A Work Project, presented as part of the requirements for the Award of a Master's Management from the NOVA – School of Business and Economics

Consulting project for TAP´s *Melhoria Contínua* Area to Increase Operational Efficiency at Lisbon HUB

Augusto José Casalta Miranda #1121

Carolina Maria Morais Cardoso Freire de Andrade #1120

Francisco Gil Ferreira Sampaio #1189

Francisco Maria Cavaleiro Gonçalves Pereira Martins #1256

Maria Inês Forjaz Morão Dias Coimbra #1219

A field lab carried out under the supervision of:

Professor Constança Monteiro Casquinho

16th January 2014

ACKNOWLEDGEMENTS

We would like to thank with gratitude to our coordinator, Constança Monteiro Casquinho, for the constant guidance, counseling and motivation throughout the entire project, to Professor Luís Filipe Lopes for the support to structure the produced material, to Professor José Pinheiro for the support to produce and organize statistic information. The support given by TAP's member was also crucial for the success of the project. We would like to thank to Executive Board member Dr. Luís Rodrigues for the constant availability and effort to create the conditions for the development of the project, to TAP's Hub Jorge Pinto Massiprofor all the teachings and experiences shared with us, and support given independently of his busy schedule. It is also important to notice the role of TAP's Head of Management Information Gonçalo Antunes, who provided all the necessary numerical data to our analysis, as also to TAP Hub Control Center team Customer Team for the Airline's spent with us during the observations on the field and all the operational knowledge shared during that process.

ABSTRACT

The following report is destined to shortly describe the project developed under NOVA SBE's Management Consulting Field Labs initia five NOVA SBE's student TAP on its *Melhoria e Contínua* area. The objectives were to reduce TAP's operational irMinimum regularit Connecting Time (MCT) in approximately 15 minutes at Lisbon Airport. In order to find the solution to the mentioned challenges the team adopted a practical work approach that proved to have a final positive impact in the company, namely the implementation of recommendations for operational irregularities would save **4.156.180,00 ú per year,** whilst the implementation of recommendations for the MCT would MCT by **9 minutes**. Lisbo

Keywords: TAP, Operational Irregularities, MCT

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The Management Consulting project *Melhoria Contínua* was developed for the main purposes of increasing the efficient usage of the aircrafts on air as well as increasing the visibility of the company at the GDS (*Global Distribution System*) for a stronger competitive position and consequently a revenue growth. In keeping with this the project's objective reduce as much as possible **TAPôs Operational Irregularities at the Lisbon Airport** and access the **viability of a reduction of Lisbon airportôs Minimum Connecting Time (MCT)**, respectively.

Several recommendations were developed and presented to the client, which, when implemented, can contribute for the improvement of the core Hub, having as final consequences a reduction of **4.156.180,00 ú per year** in costs incurred by TAP Portugal with delayed flights, and a reduction of **9 minutes** in the MCT for International flights at Lisbon airport.

The reduction in the annual total cost incurred by TAP Portugal with delayed flights was only possible after the analysis of all the activities and stakeholders involved during the turnaround of an aircraft, which enabled the development of recommendations specially focused on the activities related with the most significant delay codes. Those delay codes were linked with the following topics related with handling processes, more specifically **Cleaning, Catering, Baggage,** as well as **Mandatory Security** issues, and problems during the **Boarding of Passengers.**

Similarly, in order to assess the viability of their processes and stakeholders involved were conducted. On this subproject it was possible to conclude that it is impossible to reduce the domestic MCT due to the **current conditions offered by TBP (*Terminal de Bagagens de Partida*)**, which are not prepared to process within the available time the baggage of passengers in a domestic transfer. Taking into account the MCT for international flights it is possible to conclude that it can be reduced in 9 minutes, as currently passengers spend excessive time in the **Passport Control** and in the **Security Control.** Thus the recommendations suggested will be mainly directed to streamlining these processes.

List of Abbreviations

ATA - Actual Time Arrival

BRS - Bagagge Reconciliation System

DCS - Departure Control System

GDS - Global Distribution System

GPU - Ground Power Unit

HCC - Hub Control Center

MCT - Minimum Connecting Time

SEF - Serviços de Estrangeiros e Fronteiras

STD - Schedule Time Departure

TBP - Terminal de Bagagens de Partidas

TBT - Terminal de Bagagens de Transferências

1. INTRODUCTION

The project described in this report was taken Lab during the first semester of the curricular year 2013/2014. The project was developed specifically for TAP, further referenced TAP, a Portuguese airline company, which already developed other projects alongside NOVA students in the past.

The beginning of the consulting project was heavily focused on the definition of the objectives and purpose of the project for a close tations. The discussion of the objectives and purpose of the project was since the first moment mostly directed at TAP's operations, *Melhoria Contínua* area, existent since 2008, which intends to continuously restructure operational processes and introduce different kind of technology and knowledge, to consequently contribute to a revenue increment and improvement of the customer service level.

After clarification about needs for the near future there were defined two main purposes for the consulting project. The first one involved the need for a higher profitability of the company. Being TAP one of the airline companies that more efficiently uses its aircrafts, due to a good maintenance and excellent scheduling and subsequent adaptation of the aircrafts to be used in its routes, the objective of the project was to diminish as much as possible TAP's operational irregularities at the Lisbon Airport, TAP's[1], consequently increasing the efficient usage of the aircrafts on air. The second purpose involved the need for a greater prominence of the company at the GDS (*Global Distribution System*) for a stronger competitive position and consequently a revenue growth. Therefore, the project objective was to study the viability of the reduction of the Minimum Connecting Time (MCT) of the Lisbon's Airport in MCT between international flights[2] from 60 to 45 minutes and the MCT between domestic flights from 45 to 30 minutes.

The consultancy project had the duration of approximately 60 days and followed a pragmatic work stream. The first part of the project, from October 2nd to October 23rd, consisted in making a diagnosis of the company for basic knowledge and data collection. The second part, from October 24th to November 19th, consisted in analyzing in greater detail the operational irregularities and the components of the MCT for the beginning of brainstorming of viable

[1] TAP uses the Hub and Spoke distribution system, being Lisbon Ariport the Hub, i.e. its flights distribution point. (See Appendix 1.1)

[2] Flights are international if its origin or destination is not part of the Schengen Agreement. (See Appendix 1.2) while flights are domestic if its origin and destination are part of the Schengen Agreement.

recommendations. Finally, the third part, from November 20th to December 20th, consisted in designing and deepening the recommendations to be proposed (see Appendix 1.3). The implementation of the recommendations was not started during the project since they involve negotiations with third parties, which was out

2. THEORETICCOANLTEXT

The group made effort to find theoretical background for a proper definition of management consulting and also for some specific topics of the project, given the intended framing of the Field Lab, to be as similar to a consultancy project as possible.

Management consulting can be defined as "an advisory service contr organizations by specially trained and qualified persons who assist, in an objective and independent manner, the client organization to identify management problems, analyze such problems and help when requested in the implementation of solutions" [3]. Shortly, a management consulting project has four main stages, problem identification and structuring, defining hypotheses to solve problems and validate potential solutions, engage decision-makers in solutions, and support implementation of accepted solutions, from which the group tried to plan the project.[4]

Westminster University in 2003 developed a method to calculate the cost correspondent to a minute of delay of a flight, later published by EuroControl in May 2004[5]. The average value for the cost of a minute delay corresponds to 72€, which comprehends direct cos and passenger compensation, among others, and also passenger opportunity costs (see Appendix 2). This reference value is widely used by airlines, such as TAP, for the calculation of overall delay costs.

In light of Pareto's Law[6] prioritization purpose it was necessary to access the small percentage of causes that are responsible for the majority of the consequences of a certain phenomenon. Particularly for operational irregularities subproject, due to the highly segmented and detailed codification of the types of irregularities it was not possib with the help from Lisbon's HUB Director a pr of aligning the outcome of the expectations. and t with t

[3] Greiner, L. and R. Metzger. 1983. *Consulting to management.* Englewoods Cliffs, NJ: Prentice Hall.

[4] Lopes, Luís F. September 11, 2012. *Consulting* course, *1. Course Overview and First Insights*. Lisbon: Nova School of Business and Economics.

[5] Evaluating the true cost to airlines of one minute of airborne or ground delay, EUROCRONTOL, May 2004

[6] Rasiel, Ethan M., The McKinsey Way: Strategic Consultants to Help You and Your Business, Mc Graw-Hill

3. COMPANY OVERVIEW

TAP is a Portuguese legacy carrier founded in 1945, currently with *Portugália* airline (PGA) integrated in its business portfolio, a Star Alliance member since 2005, with its Hub at Lisbon Airport, which is a privileged platform for connecting flights between Europe and the African and American continents. Recently TAP was awarded with the "Best European Airline Company" recognition by *Global Traveler*, a prestigious American magazine, based on an annual poll to frequent flyers and executive passengers[7]. This recognition results fr in serving the corporate customer segment and the high quality of its product, e.g. with the launch of a mobile site compatible with every kind of mobile device[8], leveraging the potential of its Hub as strategic connection platform, which is highly important for the company given the representation of connections in its operations, approximately 45%.

The airline industry is under intense competition, mainly due to the growing presence of low cost carriers, being therefore of strategic importance a balance between customer service and product differentiation and on-time performance, the latter consisting on ever improving network planning and control, aircraft availability, ground operations and departure process[9]. TAP has already proved to be applying efforts on aircraft management, on top of a strong commercial activity[10], in June 2013, by reducing 1,4% of its offer, which corresponded in a demand increase of 2,4%, allowing for its occupation rate to go from 74% to 76, 9%[11].

4. METHODOLOGY

In order to have a deeper understanding of TAP's operational process to better respond to the challenges of the Reduction of Operational Irregularities and Reduction of MCT subprojects, several approaches were followed. Operational irregularity is considered any anomaly that can result in a delay of an aircraft, and MCT is the amount of time, agreed in advanced between an Airline and the Airport Authorities, considered sufficient for a passenger and baggage to make the connection

[7] "Companhia aérea lusa eleita a melhor da Eur
http://boasnoticias.sapo.pt/noticias_Companhia-a%C3%A9rea-lusa-eleita-a-melhor-da-Europa-nos-EUA_18043.html?page=0

[8] TAP Grupo TAP, Relatório Annual 2012

[9] M.Ramana Reddy, *Revival of a sick* Airline (A Project Report on Silk Airline). Nalsar University of law, hyderabad, and Institute of applied aviation management, Calicut. Academic Year 2011-2012

[10] According to Board Member Dr. Luis Rodrigues, TAP is the most profitable European legacy carrier for the last three years.

[11] "Venda de passagens da TAP cre 27 August 2013 in milhõe
http://www.tapportugal.com/PressRelease/pt/venda-de-passagens-da-tap-cresceu-41-milhoes-em-2013-#sthash.OYicQQCr.Sxe4Eawz.dpuf

between the arrival flight and the departing one[12].

In an initial stage of diagnosis, several interviews and conversations were conducted with professionals of the distinct operational areas inherent to both subprojects. Regarding TAP, information was collected from the Hub Director and Hub Control Centre team, the Head of Management Information, the Network Department and from the Customer Team. Additionally, other important sources of information were the remaining collaborators involved in TAP's operations such as *ANA Aeroportos de Portugal*, *Groundforce*, *SEF* (*Serviço de Estrangeiros e Fronteiras*) and other entities that are present in the aircraft turnaround - the process of or time needed for loading, unloading, and servicing the airplane - such as *Iberlim*, in charge of cleaning, and *CateringPor*, responsible for the catering. These last two are some of the services that occur in the aircraft while it is on the ground and parked at a terminal gate of an airport that compose the Handling process.

During the diagnosis and analysis period several observations were conducted throughout the different areas of the Lisbon Airport namely in the landside and airside. The landside is the part of the airport where several services take place before the security control, which is the transition point to the airside, the zone directly involved with passport checks as well as the arrival and departure of the planes. These observations were done during the different time ranges of the day and often in the platform next to the aircrafts.

Concerning the analysis stage, for the Reduction of Operational Irregularities specifically the database provided by the Information Management Department were treated in order to obtain the main causes of TAP's flight delays. Regarding the MCT subproject, through the database provided and the observations realized, the processes that contribute negatively to the MCT (bottlenecks) were identified and analyzed. Also, was initiated the feasibility analysis to readjust the MCT.

Furthermore, two surveys were elaborated following the guidelines provided by the recommend textbook[13] of the Marketing Research curricular unit, one with the goal of understanding the perception of passengers about the signalization of the airport and the other to test some possible recommendations that could be suggested to TAP. The total number of completed responses was 100 and 200 respectively (see Appendix 3).

Finally, after all the processes were mapped and the results from the analysis established, the objective was to understand which are the challenges from the operation and, consequently, several

[12] Airline Coding Directory eIcATiAn,g CThiampet"e.r 270 1"2Minimum

[13] Malhotra, Naresh K and Birks, David F. *Marketing Research ïAn Applied Approach*. 3rd Edition, Prentice Hall, 2008

brainstorming sessions were conducted in order to determine the final recommendations. For each of these recommendations the impact of their implementation in TAP operations was estimated, being presented in amount of money saved annually for the Reduction of Operational Irregularities and in total time reduced for the MCT subproject.

5. OPERATIONAL CONTEXTUALIZATION

5.1 OPERATIONAL IRREGULARITIES

In this topic it is pretended to give a short overview of the whole *Turnaround* process (see Appendix 4.1). This process starts when **blocks** are put. Immediately the *GPU*[14] must be connected, airbridge, or stairs and bus (depending if it is a remote or an airbridge turnaround) should be placed. After this, the procedures of unloading and deboarding start. By the time that the airplane is empty of passengers several actions starts simultaneously, more specifically, *cleaning*[15], *catering*[16] and *fuel*. While these activities are occurring, the baggage unloading finishes and consequently starts the loading. Also, during this period the *boarding* starts, when the gate opens, and as soon as the *catering* and *cleaning* services are finished, passengers should start entering on the airplane (once more by an airbridge or bus and stairs). After the boarding and loading are done, if, for any reason, a passenger has not boarded it is mandatory to search and offload the correspondent baggage before closing the cargo hold. Subsequently, doors are closed and the *GPU* is disconnected, the *push back*[17] is on, the blocks are removed and, therefore the turnaround is, finally, over.

Although this is an identical process for every aircraft, there are some slight changes in terms of timings agreed with the subcontracted collaborators, depending on variables as aircraft typology, remote or airbridge parking, and if it is in between intercontinental or continental flights (see Appendixes 4.2 & 4.3).

5.2 MCT

In order to study the viability of reducing the MCT it was necessary to understand and analyze deeply the processes of passenger and baggage transfer[18]. Since the project is focused on improving the activities of these processes, it is imperative to describe them.

[14] *GPU* – Ground Power Unit, which provides energy while the aircraft is parked
[15] *Cleaning* – Includes several services as Cabin Cleaning, Toilet Service and Potable Water
[16] *Catering* – Offload and onload catering
[17] *Push Back* – vehicle responsible to maneuver the aircraft backwards away from the stand where it is parked.
[18] Soeiro, *Lecture 9p Process Capacityô Gap Analysis, Services Operational Change Management* Course. Lisbon: Nova School of Business and Economics

Starting with the process of a passenger transfer, it is important to mention that the MCT is related with a common transfer process and does not take into consideration the exceptions that occasionally happen. Therefore, the project will only focus on a common passenger transfer (see Appendix 4.4).

First of all, this process is extremely complex, considering that it includes several independent entities with different roles. The first activity in the passenger transfer is the deboarding, which can be done in two different ways, by airbridge or by stairs. When using airbridge the passenger is already inside the airport terminal, while when using stairs, the passengers have to be transported by a bus to the airport terminal[19]. The next step of this process is the passport control, which is done by the *SEF*. In this activity the passenger can be accepted or not. After the passenger has been accepted by the *SEF*, he has to pass by the security control, which is performed by *Prosegur*. Subsequently, the passenger proceeds to the boarding, which can be also done by two different ways. If the aircraft is parked in a gate, the boarding is done by airbridge, if it is not parked in a gate the passengers have to be transported by a bus. Finally, after the boarding, the passengers are accommodated in their seats and then the aircraft's doors are closed.

It must be noted that the above described process refers to the passenger transfer between an international and a domestic flight, which represent the process with more activities. For transfers between domestic flights there is no need to pass security or passport control, for transfers between international flights there is no need to pass passport control, an finally for transfers between a domestic and an international flight there is no need for security control.

Regarding the baggage transfer (see Appendix 4.5), this process starts with the activity of offloading the baggage. Afterwards, the baggage is transported to the baggage terminal that can be the *Terminal de Bagagens de Partida* (TBP) or the *Terminal de Bagagens de Transferência* (*TBT*). In the terminal, the baggage is processed in the *BRS* (*Baggage Reconciliation System*), passing by the security control being then disposed in its respective chute. After the baggage has been stowed in containers or in cars for bulk loading, it is transported to the aircraft and then it is loaded into the aircraft. Finally, it is important to refer that *Groundforce* operates this process. For the project development the TBT was disregarded since it will not be used in a near future.

6 NUMERICAL MODELS AND INTERPRETATION

6.1 OPERATIONAL IRREGULARITIES

PROBLEM OVERVIEW

[19] The name of this type of deboarding is remote.

TAP needs to understand the reasons behind the frequent delays of its flights departing from Lisbon Airport. This will enable a well-founded problem solving approach, in order to develop solid recommendations to tackle the operational challenges that cause more minutes of delay, which will consequently result in revenue loss and higher costs.

DATABASE

The initial database used to study TAP's operation comprises TAP's flights in 2013, from January to October. Since the main only entries with departure from Lisbon were considered. There is a list of delay codes established by IATA (see Appendix 5.1), which is used by TAP to classify the nature of each delay that affects flights' punctuality. The database used contains flights. The total delay minutes of a flight can be explained by more than one reason, and the flight total delay is simply the sum of minutes of all codes associated with the flight.

CLUSTERS OF DELAY CODES

The use of the extensive list of codes provided by IATA was mandatory in terms of daily operation. Besides this, it was necessary to create clusters of delay codes (see Appendix 5.2) which enable a more intuitive and focused analysis. These clusters were created under the supervision of the Lisbon HUB's director, which is essential in order to output and the needs and expectations of the client. There were created eighteen micro-clusters, each one compounded by codes that are related among them, and consequently are not related with other codes that represent the other micro-clusters. If it was necessary a less detailed division of the codes used to classify the nature of delays, the eighteen micro-clusters could be compressed into eight clusters.

PARAMETERS

The characterization of TAP's operation accordingly with some reliable analysis of irregularities, so it was necessary to differentiate each flight accordingly with some parameters.

Flight Date - Over the year Lisbon Airport faces some variations of traffic, so it is important to know if during the periods with higher traffic the minutes of delay also increase in a similar proportion. In Portugal, the summer season begins on the last Sunday of March, and the winter scheduling season commences on the last Sunday of October. This parameter will enable the comparison of both seasons, in order to figure out if there are significant operational differences between them.

Schedule/ Time Slot - During each operation day, the resources available at the airport should match the passenger and baggage flows, in order to assure high levels of punctuality in all the flights that depart from Lisbon Airport. Knowing that occurs mainly during certain time ranges, it is important to study the nature of delays that occur in each one of them, as also the total minutes of delay in each time range. Through the analysis eight different time slots will be used. Half of those time slots represent operational peak periods, whilst the other half represent operational off peak periods (see Appendix 5.3)

Arrival Airport - A flight that departs from Lisbon to a particular destination could be delayed due to inherent particularities related with the flow and typology of passengers who take the flights, as also the baggage carried by those passengers. The typology of passengers could affect the time spent by them in certain control points at the airport, namely during the passport and security control procedures.

Aircraft - TAP's fleet counts with two distinct aircrafts, whilst the narrow-body and (PGA) families count each one with three distinct aircrafts (see Appendix 5.4). It is important to make this division because some aircrafts present different flight autonomy, passenger capacity, handling procedures, which could be reflected in differences among the nature of the delays that are more representative for each type of aircraft within TAP's fleet.

SPREADSHEET MODEL

To summarize the information contained in th
enables the extraction of critical information comprised in the database that will proof the existence of irregularity patterns in TAP's Lisbon operations.

The analysis conducted with this Excel's tool
delay codes previously described. Range names were used to group common data. The initial database suffered some additions, since after the formation of clusters it was necessary to use the VLOOKUP function to match each IATA's code w
distinct types of analysis, one focused on the number of events, and another one focused on the total number of delay minutes. The COUNTIFS function was used to extract the desired information from the database. The parameters and clusters of delay codes were the criteria used on this particular function. The SUMIFS function was used to obtain the total number of delay minutes of each particular cluster from the database. The parameters and clusters of delay codes were the criteria

used on this particular function, and the sum interval was the column in the database that corresponds to the minutes of delay.

6.2 MCT

PROBLEM OVERVIEW

TAP needs to understand the viability of a reduction of fifteen minutes in Lisbon Airport's international and domestic MCT. This will enable TAP to make an even more efficient management of its fleet, being able to operate more flights and consequently increase its revenues. It was necessary an analysis of the time spent by transfer passengers and their baggage that they need to complete, as also the resources allocated in each stage of the processes.

DATABASES

There were used two different databases to study the viability of a reduction in Lisbon Airport's MCT.

One database comprises data from January 2012 to middle October 2013. This database has information regarding the stands where TAP's flights departed or arrived at the Lisbon Airport, which enables an overview of the stands frequently used by TAP. The other database contains information regarding TAP's passengers in Lisbon Airport during 2013. This database has information regarding the inbound source airport and the final destination airport, as also the number of passengers in transfer, which enables a real perception about what are the most common transfer flows of TAP's operation at the Lisbon Airport.

PARAMETERS

A real characterization of TAP's operation is crucial to assure MCT, so it will be necessary to collect accurate information regarding the operation of TAP and Lisbon Airport. There were considered different times for each one of the processes of a transfer at the Lisbon Airport.

Flight Date - Over the year Lisbon Airport faces some variations of passengers and baggage's traffic, which impacts the time needed by a passenger in transfer to complete certain activities at the airport, as also the time needed by its baggage to go through all the required phases. The time required by passengers generally is higher during summer season, whilst during the winter the time is lower (see Appendixes 5.10 & 5.12).

Schedule/ Time Slot - During each operation day, the resources available at the airport should match the passenger and baggage flows, in order to assure that the majority of flights depart on time.

Knowing that TAP's operation ranges, it is important to assess the daily time spent by in-transfer passengers and their baggage in the different stages of the transfer process. This time will vary accordingly with the resources available during particular time slots, as also the flow of passengers that arrive at Lisbon. It is necessary to divide a normal day of operation into eight different time slots (see Appendix 5.3), representing half of those time slots operational peak periods, whilst the other half represent operational off peak periods.

Aircraft - TAP's fleet consists of one airplane. The wide-body family counts with two distinct aircrafts, whilst the narrow-body and *PGA* families count each one with three distinct aircrafts (see Appendix 5.4). It is important to make this division because there are significant differences between the different aircrafts, relatively to the deboarding and boarding timings. The aircraft typology also influences the timings the loading and offloading activities (see Appendix 5.8.2).

Transfer Flows - The number of passengers in transfer, who arrive at Lisbon from a particular inbound source airport before take another flight, allows a real perception of what are the most common transfer flows of TAP. It is important to classify the country type of each airport in order to classify each one accordingly with a classification of Schengen or Non-Schengen (see Appendix 5.5). This will be important for the final calculation of Lisbon Airport's international MCT, since there are three different types of international transfer flows, and there are some differences between the processes that must be completed by in transfer passengers in each one of them.

Arrival Stand - The arrival stand impacts directly the transfer processes of passengers and baggage. It is important to understand the proportion of flights that arrive in remote stands and the proportion that arrive in stands with airbridge, and which ones are mostly used by TAP (see Appendix 5.6). The time before the deboarding of the first passenger depends if the flight arrives in a remote stand or in a stand with an airbridge (see Appendix 5.8.1). The arrival stand will also affect the routes made by passengers and their baggage, since every stand was positioned at a certain distance from the airport terminal, in the case of passengers, and from the TBP in the case of baggage. These differences will be reflected in the time spent by passengers in transfer to reach the airport terminal, or in the taxi time of their baggage before being introduced in the TBP. The distances used in the model are the same that HCC team uses to parameterize an application that will be used in the future to monitor the transfers at the Lisbon Airport (see Appendixes 5.8.3, 5.8.4 and 5.9).

Departure Stand - The departure stand impacts directly the transfer processes of passengers and baggage. It is important to understand the proportion of flights that depart in remote stands and the proportion that depart in stands with airbridge (see Appendix 5.7). In order to be able to do that was necessary to assess which boarding gates were used regularly by TAP, since there are boarding gates that enable a boarding process with airbridge, whilst others only enable a remote boarding process. The departure stand also affects the routes made by passengers and their baggage after they reach the airport terminal and the TBP, respectively. Once in the airport terminal, and after having completed all the mandatory procedures, passengers must go to the boarding gate assigned to their next flight. Since each boarding gate has a particular location, the distance and time spent to reach it can vary. There are some flights that will depart from a remote stand, so in those cases passengers have less available time to be at the boarding gate, then the passengers with a flight that will depart from an airbridge stand (see Appendix 5.11). The distances used in the model are the same that HCC team uses to parameterize an application that will be used in the future to monitor the transfers at the Lisbon Airport (see Appendixes 5.8.3 and 5.8.4 and 5.9).

SPREADSHEET MODEL

To analyze the domestic and international MCT at the Lisbon Airport a n E x c e l ' s e m p i r was developed. This model uses the information extracted from the databases to generate representative proportions that reflect the passenger and baggage transfer at the Lisbon Airport. The COUNTIFS function was used to extract the desired information from the databases, being the parameters previously defined the criteria used on this function. These proportions enabled an accurate approximation of the time spent by passengers and their baggage through different processes, in different periods of day of operation, as also in different seasons of the year. The initial databases suffered some additions. The VLOOKUP function was used to match each airport code with the designation of Schengen or Non-Schengen. The SUMPRODUCT function was used to compute the calculations relatively to the time spent in each activity during a transfer at the Lisbon Airport. These calculations are simply a real approximation of the time spent in each process that occur during a transfer at the Lisbon Airport, since the time spent in a given scenario was weighted in the final calculations according to the proportion of times that the same scenario occurred.

6.3 MAIN CONCLUSIONS

6.3.1 Operational Irregularities

Given the methodology and the models previously explained it is possible to sum-up the main findings on the following paragraphs. It must be noticed that operational issues of the eighteen

clusters developed with client, some of them[20] were not taken into consideration due to the fact that it was not possible to create recommendations that would correct or prevent them.

Firstly, it is important to express that the analysis focused on three particular parts of the day, which are from 05h00m to 08h59m, 12h00m to 15h59m and 19h00m to 21h59m (see Appendix 6.1.1), since these are the periods in which there are more TAP flights departing from Lisbon, and consequently where more irregularities occur. Then, by looking at the causes of these irregularities, the main finding was ***Aircraft Rotation*** (see Appendix 6.1.2) **is the major cause of delays during the whole day**, around 30% of the total time of delay. *Aircraft Rotation* stands for the late departure of a plane from Lisbon because it had already arrived late, i.e. the real cause of this irregularity (delay) occurred on a previous flight done by the same aircraft during the same day. Consequently, the only way to reduce *Aircraft Rotation* is to eliminate the other types of irregularities during the previous flights of the same day, preferably the ones that occur on the first hours of operation.

Given this, although it is not the most critical time of the day in terms of flight and irregularities, it was decided a focus only on the causes of delays which occurred during the first peak: from 05h00m to 08h59m. By looking to this time range it was possible to find that, besides *Aircraft Rotation*, the other causes are *Passengers, Connections, Total Handling, Total Crew, TAP, Mandatory Security, SEF, Reduced Mobility* and *Airport Conditions* (see Appendix 6.1.3). In this way, further presented recommendations cover the challenges related with *Passengers,* 6% of the considered causes, *Total Handling* 13% and *Mandatory Security* 11%. Issues related with *Connections*, *SEF* and *Airport Conditions* will be faced by the MCT sub-project. These particular three topics (*Passengers, Total Handling, and Mandatory Security*) were chosen not just because they are relevant in terms of delays, but also because these were topics particularly relevant for the client and likely to be improved in a short term period.

6.3.2 MCT

The MCT model (see Appendix 6.2) allows us to conclude if the real MCT is consistent with the theoretical/agreed MCT for the Lisbon Airport.

In this way, considering the times of the MCT model, it is possible to conclude that the real international MCT is relatively below the theoretical one. Since the latter is 60 minutes, an international transfer can be done successfully in less than 60 minutes. More specifically, according

[20] *Fueling*, *Maintenance*, *Others* and *Traffic at Ground* were excluded, while *Catering Cleaning*, *Baggage* were agglomerated into *Handling*, as well as *Crew*, *Crew Shortage* and *Crew* were put together into *Total Crew.*

to the model it can be done in 57 minutes (see Appendix 6.2.1). Although the difference is not significant it is favorable for the reduction of the theoretical/agreed MCT in 15 minutes.

On the other hand, the real domestic MCT is above the theoretical/agreed time for the domestic MCT. In other words, the theoretical domestic MCT is 45 minutes whereas the real domestic MCT is 47 minutes (see Appendix 6.2.2). Once again the difference is not substantial, but it is considered a negative aspect for the viability of reducing 15 minutes in the domestic MCT. In this case, the real domestic MCT is negatively affected by the time of the baggage transfer, since the latter one is higher than the passenger transfer. This is explained by the fact that in a domestic transfer the passenger does not have to proceed by the passport control neither by the security control.

Moreover, the other objective of the MCT model consists in revealing the bottlenecks of the transfer's process. The observations and the interviews give an idea of the bottlenecks of the processes, the model is imperative to confirm them. More specifically, analyzing the times of the model for each stage of the passenger and baggage transfer, it is possible to conclude that for the passenger transfer, the bottlenecks are the deboarding and also the passport control. Even though the MCT model does not highlight the security control as a bottleneck, the team considers that it is a bottleneck, since its area is frequently congested and the passenger has to wait a significant time to pass by it. On the other hand, for the baggage transfer, the bottlenecks are the offloading, the processing at the baggage terminal and the loading.

Taking into account that the project goal is studying the viability of reducing the time of the transfer process in 15 minutes, it is imperative to understand the reasons why some activities are considered bottlenecks. Thus, regarding the passenger transfer, the deboarding is considered one of the bottlenecks for the reason that in the majority of the cases (approximately 60%[21]) the passenger's deboarding is remote, which means that the passenger takes more time to arrive to the airport terminal. Moreover, the passport control procedure is also one of the bottlenecks since there are not enough human resources to cover the flow of passengers, especially in the critical hours, and also, because this area does not have an appropriate management of queues. Furthermore, regarding the security control, it is considered as a bottleneck for the reason that it does not have an adequate management of queues, as well as for the lack of a preparation area for the passengers and also because of the short proportion of feminine *Prosegur* agents.

Regarding the baggage transfer, its bottlenecks are the offloading and loading activities because they heavily depend on the resources that *Groundforce* uses, such as the loaders and transporters. In other

[21] Average rate of the passenger landing by remote and passenger landing by an airbridge, with data from November and December of 2012 and the firsts 10 months of 2013.

words, frequently *Groundforce* just uses one loader for offloading and loading the baggage, when in some cases, such as with Airbus 321, 330 and 340 aircrafts so few resources affect negatively the time of these activities. Furthermore, regarding the baggage processing at the baggage terminal, its infrastructure itself is the reason why this activity is considered a bottleneck. Namely, the TBP has a point where the transfer baggage and the local baggage cross each other, which causes frequent disruptions in the system.

Concluding, to study the viability of reducing the MCT, the project focused in recommendations targeted to those bottlenecks.

7 SUMMARY OF RECOMMENDATIONS

In this section there will be presented the recommendations destined to solve the identified challenges above described. In order to structure and simplify the recommendations that are built on the studied processes the group decided to construct two matrixes[22].

These Recommendations Matrixes (one for each sub-project) were built with two main purposes. Firstly it should work as guideline to assist our client on choosing which recommendations should select first; secondly to help readers to have a general spectrum of the impact and implementation easiness of our recommendations. Therefore, the two axes chosen were: ***Impact*** – vertical – that is measured in cost savings, on the irregularities project, and in time savings (minutes), on the MCT project. ***Easiness*** – horizontal – that is ranked in a scale from 0 (hardest) to 10 (easiest) based on several indicators (e.g. investment, legal issues, passengers approval etc.).

Given this, for both matrixes, in the first quadrant (upper right corner) we have ***quick wins*** that are recommendations easy to implement and with a greater impact. Then, on the second quadrant (upper left corner), we have those which also have great impact but more difficult to put into practice. On the third one (down right corner), the recommendations are simple to implement but not that effective. Finally, on the fourth one (down left corner), there are those recommendations which are more difficult to execute and with lower operational impact (see Appendix 7.1).

7.1 OPERATIONAL IRREGULARITIES

AIRCRAFT TURNAROUND

[22] Lopes, Luís F. October 9, 2012. Consulting course, 9. *Displaying information with charts*. Lisbon: Nova School of Business and Economics.

With the aim to follow a structured approach the recommendations are presented by order of processes, and in each process the recommendations are ranked by impact. As explained previously, to quantify the impact it was taken into accou

The ***handling*** processes, more specifically *cleaning*, *catering*, *baggage loading and offloading*, which accounts for **50.938** minutes per year representing **3,6Mú**, will be the first ones targeted by recommendations.

WE ARE ONE – One of the biggest issues found during the observations and interviews made to stakeholders was the **lack of motivation of the handling agents**. Issues like high absentee rates, non-efficient preparation for the turnaround, the lack of coordination between themselves, etc. affect severely the customer service provided by airlines. In this sense it is suggested the creation of a top-down motivation program. This has the objective to align the interest of *TAP*, *Groundforce*, *CateringPor* and *Iberlim*, in order to **increase the turnaround punctuality**. A common KPI must be agreed between all the entities. Even though it is not possible to estimate the concrete impact of this program, TAP could set an initial humble objective of reducing 5% of the handling irregularities. If accomplished this may result into a **183.375ú** of cost savings in the first year (5% x 50.938 x 72€). Some of the past by several programs airlines, being *Southwest* the best example, in which TAP could base its program, where all collaborators have this common objective, which led to an impressive result of reducing a turnaround time from 45 minutes to 23 minutes (see Appendix 7.2.1)[23].

MAP OF ACTIVITIES – The development of **maps and schemes that display both the physical space and timing that each activity of the *Over the Body* [24]turnaround requires** to be performed. (see Appendix 7.2.2)It is necessary to make sure that these tasks do not obstruct each other once they are realized in the same area and many of them at the same time. In particular, the enforcement of the Cleaning, Catering and Security Check, made by TAP's crews, can be optimized. Through the Mapping of the turnaround *Over the Body* activities is predicted a reduction of 3% in the total delays caused by Handling. Thus, TAP will save **110.025,22 ú/year** (3% x 50.938 x 72€). value can be increased with the commitment of all the interveners. The success of this measure only requires the presence of a supervisor inside the airplane to map the activities. Thus the recommendation is considered of easy implementation.

The following recommendations have impact over ***Mandatory Security*** issues, which account for 33.600 minutes per year representing 2,4M€

[23] http://www.awardco.com/4-reasons-employees-love-southwest-airlines#.UsWKUPRdUeI
[24] Turnaround over the body – Every activity that occurs inside the aircraft while parked.

DISCONTINUE THE OFFLOADING PROCESS - The most effective way to reduce this kind of irregularity would be to **put an end to the process of offloading baggage of a no show passenger**. This would represent a yearly cost saving of **2.419.000€**.

Although it seems legally impossible, everyday thousands of unaccompanied baggage fly over the skies, more specifically if for any reason the baggage is not loaded on time to the scheduled flight, where the correspondent passenger travels, being transported alone afterwards. For being transported alone, according to *TAP Security Manual*, approved by the regulators, the baggage must pass through a specific security check, which consists on taking an image with two particular X-Ray angles, followed by the approval of a ***Prosegur*** security agent. As a result the recommendation would be to implement this security check to every baggage. By doing so, TAP would enable the unaccompanied baggage to fly automatically, without needing to offload it (see Appendix 7.2.3). This may represent huge investment in X-Ray scanners and some legal issues could be raised, the implementation easiness should be difficult.

BAGGAGE SHORT CONNECTION - Since it may not be possible to discontinue the offloading process, other alternative solutions were thought. The first one passes by **identifying the baggage in short connection**, since these are the most probable ones to have a no show passenger. With this process was estimated that 30% of total time lost with this irregularity could be cut, representing a cost saving of **725.760€** per year (30% x 33.600 x 72€).

Through the *BRS* short connection baggage would be marked with the code *SCONN*. Then this baggage would remain waiting outside the aircraft until the DCS (*Departure Control System*) gave the message that the correspondent passengers have boarded. This baggage could be loaded on a particular container, or in bulk, depending on the amount of short connection baggage and loading resources. The biggest issue here is that some flights are mainly loaded with short connection baggage. Therefore this would represent a huge amount of it remaining outside and waiting for passengers to board. So this process must be redefined according to the amount of SCONN baggage and resources available (see Appendix 7.2.4), this is why this may not be so easy to implement, however it is easier than the first one.

TRACKING PASSENGER – This recommendation consists on implementing a passenger ***tracking*** **system in order to perceive if they are in time to board or not**. If they pass their boarding ticket on the tracking at between 2.5 and 8 minutes before the boarding gate close, depending on the boarding gate (see Appendix 7.2.5.1), they are allowed to board, otherwise they will be redirected to the transfer balcony, and the order to offload their baggage would be given earlier (see Appendix

7.2.5.2). This recommendation focuses only on the most critical passengers, those in connections which have to pass through passport control and security control, during the first peak, when there is higher flow of connections. In this way, *Groundforce* members could do the track during the short time-range, saving the costs of implementing expensive physical barriers as it has been developed in other airports.

According to trials done in Heathrow Airport, by implementing a similar system it was founded that 44% of the passengers were in danger of missing the flight[25]. So we estimated an impact of **428.803,20ú** (50% x 11911[26] x 7 2 €) .

CONTAINER ORGANIZATION **ï** This recommendation consists **on arranging specific parameters to organize the baggage inside a container** (see Appendix 7.2.6). This would speed up the search of non-accompanied baggage (those of passengers who did not board) since its position on containers would be previously known. Particular zones could also be created for short connection baggage inside the container, more accessible to reach, as it is the most likely to not be accompanied.

This recommendation would have a small impact (5%), resulting on **120.960ú** (5 % x 3 3 . 6 0 0 savings per year. Regarding implementation easiness this should be high, the only restriction is to create a practical but still useful way to standardize.

The final set of recommendations cover *boarding* issues since it is the most problematic topic regarding *passengers*, accounting for **15.334** minutes per year representing **1,1Mú**

SELF-BOARDING – Through the Self-Boarding implementation the passengers must pass their own boarding card using the actual technology of the Lisbon Airport (see Appendix 7.2.7.1), reducing consequently the activity of *Groundforce ô* employees who can start focusing on checking p a s s e n g e r s ' I D s o r i n a d d i t i o n a l t a s k s t h a t c of time spent in the Boarding Gate, which is unnecessary, and additionally, the number of workers could be reduced. However the optimal solution would be the placement of Automatic Gates (see Appendix 7.2.7.2), due to the high investment needed this was considered an unrealistic alternative. The execution of this Boarding method would streamline the whole process and, assuming that the reduction of irregularities would be proportional to the decrease of the boarding time in two seconds per passenger boarding, t h e t o t a l s a v i n g e s t i m a t e d w o u l d c o Appendix 7.2.7.3) Since the execution of the Self-Boarding method simply implies a different use of

[25] http://www.telegraph.co.uk/finance/newsbysector/transport/10207814/Heathrow-to-track-customers-through-airport-to-cut-cost-of-delays.html

[26] 11.911 – number of minutes yearly lost with *offloading baggage* during the first peak

the actual technology and there are no extraordinary costs, this recommendation is considered of easy implementation.

WILMA – The new recommended **Wilma B consists in boarding the passengers by rows in a sequence of Window-Middle-Aisle** so that there is no contention for the same physical space, such as in the stowage of hand bagga (see Appendix 7.2.8.1). In the terminal, this process must be supported by monitoring the passengers through some screens next to the gate where these would be called by zones. This Boarding Method should be particular to the Narrow Body aircrafts (A319, A320 and A321), due to its physical characteristics, in which the boarding is done by airbridge Moreover it was assumed that the time saved was 2 minutes, 2,5 min and 3,5 min in a A319, A320 and A321, respectively. Given this by speeding this process we ass (see Appendix 7.2.8.2). Through cost this method Families and Business or Executive passengers should be the first to board. In the other cases the "Block" Method, currently us (see Appendix 7.2.8.3). by TA In order to test the feasibility of this alternative method a pilot test should be developed and no direct investments are necessary. KLM started few months ago a trial test to this boarding with three daily flights from Schiphol Airport, a similar approach should be done by TAP[27]. Thus, this is a recommendation of easy implementation that can be extended to other aircrafts if it proves to be successful.

SIZERS – In order to counter the **current tendency of passengers carrying excessive hand luggage that leads to the congestion of the Boarding and Accommodation Process** arises the recommendation of implementing sizers (55x40x20 cm) next to the boarding gate. In case the luggage exceeded the stipulated measures, it would be labeled and sent through a slide to a container that would be posteriorly loaded in the aircraft when all the passengers are boarded (see Appendix 7.2.9). Admitting that the irregularities due to Boarding could decrease 5%, the annual savings amount to **55.205,28ú**. However, this is a measure of difficult implementation once it is needed a high investment in the construction of the slides in all the appropriate gates by ANA Aeroportos de Portugal. Also, the customer relations can be damaged due to the increased restrictions in this field.

PROACTIVE BOARDING – The proactivity of the passengers in their boarding should be boosted and therefore some behaviors should be promoted. Passengers should go as soon as possible to the boarding gate, their IDs should be prepared, and passports opened on the right page. The awareness

[27] http://www.futuretravelexperience.com/2013/11/klm-introduces-innovative-boarding-technique/#more-12934

for these actions should be done by using the microphones next to the boarding gates and by distributing flyers explaining the behaviors that passengers should have and its benefits. Also, the presence of *Pontos Amarelos*[28] in the Boarding queues to facilitate the process is recommended. Moreover, it is considered that due to frequent change of boarding gates, the boarding tickets should not have printed the scheduled gate (see Appendix 7.2.10), avoiding therefore possible deceptive information to the passengers, which may lead to late boarding. The value of the annual savings is **33.123,17ú** after assuming a reduction of 3% in the irregularities due to Boarding. Once there is no need for any investment the recommendation is considered of easy implementation.

7.2 MCT

PASSENGER TRANSFER

Since the recommendations aim to improve a specific process of the passenger and baggage transfer, it is imperative to present them according the process flow, to understand how each measure will benefit each specific activity. The impact of each recommendation was estimated considering the MCT modules.

First of all, as it was mentioned before, the first procedure of the passenger transfer process is the **deboarding**, which is considered one of the bottlenecks.

USE STAND 107 Considering that 60% of total deboarding is done in remote parking spots, the first recommendation consists on using stand 107[29] for all flights operated with a Fokker100. This stand has the particular characteristic of being the only stand with an airbridge that supports a Fokker100. This type of aircraft is used everyday and usually transports several passengers with connections. In this way, this recommendation consists on using this stand for the deboarding of the Fokker100's passengers. This measure will red
between the stand where the aircraft is parked and the airport terminal. Since in overa
operations only 3% of the flights use a Fokker100, the overall impact on the Lisbon's a
would be marginal.

For the implementation of this measure *TAP* and *ANA* would have to negotiate the utilization of the stand 107. Considering that both parties gain from it, it would be easy to implement it. However, *ANA* would have to guarantee human resources with skills to use this specific airbridge, since it is relatively different from the other ones.

[28] *ANA*'s team that supports Lisbon Airport passengers in the
[29] Currently stand 107 is not used.

After the passenger is off the aircraft and inside the terminal, he has to pass by the **passport control**; this procedure is also one of the bottlenecks for the reasons described before. Four recommendations were developed with the goal to improve the management of queues, increase the human resources and increase the use of the current resources.

FAST TRACK SYSTEM **-** The first recommendation consists on the implementation of a *Fast Track* system, which has a direct impact on the time of the queue for the passport control by reducing it approximately 2 minutes during the summer and 1.2 minutes during the winter.

After research about best practices, it was possible to find that the Amsterdam Schiphol Airport (see Appendix 7.3.1) already has a system for short connection time flights. Therefore, it is proposed a similar system for the Lisbon Airport. In detail, it is proposed the creation of a *Fast Track* queue with three boxes with a screen in each one, that refer the names of the destinies for the transfer passengers that do not have much time left to board[30]. Moreover, TAP would be the responsible for analyzing and deciding the connections that would be in the Fast Track system and also for requesting *SEF* to use these boxes.

To estimate the impact it was considered that 45%[31] of the total passengers are in transfer but only 55% of them would be in short connection, which means that only 24.75% of the total passengers passing by passport control are eligible to use the fast track. Knowing that those passengers would use the new channel, all passengers could benefit from it, since the waiting time in queue for any passenger was estimated to reduce in 8% of the total minutes.

The implementation easiness of this recommendation is medium, since it is highly dependent on *SEF ô* acceptance and accordance with the regulation[32]. *SEF* does not have the responsibility to concede priority to any airline company, which could be an obstacle to the implementation. Nevertheless, this system is already used in some European airports and Lisbon Airport' s p a s s e n g consider it a fair system[33], according to the survey developed by the group.

INCREASE SEF AGENTS **-** A better fit between the number of transfer passengers and the available *SEF* agents during the critical time ranges of operation would allow a more effective passport control, therefore reducing the time waiting in queue for the passport control. With more 6 *SEF* agents during the critical hours (3 agents for the departures' p a t scontpoland 3 for the

[30] The time left would be computed by the difference between the Schedule Time of Departure of the connection flights (STD) and the time that the passenger has to be in the passport control

[31] Data provided by TAP

[32] *Diário da República, 1.ª série ð N.º 214 ð 6 de novembro de 2012 http://www.sef.pt/documentos/56/LOSEF.pdf*

[33] 48% of the interviewed considered the *Fast Track* as a fair system.

arrivals' hall, all the boxes for non-European passengers would be opened, and so it was estimated that the time waiting in queue would reduce approximately 8 minutes during the Summer and around 5 minutes during the Winter.

This impact was estimated considering that currently the passport control has in average 9 agents available in the critical hours. Moreover, assuming that with more 3 agents the capacity increases approximately 33% the time of the queue is assumed to be reduced in 33%. The time to pass by passport control is mainly spent waiting in queue, according with observations that show that the passport control process itself is a procedure with an average time of 40 seconds (202 observations).

Due to the fact that this recommendation implies a negotiation with the Portuguese Government, it implementation could be a complex process.

INFORM THE EXISTENCE OF THE RAPID SYSTEM - By informing the existence of the RAPID[34] system as well as the procedures to follow when using it would reduce the time waiting in the conventional queue, since more passengers would choose to use the RAPID equipment. Therefore, assuming that with the new information the usage of the RAPID would increase 5%, the time in queue for passport control would decrease 5%, which means that the passport control process would be reduced in approximately 1.25 minutes during the summer and 42 seconds during the winter.

Currently, the utilization percentage of this system is quite low for what it was expected, namely it is approximately 15%[35], which is due to insufficient information available about it. Therefore, through posters placed in strategic areas dedicated to *SEF*, brochures delivered during the boarding and showing a movie on board, the use of RAPID boxes by passengers with electronic passport would highly increase.

The easiness of the implementation is considerably high, in the sense that it only consists in developing a communication plan.

EMBRACE NEW NATIONALITIES IN THE RAPID AGREEMENT - Creating agreements with other strategic countries to use the RAPID system, such as Brazil since it is a valuable destination for TAP, would increase the utilization of the RAPID and, therefore, reduce the time in queue for the conventional passport control in approximately 1.2 minutes for the summer and 45 seconds for the winter.

[34] The RAPID (Automatic Identification of Passengers Holding Travelling Documents) is a worldwide innovating system that allows an automatic control of passengers in possession of electronic passports.

[35] Data provided by *SEF*, 15% of the passengers that can use RAPID.

Assuming that Brazil would sign this agreement with Portugal, the group assumed that 15% of the Brazilian passengers would use the RAPID[36], which means that 5%[37] of the passengers passing by arrival's passport control would use it, reducing the time in queue for the conventional passport control in 5%.

The implementation easiness of this recommendation is medium, due to the fact that it implies a first negotiation between TAP and *Ministério da Administração Interna*, in order to demonstrate the need to expand this agreement[38]. Furthermore, it requires a second negotiation process with the Brazilian Government, which can be a complex process.

After the passenger has passed by the passport control, he has to pass through **security control,** which is also one of the bottlenecks as explained above. Four recommendations were developed to improve the security control process.

EASY CHECK PROGRAM – PREPARATION ZONE - A previous preparation zone before passing the security control with informative signs about the steps to follow (i.e. removal of personal items and clothes) would ensure a fast security control. More, there should be *Pontos Amarelos* to help the passengers with more difficulties. This measure would prevent situations when a security aisle is blocked, because a passenger did not previously prepare for it. It was estimated that this measure would reduce 20% of the time waiting in queue, which is approximately 50% of this activity's time. Therefore, taking into account only the critical time ranges of operation, where usually the security control has a queue, the reduction is 1 minute[39].

The easiness of implementation of this recommendation it is high, considering that it is not necessary a significant investment and *ANA* would benefit from this measure, which may ensure the *ANA*'s support. On the other hand, the airport's infrastructure is an is an area with a significant traffic flow.

INCREASE NUMBER OF FEMALE PROSEGUR AGENTS - By increasing the number of female Prosegur agents the security control process would be reduced in approximately 1.8 min during the critical time ranges of operation (peak time).

There should be placed at least one more female agent in each security control aisle, since there is not a sufficient number of agents of the referred gender. Currently, there are normally five agents in

[36] In light of the actual percentage of European RAPID users.

[37] Data from a common day at the Lisbon Airport, where arrive in average 3 flights from Brazil during the critical time ranges of operation of the morning. Assumption: each aircraft is used at full capacity.

[38] There is already a bilateral agreement with Angola for the utilization of the RAPID system.

[39] Time of the security control during the critical hours is 10 minutes. 20% of 10 minutes is 1 minute.

each aisle, two agents to place the hand baggage in the x-ray mats, one agent to ask the passenger to pass by the metal detector and for the physical control whenever necessary, and two agents to visualize the screens with the images from the hand baggage screening.

With a female agent in each security aisle there would not be the need for the agents to switch places, so there is an available agent of the same gender of the passenger that has to pass by physical control whenever necessary, which takes 0.5 minutes. Also, the passenger processing capacity by each aisle would increase by approximately 75%. Assuming that the current time of the security control process is 3 min and the average waiting time in line is 7 minutes, the recruitment of female agents would reduce the control process by 0.5 minutes for the elimination of switching places and 1.3 minutes for the greater speed in processing passengers due to increased human resources.

The implementation of this recommendation would be of medium difficulty, being necessary to take into account the difficulty in recruiting female agents.

UNDIFFERENTIATED SECURITY-CHECK - By eliminating passengers
the security control process would be reduced by approximately 0.5 minutes.

The elimination of passengers' g*Prosegur* agents to scrin
switch places. The current physical control policy, which does not follow any existent regulation regarding gender discrimination, extends the overall time of the security control process.

The implementation of this suggestion should not involve any investment but a cultural change from passengers. According to one of the developed surveys it was possible to conclude that 42% of the passengers answered that do not agree with th
physical control. In the future it is advisable the realization of a similar survey to confirm if passengers have changed their opinion about embracing this suggestion.

It must be noticed that the implementation of this suggestion would replace the need to recruit more female *Prosegur* agents.

NEW SCREENING EQUIPMENT ï MILLIMETRE WAVE - The substitution of the current metal detectors for the Millimeter Wave Body Scanners, devices for passenger screening which use millimetric waves with the ability to detect potentially dangerous objects from metallic and non-metallic origin that may be covered by clothes, would reduce greatly the need to make physical control to passengers; it would be only necessary to make the mandatory random physical controls and in cases where the scanning system identified a potentially dangerous object. The utilization of these devices has been already approved by the European Commission, while the utilization of Backscatter Body Scanners was not.

There is not yet a study that proves that, in addiction to greater effectiveness in detecting dangerous objects, these new body scanners contribute for a faster security control process. It is believed, after extensive reading, that with the continuous technological evolution of this kind of equipment, in the future they will be able to bring a bigger change to the entire security control process, e.g. will no longer be required the removal of pas and accessories, besides the hand baggage.

In conclusion, the implementation easiness of this suggestion would be extremely reduced, due to the great investment and the inexistence of proof in time reduction.

Finally, for the **boarding** process, the last one of the passenger transfer, two recommendations are proposed in order to increase the utilization of the air bridge.

USE THE STAND 107- Increasing the utilization of stand 107 for boarding would allow a 5 minutes gain of useful time for passenger transfer, since the time difference between remote boarding and airbridge boarding is 5 minutes. More specifically, remote boarding requires the passenger to be at the boarding gate, at most, 15 minutes before the Schedule Time of Departure (STD), while airbridge boarding demands the pas the boarding gates, at most, just 10 minutes before the STD. Considering the description mentioned before about stand107, this stand could be mainly use for the boarding of the Fokker100, so the overall impact on the Lisbon's airport marginal.

Implementing this measure, like it was mentioned previously, implies a negotiation between ANA and TAP in which both parties gain from it. Hence, the easiness of implementation of this measure is high.

DYNAMIC AIRBRIDGE MANAGEMENT - The dynamic airbridge management consists on an innovative deboarding method that allows increasing the boarding by airbridge. Therefore, the passenger transfer time is reduced by 5 minutes, considering the explanation previously presented in the last recommendation.

This methodology focuses on the cases in which an aircraft is used for a flight that arrives at Lisbon Airport from a Schengen (or Non Schengen) origin and then rotates to a flight with a Non-Schengen (Schengen) destiny. Currently, in these cases the aircraft is always parked in a remote stand in order to avoid the transportation of the aircraft between the Schengen and the Non-Schengen areas[40]. Thus, to increase the utilization of the airbridge in the boarding process, the team recommends parking the

[40] The Lisbon Airport Terminal is divided into Schengen (before the departu and Non-' pass Schengen area (after the departures' passport control)

aircraft in a stand with an airbridge in the Schengen (Non-Schengen) side, when the aircraft will be afterwards used for a flight with a Schengen (Non-Schengen) destiny. In this way, the passengers that arrive from a Non-Schengen (Schengen) country have to deboard by the masonry stairs (see Appendix 7.3.2) having then to be transported by a bus to a Non-Schengen gate, while the passengers boarding can use the airbridge.

This since it has a substantial impact in the transfer time and it has a relatively easy implementation, although it depends essentially on ANA to embrace this disruptive idea. On the other hand, it is not necessary to acquire any new resources.

BAGGAGE TRANSFER

As for the passenger transfer the following recommendations are presented according to the baggage transfer flow, to understand how each measure will benefit each activity of the process.

SLA FOR INJECTION OF BAGGAGE AT TBP - Taking into consideration the utilization percentage of each type of aircraft and the average time needed to go from a parking platform to the baggage terminal TBP (taxi time), with the definition of SLAs for injection of baggage in TBP there would be a reduction in 2,5 minutes in the current time for baggage injection in the terminal.

The unloading time, using two loaders, suggested by official Airbus manuals are: A319: 4 min; A320: 7 min; A321: 9min; A330: 14min; A340: 17 min. The average taxi time is approximately 3,50 minutes.

The definition of SLAs which indicate that after the ATA (Actual Time of Arrival) the moment of injection of the baggage in the terminal must correspond to the time of offloading it using two loaders plus the taxi time would give depth to the current SLAs celebrated between TAP and *Groundforce*, since they only settled specific times for baggage delivery to passengers. The control of this SLAs' fulfillment would be done by consulting the BRS, with the passage of the baggage by the x-ray, being then necessary to subtract the time from the baggage injection in the until the x-ray machine.

The necessary investment to implement this suggestion may relate to the increase in the value of the contracted baggage handling services to *Groundforce* by TAP. It is considered that the implementation of this suggestion is of medium difficulty, being necessary the negotiation and establishment of the new SLAs to be fulfilled by *Groundforce*.

EFFECTIVE CARGO HOLD'S SPACE MANAGEMENT - The segregation of baggage with the final purpose to create "baggage containers inside the cargo" for

holds would allow the offloading to be made according to the urgency in injecting it in the terminal. With this, the transfer baggage would have priority, reaching the terminal 2 minutes before the other "c l a s s e s" (see Appendix 7.3.3).

The possibility of having transfer baggage superior to the capacity of one container should be taken into consideration, being necessary its loading in Bulk or in a container to be placed near the transfer container. This would apply to narrow bodies, in particular the A319 and A320, due to the reduced capacity of their cargo holds. In the wide-bodies a more detailed segregation of baggage transfer could be made (short connection, standard & long connection) due to their greater capacity.

This suggestion would demand the existence of the BRS in every airport where TAP operates, b e c a u s e i t i s n e c e s s a r y f o r t h e i d e n t i f i c a t i (business & first, short connection, standard & long connection, local). Consequently, this suggestion would involve the restructuring of the baggage terminals in several airports that currently do not have the BRS. Also, it must be noticed that in the Lisbon Airport normally there are only two vehicles per aircraft to transport the containers, one for the transfer baggage and one for the local baggage; invalidating the effect of the baggage segregation since the containers would be transported all at the same time, being then necessary their repeated motion between the aircraft and the terminal.

GENERAL SCOPE

The following recommendation and suggestion intend to improve the overall transfer process.

HISTORY OF TRANSFERS - With a history of transfers the *Rede* and *Melhoria Contínua* areas w i l l b e a b l e t o c o m p u t e t h e t r a n s f e r s ' s u c c e s adequacy of implementing alterations to the transfer processes for the reduction of the theoretical MCT, in case the success rate is rather positive.

The registration of unsuccessful transfers with the appropriate identification of their respective causes, for posterior comparison with the planned ones, will provide a history of misconnections to c a l c u l a t e t h e t r a n s f e r s ' s u c c e s s r a t e . T h i s r maintain data consistency after numerous insertions (see Appendix 7.3.4).

This implementation does not involve any kind of investment, since the registration of the planned transfers is already made and information about unsuccessful transfers is produced in text, not preformatted documents.

IMPROVE LISBON AIRPORT'S SIGNAGE - The improvement of the air p o r t ' s s i g n a g imply an improvement in the speed of the transferring passengers walking inside the airport by

approximately 10%. The average speed used in the numerical model was 70 meters per minute. Therefore, the average speed would pass to 77 meters/min, with a final reduction in 0.62 minutes to domestic transfers and 0.89 minutes to international transfers.

To assure the effectiveness of the passengers' transfer it is extremely important the improvement of Lisbon Airport's signage, vital resource for the passengers' orientation. With the aim to know passengers' opinion on this matter people (see Appendix 7.3.5), the majority passing by the airport, while the rest answered online with the condition of having passed by the airport recently (one month at most). It was possible to conclude that 39% of the passengers had trouble getting oriented at Lisbon Airport at least once mainly in the commercial area and when arriving at the terminal after deboarding.

The implementation of this recommendation should not have a high investment since it involves installing or substituting just some information points by ANA. Nevertheless, due to the recent airport expansion and recent investment on its signage it is probable some resistance to this recommendation by ANA.

8 PROJECT VALUE ADDED

The project's derives from the above presented recommendations, consisting in the reduction of costs incurred with delayed flights, approximately 4.156.180,0€, and also reduction in the MCT for domestic and international flights, 0 and 9 minutes respectively (see Appendix 8).

More precisely, in the MCT subproject, with the implementation of the recommendations for the domestic MCT it would be possible reduce the real MCT in 2 minutes, which means it would be equal to the conventional MCT, while for the international MCT it would be possible reduce the real MCT in 12 minutes, which means that the final result would correspond to a lower real MCT than the theoretical one. The viability of reducing the MCT in 15 minutes must be kept into consideration for the future conclusion of TBP's expansion,

It was the group's intention to calculate the effect of a variation in connection time on revenues, although it was not possible due to lack of available information being only possible to present results in minutes.

Moreover, if this project were developed by a consulting company, with a 5 consultants team, during approximately 60 days (8 hours of work per day), TAP would have to pay a value similar to a range of 96 000€ and 156 000€ (5 consultants x 40€

9 CONCLUSION

In conclusion, this project can be seen as reinforcement to TAP's *Melhoria Contínua* area by introducing some realistic and practical recommendations of strategic value for the continuous improvement of the coverage of the potential of its Hub, with the final and consequence of improving its profits.

With this project TAP has available designed and systematized recommendations to apply to its daily operations in a near future, being almost just necessary their implementation and control, which will contribute for a reduction of **4.156.180,00 ú** in annual expenses related with operational irregularities, and a reduction of Lisbon **9 minutes**. Airport Inte

REFERENCES

Books and Articles

1. Greiner, L. and R. Metzger. 1983, *Consulting to management.* Englewoods Cliffs, NJ: Prentice Hall.
2. IATA, *Airline Coding Directory IATA*, Chapter 7 "Minimum Connec
3. Malhotra, Naresh K and Birks, David F. *Marketing Research – An Applied Approach.* 3rd Edition, Prentice Hall, 2008
4. M. Ramana Reddy, R*evival of a sick airline* (A Project Report on Silk Airline). Nalsar University of Law, Hyderabad, and Institute of Applied Aviation Management, Calicut. Academic Year 2011-2012
5. Rasiel, Ethan M., *The McKinsey Way, Using the Techni Consultants to Help You and Your Business*, Mc Graw-Hill
6. Schulz, Alex, *The Role of Global Computer Reservation Systems in the Travel Industry Today and in the Future.* Lufthansa Systems GmbH, 2000
7. University of Westminster, *Evaluating the true cost to airlines of one minute of airborne or ground delay*, EUROCRONTOL, May 2004

Course Materials

1. Casquinho, C. 2013. *Team dynamics – Belbin. Consulting Lab*. Lisbon: Nova School of Business and Economics
2. Lopes, Luís F. September 11, 2012. *Consulting* course, *1. Course Overview and First Insights*. Lisbon: Nova School of Business and Economics.
3. Lopes, Luís F. October 9, 2012. Consulting course, 9. Displaying information with charts. Lisbon: Nova School of Business and Economics.
4. Soeiro, *Lecture 9 – Process Gap Analysis, Services Operations Management and Six Sigma* and Change Management course. Lisbon: Nova School of Business and Economics

Websites

"Companhia aérea lusa eleita a melhor da http://boasnoticias.sapo.pt/noticias_Companhia-a%C3%A9rea-lusa-eleita-a-melhor-da-Europa-nos-EUA_18043.html?page=0

http://www.awardco.com/4-reasons-employees-love-southwest-airlines#.UsWKUPRdUeI

http://www.cbsnews.com/news/tsa-quietly-removing-some-full-body-scanners/

http://ec.europa.eu/health/scientific_committees/docs/citizens_security_scanners_en.pdf

http://www.futuretravelexperience.com/2013/11/klm-introduces-innovative-boarding-technique/#more-12934

http://www.manchesterairport.co.uk/manweb.nsf/Content/X-Ray-Scanners-Public-Information

http://prudata.webfactional.com/wiki/index.php/IATA_season

http://www.rapid.sef.pt/

http://www.securitymanagement.com/article/new-views-airport-screening-004586?page=0%2C1

http://www.telegraph.co.uk/finance/newsbysector/transport/10207814/Heathrow-to-track-customers-through-airport-to-cut-cost-of-delays.html

http://www.terminalu.com/europe/full-body-scanner-trials-banned-at-europes-airports-until-cancer-risk-fully-assessed/19762/

http://www.terminalu.com/air-travel-news/manchester-airport-to-replace-naked-body-scanners-after-eu-fails-to-approve-them/29850/

“ Venda de passagens da TAP cresceu 41 in milh 27 August 2013
http://www.tapportugal.com/PressRelease/pt/venda-de-passagens-da-tap-cresceu-41-milhoes-em-2013-#sthash.OYicQQCr.Sxe4Eawz.dpuf

Legislation

Diário da República, 1.ª série ð N.º 214 ð November 6, 2012 http://www.sef.pt/documentos/56/LOSEF.pdf

10.1 INDIVIDUAL REPORT ï Augusto José Casalta Miranda

THEORETICAL CONTEXT AND METHODOLOGY

As referred in the group report, the Consulting Lab has a consulting project nature, therefore its methodology was built recurring to the general stages of a management consulting project, which are problem identification and structuring, defining hypotheses to solve problems and validate potential solutions, engage decision-makers in solutions, and support implementation of accepted solutions.

For the problem identification and structuring, to better respond to the challenges of the Reduction of Operational Irregularities and Reduction of MCT subprojects, several approaches were followed. In an initial stage of diagnosis, some interviews and conversations were conducted with professionals of the distinct operational areas inherent to both subprojects. After this first stage, a steering meeting was conducted with the main purpose objective; conf demonstrate the initial analysis tools that had been developed as well as characterization of the delays and the transfer process for the Irregularities and MCT subprojects for operational contextualization, respectively; and to define the work stream for the second stage of the project.

During the definition of hypotheses to solve problems and validation of potential solutions several interviews were made to the different stakeholders and observations were conducted throughout the different areas of the Lisbon Airport, during different time ranges of the day, often in the platform next to the aircrafts. Also, for the Irregularities subproject the databases provided were treated in order to obtain the main causes of the MCT subproject, through the flig database provided and the observations realized, the processes that contribute negatively to the MCT (bottlenecks) were identified and analyzed, initiating the feasibility analysis to readjust the MCT. In this stage several progress review meetings with Lisbon adequacy between the developed work and the p theoretical knowledge such as the Pareto Law[41] and Westminster Universi steering meeting was done to present the analysis tools further developed, and also, to demonstrate analysis dashboards of irregularity patterns and deeper analysis on transfer processes that negatively contribute for the MCT, with initial recommendation proposals.

For the engagement of the decision-makers in the solution two surveys[42] were elaborated, one to understand the perception of passengers about

[41] Rasiel, Ethan M., *The McKinsey Way, Using the Techniques of the World* *You and Your Business*, Mc Graw-Hill

[42] Malhotra, Naresh K and Birks, David F. *Marketing Research ï An Applied Approach*. 3rd Edition, Prentice Hall, 2008

some possible recommendations that could be suggested to TAP; the total number of completed responses was 100 and 200, respectively. After all of the previous work was finished and the analysis results established, several brainstorming sessions were done to set and deepen the final recommendations. The final meeting with the client occurred at the end of this stage, focusing on recommendation of corrective measures for main delay causes at Lisbon Airport and on the viability of readjusting the MCT; their implementation was not started since it was out of the pro

DEVELOPMENT OF A PARTICULAR PROJECT'S TOPI

In this section it will be clarified in detail the methodology and analysis tool developed to build the pillars that sustained the analysis behind the suggested recommendations to reduce the operational irregularities on TAP Airport. These analysis tools were discussed at t within the team, to guarantee a well-founded problem solving approach, and develop solid recommendations to tackle the operational challenges that cause more minutes of delay. The tools count also with the valuable contribution of Lisbon HUB's (the "Hypothesis" in the consulting Problem S analysis, and provided the guidelines to tailor the tools according to his specific needs.

Nowadays data are more than ever a critical success factor for companies that operate in an extremely competitive global business environment, where changes occur at a fast pace. The use of large pools of data can give TAP Portugal the competitive advantage to leave behind its direct competitors, since through the analysis of that data, it might be possible to recognize patterns related with the daily basis operation that would stay unknown if the data was not scrutinized. These uncovered insights will help to decide faster and better than before, minimizing at the same time inherent risks. It is important to consider also the potential boost that productivity and efficiency levels can reach through the analysis of data, due to the fact that data allows an adequate allocation of the resources available according to the specific needs of a certain task in a particular time range, which contributes to a reduction of waste and a higher quality level of services and products offered to clients.

It was necessary to proceed, under the supervision process of IATA's delay codes in Clusters (se focused analysis. We created eighteen micro-clusters, each one compounded by codes that are related among them, and consequently are not related with other codes that represent the other micro-clusters. The initial database used to study 2012 and 2013, from January to October.

Since the main focus of the project is TAP's
Lisbon were considered. The database used contains a column that explains the delay nature of TAP's flights. The tota explained by more than one reason, and the a f
flight's total delay is simply the sum of minu

The characterization of TAP's operation accor
analysis of irregularities, so it was necessary to differentiate each flight accordingly with several parameters. Over the year Lisbon Airport faces some seasonal variations of passengers and baggage's traffic, so it is im traffic the minutes of know
delay also increase in a similar proportion. This parameter will enable the comparison of both seasons, in order to figure out if there are significant operational differences between them, enabling in a subsequent stage a field analysis to asses if the causes of these discrepancies are related with the fact of the Lisbon airport is not prepared to deal with higher flows of passengers due to its infrastructures limitations, or if the differences are explained by an insufficient quantity or adaptation of resources during high traffic season.

The topic concerning the resources available at the airport is in reality very important, since it is crucial to guarantee during each operation day that the resources available at the airport match the passenger and baggage flows. This adequate allocation of resources is necessary to assure high levels of punctuality in all the departures from Lisbon airport. Through data analysis it is possible to conclude that irregu occur mainly during certain time ranges (see TAP operat
Appendix 6.1.1), namely “... – 08:59” and “... – ...:00”. The analysis
delays that occur in each one of them is fundamental, since both periods represent operational peak periods, which are periods when the all the resources at the airport should be allocated properly and working at full capacity in order to guarantee an adequate service level. It is possible to identify a clear pattern that the majority of the minutes of delays, excluding maintenance, in the flights between 05:00 and 08:59 were explained by codes related with the clusters such as Connections, Mandatory Security and SEF, or even with Handling (see Appendix 6.1.3). This was explained by the flow of in transfer passengers that arrive at Lisbon in the beginning of this period, passengers from intercontinental flights that will take other

Other important parameter analyzed was the arrival airport of a flight that departs from Lisbon, since there are flights of some specific destinations, like Dakar, Bamako, Bissau, Fortaleza that constantly were delayed because of the behavioral particularities of the passengers of these flights, that generally are passengers in transfer that carry heavy quantities of baggage, and tend to become stuck in diverse airport areas, namely in passport control, security control or even in the commercial area.

TAP Portugal's fl-one airplanes. The wide-body family counts with two distinct aircrafts, whilst the narrow-body and *Portugalia* (PGA) families count each one with three distinct aircrafts. It is important to make this division because some aircrafts present different flight autonomy, passenger capacity, handling procedures, which could be reflected in differences among the nature of the delays that are more repre
During the analysis conducted regarding this parameter, it was possible to identify patterns regarding the most common delay codes of some particular aircrafts. For example, the aircrafts that compose *Portugalia* family, namely Fokker, Beechcraft and Embraer account all for high number of minutes of delay due to codes related with Maintenance, which could be justified by the frequent maintenance procedures needed because of the average age of those aircrafts. Those aircrafts also present more a higher percentage of minutes of delay due to codes related with handling activities, more precisely codes related with Baggage, Catering and Cleaning procedures. The delay codes related with baggage could be explained because the baggage was loaded and offloaded in bulk, making those process more time consuming and creating more conditions to the occurrence of fails during the process. The delays caused by cleaning and catering activities were originated especially because those activities occur in simultaneous during turnaround process, but due to the reduced dimensions of these aircrafts, it was difficult to perform both activities properly and on time. Regarding the other aircrafts that compose Wide-Body and Narrow-Body families, there is constant necessity to offload the baggage of passengers that cannot proceed to the boarding on time, during the 20 months analyzed there were 63.510 minutes of delay search and offloading, representing accordin Appendix 2.1) costs of 4.572.720 € for ng the AP Po analysis, and confirms one of the major conce to develop solutions that enable the airplane to depart with unaccompanied baggage, or solutions that enable a faster searching process of possible unaccompanied baggage in order to guarantee with this higher punctuality levels on flights that depart from Lisbon.

PERSONAL CONTRIBUTION AND LEARNINGS

During all the process, given my observed skills, I was asked by our Academic Advisor to assume a formal coordination/leadership role, working in parallel with both teams allocated to each one of the two subprojects, with the objective of creating a bridge between them. This was a highly challenging role, as I required my deep analysis and understanding of the content of both sub-projects, as well as a higher level coordination view to ensure the efficiency and efficacy of the work produced by both teams (no gaps and no overlaps). This particular experience was very valuable, it enables me to

realize that a person with a coordination/leadership role should understand what are his strengths and weaknesses. It is impossible control everything, and the ones who try to do it most of the times will became exhausted and fail.

In this initial stage I will use as a guide to evaluate my skills, the distributed leadership model[43] presented by Deborah Ancona, where there are two major capabilities each one with different abilities generally identified in leaders, the enabling capabilities, like sensemaking and relating, and the creative and action oriented capabilities like visioning and inventing.

In my opinion, and based on feedback, I have the ability to easily understand the kind of context in where I am inserted, as also the characteristics and specificities of all the other elements in the project because it allows me to understand in a way to deal with a person or in order to pursue the result of all the knowledge collected during diverse situations with different types of persons, which facilitate my judgments and understandings of what surrounds me in order to develop a path of actions to correctly answer the requirements that a particular context and participants call for.

Even though I have a good sensemaking capacity, my relating capacities could be clearly improved. I feel some times a certain difficulty to build good relationships with some people who are working with me, which is essentially nowadays. Usually my view or developed work are influenced by my interpretations. Sometimes my premature conclusions, lead me to overreact, which causes in my colleagues some frustration that have impact on their motivational levels. Regarding this particular issue I would like to thank to our Academic Advisor, Constança Monteiro Casquinho, for the experiences shared and constant counseling and motivation regarding this particular dimension that I expect to continue to improve in the future, in order to be able to engage people who work with me to give their best without pushing them beyond what they are able to do.

My special focus on details of everything that surrounds me, and a tendency to think creatively enables me to overcome challenging obstacles that appeared during the project. When in some stages of the project we were not able to advance, I established new ways of acting and thinking in order to pursue our final objective. Even though I am able to translate a simple idea into practical action, my room for improvement in the relating area caused me some difficulties when I need to articulate my own ideas with the ideas of the ones who work with me. This project was fundamental to my

[43] Ancona, D. et al. (2007). In praise of the incomplete leader. *Harvard Business Review (*Feb)

personal development, since many times I need to articulate my toughs with the perceptions and other's ideas, in order to create a compellin committed and excited.

On the work-life balance front, I tend to struggle with issues related with the organization of my schedule, so sometimes I am not able to reach the desirable balance between work, personal life and leisure moments, maybe due to the fact I generally I am not able to delegate and trust some tasks to others, accordingly with the priorities of a given moment of time. During the project I made an effort to surpass this limitation, and in some occasions I was able to achieve an appropriate balance, but in the final stage of the project I tried to answer too many challenges at the same time, which cause the delay of some priority level tasks allocated exclusively to me. I conclude that it is priority for me to work on this front, mainly through delegation and trust as I consider that effective leaders need to ensure that their time allocation and that of their peers match their key personal priorities and the key priorities of the project. In summary reflection, I have found that there is very seldom a leader that possesses at the same time: (i) the capacity to solve very complex problems that emerge from an inexplicably set of complex issues and (ii) extraordinary interpersonal skills to engage people around him to face and solve the problems that suddenly have appeared. I am happy to have discovered during this project that I have fertile ground for the development of both areas of capabilities. I shall focus the progress in my career in the enhancement of both areas, so I can develop to become an effective and inspirational Leader.

Finally I can extract from this project a lifetime learning related with the measure of success that should be used to qualify our work. The satisfaction and the development of the ones who work with me are in my opinion the most important measures of success. It is clear that more satisfied people tend to participate more actively on all the decided attitude. On the other hand, people who have more knowledge about a specific topic are more prepared to perform the tasks for which they were assigned. If satisfaction and knowledge are put together, the probability of achieve good results will be higher, and if for some reason the final results are not the expected ones, I am sure that sooner or later the effort spent will enable a pleasant harvest of all the projected results, since more important than an immediate success, is create the conditions to a plenty personal and professional development, enabling sustainable and long term oriented success.

10.2 INDIVIDUAL REPORT – Carolina Maria Morais Cardoso Freire de Andrade

THEORETICAL AND METHODOLOGICAL CONTEXT

As referred in the group report, the Consulting Lab has a consulting project nature, therefore its methodology was built recurring to the general stages of a management consulting project, which are problem identification and structuring, defining hypotheses to solve problems and validate potential solutions, engage decision-makers in solutions, and support implementation of accepted solutions.

For the problem identification and structuring, to better respond to the challenges of the Reduction of Operational Irregularities and Reduction of MCT subprojects, several approaches were followed. In an initial stage of diagnosis, some interviews and conversations were conducted with professionals of the distinct operational areas inherent to both subprojects. After this first stage, a steering meeting was conducted with the main purpose of confirming with the client the project demonstrate the initial analysis tools that had been developed as well as characterization of the delays and the transfer process for the Irregularities and MCT subprojects for operational contextualization, respectively; and to define the work stream for the second stage of the project.

During the definition of hypotheses to solve problems and validation of potential solutions several interviews were made to the different stakeholders and observations were conducted throughout the different areas of the Lisbon Airport, during different time ranges of the day, often in the platform next to the aircrafts. Also, for the Irregularities subproject the databases provided were treated in order to obtain the delays, whilst for the MCT subproject, through the flig database provided and the observations realized, the processes that contribute negatively to the MCT (bottlenecks) were identified and analyzed, initiating the feasibility analysis to readjust the MCT. In this stage several progress review meetings adequacy between the developed work and the p theoretical knowledge such as the Pareto Law[44] and Westminster University's study steering meeting was done to present the analysis tools further developed, and also, to demonstrate analysis dashboards of irregularity patterns and deeper analysis on transfer processes that negatively contribute for the MCT, with initial recommendation proposals.

For the engagement of the decision-makers in the solution two surveys[45] were elaborated, one to understand the perception of passengers about

[44] Rasiel, Ethan M., *The McKinsey Way, Using the Techniques of the World– You and Your Business*, Mc Graw-Hill

[45] Malhotra, Naresh K and Birks, David F. *Marketing Research – An Applied Approach.* 3rd Edition, Prentice Hall, 2008

some possible recommendations that could be suggested to TAP; the total number of completed responses was 100 and 200, respectively. After all of the previous work was finished and the analysis results established, several brainstorming sessions were done to set and deepen the final recommendations. The final meeting with the client occurred at the end of this stage, focusing on recommendation of corrective measures for main delay causes at Lisbon Airport and on the viability of readjusting the MCT; their implementation was not sta r t e d s i n c e i t w a s o u t

D E V E L O P M E N T O F A P A R T I C U L A R P R O J E C T ' S T O P I

T h e b o a r d i n g p r o c e s s i s o n e o f t h e t o p i c s t h a

according to the database provided by the Information Management Department of TAP Portugal and to several observations that we made next to the boarding gates. As previous mentioned, b o a r d i n g i r r e g u l a r i t i e s a r e r e s p o n s i b l e f o r 1

In the following pages I will develop one recommendation that can streamline the boarding process a n d c o n s e q u e n t s p e n d i n g a t t h e e n d o f t h e y e a r i n **236.977,44 ú**.

Firstly, is important to do a diagnosis and to understand how the boarding is currently processed in the Lisbon Airport. As soon as the boarding starts, 22 minutes before the aircraft get out blocks, passengers start forming a queue next to the counter which extends down the hall. Afterward, as passengers arrive at the counter they are assisted, one by one, by the Groundforce' s personnel which proceeds to the positive ID and cross the boarding pass through a technology (see Appendix 7.2.7.1) that signalizes the entry of each passenger in the aircraft. The positive ID process is mandatory in Portugal and consists on the verification that a boarding pass is of a certain person by looking at both the passengers 'identification card and the boarding pass. In the particular case of TAP Executive, TAP Business and priority passengers the procedure is exactly the same but they have an exclusive queue.

Nowadays, using this boarding method, are in majority of times t h r e e G r o u n d f o r c e ' s at the boarding gates. One of these elements is responsible for attending TAP Executive, TAP Business or priority passengers, while the other two assist the common clients.

Logistically, the current boarding method is not the ideal solution once the long queues that can be formed interfere with the normal traffic and movement of passengers next to the boarding gates. Furthermore, the time spent by each passenger in the counter is considered unnecessary and excessive. Actually, passengers tend to find in boarding counters a personalized service where G r o u n d f o r c e ' s s t a f f d o e s s o m e p o l i t e c o n v e r s a t

The optimal solution to increase the streamline of boarding would be the implementation of automatic gates (see Appendix 7.2.7.2) leading to the Self-boarding[46] by passengers. In fact, this method is already been practiced by Lufthansa in several German airports such as Frankfurt, Berlin, Munich and Hamburg[47]. These new gates enable an instant verification of the passengers' identification and make the confirmation that the person who boards is the same who did the check-in. Although, this cutting-edge technology would imply a large investment that ANA is not able to afford. In fact, with the exception of TAP, the investment does not makes sense to the other airlines operating in the Lisbon Airport since for them the operations in our capital's airport do not have the same magnitude which have for the Portuguese airline. For all these reasons, we believe this is an unrealistic alternative.

Therefore, we recommend the implementation of a method that still enables the Self-boarding of passengers but using the current technology. According to this solution, the machine used by the Groundforce's employees at the boarding gates nowadays, would be displayed in a different way – instead of being positioned behind the counter it must be turned to the passengers which just need to cross their boarding pass through this technology as long as they pass through it, doing their Self-boarding. Therefore, instead of the current three employees present at the boarding gates only two would be necessary, one of them positioned next to the boarding machine to supervise the Self-boarding of passengers and the other focused on attending the priority passengers, as well as TAP Executive and TAP Business clients. Moreover, *Pontos Amarelos*[48] which usually are present in *SEF* to organize and streamline the process must be allocated next to the boarding gates doing the positive ID of passengers while they are in the queue preparing to board. Also, while doing that *Pontos Amarelos* have the capacity to arrange the disposition of the queues in order to facilitate the normal traffic of passengers next to the boarding gates area. Is important to mention that this team of ANA is a cheap resource and mostly composed by young people.

Thereby, through the implementation of the new method recommended either ANA or TAP need to do further investments in new technology. In TAP's situation, the Self-boarding approach will reduce the boarding time and consequently the delays caused by this activity, which leads to the decrease of the Portuguese airline spending. Regarding ANA, it will have a more automated boarding process which contributes to the existence of a more modernized airport and also will improve the effectiveness in the usage of its resources.

[46] www.iata.org
[47] www.airport-technology.com
[48] ANA's team that support passengers in the Lisbon A

In order to calculate the impact of this recommendation, i.e. the value saved by TAP per year through the decrease of aircrafts' delay due to the flights (see Appendix 7.2.7.3). Hence, we assume that with the Self-boarding implementation passengers will board two seconds faster. In addition, was made the assumption that the occupation of the aircraft is in average equal to 85% of the total capacity. The first step in the analysis was to distinguish the different type of aircrafts, to observe the total minutes annually lost with boarding irregularities by each of them and consequently calculate the average time lost per irregularity. Then, with the purpose of calculate the Average Time Saved per Boarding in each type of aircraft (in minutes) by implementing this recommendation, we computed *Capacity of the aircraft x Occupation Rate (85%) x Time Saved per passenger (2 seconds or 0.0033 minutes).* Afterward, we wanted to obtain the Percentage of Time Saved in Irregularities for each type of aircraft to consequently calculate the Total Time Saved after implementing the Self-Boarding Method, by computing *Percentage of Time Saved in Irregularities x Annual Minutes Lost with Boarding Irregularities*. Moreover, in order to calculate the Total Savings we Westminster Study[49], which quantifies the cost of one minute of delay for an airline as it was previous mentioned. Summing the Total Savings of each type of aircraft we obtain the value of 236.977,44 € saved yearly by TAP.

In the final presentation with the client, it was used a scale from 0 to 10 to measure the easiness of implementing each recommendation that we purposed, in which 0 corresponding to the hardest level of implementation and 10 to an easiest level of implementation. The Self-Boarding method is considered a recommendation of level 7, since it does not imply extraordinary costs or investment and being only required a different usage of the currently of the airport.

PERSONAL CONTRIBUTION AND LEARNINGS

In order to understand which role should each element of the group play during the TAP Management Consulting Lab, the performance of the Belbin Team Role Inventory was the initial step. The main purpose of this method is to evaluate the behaviors of individuals in a team environment by measuring there personality traits associated on eight different team roles[50]. In fact, this exercise demonstrated to be extremely useful for me to understand what my strengths are as a team member as well as the individual areas that I need to improve and the aspects that I need to

[49] Evaluating the true cost to airlines of one minute of airborne or ground delay, EUROCRONTOL, May 2004

[50] The roles included in Belbin's Model are: Presiden Worker, Prospector and Finisher

develop while working in team[51] allowed me to have a better. In other words self-perception about my work characteristics, individually and as part of a group.

Concretely during this project my main roles in the team turned out to be Team Worker, Operational and Monitor, whereas I had the lowest score in Finisher, Prospector and Intellectual (see Appendix 9.1). Some strengths in these roles I identify with, are related with the promotion of unity within the group, the enthusiasm and the promptitude to help my colleagues whenever they need. Also, I regularly am more interested in practical tasks than in abstract ideas and like to objectively evaluate alternative ideas and solutions. On the other hand, I faced myself with some challenges and development opportunities related with the lack of firmness and decision capability, the need for clear and precise tasks as well as the improvement in oral presentation skills.

During the management consulting lab in TAP Portugal I have been focused in the reduction of operational irregularities subproject, which enable me to develop several competences in distinct areas such as the ability to conduct interviews with the client and its stakeholders – ANA *Aeroportos de Portugal*, Groundforce, SEF, some of the entities responsible for the turnaround of the aircrafts, and TAP's – and educated me to build a work plan in the beginning of every project, how to organize a meeting and make an agenda before a reunion. In addition, became much clear to me the importance of the approach taken to present our findings and recommendations in order to demonstrate the real value of the developed work and to captivate the interest and attention of the client. As a matter of fact, while preparing the final presentation, I already have in mind that the best approach was to tell a story and always think recommendation. Throughout the three months of work for TAP I had the opportunity to do some fieldwork, both in the terminal and in the platform, which jointly to the analysis of the databases, the manuals and other private information leaded me to better understand the procedures and the whole operation. In the specific case of the turnaround process, was essential to observe closely all the involved activities and to draw some schemes of the process. Furthermore, to propose feasible and updated recommendations I performed some benchmark of the others airlines and airports, mainly in Europe.

Regarding the challenges that we face along the project, I can distinguish essentially three. The first one is related with the complexity of the aviation industry. We are talking about a competitive business that involves a great planning with numerous entities and companies, a capital-intensive market with perspectives to continue to grow in the future. At the same time, all of these turn into a very appealing industry. In fact, before the Management Consulting Lab I was not aware of the

[51] *What's your role in a team?* Inspired in "*Nobody's perfect*" from Belbin's Model

magnitude of things that lies behind a simple plane trip and next time I fly I will look at everything with different eyes. The second challenge has to do with the operational area. Since it is labor-intensive and the personnel are frequently fixing unpredictable problems, we sometimes found some difficulties to schedule meetings and conversations with them. Moreover, during this project I start considering that is fundamental to understand the operations of a company to work and do a good job in the other areas. Finally, it was a challenge and a pleasure to deal, for the first time, with top professionals and so recognized as Dr. Luís Rodrigues and Sr. Jordi Pi Massip.

One of the most unforgettable experiences of this incredible experience in TAP was absolutely the journeys to the airport at 4 am to observe the arrival of the aircrafts in the first flow of the day. Besides, all the support gave by TAP's perso undeniable and demonstrated to be always ready to help and guide us. Indeed, during the time in the TAP HCC the entire group felt like part of the team and we definitely built a great relationship with our client. In line with *The McKinsey Way*[52], one of the suggested reading before the Management Consulting Lab has initiated, the bond between the members of our group was excellent and it certainly was a key aspect to have a good performance and deliver a good work to TAP.

There are no words to describe the gratification that was to develop this consulting project to a company as TAP Portugal, one of the national companies with more history and recognized not only in our country but also abroad. After the completion of the project, I believe the group attained our main goal which is, as any consulting firm, to create value to the client.

At the end of the project I can say that the Management Consulting Lab enable me to have a completely new understanding about a great national company, a magnificent industry as Aviation and a challenging business area like operations. Finally, I would like to thank to our advisor, Constança Casquinho[53], with whom I learned so much, not only professionally but on personal terms as well. Indeed, she advised and helped us a lot throughout the entire project, always giving words of motivation and encouragement during the more intensive work times.

[52] Rasiel, Ethan M., *The McKinsey Way, Using the Techniques of t*
You and Your Business, Mc Graw-Hill

[53] Casquinho, C. 2013. *Team dynamics ïBelbin. Consulting Lab*. Lisbon: Nova School of Business and Economics

10.3 INDIVIDUAL REPORT – Francisco Gil Ferreira Sampaio

THEORETICAL AND METHODOLOGICAL CONTEXT

As referred in the group report, the Consulting Lab has a consulting project nature, therefore its methodology was built recurring to the general stages of a management consulting project, which are problem identification and structuring, defining hypotheses to solve problems and validate potential solutions, engage decision-makers in solutions, and support implementation of accepted solutions.

For the problem identification and structuring, to better respond to the challenges of the Reduction of Operational Irregularities and Reduction of MCT subprojects, several approaches were followed. In an initial stage of diagnosis, some interviews and conversations were conducted with professionals of the distinct operational areas inherent to both subprojects. After this first stage, a steering meeting was conducted with the main purpose of conf demonstrate the initial analysis tools that had been developed as well as characterization of the delays and the transfer process for the Irregularities and MCT subprojects for operational contextualization, respectively; and to define the work stream for the second stage of the project.

During the definition of hypotheses to solve problems and validation of potential solutions several interviews were made to the different stakeholders and observations were conducted throughout the different areas of the Lisbon Airport, during different time ranges of the day, often in the platform next to the aircrafts. Also, for the Irregularities subproject the databases provided were treated in order to obtain the main causes of TAP's flig database provided and the observations realized, the processes that contribute negatively to the MCT (bottlenecks) were identified and analyzed, initiating the feasibility analysis to readjust the MCT. In this stage several progress review meetings adequacy between the developed work and the p theoretical knowledge such as the Pareto Law[54] and Westminster Universi steering meeting was done to present the analysis tools further developed, and also, to demonstrate analysis dashboards of irregularity patterns and deeper analysis on transfer processes that negatively contribute for the MCT, with initial recommendation proposals.

For the engagement of the decision-makers in the solution two surveys[55] were elaborated, one to understand the perception of passengers about

[54] Rasiel, Ethan M., *The McKinsey Way, Using the Techniques of the World* *You and Your Business*, Mc Graw-Hill

[55] Malhotra, Naresh K and Birks, David F. *Marketing Research – An Applied Approach.* 3rd Edition, Prentice Hall, 2008

some possible recommendations that could be suggested to TAP; the total number of completed responses was 100 and 200, respectively. After all of the previous work was finished and the analysis results established, several brainstorming sessions were done to set and deepen the final recommendations. The final meeting with the client occurred at the end of this stage, focusing on recommendation of corrective measures for main delay causes at Lisbon Airport and on the viability of readjusting the MCT; their implementation v

DEVELOPMENT OF A PARTICULAR PROJECT'S TO

Since I was part of the Operational Irregularities subproject, the particular topic developed throughout this individual report will be related with the ***Mandatory Security – Searching and Offloading Baggage*.**

What is Mandatory Security ï Searching and Offloading Baggage?

This process occurs, fifteen minutes before the scheduled time departure (STD) (see Appendix 4.3.1) when, for any reason, the passenger has not boarded on time and if his hold baggage had already been loaded to the aircraft, thus for legal and security procedures, his baggage has to be searched and offloaded.

During the past years, airlines together with airport services and authorities have been trying to develop mechanisms which may streamline this procedure. Although these advance, it continues to be a main issue for airline carriers. So the reason of choosing this particular topic was not only because it has a great impact, but also due to the fact that this is a top priority issue for our client.

Analysis

In order to quantify the impact of operational irregularities, it was developed an irregularities model on Excel, based on a database, provided by D Information. This database included every delayed flight, from January to October 2012 and 2013. Each delayed flight has a cause, which is c determine the impact of *Mandatory Security* the model was run.

Main Conclusions

So by analyzing the database, we conclude that *mandatory security* causes around 33.600 minutes of delay per year. Moreover, if we look to the major cause of irregularities, which is *Aircraft Rotation*[56], by eliminating this kind of irregularities it is possible to also cut on *Aircraft Rotation* irregularities, since the real cause of this delay can be problems related with *mandatory security* in previous flights done by the same aircraft.

Finally it is also important to refer that this kind of irregularity has a particular prominence during the first peak of the day, from 05.00 to 08.59, (see Appendix 6.1.3) representing 11911 minutes of irregularities per year in this single time range. This is intrinsically related with the fact that passengers in short connection are the most probable ones to incur in this kind of irregularity, specially the one that will have to face bottlenecks as passport and security control, as explained on the MCT sub-project. This relation with connections excels, even more, this irregularity importance, since transfers represent 45% of TAP's operation in the Lisbon Hub.

Recommendation

As stated in the *Theoretical Contextualization*, to compute the impact in terms of cost savings, it was used a study developed by *University of Westminster*, which estimates that a minute of delay represents in terms of irregularity cost. This value has been used as a standard for major international airlines, as well as for TAP.

As said previously, much has been developed during this past years about this topic. However the solutions have been failing in terms of operational efficiency. So, with the aim to provide an effective recommendation, it was developed a totally disruptive idea which consists on:

DISCONTINUE THE OFFLOADING PROCESS - The most effective way to reduce this kind of irregularity would be to **put an end to the process of offloading baggage of a no show passenger**. This would represent a yearly cost saving of **2.419.000 €**.

Although it seems legally impossible, everyday thousands of unaccompanied baggage fly over the skies, more specifically if for any reason the baggage is not loaded on time to the scheduled flight, where the correspondent passenger travels, being transported alone afterwards. For being transported alone, according to *TAP Security Manual*, approved by the regulators, the baggage must pass through a specific security check, which consists on taking an image with two particular X-Ray angles, followed by the approval of a ***Prosegur*** security agent. Thus, the recommendation would be to

[56] *Aircraft rotation* stands for the late departure of a plane from Lisbon because it had already arrived late, i.e. the real cause of this irregularity (delay) occurred on a previous flight done by the same aircraft during the same day.

implement this security check to every baggage. By doing so, TAP would enable the unaccompanied baggage to fly automatically, without needing to offload it.

So the baggage would pass by the normal security check, then by the two angles X-Ray, a copy of each image should be saved, then if the passenger did not board, his baggage and correspondent image would be automatically recognized and checked by the *Prosegur* agent which could give the authorization instantly to transport the baggage, without the need of offloading and searching (see Appendix 7.2.3)

Regarding implementation easiness, it is expected to be difficult. Given that it may represent huge investment in 2 angles x-ray scanners, as it must have capacity to scan every baggage which passes by Lisbon Airport. Furthermore some legal issues could be raised. Although, even if hard to implement, this may be a *win-win* solution for TAP and Airport in the future, since by applying this unique system it would represent a first-mover advantage comparing with other European airports.

PERSONAL CONTRIBUTION AND LEARNINGS

In this final part of the report it is pretended to sum-up the major learnings obtained over the past months during the *Management Consulting Lab*. The learnings obtained will be divided in three parts: *Consulting Experience*, *My Personal Role,* and *Learning from TAP*

Consulting Experience

Since the early beginning of my Masters it has been growing on me a huge interest for consultancy work, actually that is why I took a Major in Strategy, as I would like to follow a strategic consulting career. Indeed this project proved to be right step between my academic and professional experience. Throughout the whole Consulting Lab I understood the main challenges of a consultant works, and I can say that I, as well as the whole team, was able to overcome things like: misalign of objectives and expectations between the team and the client, an ambitious scope for the time available, critical deadlines, understanding the technical and operational issues just in a few weeks, in between others.

In fact, this project emphasized my ambition to start a career in the consultancy area, which I think it is the greatest compliment that I can give to this experience.

My personal Role

Working in team over the past three months every day, eight hours per day, in average, strengthen my team working skills Actually, in terms of was a key point of the whole *Consulting Lab*, since he was constantly giving us feedback with the objective to improve our cooperation and communication skills.

According to *Belbin evaluations*, which I believe that describes my role during the entire project, my two main team roles are *Team worker* and *Monitor* (see Appendix *9.2*).

Team worker role is to promote unity and harmony within a group and manages to solve the conflicts.[57]. This definition fits perfectly on my role during the whole project since I was always available to help other group members, independently of the sub-project. Moreover I always tried to be a stable and enthusiastic, which I believe that, were two indispensible characteristics in a project were demanding challenges were continuously arising.

About *Monitor - provide a logical eye, make impartial judgments where required and to weigh up the teamôs options*[58]. In fact I always tried to keep the whole work under a critical eye, trying to understand team members feelings interfere, especially when we were dealing with controversial issues related with *mandatory security*, where legal matters and aircraft security have to be taken into account.

On the other hand, *Finisher*, represents the role which I do not identify myself at all, with an expressive score of zero. Actually, attentions to details, perfectionism, and sense of urgency are some of the issues which I have struggled during my academic life. However during this project I think I overcome these problems successfully, and I believe that from now on I will take particular attention to these topics.

Finally, in terms of team roles, I must say that every team member was able not only to give his best individual contribute to the project, as well as to motivate, help and compliment the others. Otherwise the goals defined at beginning of this project would not be achieved.

Learning from TAP

Having talked about the consulting experience and my team role, it is now time to express how this particular client interfered with my learning.

This project gave me the possibility to work with one of the biggest Portuguese companies which operates in one of the most complex industries. Furthermore this experience was extremely rewarding due to the fact that I was working with a state-of-art department that was always able to help us in every short *time slot* available. I understood what represents to work under a challenging operational environment, responsible for managing hundreds of arrivals and departures every day, where each second of delay represents an additional cost.

[57] *Casquinho C. 2013 Team Dynamics ï Belbin Consulting Lab. Lisbon: Nova School Of Buisness & Economics*
[58] *http://www.belbin.com*

To conclude, I would like to express gratitude to Constança Monteiro Casquinho, for her constant support and cooperation with the team. Her consulting background and personality were crucial not only to this project, but also to my personal development, which I consider that will be extremely important in my future personal and professional life.

10.4 INDIVIDUAL REPORT ï Francisco Maria Cavaleiro Gonçalves Martins

THEORETICAL AND METHODOLOGICAL CONTEXT

As referred in the group report, the Consulting Lab has a consulting project nature, therefore its methodology was built recurring to the general stages of a management consulting project, which are problem identification and structuring, defining hypotheses to solve problems and validate potential solutions, engage decision-makers in solutions, and support implementation of accepted solutions.

For the problem identification and structuring, to better respond to the challenges of the Reduction of Operational Irregularities and Reduction of MCT subprojects, several approaches were followed. In an initial stage of diagnosis, some interviews and conversations were conducted with professionals of the distinct operational areas inherent to both subprojects. After this first stage, a steering meeting was conducted with the main purpose of conf demonstrate the initial analysis tools that had been developed as well as characterization of the delays and the transfer process for the Irregularities and MCT subprojects for operational contextualization, respectively; and to define the work stream for the second stage of the project.

During the definition of hypotheses to solve problems and validation of potential solutions several interviews were made to the different stakeholders and observations were conducted throughout the different areas of the Lisbon Airport, during different time ranges of the day, often in the platform next to the aircrafts. Also, for the Irregularities subproject the databases provided were treated in order to obtain the main causes of TAP's flig database provided and the observations realized, the processes that contribute negatively to the MCT (bottlenecks) were identified and analyzed, initiating the feasibility analysis to readjust the MCT. In this stage several progress review meetings adequacy between the devel oped work and the project's objec theoretical knowledge such as the Pareto Law[59] and Westminster Universi steering meeting was done to present the analysis tools further developed, and also, to demonstrate analysis dashboards of irregularity patterns and deeper analysis on transfer processes that negatively contribute for the MCT, with initial recommendation proposals.

For the engagement of the decision-makers in the solution two surveys[60] were elaborated, one to understand the perception of passengers about

[59] Rasiel, Ethan M., *The McKinsey Way, Using the Techniques of the Worldô You and Your Business*, Mc Graw-Hill

[60] Malhotra, Naresh K and Birks, David F. *Marketing Research ïAn Applied Approach.* 3rd Edition, Prentice Hall, 2008

some possible recommendations that could be suggested to TAP; the total number of completed responses was 100 and 200, respectively. After all of the previous work was finished and the analysis results established, several brainstorming sessions were done to set and deepen the final recommendations. The final meeting with the client occurred at the end of this stage, focusing on recommendation of corrective measures for main delay causes at Lisbon Airport and on the viability of readjusting the MCT; their implementation

DEVELOPMENT OF A PARTICULAR PROJECT'S TOPIC

In this section, it will be explained in more detail the methodology followed to develop one of the main recommendations of the MCT subproject. Considering that the project has two subprojects, the team was divided in two subgroups. In this way, I was allocated in the MCT subproject, with my colleague Maria Inês Coimbra and with Augus.to's valuable help

One of the bottlenecks identified through the numerical model developed for the computation of the real MCT at Lisbon Airport, using numerical data collected from interviews with TAP collaborators and through repeated observation of determined processes, was the passport control. Through several observations in loco it was also possible to confirm that in some time ranges of the day the passport control area is flooded with passengers and that there is an evident difficulty in processing them, mostly due to a reactive position of the entities involved in this process instead of a more proactive one. As mentioned in the group report four recommendations were developed with the goal to minimize the negative effect of this bottleneck.

In specific for the maximization of utilization of the existing resources, the recent RAPID system (Automatic Identification of Passengers Holding Travelling Documents), which allows for European citizens, in possession of electronic passports, and more recently pre-registered Angolan citizens, to go through an automatic passport control, was a subject deserving of close attention by the group, since it is a technology developed with the main purposes of making the passport control as efficient as possible, by its ability to detect document forgery, and also to make the entire process fast and, consequently more convenient to passengers.

Having the notion that the maximization of the utilization rate of the RAPID system would contribute for the reduction of passport cont

only information available online, since TAP did not had any available documents about the subject, but also to have an interview with a collaborator from *SEF*. Consequently, an interview was conducted to *Adjunto* Nuno Francisco from *SEF* who provided few information about the new system, due to serious lack of official information; nevertheless was able to explain that the current

machines that support RAPID are not being fully used and that frequently happens because passengers frequently do not have the notion that are eligible to use the system. Also, it was extremely difficult to gather online information about RAPID. After the above described situations, alongside Lisbon Hub's Director and Constança and further discussion of ideas the recommendation to **inform the existence of the RAPID system** was considered to be viable.

By informing the existence of the RAPID system as well as the procedures to follow when using it would reduce the time waiting in the conventional passport contro would choose to use the RAPID equipment. As a result, assuming that with the new information the usage of the RAPID would increase 5%, the time in queue for passport control would decrease 5% in the time ranges where the operation is considered to be critical, this is when there is more plains arriving and/or departing. It was taken into account the difference in operation during the summer and the winter, the two periods considered by IATA, since summer as a more intense operation; the reason why the time for the passport control during critical time ranges in the summer corresponds to an average of 25 minutes and during critical time ranges in the winter corresponds to an average of 15 minutes. The not critical operation time ranges were not taken into consideration due to the fact that the conventional passport control processes passengers that pass by during those time periods without difficulty, and the maximization of the RAPID system utilization would not reduce the time of the process.

With the collected data and described considerations, with the implementation of the recommendation the passport control process would be reduced in approximately 1.25 minutes during summer operations (25 x 0.05) and 0.75 minutes during winter operations (15 x 0.05). Currently, the utilization percentage of this system is quite low for what it was expected, namely it is approximately 15%, which is due to insufficient information available about it, as mentioned. Therefore, through posters placed in strategic areas dedicated to *SEF*, brochures to be delivered during the boarding and showing a movie on board, the use of RAPID boxes by passengers with electronic passport would highly increase.

In order to simplify the comprehension of th final presentation with the client, it was used an implementation easiness scale from 0 to 10, with 0 corresponding to the hardest level of implementation while 10 corresponded to the easiest one. The easiness of the implementation of this recommendation is considerably high, in the sense that it only consists in developing a communication plan that would not only benefit TAP by reducing the overall transfer process but also by decongesting an Airport area and contributing for a better

experience to Lisbon Airport passengers. Consequently, it was considered that this recommendation corresponded to a level 7 in the mentioned scale.

In the Recommendations Matrix for the MCT sub-project, where the vertical axis corresponds to impact in time savings and the horizontal axis to the implementation easiness based on several indicators, the recommendation to inform the existence of the RAPID system was placed on the first quadrant, a ***quick win***, being therefore one recommendation to be implemented in the near future.

PERSONAL CONTRIBUTION AND LEARNINGS

The three months experience at TAP was of extreme help for me to put into practice the knowledge acquired during the first year of the Master's work methods that contributed for a valuable project delivery and for an adequate entrance in the corporate world.

More importantly, the Consulting Lab was essential for me to be conscious of my contributions when working in a group, which is essential to be successful and thrive inside an organization, because it helped me to know my strengths and things I must improve. As introduced by Constança Casquinho in the beginning of the Consulting Lab, is a good tool for behaviour assessment in group work environment, because it provides a questionnaire that, according to the provided answers, explains in which behaviour the ones in which a person must work on. After answering the questionnaire I was able to categorize my role in the group for the Consulting Lab (see Appendix 9.3) and better understand where I could improve by working with my group members.[61]

The cluster in which I had a highest score was Team Worker; in fact the promotion of group unity and harmony was for me highly important since every member of the group was very different and with distinct potentials, which for me was necessary to develop a strong project with a good analytical basis, but with detail and appealing through the way it would be presented.

The second behaviour cluster in which I had the highest score was Monitor. Despite the fact that I was not the project manager[62] I believe that I contributed for the continuous review of the work done and discussion of the best ways to present deliverables in the meetings with the client. Nevertheless, in order to excel as monitor I must try to be more objective when discussing the format of the deliverables.

[61] The Belbin's questionnaire is a tool to help team work led by Dr. main purpose of understanding what controlled the dynamic of teams and how problems could be pre-empted and avoided.

[62] The group member that is responsible for coordinating the development of the project.

The third one was President, which helped me Constança Casquinho and define priorities, set schedules and lead in the communication with the company's collaborators and third parties wh characteristics I was able to motivate my colleagues and ask for help in the areas where they are better (taking notes, designing presentation templates, creating analysis dashboards, among others). Also, I believe I was a valuable resource to promote communication between the group and the stakeholders of both sub-projects, something essential for the success of the final deliverables, which in the end corresponded to the client's neces

The fourth behaviour cluster was Prospector, which alongside with the President cluster, I was able to discuss ideas frequently exposed during progress review meetings Constança Casquinho, collect data from TAP's However, I have noticed in the beginning of the project a slight difficulty to engage with some people, delaying the collection of necessary information, something that was solved by the intervention my colleagues.

The fifth cluster was Strategist; my contribu not very expressive project manager made an excellent contribution to the way the project's deliverables were structured and ho almost just to discuss the alignment of the g

The bottom three clusters were Operational, Finisher and Intellectual, with rather low scores. Regarding the Operational cluster, my contribution to the creation of an organizational frame was relatively low, consisting mostly in the help to define each one's main roles and activities such as processing receipts from t

The last two clusters, Finisher and Intellectual, with the same low score, were the areas where in fact I could not contribute much; it was difficult to respect deliverables deadlines and have a constant focus on the details by the end of the project, mostly due to the workload, and also, to present new and disruptive ideas to the group, due to personal lack of creativity and complexity of the airline industry.

Making a brief analysis to the entire team, I believe that because every member of the group was different for each other it was possible to explore different behavioural roles to reach the common goal of corresponding to the client's expectations understand how can we enter the corporate world with the necessary tools for a successful career. Nevertheless, I have concluded that a common trait should be improved, the difficulty in following and respecting deadlines, in taking closer attention to details and in focusing on a specific task for several hours was something that negatively contributed for the group harmony in the end of the project, when the workload became heavier and more complex.

In conclusion, I believe that by making the Consulting Lab I became more aware of my individual potential and, most importantly, of my improvement opportunities whenever I have the chance to work and learn from other people, which will certainly happen in the future.

10.5 INDIVIDUAL REPORT ï Maria Inês Forjaz Morão Dias Coimbra

THEORETICAL AND METHODOLOGICAL CONTEXT

As referred in the group report, the Consulting Lab has a consulting project nature, therefore its methodology was built recurring to the general stages of a management consulting project, which are problem identification and structuring, defining hypotheses to solve problems and validate potential solutions, engage decision-makers in solutions, and support implementation of accepted solutions.

For the problem identification and structuring, to better respond to the challenges of the Reduction of Operational Irregularities and Reduction of MCT subprojects, several approaches were followed. In an initial stage of diagnosis, some interviews and conversations were conducted with professionals of the distinct operational areas inherent to both subprojects. After this first stage, a steering meeting was conducted with the main purpose of confirming with the client demonstrate the initial analysis tools that had been developed as well as characterization of the delays and the transfer process for the Irregularities and MCT subprojects for operational contextualization, respectively; and to define the work stream for the second stage of the project.

During the definition of hypotheses to solve problems and validation of potential solutions several interviews were made to the different stakeholders and observations were conducted throughout the different areas of the Lisbon Airport, during different time ranges of the day, often in the platform next to the aircrafts. Also, for the Irregularities subproject the databases provided were treated in order to obtain the main causes of TAP's flight delays, whil database provided and the observations realized, the processes that contribute negatively to the MCT (bottlenecks) were identified and analyzed, initiating the feasibility analysis to readjust the MCT. In this stage several progress review meetings adequacy between the developed work and the p theoretical knowledge such as the Pareto Law[63] and Westminster Universi steering meeting was done to present the analysis tools further developed, and also, to demonstrate analysis dashboards of irregularity patterns and deeper analysis on transfer processes that negatively contribute for the MCT, with initial recommendation proposals.

For the engagement of the decision-makers in the solution two surveys[64] were elaborated, one to understand the perception of passengers about

[63] Rasiel, Ethan M., *The McKinsey Way, Using the Techniques of the Worldô You and Your Business*, Mc Graw-Hill

[64] Malhotra, Naresh K and Birks, David F. *Marketing Research ïAn Applied Approach.* 3rd Edition, Prentice Hall, 2008

some possible recommendations that could be suggested to TAP; the total number of completed responses was 100 and 200, respectively. After all of the previous work was finished and the analysis results established, several brainstorming sessions were done to set and deepen the final recommendations. The final meeting with the client occurred at the end of this stage, focusing on recommendation of corrective measures for main delay causes at Lisbon Airport and on the viability of readjusting the MCT; their implementation was not started sinc

DEVELOPMENT OF A PARTICULAR PROJECT'S TOPIC

In this section, it will be explained in more detail the methodology followed to develop one of the main recommendations of the MCT subproject.

Considering that the project has two subprojects, the team was divided in two subgroups. In this way, I was allocated in the MCT subproject, with my col valuable help.

First of all, to study the viability of reducing the MCT in 15 minutes, it was imperative diagnose the challenge, more specifically all the procedures included in a passenger and baggage transfer were observed, as well as all the entities involved in those processes were interviewed and a numerical model was constructed. From this diagnostic phase, it was possible to identify the bottlenecks of the processes, which are the deboarding, the passport control and the security control.

Since the security control is one of the bottlenecks, it was developed a detailed diagnostic to determine its problem. To be precise, this procedure was observed *in loco* at the arrivals' secu control, which is the security control for the transfer passengers[65], mainly during the critical time ranges (from 5:00 a.m. to 9 a.m.). Additionally, during the observations, it was counted the time that several passengers spent on it, with the purpose of known in which stage of this activity the passenger spent more time.

With the observ[66], it was possible to conclude that one of the reasons for the security control being a bottleneck is the fact that several passengers do not prepare before passing it. For instance, frequently a passenger does not prepare his computer to be controlled separately, as well as he does not remove his personal items and clothes.

After the diagnostic stage, the next step consists on researching and analyzing hypotheses to solve this challenge. Hence, with this purpose, several entities were interviewed, such as *Prosegur*, Hub Control Centre team and the Hub Director. Taking into consideration all the information collected

[65] These passengers have a transfer from a Non-Schengen country to a Schengen destiny.
[66] This analysis was developed with the valuable help of the Professor José Pinheiro

and with a brainstorming session, it was determined that one of the best measures to agile the security control procedure is creating an *Easy Check Program*, which includes the creation of a preparation zone at the arrivals' security co

More specifically, this recommendation consists on creating a previous preparation zone before passing the security control with informative signs about the steps to follow (i.e. removal of personal items and clothes), with the aim of ensure a fast security control. Moreover, the *Pontos Amarelos* should be present to help the passengers with more difficulties.

During the development of the *Easy Check Program* recommendation, it was estimated its impact in time savings (minutes) and its easiness of implementation.

The *Easy Check Program* would prevent situations when a security aisle is blocked, because a passenger did not previously prepare for it and it also would remove a high percentage of passengers in the queue. The impact estimated was a accord the security control is considered to have a time of 10 minutes[67] during the critical time ranges, when usually it has a queue. Thus, it was predictable that this measure would reduce 20% of the time waiting in queue, which is approximately 50% of this activity's time. More pre 1 minute, i.e. 20% of the 5 minutes (50% of 10 minutes).

In order to know the easiness level of the re into consideration the stakeholders involved, the necessary investment and the potential obstacles.

Firstly, the main stakeholder involved in the implementation of this measure would be *ANA Aeroportos de Portugal*, namely it would be responsible to create the preparation zone and to put the informative signs, as well as to train the *Pontos Amarelos* team for their new function. Furthermore, *Prosegur* would be responsible to help in the *Pontos Amarelos's* training, since *Prosegur* agents know precisely the steps that a passenger should follow to be well prepared. These two stakeholders would benefit from this measure, so it was assumed that both would support it. Moreover, the *Easy Check Program*'s implementation would not require a only necessary an investment to construct the preparation zone, to create the informative signs and also to train the *Pontos Amarelos.*

On the other hand, one potential obstacle for the implementation of this recommendation would be the actual airport infrastructure. In other words, the previous zone of the arrivals area has at the same time a flow of transfer passengers and passengers who will stay at Lisbon, so

[67] This time was estimated based on observations and with information collected from the Hub Director and Hub Control Centre team.

ANA has to select a strategic location for the preparation zone in order to ensure a normal passengers flow. Therefore, assuming that *ANA* would be capable to surpass this potential obstacle, the easiness of the *Easy Check Program* implementation was considered high.

To conclude, as it was mention in the group report, it was also constructed a recommendation matrix in which the *Easy Check Program* recommendation was considered a **quick-win** with a medium impact but with a high easiness implementation (see Appendix 7.1.2 from the group report). In this way, it was concluded that this recommendation should be take into consideration by TAP to future negotiations with ANA, with the aim to agile the passenger transfer process.

PERSONAL CONTRIBUTION AND LEARNINGS

With the Management Consulting Field Lab, I had the opportunity to have as my first experience in real world business an ambitious and challenging project in one of the largest national companies from one of the most complex sectors.

Firstly, this consulting project allowed me to learn an effective methodology to approach a project. More specifically, I learned that in a first objective, in order to ensure that the proj expectation. Moreover, in a consulting project, or another type, a work plan is vital to guide the project and to guarantee that deadlines are fulfilled. Furthermore, I also learned that it is quite important to follow a specific methodology to approach a problem, which in a first stage it should be the diagnostic of the actual situation, then, it should follow to the analysis phase and finally the definition of the recommendations.

Since it was a group work project, I improved my listen actively ability, communication and cooperation skills, which are quite important for my professional future. To specify my role in the team, I would like to start to present my results of the Belbin's Model[68].

In this way, the Belbin's Model (see Appendix 9.4) revealed that my main roles in a team are Team Worker and Monitor[69] i.e. according to Dr. Meredith Belb using their versatility to identify the work required and complete role of Monitor consists on "provide a logica weigh up the team's options in a dispassionate[70].

---

[68] *What's your most natural team role? Nobody's perfect*, but Belbin's Model
[69] The roles included in Belbin's Model are: President, Monitor, Operational, Team Worker, Prospector and Finisher
[70] http://www.belbin.com

In fact, I identify myself in those roles, namely I consider that during the project, I tried to provide support to the all team in order to ensure that all members were working together effectively, as well as when the team was in brainstorming process, I always tried to analyze the ideas from several perspectives and carefully weigh the pros and cons of all the options before coming to a decision[71]. Besides, I also consider that I was extremely mature when receiving and giving feedback, in which I always tried to do in a dispassionate and professional empathic way.

Furthermore, I also learned that to have a good team performance is quite important the team bonding[72]. In this case, I consider that our group had a great team bonding, namely, although our project had two subprojects and so the team was divided in two, we always helped and cooperated with each other independently of the subproject.

Additionally, during the project, I also concluded that it is imperative to have a cooperative relationship with the inspectors, in this project, it was extremely important the collaborators' cooperation to understand stakeholders about the problem, since the project was focused on analyzing their work and finding approaches to improve it.

Developing this project with TAP, it was an opportunity to acquire knowledge about the company and also about one of the most complex sectors, the airlines industry. In other words, considering the scope of the project, I had the opportunity to observe *in loco* all the processes included in the project[73], as well as interview several collaborators from different entities that are involved in those processes. Besides, it was possible only with the Hub Director and Hub Control Centre team. operations involve several independent entities, as also, their success depends on the effectiveness of each activity. Therefore, I am able to confirm the complexity of the air

As it was mentioned previously, I was allocated to the MCT subproject, which was an ambitious and challenging subproject that allowed me to develop my ability to interview and observer skills, as well as my brainstorming capabilities to find new methods to agile the transfer process. Moreover, with this specific subproject I learned about the best practices of the sector, such as the case of the Amsterdam Schiphol Airport with a MCT of 40 minutes.

[71] Casquinho, C. 2013. *Team dynamics ï Belbin. Consulting Lab*. Lisbon: Nova School of Business and Economics

[72] Rasiel, Ethan M., *The McKinsey Way, Using the Techniques of the World ô You and Your Business*, Mc Graw-Hill

[73] Turnaround Process, Passenger Transfer and Baggage Transfer Process

This subproject allowed me to realize the importanc
to be precise in the TAP's case the reduction
revenues.

To conclude, this Management Consulting project not only gave me the opportunity to work with one of the largest Portuguese companies, but also allowed me to work with an experienced advisor, Constança Casquinho. More specifically, with the support provided by Constança Casquinho, which I take this opportunity to thank her, I acquired knowledge that will be extremely valuable for my professional life.