Intelligent Model driven Tour Packages for Indian and International Tourism

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Abstract: The Indian Tourism industry is undergoing a major change. The acceptability of western brands in the Indian market has indicated the rise in the desire to enjoy the western culture and its sophistication. This has also resulted in large number of Indian tourists opting for outbound tours every year. Between 2013 and 2014, the number of travelers traveling abroad has risen by almost 21 %. Dynamics of international tourism market is of interest for many years. To understand the dynamics of international tourism market it becomes essential to study exchange between Indian and International tourism industry. Tour operators are responsible for configuring the holiday packages and pricing them appropriately. The tourism supply chain for a package holiday includes three sectors: a theme park, hotel and accommodation providers and tour operators. Theme parks and hotel accommodation providers coordinate with tour operators.

This paper considers European Supply Chain that provides package holidays to facilitate decision making of Indian Tourist. In the current study the researchers have designed an Intelligent Travel Model, MyTravel. MyTravel provides travels agents, tour operators and travelers optimized tour package at cost effective price. MyTravel has been designed and developed considering: (i) what optimal equilibrium states tour operators could achieve by competing with each other. (ii) coordinated relationship between the three sectors of the tourism supply chain (iii) differentiation between the effect of quantity competition and the effect of price competition on three sectors.

The researchers in the current study have used computational game theoretic framework to study the impacts of competitive and cooperative relationships between the enterprises in a TSC to devise a cost effective solution for Indian Tourist. In the current study the authors have designed a game theoretic pricing mechanism for selecting the best optimal tour package.

Keywords: Expert System, game theory, hotel and accommodation provider, theme park, tourism supply chain, tour operator

I. INTRODUCTION

Over the last couple of years outbound tourism is on rise in India. Every year Indian tourist's travel to foreign destinations. Indian Tourist normally prefers package tours designed by the local Indian Travel Agents (TA) such as Kesari, Thomas Cook, and SOTC. Package holidays are becoming increasingly popular due to their cost advantage and convenience to tourists. Wang *et al* (1999) define package holidays as tourist programmes that purposefully consist of a variety of tourist activities, such as tourist attractions, accommodation, transportation, dining, shopping, experiences, etc. For designing a package tour the Travel Agents (TA) depends upon the location specific Tour Operators (TO) such as Vacations Worldwide for Europe, Mystify for Europe and Far East Asia. A tourism supply chain (TSC) includes the suppliers of all the goods and services that deliver tourism products to tourists [Font and Tapper, 2008]. These suppliers can be configured in different layers or echelons according to their roles played in the supply chain for package holidays e.g. Fig 1. Each of these travel agents pricing of the tour package differs based on the tour itinerary. In the current study the researchers have studied the tourism supply chain and designed a game theoretic pricing mechanism for tourist for choosing the optimal travel package.

A. Components of Streams in TSC

Tourism supply chain is made up of Downstream, Midstream and Upstream components. The components of Tourism Supply Chain are identified as follows:

(1) Downstream

Downstream of a Tourism Supply Chain includes:

(i) The tourist as end customers

(ii) Travel agents (TA) as retail branches of package holidays dealing with tour operators. Customers of package holidays deal with Tour operator (TO).

Tour operators having direct/indirect influence on the volume of tourism and the choice of destinations and tourist facilities.

(2) Midstream

The Midstream of a TSC involves enterprises that directly provide activities e.g. historical, cultural attraction, hotel accommodations, shopping centers, hotels, bar etc.

(3)Upstream

The upstream are enterprises that provide raw materials and services to enterprises located in the midstream of a TSC.

B. Interaction between Streams

The tour operators are responsible for packaging the holidays which are then sold by the travel agents at the appropriate prices to the Indian tourist. The change in one sector of TSC induces a series of changes in the other sector which in turn will change dynamics of TSC. For example:

1. The prices charged by the tour operator include admission to Theme Parks (TP), Hotel Accommodation (HA). Because of multiple entities within Hotel Accommodation (HA) there is internal competition among them.

2. The prices charged by the airlines/travel agencies (A) also affect the tour package. Because of multiple airlines/travel agencies there is an internal competition among them.

We thus need to identify the number of situational levels at which the decision making needs facilitation within a TSC

The key factor in TSC to achieve business competitiveness is pricing among business partners and to realize an individual firms business objectives within the sustainability envelope set out by the local government. This study discusses the phenomenon of outbound package tour in India with the following objectives:

(i) We analyze the competition relationships in tour operators and the hotel accommodation providers sector

(ii) The coordination relationship between tour operators and the customers.

(iii) Providing an optimized tour packages for travelers

Table I Tourism Supply Chain for Package Holidays

Upstream ←	Midstream	Downstream →		
Food/Drink Manufactures	Theme Parks	Tour Operators	Tour Agenst	TOURIST
Equipment Manufactures	Natural/Cultural Attraction	TO_1	TA_1	
Craft Procedures ←	Hotel Accomodation	TO_2 ←	TA_2 ←	
Furniture Manufactures ↔	Bars and Restaurants	. ↔	. ↔	
Water/Engery Supplies	Transport	.	.	
	Shopping	TO_{N1}	TA_{N1}	

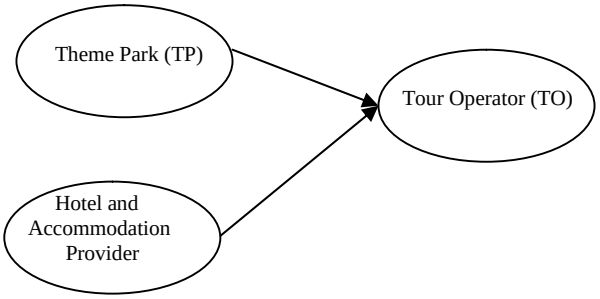

Figure 1. Tourism Supply Chain Game Structure

In the current research we have employed game theoretic models to examine the competition and cooperation among the enterprise involved in TSC. The game framework proposed in this study includes two stages:

(i) Non-Cooperative game between tour operators as Cournot game model
(ii) Non-Cooperative game between the hotel accommodation providers
(iii) Sequential game to coordinate the tourist quantities between the three sectors in a TSC.

II. MODEL ANALYSIS AND SELECTION

Thomas Cook and Kesari are the biggest players in the market of travel and tourism. The two companies sell tour packages which are very close substitutes and are constantly fighting for greater market share. A tourist may buy a Kesari product instead of Thomas Cook and vice versa. The objective of both is to maximize their profit. Hence these players are involved in non-cooperative game, the objective being to garner the most profit and capturing market share being the most effective way to do. Both the payers have the same knowledge because both are big companies. In the current research an analysis of the different models was done to select the best model for game formulation. In the current study all travel companies produce identical products. There is no collusion.

Each firm output affects price. All firms seek to maximize profits. Their profit maximizing condition is Marginal Revenue=Marginal Cost. Cournot model describe structure in which firms compete on the amount of output they will produce which is decided independently of each other at the same time. The Tour operators, Hotel Accommodation Providers, Airline/Travel agents adjust the quantity of their product offers in order to capture higher market shares. In the current study we use Cournot model to design the pricing mechanism for selecting the optimal travel package.

III. AIMS AND OBJECTIVE

The key factor in TSC to achieve business competitiveness is *pricing* among business partners and to realize an individual firms business objectives within the sustainability envelope set out by the local government of that nation. *To achieve business competitiveness effective strategies need to be developed which can handle multiple arms of decision connecting the three sectors.*

Arm 1: Hospitality Industry and Tourism Industry
Arm 2: Tourism Industry and Travel Industry

Both the arms include internal competition among the Players of each industry. After the in-depth study of business models and due to the complexity level at Arm 1 we concentrate on Arm 1 and keep aside Arm 2

IV. MYTRAVEL: INTELLIGENT TRAVEL SYSTEM

In the current study the researchers have designed and developed an Intelligent Travel System called as MyTravel. MyTravel is a Fare Matrix, facilitating simplified and faster way of selecting airfares, hotel accommodation and theme parks. It cuts down the time consuming process of manually searching for the airlines, hotel accommodation and theme parks details for travel agents, tour operators and travelers. Users can filter the flight search and hotel accommodation through multiple

filter options. Travel agents can source more comprehensive information on flights and hotel accommodation through simplified and detailed itinerary, speeding up the selection process. The option to keep the selected fares in a cart and reconsider later, streamlines the fare selection process further with simplified booking details, eliminating any possibility of booking error.

Global travel agents can enhance their ticketing and packaging fulfillment experience through MyTravel. MyTravel facilitates search by querying MyFareBox [5], leading travel partners for most competitive SOTO/SITI across 70 countries with airfare content from 900+ airlines on single platform. MyTravel facilitates hotel accommodation search by querying different hotels. The size of the inventory makes it the world's largest B2B platform offering consolidated fares for hotel accommodation and flight Travel customers across the world reap unmatched revenue with increased profit margin.

The system is tailored to searching, booking and ticketing needs of travel customers. MyTravel is a preferred B2B platform offering consolidated airfares and hotel accommodations.

V. GAME THEORY MODEL

Game theory is the formal study of conflict and cooperation. Game theoretic concepts apply whenever the actions of several Players are interdependent. One model of game theory the Cournot's duopoly model is the strategic game in which

- the Players are the firms
- the actions of each firm are the set of possible outputs (any nonnegative amount)
- the payoff of each firm is its profit.

This game, models a situation in which each firm chooses its output independently, and the market determines the price at which it is sold. Specifically, if firm 1 produces the output y_1 and firm 2 produces the output y_2 then the price at which each unit of output is sold is $P(y_1 + y_2)$, where P is the inverse demand function. Firm 1's total cost function is denoted by $TC_1(y)$ and firm 2's by $TC_2(y)$. Then firm 1's total revenue when the pair of outputs chosen by the firms is (y_1, y_2) is $P(y_1 + y_2)y_1$, so that its profit is $P(y_1 + y_2)y_1 - TC_1(y_1)$; firm 2's revenue is $P(y_2 + y_2)y_2$, and hence its profit is $P(y_1 + y_2)y_2 - TC_2(y_2)$.

The Cournot's Duopoly model can be embedded into certain areas of tourism supply chain, particularly the pricing of tourism products, taking cognizance of the features demonstrated by the activities that correspond to its key theoretical assumptions. The principle of rationality stressed in game theory fits well with tourism pricing scenarios, that is, all of the Players; whether they be wholesalers, hotel and accommodation providers, tour operators, or guests, act in a way that achieves the best payoff. Game theory is particularly well-suited to providing a global perspective, and it offers the means to incorporate the institutional and behavioural aspects of Player relationships that are subject to deeply rooted historical, cultural, and organizational rules.

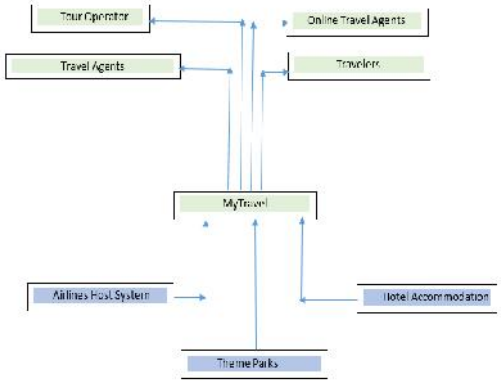

Figure 2. MyTravel Travel System

Also, the sequences emphasized by game theory take into account the possible influence of the order of the decision-making processes on the final outcome. This corresponds well to tourism products, which are service-intensive, experiential, and intangible and characterized by a high level of price elasticity, thus highlighting the significance of the order of the offers and responses made by the Players involved in the trade.

The norm-rather-than-exception scenarios of inequality with regard to Player's access to information about tourism products, for which the simultaneity of the production and consumption of those products is partly to blame, are particularly compatible with the game theory framework, thanks to the due rigor assigned to imperfect information situations. Game theory has been successfully applied to a range of tourism issues that concern the interrelationships between respective members of the tourism industry, such as travel services, attractions, hotels, and tourist bus services. The interactions between the tour operators, hotel and accommodation providers, theme parks and tourist have also been discussed from a game theory perspective.

A. Foreign Destination

Every year thousands of Indian Tourist takes outbound tours to two destinations: (i) Europe (ii) Far East during peak seasons. The Indian tourist books tour packages to this destination through Tour Operators (TO). The tourist taking the tour package must visit the theme park and stay at the hotel during their stay at the foreign destination. The Tour operators charge either "High" or "Low" prices for the Tour packages to maximize their profits.

B. Game Model for Hotel and Accommodation Provider

The tour package cost designed by the Tour Operator depends upon the prices discounts on hotel suits offered to them by the Hotel and Accommodation Providers and the Theme Parks entry charges. In the current research the data from two leading Hotel and Accommodation Providers of Switzerland were taken and compared. During the peak season the HA will give either High discounts or Low discounts to the TO. Therefore the HA possible actions are price 'High' or 'Low' and each HA strategy is a plan to give one of these two discounts. A non-cooperative game model is formulated to implement the behavior of Hotel and Accommodation providers.

Let C be the HA_1 and D be HA_2. If C gives more discounts and D gives less discounts C gets 3 and D gets -1. If D gives more discounts and C gives less discount D gets 3 and C gets -1. If both C and D give high discounts both get 1 and if both C and D give low discounts both get 0.

Table II Payoff for the Hotel and Accommodation Providers

D chooses	C chooses	
	High	Low
High	1,1	3, -1
Low	-1, 3	0,0

In Table 1, each row represents the two different strategies of HA_2 D: discount High or Low. The columns correspond to the same strategies for HA_1 C. The entries in the table show the payoffs of HA_1 C and HA_2 D.

If HA_1 C chooses high, C earns 3 and if C chooses Low then C earns -1. If HA_2 D chooses High then C choosing High yields him 1 and choosing Low yields him 0. So, in either case, giving more discounts on hotel suits to Tour operators is profitable to HA.

VI. GAME MODEL FOR COST EFFECTIVE SOLUTION

There are N Tour operators indexed by 1…N and M Hotel Accommodation Providers indexed by 1…M. For the current research the data was collected from four different tour operators: (i) Thomas Cook (ii) Kesari (iii) Cox n Kings (iv)Goldleaf for a tour package of Switzerland of 7 nights and 8 days. Based on the tour prices Thomas Cook and Kesari were considered from the four tour operators

for the current study. The package designed by the TO depend upon the following parameters: 1. Number of days 2.Hotel Accommodation providers (HA) 3. Theme Park (TP) 4. Food Habits. Based on these parameters the Tour operators price their packages. The tour operators target the customers during the peak season without knowing the price set by its competitor. Each firm designs the tour package independently and the market determines the price at which it is sold. In the current study the researchers have implemented the Cournot's Duopoly Model to enable the tour operators to set an optimal price of their packages and also enable the customers to choose an optimal tour package based on their needs.

A. Cournot's Duopoly Model for Pricing of Tour Packages

In this game model the players are the two firms, strategies are the tour packages offered: $q_1, q_2, \ldots q_{i-1}$. The payoffs are the cost of products = cost of 1 unit * quantity= c* q. Firm 1 chooses q_1 and firm 2 chooses q_2. Then the market decides the price of product P, through the aggregate demand curve:

$$P = a - b\,(q_1 + q_2) \quad (1)$$

which is a line with slope b indicating that as the quantity produced is increased the price reduces in the market. The payoffs for these firms will depend on the profit:

$$U^1(q_1, q_2) = [p]\; q_1 - c\; q_1 \quad (2)$$
$$U^2(q_1, q_2) = [p]\; q_2 - c\; q_2$$

To calculate firms 1st profit; substituting (1) in (2) we get

$$U^1(q_1, q_2) = [(a - b)\,(q_1 + q_2)]\; q_1 - c\; q_1 \quad (3)$$
$$U^2(q_1, q_2) = [(a - b)\,(q_1 + q_2)]\; q_2 - c\; q_2$$

To determine the Nash equilibrium, we need to figure out Player1's best response (BR_1) with each Player and then figure out Players 2s' best response (BR_2) with each Player.

To find the best response we need to maximize profit. Differentiating U^1 and U^2 in (3) with respect to q_1 and q_2 respectively, we get

$$\partial U^1/\partial q_1 = a - 2bq_1 - bq_2 - c \quad (4)$$
$$\partial U^2/\partial q_2 = a - 2bq_2 - bq_1 - c$$

Since we maximize the profit we set equation (4) equal to zero to get

$$a - 2bq_1 - bq_2 - c = 0 \quad (5)$$
$$a - 2bq_2 - bq_1 - c = 0$$

Best response for Player P1 as a response of Player P2 choice occurs at the critical value is:

$$BR_1(q_2):\; q_1 = [(a - c)/2b] - (q_2/2) \quad (6)$$

and best response for Player P2 as a response of Player P1 choice occurs at the critical value is:

$$BR_2(q_1):\; q_2 = [(a - c)/2b] - (q1/2) \quad (7)$$

2nd order Conditions when applied to U^1 and U^2 by differentiating (5) with respect to q_1 *and* q_2 gives

$$\partial^2 U^1/\partial q_1^2 = \partial^2 U^2/\partial q_2^2 = -2b$$

→ *The pay – off will be maximum at the above critical value of* q_1 *and* q_2.

For a partnership Game

1. Player P1 best response with respect to Player P2 if Player chooses q_2=0 it result in Player P1 monopoly and vice- -versa

$$BR_1(0):\; q_1 = [(a - c)/2b] \quad (8)$$
Similarly, $BR_2(0):\; q_1 = [(a - c)/2b]$ (9)

2. As Player P2 produces more quantity till prices will decrease. If Player P1 produces more quantity prices will further decreases.

Nash equilibrium for partnership game is the intersection point of Player P1's best response w.r.t to Player P2 and Player P2 best response w.r.t to Player P1

Therefore $q1^* = q_2^*$ at Nash Equilibrium

Replace q_1 by q_1^* and q_2 by q_2^* in equations (7) and (8)

$$q_1^* = (a - c)/2b - (q2^*)/2 \quad (10)$$
$$q_2^* = (a - c)/2b - (q1^*)/2 \quad (11)$$

Substituting q1* = q_2^* at Nash Equilibrium in equation (10) and (11) we get

$$q_1^* = (a - c)/3b \; \frac{a-c}{3b}$$

$$q_2^* = q_2^* = (a - c)/3b$$

In the current research the data from four tour operators (TO): : Tomas Cook, Kesari Tour, Cox n Kings, Goldleaf were taken and compared for the best market price for Switzerland tour package of 7 nights and 8 days. During the peak season the tour operators will charge either a High Price or a Low Price for all packages. Therefore the TO possible actions are price 'High' or 'Low' and each TO strategy is a plan to charge one of these two prices.

At high price the TO unit contribution margin is $ 1500/per package; at the low price the TO unit contribution margin is $900/per package. There are 2 segments of customers for the packages and the maximum price each segment is willing to pay is very different. The 50,000 customers in the "High" segment are willing to pay the High price but would also prefer low price, while the 50,000 people in the "Low" segment are willing to pay the low price. We also assume that if both firms charge the same price, then sales are split equally between the two TO.

The total contribution margin given the High price is 50,000 * $1500 = $75000000

The margin given at Low price is

(50,000 +50,000) * $900=90000000.

Therefore, the optimal solution for a monopoly is to set prices to exclusively target the high end market. The game is formulated as a two Player game between two leading tour operators. Let A be the TO_1 and B be TO_2.

Table III Payoff for the Tour Operators

Price	Unit contribution margin at that price	Number of Segment
High	$1500	50000
Low	$900	50000

Table IV Payoff for the Tour Operators

A chooses	B chooses	
	High	Low
High	$(375 * 10^5, 375 * 10^5)$	$(0, 90 * 10^6)$
Low	$(90 * 10^6, 0)$	$(45 * 10^6, 45 * 10^6)$

In the Table 5, the row corresponds to the two different strategies of TO A: price High or Low. The columns correspond to the same strategies for TO B. The entries in the Table 5, show the payoffs, the total contribution margins for TO A and TO B in units of $.

If both TO price High, then they split the $75000000 equally between them i.e. $ 375 * 10^5. If both TO price low then they split the $90000000= 4 45 * 10^6. In the upper right cell of Table I, A prices low but B prices high, hence A captures all the demands at the low price and gains $ 90 * 10^6.

For the cell in lower left TO A prices High and TO B prices low, so that B captures all the demand at the low price and gains $ 90 * 10^6. TO A's decision if B chooses High would be to chooses Low. Therefore Low is TO A's best response to B choosing High. If B chooses Low then TO A's best response is to choose low as well. It is best for A to choose Low no matter what TO B does, making the price low is a dominant strategy in this game. Pricing Low is also a dominant strategy for B no matter what TO A chooses. Therefore [A Low, B Low] is the unique Nash equilibrium of this game, if both TO choose low, and then neither has a reason to unilaterally change its mind.

VII. CUSTOMERS EVALUATION OF TOUR PACKAGE

The customers evaluate different tour operators based on five key parameters so that the tour cost remains to be minimum and facilities to be maximum. In the current study, the researchers have designed and developed a computational game theoretic model to enable the customers design the pay-off matrices for the five key parameters so that an appropriate decision can be taken.

A. Parameter 1 No of Days

Every tour operators designs his tour package based on number of days. Even for a standard package the number of days varies between tour operators. Based on the number of days included in the tour package a payoff matrix is designed for the customers to choose from.

Table V Payoff for the Tour Operators based on Number of Days

	TOB	
TOA	Less Number of Days	More Number of Days
Less No of days	(1,1)	(0,1)
More no of days	(1,0)	(2,2)

Both the tour operators can offer either less number of days or more number of days. If both TO's give more number of days then the game has a saddle point and the customers may be divided between the two based on the parameter 2 i.e. food habit

B. Parameter 2 Food Habits

Suppose all customers prefer Indian food but some also prefer local food accordingly the customers prefer to choose TO operators

Table VI Payoff for the Tour Operators based on Food Habits

	TOB		
		Local Food	Indian Food
TOA	Local Food	(1,1)	(0.5,1)
	Indian Food	(1, 0.5)	(1,1)

The above payoff matrix has a saddle point at more than one condition: both tour operators serve country-wise local food and both tour operators serve Indian food .So based on the food served customers will prefer the hotel accommodation.

C. Parameter 3 Hotel Accommodation

The tour operator offers either hotel rooms with twin sharing basis or apartments in tour package. Based on the hotel accommodation provided the tour operators price their tour packages.

Table VII Payoff for the Tour Operators based Accommodation

	TOB		
		Local Food	Indian Food
TOA	Local Food	(1,1)	(0.5,1)
	Indian Food	(1, 0.5)	(1,1)

Indian customers normally prefer apartments in foreign countries as compared to Hotel Rooms as they can cook Indian food as eating habits are a problem in foreign countries for Indians.

D. Parameter 4 Sightseeing in large group or Chauffer Driven Cars

In the recent years along with group tours, chauffer driven tour packages have also become very popular.

Table VIII Payoff for the Tour Operators based on Mode of Sight Seeing

	TOB		
		Group	Chauffer
TOA	Group	(1,1)	(0, 1)
	Chauffer	(1, 0)	(2,2)

Based on Chauffer Driven or Group the pricing of the tour will be high or low.

E. Parameter 5 Tour Package

Based on the above four parameters the pricing of every tour operator varies. From customers point of view the tour prices are either low or high.

Table IX Payoff for The Tour operators based on Tour Package

	TOB		
		High	Low
TOA	High	(1,1)	(0,2)
	Low	(2, 0)	(1,1)

Every customer prefers low prices of the tour package. Hence the game has a saddle point when both the tour operators offer low prices.

VIII. ALGORITHM

A. Algorithm Design for Game Theoretic Model

Input: Source, Destination, Travel_Date, No_of_Persons
Output: C_{opt}
Initialize: Counter i=0
Step 1: Select Source, Destination, Travel_Date, No_of_Persons
For i=0
Step 2: Mytravel queries MyFareBox, Hotel_Accomodation, Theme_Park
Step 3: Select the Best possible Flight, Hotel_Accomodation
Step 4: Generate Quote (Payoff)
Step 5: if (Optimal Price, Reached Nash Equilibrium) then
stop
else
Step 6: i++
Step 7: Go to Step 2
Step 8: End

B. Algorithm for Customer Evaluation

The customer evaluates tour packages based on the following parameters: (i) Number of Days (ii) Food Habits (iii) Accommodation Type (iv)Sightseeing (v) Cost of Tour Package. The system designed is Rule Based System.

Input: Source, Destination, Travel, No_of_Persons
Output: Tour_package
Initalize: Counter i=0
Step 1: Select the Source, Destination, Travel_Date, No_of_Persons
For i=0
Step 2: If (No_of_Days of TOA > TOB)
Select TOA
Else
Select TOB

Step 3: If (Food_Habits== Indian || Food_Habits == Local)
Select TOA
Else
Select TOB
Step 4: If (Accomodation == Single || Accomodation ==Twin_Sharing)
Select TOA
Else TOB
Step 5: If (Sight_Seeing == Large_group || Cahuffer_Driven)
Select TOA
Else TOB
Step 6: If (Cost_of_Tour_TOA > Cost_of_Tour_TOB)
Select TOA
Else TOB
Step 7: Generate Quote (Payoff)
Step 8: Optimal Tour_Package Reached Nash Equilibrium
Goto Step 11
Else
Step 9: i++
Step 10: Goto Step 2
Step 11: End

IX. IMPLEMENTATION DETAILS

The game theoretic model is implemented using a web and mobile based system. The system is developed using JAVA, PHP and SQL which are platform independent. The web based application facilitates the travelers to choose the travel package as per their needs. Based on their travel needs the travel package with the custom optimized price is made available to them. The web based application also helps the tour operators to forecast competitive prices of tour packages to compete with other tour operators based on the sales results.

X. FINDINGS

1) Under the quantity competition, the effect of a small change in the operating cost of HA providers or the cost of TP on the equilibrium price, quantity and profit, effects a small change in the operating cost of TO in the TSC. From the two game models it was observed that when the operating cost of a firm in the TSC decreases, it is able to reduce its product/service price. As a result, it can attract more tourists and thus improve its profit. Those TOs whose costs are lower than the average cost enjoy their cost advantages and attract more customers and higher profits; those TOs whose costs are higher than the average cost must set higher product prices in order to remain profitable, resulting in a loss of customers and profits.

If a TO is able to reduce its operating cost, this reduction will attract more tourists and higher profits from its competitors in the same sector. Another observation is that when the downstream enterprises reduce their costs, the prices, number of tourists and profits of the upstream enterprises demonstrate increasing trends. This finding is important in the sense that downstream enterprises should reduce their operating costs as much as possible to encourage the upstream operators to attract more tourists, which benefits the downstream enterprises. On the other hand if the cost of the upstream enterprise decreases, downstream enterprises are able to reduce their prices in order to attract more tourists and still improve their benefits.

2) Under the quantity competition, as new TO and HA enter the market, it results in further decreases in prices. In the current research, a new Tour Operator namely TO_3 E designed the same tour package with a relatively lower cost of $ 725. As a result the new entrant is able to attract more tourists and achieve higher profits. Similarly as, new HA enters into the market with more discounts, it results in reduced prices in tour packages thereby attracting more customers.

3) MyTravel Intelligent Travel System facilitates revenues of travel companies by gaining personalized services. Fare rules are made available to the users with the ability to generate optimal quotes.

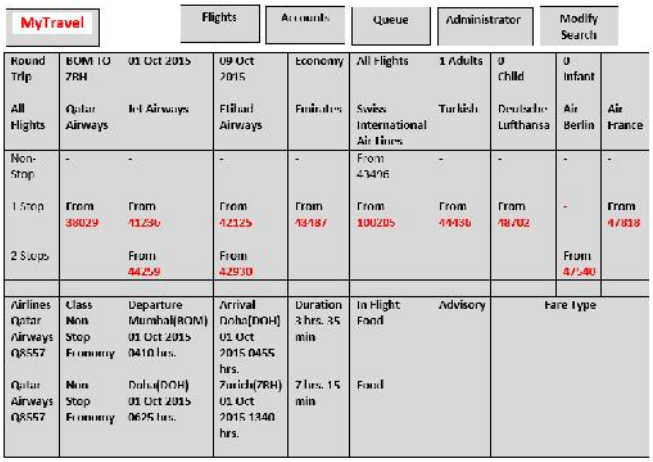

Figure 3: User Interface for Airline Booking

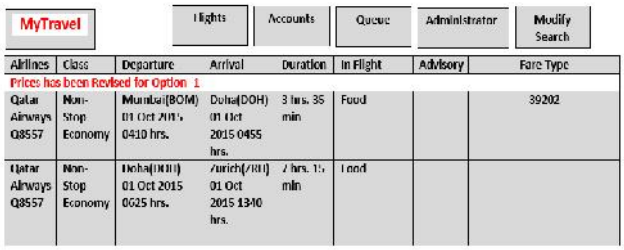

Figure 4: Optimal Quote Generated for the Selected Airline

4) Travel Agents are able to cater to large global customers. Thus enhancing profits and market shares. The system display market specific public, private and published fares to the customers thereby helping the customers to save more.
5) Tour operators often face challenges in accessing bulk local airfares and hotel accommodations in another country. MyTravel enables them to source most competitive fares globally.
6) MyTravel enables the customers to select the best optimal tour package best suited to them to cater their needs at a competitive price.

XI. CONCLUSION

This research discusses the competition and dynamics of a TSC providing package holidays. Non-Cooperative games are used to model the quantity decision between the enterprises in the TSC. Equilibrium solution of these games was derived for price and quantity. The implications of the study states that:

1. When a TO and HA in TSC is able to reduce its operating cost, the TO should be able to lower its product prices to attract additional tourists from its competitors in the same sector and thus improve its profitability as customers always prefer tour operators which offer low packages.
2. If a new competitor enters the market, the decision makers of the other TO are forced to reduce their product prices. But the HA and TO will get more tourists and earn more profits benefiting from the competition in its complementing sector. The downstream enterprises also reduce their products prices and gain more tourists and profits.
3. Intelligent Travel System caters to the needs of large global audience, thus enhancing the profits and market shares of the tourism industry.

4. Intelligent Travel System streamlines travel programs for their customers by publishing all variants of airfares, hotel accommodations and theme parks from across the world. Thereby generating optimized travel package for the customers

   Thus using the concept of game theory the competitive and cooperative relationships between enterprises of a TSC are analyzed and a cost effective solution is devised for the Indian Tourist.

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