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The New Distribution Capability in the **Airline** Industry: a **Game Theory** approach

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Objectives | The air transportation market is one of the largest markets in the world, and is the major focus of this study. Nowadays, with the growth of the Internet and the GDS (Global Distribution Systems), airlines started to find the GDS an expensive process compared with what airlines could win if they were not using this intermediate. However, the consumer base which is obtained when using these systems is very different and greater than the one which the carriers can get on their websites. With this, IATA has created the NDC (New Distribution Capability) to tackle the main problems that airlines were having with the distribution of their products. This NDC will allow airlines to fill the gaps between their direct channel (the website) and indirect channel (travel agencies), providing identical distribution capacity in both cases. This will also be advantageous for airlines, since they have the opportunity to distribute directly to travel agencies and thus reduce costs. The objective of this paper is the study of the different distribution strategies that the airlines have at their disposal. Also, it analyses the strategic behavior of the several players in the market with the entry of the NDC. In this research, we have used game theory, more specifically a static game model of simultaneous decisions, to find the airlines strategic behavior when it comes to choose the distribution channels. The main goal of our paper is to discuss the behaviour of airlines in the distribution of their products, if they keep the distribution channels that they are currently using, including website (direct channel) and GDS (indirect channel), or if the entry of the NDC is going to change these options.

Methodology | Given the level of strategic behaviour of this problem, the goal was to find strategies for airlines to adopt in the distribution market. We model a game theory set up so as to achieve predictions on the airline's behaviour. We consider that airlines were symmetrical and the distribution costs were lower by the NDC than the GDS. Following Koo et al. (2011), we assume a duopoly market and consider an uniform distribution of consumers' willingness to pay for a ticket. It is assumed that, by doing the

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reservation through the website, no costs for airlines are to be acknowledged. However, by doing it through the GDS and the NDC, there are marginal costs to be taken into account, g by GDS and n by NDC. The relationship between these costs is as follows: $u > g > n$. We computed all Nash equilibrium payoffs of our static game model matrix and then look for the Nash equilibria for different levels of g.

Main Results and Contributions | Our results show that the Nash equilibria found depends on the value of g. For high values of the distribution cost under the GDS, airlines give up using the GDS and start making their distribution through their websites and NDC. However, for lower values of g, the model shows that airlines use the three types of distribution: their websites, the GDS and the NDC. Finally, we still get two Nash equilibria, for intermediate values of g, where at least one of airlines stops using the GDS and the other chooses the three approaches of distribution. Thus, it is essential for an airline to consider the costs of the distribution channel GDS prior to its decision: for low cost, airlines will continue to use this channel, whereas for high cost, they prefer to adopt only the NDC.

Limitations | The complexity of the model may be increased if we consider that the decision of the GDS cost rate be decided before the decision of distribution channel by the airlines, because turn this game in a dynamic game and the decision of g by the GDS may affect the behavior of airlines. Also including imperfect or incomplete information may bring more realism to the model.

Conclusions | Using a game theory model, our results depend on the cost of the GDS for airlines because it is central to an airline to choose to continue to use the service of the GDS. For high rates we forecast that airlines give up completely to use the GDS and start to make the distribution through the NDC and their websites, since the costs are high in relation to what may be obtained with GDS. However, for low values of g charged to airlines the Nash equilibrium describes the use by the airlines of the three distribution channels. We still find two Nash equilibria, for intermediate values of g, and in these two equilibriums at least one of the airlines gives up to make the distribution through the GDS, whereas the other chooses GDS together with the other two distribution channels. Therefore, our results show that when the NDC starts to operate, some airlines will continue to use the GDS, others not, but the balance tends to fall toward the scenario that airlines leave the GDS.

References |

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