and so on. In Level 1 grouping, an AU_Group involves one each of A and U type of customers. An example of Level 1 grouping has already been given above (the two customer, A and U, example).

In Level 2 grouping, the grouping involves making complimentary groups for more than 2 customers. As an example, consider three customers A(F1, F2, F3), U1[up(F2, F3), base(F1)] and U2[up(F1, F3), base(F2)]. The notation A(F1, F2, F3) implies a customer A who received an AFO on F1, F2 and F3 (flexibility to choose any one of F1, F2 or F3 as *Chosen Flight)*. The notation U1[up(F2, F3), base(F1)] implies a customer U1 who received a UFO and wishes to get an upgrade from F1 (base flight) to either F2 or F3 (any of the two up flights), and U2[up(F1, F3), base(F2)] implies a customer U2 who received a UFO and wishes to get an upgrade from F2 (base flight) to either F1 or F3 (any of the two up flights). An airline may group these three customers together. If A decides to choose F1 as the *Chosen Flight,* the airline may upgrade U1 to F2 and U2 to F3. Alternatively, if A decides to choose F2 as the *Chosen Flight,* the airline may upgrade U1 to F3 and U2 to F1. In the third case, if A decides to choose F3 as the *Chosen Flight,* the airline may upgrade U1 to F2 and U2 to F1. Thus by grouping them together, the airline needed to hold only one unit of inventory in each of the three flights F1, F2 and F3 to satisfy needs for all three customers in all different situations.

It is assumed that a "unit" represents one unit of seat (or flight capacity) and each customer needs only one unit of a seat. Continuing with the above example, if the airline were to not consider the complimentary nature of options obtained by A, U1 and U2 customers, the airline may need to hold (or block) a total of 5 units (seats) of capacity to ensure some level of satisfaction of needs for A, U1 and U2, i.e., 3 units for A (1 unit each of F1, F2 and F3 as A could choose any flight), 1 unit for U1 in F1 (base flight) and 1 unit for U2 in F2. Even by blocking (or holding) 5 units (seats), there may be no guarantee that the airline would be able to satisfy upgrade needs for U1 or U2 (in the event they are not grouped together). This implies, to satisfy a total need of 3 units of flights, the airline may need to hold (or block) 5 units (seats) of flight capacity, creating a

redundant capacity of 2 units (seats) that the airline may not be able to use otherwise. By creating a complimentary group of A-U1-U2, the airline needs to only hold (or block) 3 units (seats) of capacity (1 unit each in F1, F2 and F3), thus, freeing up 2 units (seats) of redundant capacity. Thus, an AU_Group mechanism may create an efficient structure with minimal holding (and/or blocking) of capacity to satisfy the needs of all the concerned customers.

The grouping may also be implemented at higher levels such as Level 3 grouping, Level 4 grouping, Level 5 grouping and so on. An example of the Level 3 grouping may be A1-U1-U2-U3.

An airline may choose to implement grouping at various flight levels such as Flight Leg, Flight Segment and Itinerary. An airline may also change terms and conditions of one or more option contracts of one or more UFO and/or AFO customers (for e.g., price, notify deadline and so on) to solicit customer participation in UFO/AFO to create more AU_Groups. The airline may also offer incentives to customers to choose complimentary UFO/AFO offerings to enable the airline to create more AU_Groups. The implementation methods mentioned above for grouping are for illustration purposes only and an airline may choose to implement grouping in one or more other ways or by combining above said methods or by combining one or more other ways along with one or more above said methods.

Fig. 94 displays a flow chart that illustrates one way of implementing grouping of A and U type of customers. In Act 94.100, sets of A and U customers are taken as input. Next, in Act 94.110, a set of one or more Grouping Rules is read from the airline's database (94.210). A grouping rule may depend upon the number of A and/or U type of customers, desired capacity redundancy in the system, the permissible time factor to create AU_Groups, any other rule of airline choosing, any combination thereof and so on. For example, an airline may choose a Grouping Rule whereby new groups are created by first ungrouping one or more of the AU_Groups (created earlier but unexercised, for example, groups for which the customer has not been notified, or if

notified, the customer has not utilized the flight and the terms of option contract allows for a change in the *Chosen Flight*). In another example, a Grouping Rule may create groups of only those A and U type of customers who are yet to be grouped and discarding all A/U customers, which have already been grouped. An airline may implement any Grouping Rule to formulate AU_Groups. The choice to Grouping rules may enhance the overall value for the airline (for example, reduce the total capacity required to satisfy flight needs for all A and U customers). Theoretically, the number of units of the seat required (or blocked) should be equal to the number of seats the customers shall be eventually utilizing. Thus, by implementing the grouping and with the help of appropriate Grouping Rules, the airline may attempt to achieve such theoretical minima.

Next, in Act 94.120, the Grouping Rules, so obtained from the airline's database, are used to make AU_Groups. Next, in Act 94.130, the AU_Groups so created are returned along with ungrouped A/U, if any, and the process then ends in Box 94.200.

The grouping may enhance customers' experience, and may comprise operating a system that delivers a URO to at least a "first customer" to utilize up to n of m selected flights for said first customer, and n is less than or equal to m; operating a system that delivers an AFO to at least a "second customer" to utilize up to k of p selected flights, and k is less than or equal to p; operating a system to define each of the k *Chosen Flights*, whereby after each of the k *Chosen Flights* is defined, said "second customer" can utilize said *Chosen Flight*; operating a system wherein an airline defines t *Chosen Flight*(s) for said "first customer" after each of said k *Chosen Flights* is defined, wherein after each of said t flights is defined, said first customer can utilize said defined flight, where t is less than or equal to n. Said t flights may be a subset of n flights, m flights or both. Said t flights or n flights or both may also include one or more flights not included in said m selected flights. Similarly, k flights may be a subset of p flights, or may include one or more flights other than said p flights. The grouping may be performed for a multiplicity of at least one of said first or second customers and may combine together at least one of each of said first and second customers to formulate at least one group with

at least one complementary set of options. The grouping may enable an airline to utilize at least one of said m or p flights at least after delivery of any of said first or second options.

Business Model to implement AFO in the Airline Industry

Different business models may be used to implement an AFO VOF. For example, an airline may choose to implement an AFO VOF individually or in conjunction with one or more partners and/or other companies. As mentioned in the sections above, in another implementation of AFO, an airline may allocate some seat inventory to another entity. The term "allocation of seat(s)" or "allocation of seat inventory" or "allocation of flight(s)" implies, without limitation, assigning one or more seats of one or more flights of one or more airlines to an entity for any purpose or use by the entity either exclusively or non-exclusively. For example, an entity may use the allocated seats to offer AFO to customers and/or to sell the seats as regular seats. The allocation of seat may be conditional. For example, one of the conditions may require a return of at least one allocated seat after a specified time period and/or other consideration(s).

The customer may select or purchase one or more flights from the airline and/or said entity and then interact with said entity to select (purchase) one or more *AFO Flights* in relation to said (already purchased) flights. Said entity may also receive seat allocation from more than one airline, and thus, offer flights from multiple airlines to a single customer during the *Initial Transaction* for AFO.

The OA may use those seats and operate a service to offer AFOs to the airline customers. As explained above in Fig. 13A, a customer may select one or more flights from the OA, and then receive an AFO on those selected flights from the OA. Another approach would be for a customer to select one or more flights from the airline and then receive an AFO option on those selected flights from the OA. In another example, a customer may select one or more flights from both the airline and the OA, and then

receive the AFO option on those selected flights from the OA. It is also possible that the customer receives an AFO from the airline or both from the airline and the OA on a given set of selected flights.

The OA and the airline may simultaneously offer AFOs to the airline customers, i.e., a customer may either approach the airline or the OA to receive an AFO on desired flights. In another model, the OA may operate as the sole provider of the AFO to all the customers of an airline. In a yet another model, the OA and the airline may choose to work together and jointly offer AFOs to the airline customers. The OA or the airline may offer and sell AFOs to customers using either or both of the Sequential or the Concurrent Buy AFO processes.

As explained in Fig. 13A above, an OA may be able to offer AFO on flights from one or multiple airlines. An OA may receive allocation of flights (seats) from two or more airlines. A customer may purchase one or more flights from one or more airlines and/or from the OA, and then receive an AFO option on those selected flights from the OA. Even if the OA may not be entitled to or does not receive seat allocation from an airline, it may still be able to formulate an agreement with that airline to offer AFOs on the flights of that airline. Thus, a customer may be able to receive an AFO on flights from multiple airlines, giving the customer more flexibility and variety to choose from. For example, a customer may receive an AFO on two flights from two different airlines and can choose to utilize either of them within the terms and conditions of the option contract. This may provide a lot of flexibility for the customers, especially when the customer itineraries include destinations only served by a few airlines. An OA may be able to thus create a multi-airline AFO VOF Framework, which may tremendously enhance the flexibility for the customers. All the participating airlines that allocate seats to and/or partner with the OA to offer AFO may also gain from an overall increase in the total spending by the consumers, enhanced overall customer satisfaction and/or other operational benefits. Either or both of the OA and the airline may process the tickets for the *Chosen Flights* associated with an AFO purchased by the customer. A customer may receive tickets from the OA or the airline for the flights related to the AFO grant. An

entity (the OA and the airline) may process tickets for the flights offered only by that entity or by either of the two entities.

The OA and the airline may engage in a business agreement to implement an AFO program. The business agreement may divide the total benefit generated by the AFO program between the two parties using any mechanism or criteria as desired. The total AFO Revenue Benefit may be shared between the two parties. The airline may allocate seats to the OA. One or more airlines may allocate only few or may allocate their entire seat inventory to the OA to offer those seats to the customers by way of regular and/or AFO seats. The OA may offer those seats as AFO seats to customers. In return, the OA may offer a lending revenue or fee to the airline for all or a portion of the seats allocated. This lending fee may be given only for the seats that the OA is able to utilize or for all the allocated seats. The lending fee may be a lump sum amount, may depend upon the number of seats allocated or may depend on one or more factors as desired. The agreement may include a provision where the OA may return the allocated seats back to the airline at a certain time and date. There may be one or more conditions associated with the return of unused AFO seats and/or seats from the *Released Flights*, including, but not limited to, returning the same seat, returning a higher value seat and so on.

The AFO VOF may include different conditions imposed on the customer regarding the payments related to the AFO. For example, a customer may be asked to make payments only to the airline even if he/she is receiving flights and/or options from the OA. Similarly, the customer may be required only to pay to the OA even if he or she selected the flights and/or received the options from the airlines. The condition may also be set to ask a customer to make one or more payments to the airlines for the flights and/or options received from that airline, and to make one or more payments to the OA for the flights and/or options received from that OA. The condition may allow the customer to make partial payments to the airline and the rest to the OA or vice versa, the basis of which distribution may depend upon various factors, including, but are not limited to, the factors of airline's choosing, the arrangement between the OA and the

airline and so on. In another example, the customer may be required to pay to a third party or may be required to pay to any of the combination of the entities mentioned above.

Information Technology System for the AFO VOF in the Airline Industry

As discussed earlier as well, a client-server architecture may be used to implement the AFO VOF. However, an airline may use a computer hardware and software infrastructure of its choosing to implement an AFO VOF.

The AFO VOF may be best implemented using one or more computer-implemented methods to operate a computer-implemented service to offer AFOs to the customers, that includes, but not limited to, recording the information pertaining to the offered and/or sold AFOs in a database. It may also include operating a computer-implemented service (and/or system) or other service (and/or system) to define the *Chosen Flights*, and recording said *Chosen Flights* (or defined flights) and all the flights related to an AFO in a database.

For the stage one (i.e., to formulate the AFO VOF), an application server may be used along with a database (e.g., a relational database) that stores all the information relevant to the airline and the customer. The database may include all the relevant information sufficient to identify flights the airline chooses to make eligible for AFO. One or more users (e.g., a business analyst or manager) may have full access to this server through Intranet or highly secured VPN environment to design an optimal value option framework. The database shall also store all the information pertaining to all the acts (in stage one) used by an airline while formulating the AFO VOF.

A similar or a different application server and/or a cluster of application servers (functioning concurrently) along with one or more web servers and a set of one or more database servers may be used for the Buy AFO as explained in Fig. 13D above and CN (Customer Notification) processes in the stage two of the AFO VOF. The application

server communicates with a web server and the database (e.g., a relational database either the same database used for stage one or a different one). This database (for stage two) stores all the relevant information pertaining to all the acts executed during and in relation to the processes and algorithms run for stage two. All the algorithms mentioned earlier for both the Buy AFO process and the CN process may be computer-implemented as explained and discussed above in Fig. 13D and 13E. All the customer interactions and the related information such as customer needs, inputs, payment transactions etc. are stored in this database, including information pertaining to the interactions with those customers who may not purchase and/or receive AFO. The systems for stage two and stage one may be maintained in a synchronized environment so that each system has access to the most current information and can communicate with each other.

As discussed above, there may be other ways for implementing the AFO VOF which may depend upon including, but not limited to, the scale of the implementation, business requirements and number of entities involved. The entities may interact through a series of hardware products and services with the OA/airline server(s). The OA may or may not be different than the airline and the OA server may be the same as that of the airline server. The information technology and network system to implement AFO VOF may include tools, without limitation, such as one or more CPUs, Hard Disk Drives, RAM, one or more series of Routers, Internet, Firewall, highly secured VPN, Intranet, load balancers, servers, primary databases, secondary databases and so forth.

As discussed and explained above, there may be one or more secondary databases that may only be in the "Read Only" form and may be updated through one or more replication servers. Alternatively, the airline may have one or more separate temporary database structure wherein the entries are updated and stored until the final update is made in one or more main databases. One the final update is done, the entries in these temporary databases may be removed.

The entire system may run at the premises of OA, airline and/or any third entity or any combination thereof. It may also be possible to run a part of the system at one

place and rest at one or more other places. The system may also be implemented even if one or more servers may be kept off-shore locations and may be accessed remotely. The geographical locations of one or more hardware product and/or services may be different depending upon including, but not limited to, the factors of airline's choice, ease of accessibility, infrastructure facilities. The structure or the interaction architecture of the system may vary depending on factors including, but not limited to, the set up of the airline, changes in the technology and with the introduction of new and better technology enhancing the interaction process.

A customer may interact with the Buy AFO and/or the CN process either directly or indirectly using a local or a remote terminal (e.g., a computer with a browser and an access to the Internet) that is able to access the web server(s) that host the Buy AFO and CN processes. A customer may also interact with an operator (or a computer operator) using any communication mechanism (e.g., in-person, phone, using email, Internet chat, text messaging system) who then communicates with the web server through the Intranet and/or Internet.

The system for the stage one may be hosted and run by an airline, an OA, a third party service provider or any combination of the above. Similarly, the system for the stage two may be hosted by an airline, an OA, a third party service provider or any combination of the above. In the model, where the OA receives seat allocation from the airline and offers AFO to the customers directly, the web server, application server and database for both stage one and stage two shall be managed by the OA. The OA may also have partial (or complete) access to the airline database and systems through a highly secured environment (for example, a virtual private network). In the model, when an OA and an airline tie-up together to provide AFO, all the computer hardware and software infrastructure for both stage one and stage two may be hosted by and/or property of either or both (mutually) of the sides depending upon the business agreement between them.

Brief description of APO VOF in the Car rental Industry

APO VOF in the car rental industry may be termed as ACO (Alternate Car Option). In a successful *Initial Transaction* for an ACO, a customer receives an option to choose up to 'n' out of 'm' selected Cars (said 'm' Cars termed *"ACO Cars"*). The 'n' Cars that are finally selected are termed *"Chosen Cars"*. After each of the 'n' *Chosen Cars* is defined (or selected or chosen), the customer has the right to utilize (or can utilize) said *Chosen Car*. Apart from the 'n' *Chosen Cars*, the remaining 'm – n' Cars are termed *"Released Cars"*. The *Released Cars* (if any, that were probably held or blocked for said customer) may be rented to others or used for other purposes. The *Released Cars* in relation to said option may be reused by the car rental company before, after, at or any combination thereof, the time the *Released Cars* and/or *Chosen Cars* are defined (or selected).

Numerically, the value of 'm' is greater than or equal to 1 and the value of 'n' may vary from '0' to 'm' depending upon the specific implementation of the ACO framework. The value of 'm' and/or 'n' may be known (or defined and/or re-defined) before, during or after the *Initial Transaction* and/or any combination thereof. The value of n may be limited to less than the value of m, or n<m (i.e., n<=m-1); however, in some situations, n may be equal to m. The value of 'n' may or may not be known (or defined or re-defined) at the time of the *Initial Transaction*. The value of 'm' and/or 'n' may be defined and/or re-defined by the car rental company, the customer, another entity or any combination thereof. For example, the value of n may not be defined at the time of *Initial Transaction*. In case the value of m is redefined after being defined at least once before, the new value of 'm' may be greater than or less than the older value of 'm'. Similarly, if the value of 'n' is redefined after being defined at least once before, the new value of 'n' may also be greater than or less than the older value of 'n'. In some of the cases, the value of new 'n' may be even greater than the older value of 'm'.

The Initial Transaction may consist of one or more acts. The customer may select (or book) all ACO Cars concurrently (i.e., all together in one transaction) or sequentially (i.e., in multiple transactions). In the sequential case, a customer may select

one or more Cars in one or more transactions just before or much before (a few days/weeks/months) the Initial Transaction for ACO begins. Said selected Car(s) (let's say X number of them), thus, may be considered as part of said m ACO Cars of the ACO (m, n) transaction, and the customer may select only the remaining (m - X) number of ACO Cars during the Initial Transaction. All the transactions used to select all the ACO Cars of an ACO (m, n) instance may be related to each other, and hence, are considered as related transactions.

The ACO Cars may be selected by the car rental company, the customer, another entity or any combination thereof. The ACO VOF may enable a customer to have flexibility by selecting m Cars and use said flexibility to satisfy his/her needs. Therefore, the customers would usually have the right to select (or define) the Chosen Cars. However, in different implementations of ACO VOF, the car rental company, the customer, another entity or any combination thereof may select one or more of the *Chosen Cars* related to an ACO. The ACO Cars and the *Chosen Cars* may be selected by the same entity, different entities or any combination thereof. The car rental company may incorporate the customer information and the data related to the ACO into the sales, production, inventory, other database or information system or any combination of the above.

A customer may select ACO Cars in several ways; through mutual agreement (i.e., during a direct interaction such as a Car purchase), or the car rental company may grant the ACO Cars to the customers without soliciting their interest or permission. For example, to enhance customer satisfaction or for any other purpose, a car rental company may grant ACO Cars to customers based on the past customer behavior, interaction and so on.

For an example, a customer may desire travel flexibility and may be willing to pay for it accordingly. On the other hand, if a car rental company has surplus Cars or rental capacity, that condition probably represents the loss of potential revenue (and/or opportunity cost) for that car rental company. This is true even though no other potential

customers have been turned away, simply because there may be one or more customers willing to switch to the unused surplus cars (or capacity) at appropriate price/terms. An opportunity thus exists to concurrently generate an incremental revenue benefit for the car rental company from consumer surplus, and to maximize the car renting utilities for the customers.

Brief description of APO VOF in the Travel Industry

APO VOF in Travel industry may be termed as ATO (Alternate Travel Package Option). In a successful *Initial Transaction* for an ATO, a customer receives an option to choose up to 'n' out of 'm' selected Travel Packages (said 'm' Travel Packages termed *"ATO Travel Packages"*). The 'n' Travel Packages that are finally selected are termed *"Chosen Travel Packages"*. After each of the 'n' *Chosen Travel Packages* is defined (or selected or chosen), the customer has the right to utilize (or can utilize) said *Chosen Travel Package*. Apart from the 'n' *Chosen Travel Packages*, the remaining 'm – n' Travel Packages are termed *"Released Travel Packages"*. The *Released Travel Packages* (if any, that were probably held or blocked for said customer) may be sold to others or used for other purposes. The *Released Travel Packages* in relation to said option may be reused by the travel company before, after, at or any combination thereof, the time the *Released Travel Packages* and/or *Chosen Travel Packages* are defined (or selected).

Numerically, the value of 'm' is greater than or equal to 1 and the value of 'n' may vary from '0' to 'm' depending upon the specific implementation of the ATO framework. The value of 'm' and/or 'n' may be known (or defined and/or re-defined) before, during or after the *Initial Transaction* and/or any combination thereof. The value of n may be limited to less than the value of m, or n<m (i.e., n<=m-1); however, in some situations, n may be equal to m. The value of 'n' may or may not be known (or defined or re-defined) at the time of the *Initial Transaction*. The value of 'm' and/or 'n' may be defined and/or re-defined by the travel company, the customer, another entity or any combination thereof. For example, the value of n may not be defined at the time of *Initial*

Transaction. In case the value of m is redefined after being defined at least once before, the new value of 'm' may be greater than or less than the older value of 'm'. Similarly, if the value of 'n' is redefined after being defined at least once before, the new value of 'n' may also be greater than or less than the older value of 'n'. In some of the cases, the value of new 'n' may be even greater than the older value of 'm'.

The Initial Transaction may consist of one or more acts. The customer may select (or purchase) all ATO Travel Packages concurrently (i.e., all together in one transaction) or sequentially (i.e., in multiple transactions). In the sequential case, a customer may select one or more Travel Packages in one or more transactions just before or much before (a few days/weeks/months) the Initial Transaction for ATO begins. Said selected Travel Package(s) (let's say X number of them), thus, may be considered as part of said m ATO Travel Packages of the ATO (m, n) transaction, and the customer may select only the remaining (m - X) number of ATO Travel Packages during the Initial Transaction. All the transactions used to select all the ATO Travel Packages of an ATO (m, n) instance may be related to each other, and hence, are considered as related transactions.

The ATO Travel Packages may be selected by the travel company, the customer, another entity or any combination thereof. The ATO VOF may enable a customer to have flexibility by selecting m Travel Packages and use said flexibility to satisfy his/her needs. Therefore, the customers would usually have the right to select (or define) the *Chosen Travel Packages*. However, in different implementations of ATO VOF, the travel company, the customer, another entity or any combination thereof may select one or more of the *Chosen Travel Packages* related to an ATO. The ATO Travel Packages and the *Chosen Travel Packages* may be selected by the same entity, different entities or any combination thereof. The travel company may incorporate the customer information and the data related to the ATO into the sales, production, inventory, other database or information system or any combination of the above.

A customer may select ATO Travel Packages in several ways; through mutual agreement (i.e., during a direct interaction such as a Travel Package purchase), or the

travel company may grant the ATO Travel Packages to the customers without soliciting their interest or permission. For example, to enhance customer satisfaction or for any other purpose, a travel company may grant ATO Travel Packages to customers based on the past customer behavior, interaction and so on.

For an example a customers may desire travel flexibility and may be willing to pay for it accordingly. On the other hand, if a travel company has surplus Travel Package capacity, that condition probably represents the loss of potential revenue (and/or opportunity cost) for that travel company. This is true even though no other potential customers have been turned away, simply because there may be one or more customers willing to take that unused surplus Travel Packages at appropriate price/terms. An opportunity thus exists to concurrently generate an incremental revenue benefit for the travel company from consumer surplus, and to maximize the purchase utilities for the customers.

While the invention has been described with respect to a limited number of embodiments, those skilled in the art, having benefit of this disclosure, will appreciate that other embodiments can be devised within the spirit and scope of the invention.

What is claimed is:

CLAIMS:

1. A computer-implemented system to provide options on products, comprising:

a. a data processor adapted by the execution of stored program instructions to receive and store, in a computer readable data store, data with respect to m products offered by a company to a customer, having at least one corresponding option for selection, definition and utilization of n of said m products, wherein m is greater than or equal to 2 and n is less than or equal to m;

b. a data processor adapted by the execution of stored program instructions to receive at least one input for at least one of said options and to select a set of said n products, where each of said selected products is available for utilization after it is defined in subsequent interaction between the company and the customer, provided specified conditions are satisfied;

c. a data processor adapted by the execution of stored program instructions to record the-information characterizing said option in a computer readable data store;

d. a data processor adapted by the execution of stored program instructions to receive at least one input to define one or more, but less than or equal to n, products for utilization among said selected products;

e. a data processor adapted by the execution of stored program instructions to record information pertaining to said defined products and their utilization in a computer readable data store;

f. a data processor adapted by the execution of stored program instructions to repeat the process of (b); and

g. a data processor adapted by the execution of stored program instructions to repeat the process of (d) to permit definition of products in those sets until the n products have been defined.

2. The system of claim 1, wherein said data store is adapted to continue to update the data stored on said data store for any subsequent interaction after a first execution of step b.

3. The system of claim 1, wherein in at least one subsequent interaction, the customer defines the product.

4. The system of claim 1, wherein in at least one subsequent interaction, the company defines the product.

5. The system of claim 1, wherein in at least one subsequent interaction, an entity other than the company and the customer defines the product.

6. The system of claim 1, wherein at least two of said data processors are a same processor.

7. The system of claim 1, wherein said data stores are a single data store.

8. The system of claim 1, wherein said subsequent interaction is an implicit interaction.

9. The system of claim 1, wherein said m products are from more than one company.

10. The system of claim 1, wherein said company is not the seller of said product.

11. The system of claim 1, wherein the data processor adapted by the execution of stored program instructions to receive at least one input for said at least one option is further adapted to permit modification of the definition of said n products during a said subsequent interaction.

12. A computer-implemented method to provide options on products, comprising:

a. operating a data processor, adapted by the execution of stored program instructions, to receive and store data with respect to m products offered by a company to a customer, having at least one corresponding option for selection, definition and utilization of n of said m products, in a computer readable data store, where m is greater than or equal to 2 and n is less than or equal to m;

b. operating a data processor, adapted by the execution of stored program instructions, to receive at least one input for at least one of said options and to select a set of said n products, where each of said selected products is made available for utilization after

each of said n products is defined in a plurality of subsequent interactions between the company and the customer responsive to satisfaction of specified conditions;

c. recording information characterizing said option in a computer readable data store;

d. operating a data processor, adapted by the execution of stored program instructions, to receive at least one input to define one or more, but less than or equal to n, products for utilization among said selected products;

e. recording said defined products in a computer readable data store; and

f. repeating step b to select one or more subsequent sets and repeating step d to permit definition of products in those sets, the repetition ending in response to definition of the n products.

13. The method of claim 12, wherein said step of recording the defined products includes updating data stored on said data store with each subsequent interaction.

14. The method of claim 12, wherein in at least one subsequent interaction, the customer defines the product.

15. The method of claim 12, wherein in at least one subsequent interaction, the company defines the product.

16. The method of claim 12, wherein in at least one subsequent interaction, an entity other than the company and the customer defines the product.

17. The method of claim 12, wherein at least two of said data processors are a same processor.

18. The method of claim 12, wherein said data stores are a single data store.

19. The method of claim 12, wherein said subsequent interaction is an implicit interaction.

20. The method of claim 12, wherein said m products are from more than one

company.

21. The method of claim 12, wherein said company is not the seller of said product.

22. The method of claim 12, wherein the data processor adapted by the execution of stored program instructions to receive at least one input for said at least one option further is adapted to permit the definition of said n products to be modified during a said subsequent interaction.

23. A computer-implemented method to provide options on flights, comprising:

a. operating a data processor, adapted by the execution of stored program instructions, to receive and store data with respect to m flights offered by airline to a customer, having at least one corresponding option for selection, definition and utilization of n of said m flights, in a computer readable data store, where m is greater than or equal to 2 and n is less than or equal to m;

b. operating a data processor, adapted by the execution of stored program instructions, to receive at least one input for said at least one options and to select a set of said n flights, each of said n flights available for utilization after each of said flights is defined in a plurality of subsequent interactions between the airline and the customer in relation to said option, responsive to satisfaction of specified conditions;

c. recording information characterizing said option in a computer readable data store;

d. operating a data processor, adapted by the execution of stored program instructions, to receive at least one input to define one or more, but less than or equal to n, of said selected flights for utilization;

e. recording said defined flights in a computer readable data store; and

f. repeating step b to select one or more subsequent sets and repeating step d to permit definition of flights in those sets, the repetition ending responsive to the n flights having been defined.

24. The method of claim 23, wherein said step of recording the information pertaining to said defined flights updates the data store for each said interaction.

25. The method of claim 23, wherein at least two of said data processors are a same processor.

26. A computer-implemented system to provide options on flights, comprising:

a. a data processor adapted by the execution of stored program instructions to receive and store, in a computer readable data store, data with respect to m flights offered by airline to a customer, having at least one corresponding option for selection, definition and utilization of n of said m flights, wherein m is greater than or equal to 2 and n is less than or equal to m;

b. a data processor adapted by the execution of stored program instructions to receive at least one input for at least one of said options and to select a set of said n flights, where each of said selected flights is available for utilization after it is defined in subsequent interaction between the airline and the customer, provided specified conditions are satisfied;

c. a data processor adapted by the execution of stored program instructions to record the-information characterizing said option in a computer readable data store;

d. a data processor adapted by the execution of stored program instructions to receive at least one input to define one or more, but less than or equal to n, flights for utilization among said selected flights;

e. a data processor adapted by the execution of stored program instructions to record information pertaining to said defined flights and their utilization in a computer readable data store;

f. a data processor adapted by the execution of stored program instructions to repeat the process of (b); and

g. a data processor adapted by the execution of stored program instructions to repeat the process of (d) to permit definition of flights in those sets until the n flights have been defined.

27. The system of claim 26, wherein said data store is adapted to continue to update the data stored on said data store for any subsequent interaction after a first execution of step b.

28. The system of claim 26, wherein at least two of said data processors are a same processor.