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A Comparative Research on The Crew Planning Department of Airlines Adopting Different Business Models-Turkish Flag Carrier and A Low-Cost Airline Example

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Abstract

Airlines operating in Turkey strive to be international leaders in their segments by adopting different competitive strategies. The crew planning department plays an active role in achieving the goals of an airline. In this study, the crew planning departments of airline companies that adopt two different strategies are compared and the differences they encounter in practice are revealed.

1. Introduction

Airline companies have emerged in the first quarter of the 20th century (Wensveen, 2007), and have gained an important place in the passenger transportation industry by growing continuously (TOBB, 2018). Due to the rapid growth in the industry, the intensity of the competition between airline companies has increased day by day (Küçükönal & Korul, 2012), and reached its highest level at the beginning of the 21st century. At the beginning, there were the major airlines which evolved into FSCs in today's terminology, the regional airlines and the charter airlines. After deregulation, LCCs entered the sector as a new model, but even this model had been pioneered by Southwest (founded in 1967) and built on the charter airline model's focus on cheap tickets. Eventually, increased competition (mainly due to rapidly growing LCCs) in the deregulated era led to major changes in business models. Thus, more competition has caused changes in existing business models and the invention of new ones, and airline companies have started to adopt different business models in order to reduce the severity of competition by segmenting the market (Koch, 2010).

Recently, it is observed that airlines adopting different business models have started to enter into each other's fields of activity (Wit & Zuidberg, 2012). For this reason, especially full-service and low-cost airline companies strive to gain a competitive advantage against each other by controlling "the overtime fees (Hava-İş, 2019), accommodation fees paid to cockpit and cabin crews, the fees paid to the accommodation facilities, and the transfer fees between facilities and the airport (Durmuş & Öztürk, 2014). The Crew Planning Department assumes one of the most important tasks in this regard (Üzülmez & Çalışkan, 2018). In order to perform the most effective flight operations at the lowest cost, the crew Planning department is engaged in two consecutive activities that complement each other: Crew Pairing and Crew Rostering (Barnhart et al., 2003). The crew pairing addresses the problem of finding a flight sequence, while the crew rostering focuses on the problem of determining the cockpit and cabin crews to be assigned to these flight sequences (Tekiner et al., 2009).

According to the business model, the expectations from crew planning departments and their focus points may differ. In the study, semi-structured interviews were carried out with the managers and employees of the crew planning departments

of a low-cost airline company and a full-service provider, which operates as Turkey's flag carrier airline, and the similarities and differences that emerge according to the adopted business model were studied.

2. Conceptual Framework

2.1. Business Models in the Airline Industry

The airline business models that comply with the competitive strategies introduced by Porter, 1980 can generally be discussed in five classes: the full-service provider, low-cost, regional, charter, and air taxi business models (Koch, 2010). In accordance with the differentiation strategy, full-service airline business model offers the highest level of service for different passenger classes (Özkan, 2019). In this business model, high costs are incurred in exchange for carrying passengers with high ticket fees (Mutlu & Sertoğlu, 2018).

The full-service provider airline business model is mostly adopted by large airline companies operating on multiple continents. They have a mixed fleet structure, which usually consists of wide and narrow-body aircraft (Önen, 2018). Due to *Flight and Duty Time Limitations and Rest Requirements* (FTL) instruction and the variety of services offered on-board, they employ more than the minimum number of cockpit and cabin crew members (Steine et al., 2009). This business model has specific features such as maintaining operations in primary airports (Wit & Zuidberg, 2012), operating connected flights using certain airports as a Hub & Spoke center (Erdoğan, 2018) and establishing low-cost airline business subsidiaries.

Low-cost airlines usually provide services only to economy class passengers with a uniform fleet of narrow-body aircraft (Eroğlu, 2015). In accordance with the cost leadership strategy, there is a constant effort to develop mitigating practices on all items of expenses (Dinçer, 2013). Low-cost airline companies prefer secondary airports to procure the services offered by the airport at more affordable rates (Şen & Akpur, 2015). As the flight density of secondary airports is less, the ground times are kept to a minimum to carry out a more frequent number of flights (Erdoğan, 2018). In addition, it is aimed to control the costs by assigning the lowest number of the cockpit crew and cabin crew allowed (Shaw, 2007).

Regional airlines, on the other hand, usually use the focus strategy. They try to avoid the severity of competition by operating flights with regional jets with seats usually less than 100, or turbo props aircrafts to destinations where other airline companies do not operate flights. Some regional airlines can generate revenue by moving passengers from small cities to Hub & Spoke centers on behalf of full-service airline businesses (Bieger & Agosti, 2005). In this business model, since the total number of flights, aircraft, flights, and cabin crew is smaller than in other business models, expense control activities are mostly based on cockpit and cabin crew fees.

Charter airlines adopt a focused cost leadership strategy (Gerede, 2015). In this business model, it is aimed to achieve the maximum number of flights by selling seats to tour operators in blocks (Aldemir, 2018). Agreements are most often concluded before the holiday season (Balta & Altıntaş, n.d.). Since the cockpit and cabin crews to be employed are usually seasonally determined, options such as unpaid leave or dismissal may be on the agenda during periods when the need decreases (Jull, 2016). In general, the demand for charter flights is low compared to other airline business models.

Adopting a focused differentiation strategy, Air Taxi businesses offer a small number of passengers the opportunity to travel with high quality and flexible hours through business jets in their fleet (Wensveen, 2007). The share of business jets leased by passengers who can pay high fares in the airline industry is increasing regularly (Vincent, 2020). There may be sudden changes in the schedules of cockpit and cabin crews as air taxi companies offer flexible flight hours to passengers. Effective flight planning is required to keep these changes under control, which may lead to an increase in overtime and accommodation fees.

Although there are differences in practice according to the adopted business model, the crew planning department is primarily responsible for ensuring that the operations of airline companies are carried out smoothly and at the lowest possible costs.

2.2. Crew Planning Department

Crew planning activity is a complex and dynamic process consisting of various tasks such as calculating flight duty period (FDP), duty period (DP), and rest time of cockpit and cabin crew members (Akyurt & Yaşlıoğlu, 2018), recording professional health controls, annual leave, training, and considering the circumstances that hinder the flight of the members (Akyurt & Yaşlıoğlu, 2018; Ernst et al., 2004). Crew formation activities include cockpit and cabin crew members and may differ depending on the structure of the industry, the size of the company, and the intended purposes.

The cockpit crew members consist of at least one pilot in command and a co-pilot. The pilot in command is a person who is responsible for the entire operation of the aircraft during flight duty and is licensed by an authorized civil aviation organization of the relevant aircraft type (SHGM, 2016). The cabin crew consists of cabin attendants licensed by an authorized civil aviation organization and who have successfully completed the airline's training, at least one of whom is a cabin chief. The cabin chief is appointed from cabin attendants who have at least 1 year of cabin attendant experience and have successfully completed their training and control flights (SHGM, 2019).

The body size of the aircraft, the number of seats, the number of emergency exit doors (SHGM, 2002) and the FTL instruction issued by the civil aviation organizations of the countries can cause significant variations in the formation of cockpit and cabin crews (EASA, 2017). However, the procedures of the airline company, the earned rights by collective bargaining agreements, the existence of connecting flights, aircraft parking capacity of airports, safety, security, and comfort conditions in the accommodation airports, and differences in service according to the business model adopted by the airline may also be effective in this regard.

In addition, the crew planning department has important additional tasks such as rostering cockpit and cabin crew to specific flights they prefer, scheduling annual permits to the dates they request, and balancing the distribution of the number of monthly and annual flights and the number of airports for flights and accommodation. It is aimed to maintain labor peace and increase motivation through these additional tasks (Barnhart et al., 2003).

2.2.1. Crew Pairing

The crew pairing activity usually refers to the scheduling of a series of flight duties that end where they started. When scheduling flight sequences, first of all, the maximum FDP, flight time (FT), and DP determined by civil aviation organizations for crew members are taken into account. FDP

covers a period that begins when a flight crew member reports his/her arrival for flight duty and ends when the aircraft's engines are shut down after the last flight (SHGM, 2018). FT is a period that starts with the first movement of the aircraft for each flight and ends with the shutdown of the engines at the end of the flight (SHGM, 2017). DP refers to the period between the arrival of crew members at the designated time at the place of duty and decommissioning from all duties at the end of the flight (Erkayman, 2013).

The procedures of the airline companies and/or the procedures that can be arranged in favor of the crew members as a result of trade union activities can have an effect on FDP, FT, and DP. There may be differences in the determination of these periods in two airline companies with different operational conditions, as well as the differences in the periods determined for different bases of a single airline company (Hava-İş, 2019a).

Many airlines plan connecting flights for destinations where passengers cannot go directly (Gerede, 2015). Passengers collected at major airports designated as Hub & Spoke centers are distributed to a wide range of flight destinations through connected flights. In order for connected flights to be carried out without delay, it is necessary to plan the flight sequences with extreme caution (Medard & Sawhney, 2007).

Each airport has a certain capacity, and in order for airlines to use airport services, they must have obtained a permit called SLOT prior to the flight (İnan, 2020). SLOT refers to the allocation of the time required to the airline company usually for a fee, for the flight of the aircraft from the relevant airport (Cengiz, 2010). Availability of SLOT dependent on the airport capacity is important, especially in order to meet the additional flight requests of airline companies and to evaluate the feasibility of new lines (Battal et al., 2006).

Crew planning departments work in cooperation with various departments to prevent possible delays by effectively planning the time that aircraft spend on the ground. For example, the maintenance activities of the technical department have an important place in the effective use of the time spent on the ground. Maintenance operations, which are often audited by authorized civil aviation organizations (SHGM, 2008), can be scheduled between flights or when the aircraft is parked during an overnight stay (Gerede, 2017).

Airline companies cannot generate revenue during the time that planes are on the ground. Therefore, the crew planning departments attempt to create flight sequences that allow for the highest number of flights. When creating flight sequences, planners should determine at which airport the aircraft will spend the parking time taking into account the connected flights and where the next flight series will start, check the availability of parking at the relevant airport, coordinate with the technical department should be ensured if there are planned maintenance procedures during the parking period, and ensure the safety and comfort of the crew staying at the airport or in a suitable facility. An extremely complex structure arises when the coordination of these activities is carried out for a large number of aircrafts, flights, and crews. After the completion of the crew pairing activities through the flight sequences, the crew planning department starts the crew rostering, which is also very challenging the second problematic issue.

2.2.2. Crew Rostering

Crew rostering activity refers to the creation of individual programs of the crew members taking into account the criteria of aircraft type, FTL, airline procedures, trade union requirements, and a balanced distribution of duties. In order to create individual programs, the number of crew members required for each type of aircraft must first be determined. The number of crew members varies according to the aircraft size. Civil aviation organizations generally require that at least 1 cabin crew member is on board for every 50 passenger seats and/or each emergency exit door (SHGM, 2002). The minimum number of cabin crew members increases in wide-body aircraft types due to the seat capacity and the high number emergency exit doors. In addition, there must be at least 2 pilots on the passenger aircraft, one of whom is the pilot in command (Lim at al., 2017). However, with the inclusion of flight engineers in the cockpit crew in some types of wide-body aircraft, the number of flight crew members may increase (EASA, 2019).

Another important factor that should be taken into account when determining the number of cockpit and cabin crew members is the FTL instruction. The instruction details many practices, especially on FDP, FT, and DP; such as, duty start times, number of flights, situations and requirements where the maximum duty period can be extended, in-flight and post-flight rest times, transitions between consecutive day and night duties (SHGM, 2018). Factors such as technical disruptions during the flight, the intensity of the airport, deteriorating health condition of the passenger, and adverse weather conditions can cause delays (Serdar, 2019). In such unforeseen circumstances, FDP may be extended and the Extended Maximum Daily FDP chart may be used within certain restrictions. In addition, if certain conditions are met, extended FDP can be applied for flights with a planned departure from the main base. In this case, cockpit and cabin crews should be provided with in-flight rest and at least one additional crew member should be assigned (EASA, 2017).

The rest period allocated for the crew members at the end of the flight should be at least 12 hours or as much as the previous FDP, depending on which one is longer. Outside the main base, this duration is applied as 10 hours or as the previous FDP (SHGM, 2018). If transition from a night flight to an early day flight is planned, then at least one-night rest should be allowed between the two duties, and at least 60 hours of rest should be planned if four or more consecutive night duties are assigned (EASA, 2017). These restrictions increase the number of crews necessary to complete flight sequences.

For the crew planning department, the airline's procedures are important, in addition to the FTL instruction, in the preparation of flight schedules. Scheduling more than the minimum number of cabin crew on certain flights, having cockpit and cabin crew members with different ratings, paid and unpaid leave periods, and special requests can affect the activities of the crew planning department.

If cockpit and cabin crews are unionized, many rules of FTL instruction and operating procedures that form the basis for the preparation of flight schedules can be changed in favor of the personnel (Akyurt & Yaşlıoğlu, 2018). Therefore, the activities of the crew planning department may differ between airline companies depending on whether the personnel are represented by a union or not. Determining the number of annual leaves, crew rostering of extra members for short flights, and FDP, FT, DPs, determined specifically in the collective bargaining agreement, in favor of employees affects crew rostering activities (Hava-İş, 2019).

The appointment of cockpit and cabin crews to the long consecutive duties, night flights, or numerous accommodation

tasks can increase the level of fatigue (SHGM, 2018). If some of the crew members consistently find their flight schedules to be more exhausting than other members, labor peace may be disturbed. This condition, which may create a decrease in the level of job satisfaction and motivation, may cause a decrease in service quality, and have a negative impact on the profitability and sustainability of the airline business (Yangınlar & Kabul, 2020).

The crew planning department performs an important task to ensure labor peace by preparing balanced flight schedules and thus increasing the competitiveness of the airline company. Activities such as granting cockpit and cabin crews the right to choose a certain number of flights, taking into account their preferred annual leave dates, allowing free days on birthdays and anniversaries are among the methods used by crew planning departments to increase job satisfaction and motivation. The crew planning departments carry out crew rostering activities by considering all these factors.

3. Research Purpose, Importance, And Problem

The study aims to contribute to the literature and relevant stakeholders in the industry by comparing the crew planning activities of two airline companies that adopt different competitive strategies in Turkey.

In the literature, there are no studies investigating the differences between the crew planning departments within the scope of the competitive strategies adopted by airline companies. It is important that the crew planning activities that have a significant impact on the profitability and sustainability of airline companies are investigated in-depth for a contribution to the literature.

The majority of the human resources employed in airline companies are cockpit and cabin crews. The research problem is to reveal the crew planning activities applied for the effective use of human resources in airline companies that adopt different competitive strategies.

4. Research Method

The research was conducted at two airlines operating in Turkey in 2019 by adopting qualitative methods. For the purpose of explaining the problem in-depth in the qualitative research method, the information collected from the relevant people is analyzed by creating themes that lead from the specific to the general (Creswell, 2007). The use of the purposive sampling technique together with the qualitative research method makes it possible to obtain more information about the subject being investigated (Curtisa, 2000).

The research participants consisted of managers and employees of the crew planning departments of two airline companies. Firstly, the crew planning department managers of each airline were interviewed within the scope of the research. Based on the information received from the department managers, department employees with at least 3 years of professional experience in the relevant airline were identified and included in the study. The number of participants is a total of 10 individuals, consisting of 5 individuals for each airline, including managers of the crew planning department of the two airlines. Semi-structured interviews were conducted with the participants. The interview technique allows direct access to the feelings and beliefs of the people participating in the research (Patton, 2014). The semi-structured interview technique is often preferred since it provides flexibility for the researcher (Tümüklü, 2000). An in-depth interview is possible with the prepared interview questions that can have a new direction according to the responses given by the participants (Toprakçı & Aksoy, 2019; Ekiz, 2003).

The research questions were prepared by considering an article that two of the authors had previously published about crew planning management and other studies available in the literature, such as DGCA, EASA publications. In addition, while preparing the interview questions, the questions that the authors obtained from the literature in the previous article were developed by taking the suggestions of two airline crew planning managers. The participants of the study were informed about the subject matter, the use of audio recording devices, and their right to get their expressions removed from the recordings if they wish. The participants were informed about their confidentiality by stating that codes will be used in the manuscript, instead of their names, and the interviews were conducted in places where they feel free to express themselves clearly to collect the most data possible. T1, T2, T3, T4, T5 codes were used for the names of individuals working in the crew planning department of the flag carrier airline, and the P1, P2, P3, P4, P5 codes were used instead of the names of employees of the crew planning department of the low-cost airline company.

5. Research Data Analysis, And Findings

By assigning codes to the collected data, their relationships with each other were determined and themes were created accordingly. After the activities of the crew planning departments of the two airlines were addressed separately, the differences between them were analyzed and interpreted.

5.1 Turkish Flag Carrier Crew Scheduling Department

Eighteen codes were identified as a result of the data obtained through semi-structured interviews conducted with the managers and employees of the crew planning department of the full-service airline operating as a flag carrier in Turkey. The codes were found to be grouped under 7 themes: business model, communication and reporting, aircraft type, airline procedures, trade union, fair and equitable distribution of duties, and FTL.

There are three codes that group under the business model theme: the *'separation of senior (experienced) and junior (inexperienced)', 'standby crew', and 'accommodation'.*

- **Separation of senior and junior:** Professional experience and language competencies are considered in the formation of cabin crew with the idea that maintaining the quality of service at the highest possible level will provide a competitive advantage. In addition, cabin and cockpit crews were classified according to the experience criterion in order to increase flight safety. If there is a junior second pilot in the cockpit crew, the pilot in command must be experienced, or vice versa, a senior second pilot is assigned for the pilot who is new as a pilot in command.
- **Standby crew:** Published flight schedules may be changed during the month for many reasons such as cancellation, delay, divert, compassionate and sick leaves. Business model-specific activities such as classifying crews by providing different training according to the type of aircraft and scheduling more people for flights to priority points of importance, such as the prestigious line, make it difficult to plan standby crews.

- **Accommodations:** Accommodations increase the costs incurred by airline companies. Subsistence paid to crew members, hotel, and transfer fees are important expense items. In order to reduce the number of night layovers, short flights are combined when scheduling the flight sequences. Due to the FDP limits, it is seen as an important crew scheduling activity to plan four short flights as a flight sequence and reduce costs instead of resting the crews outside the main base by giving one short flight after two long flights. *"The scheduling of four-legged flights is not welcomed by the crews, but it is a very effective method in terms of reducing costs,"* said participant T2 on this issue. The term leg is used for each take-off.

Two codes were grouped under the theme of communication and reporting: *'communication'* and *'reporting.*

- **Communication:** The preferred method of communication in the flag carrier airline is the use of electronic mail. Although there is no rule that prevents communication by phone, it takes an effort to access. Prior to the face-to-face interviews with the relevant departments for various reasons, an appointment is requested via electronic forms. Permission must be granted by the responsible authorities of the affiliated department in order to conduct interviews on issues related to different departments. The crew scheduling department needs to work in cooperation with various departments. This vertical communication can be an obstacle in situations that require speed.
- **Reporting:** The reporting culture is quite common in the flag carrier airline. It is expected that all conflicts between employees will be reported, especially in cases related to safety. Particularly, to follow the problems experienced among the cabin crew members, it is requested by the cabin crew department to plan face-to-face meetings under the name of office preoccupation. This increases the workload of the crew planning department and may cause flight schedules to be disrupted.

There are two codes that group under the aircraft type theme: *'variety of aircraft types'* and *'rostering by type'*.

- **Variety of aircraft types:** The flag carrier airline has a large number of narrow and wide-body aircraft in its fleet. Considering the types of aircraft with similar usage characteristics as a single type, cockpit crews only be rostered in one aircraft type, whereas cabin crews can be rostered in three aircraft types. For this reason, it is not possible for cabin crews to take part in some of the aircraft types in the fleet. Participant T1 expressed her opinion on this issue: *We have to pay attention to the classes when assigning tasks. For instance, mistakenly rostering a Y-Class cabin chief licensed for an Airbus 330/350, in the place* of *a V-Class cabin chief licensed for a B777/787 will disrupt the operation. Due to this and many similar classifications, our work becomes complicated.*
- **Rostering by type:** Especially when a new aircraft type is added to the fleet, first of all, the lines, the number, and frequency of flights with this aircraft type are taken into account. Within the scope of these criteria, the crew need is determined and type training is planned. In addition, the annual mandatory recurrent training dates of the crews are planned by considering the number of crews required at that period in the aircraft type.

There are three codes that are grouped under the theme of the Airline Procedures: *'income and expense balance'*, *'number of flight legs'*, and *'employee satisfaction'*

- **Balance of income and expenses:** Civil aviation organizations determine only the minimum number of the cockpit crew and cabin crew, but do not state a maximum number. The flag carrier airline schedules the least possible number of crew members for flights without sacrificing quality. On the other hand, in order to maintain operations at the lowest cost, many factors are taken into account, such as which airport the aircraft will spend long parking periods in, connecting flights, and technical requirements. Participant T3 said, *"We don't just perform a grouping process when scheduling flight sequences. The number of connecting flights is very large, which leads to a complex scheduling process. We are expected to perform operations at the least cost, but there are factors that increase the complexity of the process such as airport availability, SLOT permits, and the maintenance time of the aircraft,"* he said, emphasizing the difficulties of the planning work.
- **Number of flight legs:** The FTL instruction specifies how many take-offs can be performed during a flight duty, depending on the type of aircraft, the start time of the duty, and the total duty time. However, to increase safety in the flag carrier airline and not to wear down the human resources at hand, the maximum number of flight legs that are performed within a duty period is limited with four. Participant T1 stated the following regarding this issue: *"The maximum number of flights per crew in our company is 4 legs. While other airlines can plan 5-legged flights for each cockpit and cabin crew, the fact that our application of procedures not allowing us to plan more than 4-legged flights, has a negative impact on costs and increases the number of crew members needed. My opinion is that it has an important contribution in terms of working conditions and safety."*
- **Employee satisfaction:** Employee satisfaction is taken into consideration when crew planning activities are carried out in the flag carrier airline. In this context, it is aimed to share the workload equally in the cockpit and cabin crew rosters.

There are four codes under the trade union theme: *'24-hour rule'*, *'overtime'*, *'rest periods'*, and *'fixed off days'*.

- **24-hour rule:** The 24-hour rule is a restriction that is applied only to the flag carrier airline in Turkey because of trade union rights. According to this rule, the planned duties of crew members can be changed if they are notified at least 24 hours in advance. For example, T1 stated the importance of the issue to them by saying "Since there is a rule that makes it difficult to assign crew members for sudden flight changes, it causes the planning more crew members to standby duties and increasing our workload".
- **Overtime:** Flight crew members are entitled to overtime pay for each hour when they work over 70 flight hours per month, while cabin crew members are entitled to this right when they exceed 80 flight hours per month. Overtime pays should be carefully planned within the scope of expense management when preparing flight schedules. There is great importance attached to this issue since it will be a loss for the airline to enforce overtime work for some people when there are enough crews at hand.
- **Rest periods:** The rest periods in the flag carrier airline differ according to the FTL instruction. According to the

collective bargaining agreement, the minimum rest period to be given at the end of a flight duty is calculated by three different methods. The calculation of the rest period is carried out by considering twice the FT, a minimum of 12 hours, or FDP, whichever is longer.

- **Fixed off days:** According to the FTL instruction, cockpit and cabin crews should be provided with 96 free days per year. Seven off-days in a month should be given, and the remaining 12 off-days should be distributed at available times. Trade union rights require that 8 fixed off-days must be given per month. In addition, 8 fixed off-days should be allocated in the 2+2+2+1+1 form. As participant T5 said, *"Fixed off-days are a restrictive criterion for us. Sometimes we find it difficult to find a crew in case of need, and we cannot assign people, who have finished their rest period, to duty since they are on their fixed free off-days."*

The codes that are grouped under the theme of fair and equitable distribution of duties include *'person-independent pairings'* and *'off-day requests'*. In accordance with the first of these codes, the pairings are made independent of people when planning the flight schedules.

- **Person-independent pairings:** It is emphasized that each crew member is evaluated equally and efforts are made to issue a fair and equitable schedule in which the seniority of crew members in the airline company and/or personal relationships with crew planning department employees are not involved. For example, T3 explained the importance attached by saying, *"The work we do is capable of affecting the people's lives, and therefore we strive to ensure to issue the fairest possible schedule."*
- **Off-day requests:** Cockpit and cabin crews at the flag carrier airline can request eight off-days and four time-offs of 8 hours for the next month between the 1st and 10th day of the current month. In this context, participant T4 said, *"We are making a great effort to fulfill the wishes of the crews when preparing the programs. We have a priority to satisfy requests as much as possible. We try to create a balance on a monthly and sometimes yearly basis by treating everyone equally fairly."*

There are two codes that group under the FTL theme: *'civil aviation authority audits'* and *'new rules'*.

- **Civil aviation authority audits:**The participants stated that the Directorate General of Civil Aviation **(DGCA)** inspects the crew planning activities through an electronic system, that breaking the FTL instruction imposes financial obligations and is important for the performance of department employees.
- **New rules:** On January 1st, 2019, the FTL instruction was issued with significant changes in practice. Being a much more detailed instruction than before has led to an extension of the time for crew planning employees and cockpit and cabin crews to learn and get used to the new rules. In this regard, training documents have been prepared and crew members have been informed with detailed examples. The instruction, which has been in force for a short time, is supported by the operating procedures to adapt it to the operational structure of the airline. Participant T5 said, *"When the FTL instruction has entered into force, we had to provide information for the crew members to adapt.* Yet, we still receive objections regarding inappropriate duty assignments from crew members, and we have to explain to them that we have not made wrong planning according to the new rules.

5.2 Low-Cost Airline Crew Planning Department

Twenty codes were determined as a result of interviews with managers and employees of the crew planning department of the low-cost airline. It was observed that the codes are grouped under 7 themes: business model, safety management, aircraft type, airline procedures, FTL, communication and reporting, fair and equitable distribution of duties.

There are four codes that group under the business model theme: *'turnaround time, 'base', 'accommodation'*, and the *'number of employees'*.

- **Turnaround times:** Turnaround time up to 25 minutes on domestic flights and up to 40 minutes on international flights can be planned in a low-cost airline. These periods are usually 1 hour or more in full-service airline companies. A quick operation cycle is important to increase revenues by scheduling more frequent flights.
- **Base:** Different bases have been established in order to minimize the accommodation and transfer fees paid to the crew members at the low-cost airline. There are six bases: Istanbul (SAW), Antalya (AYT), Izmir (ADB), Ankara (ESB), Adana (ADA), and Lefkoşa (ECN). Cockpit and cabin crews are offered to work at one of these bases provided that they organize their own accommodation, and requests within the quota are met. The crew planning department makes its plans by recalculating the number of captain pilots, co-pilots, cabin chiefs, and cabin attendants on the bases on a monthly basis. Regarding the bases, *"We are trying to plan all the bases from a single center. Bases other than SAW are being run with fewer crew members. This is advantageous both for the company and for us. Not trying to solve the accommodation problem reduces our workload and keeps the business profitable. The major problem that can be experienced at the bases can be experienced in the* planning *of standby crew,"* said participant P2.
- **Accommodation:** When scheduling flight sequences, the low-cost airline works with the unit that makes hotel adjustments. It is important that accommodation planning is carried out at a minimum level in terms of the hotel fees and subsistence paid to crew members, hotel, and transfer fees are important expense items paid. If there is an increase in hotel expenses at the end of the year, more careful planning needs to be done for the next year. On this issue, *"Expense control is quite important in our business. We are expected to keep costs down as much as possible. We are trying not to deviate from the annual forecasts by carrying out constant checks on hotel fees and charges,"* said participant P3.
- **Number of employees:** The low-cost airline business model conducts operations with the fewest possible employees. Therefore, both the number of employees in the crew planning department and the number of cockpit and cabin crew are less than in other business models. On this issue, *"We have a significant workload, we carry out* planning *activities with a small number of people. In addition, the number of crews is kept to a minimum. We are scheduling standby crew with a limited number of crew members at hand, and we have to disrupt all the plans we have made in unexpected situations, such as adverse weather conditions, and the number of aircraft failures greater than expected,"* said the participant P2.

There are three codes that are grouped under the theme of safety management: *'safety department', 'fatigue levels'*, and

'separation of senior and junior'.

- **Safety department:** Employees of low-cost airlines do not have the right to enter into a collective bargaining agreement. Instead, the safety department provides the management with suggestions about the FT, FDP, and DPs of cockpit and cabin crews, as well as rest and off-day periods within the scope of increasing flight safety.
- **Fatigue levels:** The safety department can follow the fatigue levels of the crew members through algorithms and instruct the crew planning department to make the necessary corrections.
- **Separation senior and Junior:** The safety department pays special attention to the separation between senior and junior when forming a cabin crew. Cabin crew classifications were made as cabin chief, 1st cabin attendant (CA1), 2nd cabin attendant (CA2), and 3rd cabin attendant (CA3). The cabin chief is responsible for the front left door, CA1 is responsible for the rear left, CA2 is responsible for the front right, and CA3 is responsible for the rear right door. The safety department aims to establish equality in terms of experience in front of and behind the aircraft with this assignment structure.

There are two codes under the theme of aircraft type: the *'variety of aircraft types'* and *'rostering by type'*.

- **Variety of aircraft types:** Low-cost airlines usually operate with a uniform fleet of aircraft. Thus, it is aimed to reduce training costs, maintenance, and repair costs, as well as to use the crews effectively. The low-cost airline has three types of aircraft: B737, A320, and A321. The cockpit crew is divided into two classes as a Boeing and an Airbus crew. Since A320 aircraft and A321 aircraft are of a similar type, the Airbus crew can take part in both types of aircraft. Since they can be used in three types of aircraft, cabin crews can be utilized quite effectively. Participant P1 said, *"Our workload has increased as when we started scheduling for two different aircraft types. In the first stage, we were able to plan training for a small number of cabin crews, but over time, all cabin crews were certified. As the training of the cockpit crews took longer, we had a difficult process. It is still difficult to find a cockpit crew due to the type differences at some times."*
- **Rostering by type:** The use of more than one type of aircraft in a flight sequence disrupts the unity of the cockpit and cabin crew. In low-cost airline companies, crew rostering activities usually begin with the selection of a cockpit crew, and then they are combined with the cabin crew to ensure that they act together during the duty period. If two aircraft types are used for reasons such as maintenance requirements, fuel-saving on four-legged flights, the pairing of cockpit and cabin crews is disrupted, and the workload of the crew planning department increases.

The codes that are grouped under the airline procedures are *'restriction of residence'*, *'part-time work'*, *'decision authority'*, and the *'10 hours rule'*.

- **Restriction of residence:** Since the low-cost airline does not have a collective bargaining agreement, the most important restriction following the FTL instruction is the airline procedures. It is aimed to control the transfer costs by obliging the SAW base crews to reside on the Anatolian side of Istanbul. Vehicle planning is carried out for the residence addresses of the cockpit and cabin crews for the transportation to and from their duties.
- **Part-time work:** The low-cost airline offers part-time work to cockpit and cabin crews. The crew planning department informs the flight operations and cabin crew departments about the number of crew members needed in respective months. The crew members who are on a part-time contract are employed full-time in one of the months between July and September. The option of working part-time is offered to cockpit crews as a 15-day unpaid leave, and cabin crew as a 7-day unpaid leave.
- **Decision authority:** The crew planning department has the right to have a say in scheduling such as annual leave and holiday leaves. The crew planning department prepares calendars for annual leave scheduling, taking into account the need for cockpit and cabin crews, and allows crew members to make requests for a total of three different time frames. The flag carrier airline, on the other hand, offers a choice of 12 different time frames for the annual leave request.
- **10 hours rule:** Changes in the schedules of cockpit and cabin crews should be notified at least 10 hours before the start of the duty. About this issue, *"We try not to disrupt the programs we issued as much as possible. Disruption of a person's schedule requires us to reschedule many people's schedules. We make changes to the programs in case of necessity for reasons such as additional flights, and health reports. We need to inform about the change we have made at least 10 hours before the flight,"* said participant P5.

The codes that are grouped under the FTL theme include *'civil aviation authority audits'* *'number of flight legs'*, and *'rest requirements'*.

- **Civil aviation authority audits (DGCA AUDITS):** In DCGA audits, detection of practices contrary to the FTL instruction may result in administrative and financial sanctions. In this regard, *"With the implementation of the FTL instruction, the frequency of audits has increased. Remote controls are carried out by means of technology. In case of non-compliance, fines can be imposed on the company or measures can be taken to stop the flight,"* said participant P4, stressing the importance of the issue.
- **Number of flight legs:** Flight sequences are mostly tried to be planned as 4-legged. In order for the crew to reach the main base during the returns from the accommodation airports, 5-legged flight sequences can be scheduled provided that the last leg is off-duty (deadhead crew).
- **Rest requirements:** The in-flight rest requirements have been tightened by the FTL instruction. In order to benefit from the extended maximum FDP right with the additional crew, one of the three rest facilities with different characteristics must be offered. The maximum FDP varies depending on the rest offered. Aircraft in the low-cost airline's fleet can take advantage of the extended maximum FDP only to a certain extent since they provide a limited rest in terms of the number of seats, placement, and reclining angle of the seats.

The codes that are grouped around the communication and reporting theme are the *'communication' and 'reporting'*.

- **Communication:** Communication is carried out in a horizontal direction, intensively. The preferred way of communication is the use of electronic mail. The use of phones is accepted in order to increase the speed of communication in emergencies. The impact of bureaucratic obstacles is attempted to be alleviated

- through horizontal
- communication.
- **Reporting:** The low-cost airline company is given priority to employee satisfaction, and their commitment is tried to be increased by making them feel like family members. For example, the reporting of personal conflicts to the management are not welcome, this may be perceived as disturbing the peace in such family environment. Unlike the flag carrier airline, the reporting culture covers only circumstances related to safety and business development proposals.

The codes that are grouped under the theme of fair and equitable distribution of duties are the *'person-independent pairings'*, and *'leg fee'*.

- **Person-independent pairings:** ID codes are used instead of names when scheduling the programs. After issuing the rosters, they are only changed when a crew member is absent, has a medical report, or if there are any operational reasons. In this case, the interested parties are informed about the reason for the change.
- **Leg fee:** A low-cost airline has a fee item calculated per flight and expressed as a leg fee. Leg fees vary depending on the duration of the flight. The established fees increase by 50% in the summer season. It is important that the flight schedules are planned in a balanced manner in terms of due fares.

5.3 Comparative Analysis of Crew Planning Departments of Flag Carrier Airlines and Low-Cost Airlines

The themes and codes determined for the crew planning departments of the two airlines were created considering the frequency of the statements emphasized by the participants in their responses to the interview questions and the relationships of these themes with each other. Table 1 shows the themes, codes, and repetition frequencies obtained for the flag carrier airline and the low-cost airline.

Table.1 Themes, Codes, And Frequencies of The Flag Carrier Airline And The Low-Cost Airline.

Themes of Flag Carrier Airline	Codes of Flag Carrier Airline	Frequencies
Business Model	Separation of Senior and Junior	3
	Standby Crew	5
	Accommodation	4
Aircraft Type	Variety of Types	4
	Rostering by Type	6
Airline Procedures	Income and Expense Balance	2
	Number of Flight Legs	5
	Employee Satisfaction	3
Communication and Reporting	Communication	4
	Reporting	5
FTL	Civil Aviation Authority Audits	3
	New Rules	4
Trade Union	24-Hour Rule	6
	Rest Periods	2
	Fixed Off Days	3
	Overtime	4
Fair and Equitable Distribution of Duties	Person-Independent Parings	3
	Off-Day Requests	5
Themes of Low-Cost Airline	**Codes of Low-Cost Airline**	**Frequencies**
Business Model	Turnaround Time	5
	Accommodation	4
	Base	5
	Number of Employees	4
Aircraft Type	Variety of Types	4
	Rostering by Type	4
	Restriction of Residence	3
Airline Procedures	Part-Time Work	6
	Decision Authority	5
	10 Hours Rule	4
Communication and Reporting	Communication	3
	Reporting	2
Safety Management	Safety Department	4
	Fatigue Levels	5
FTL	Separation of Senior and Junior	5
	Civil Aviation Authority Audits	4
	Number of Flight Legs	3
	Rest Requirements	6
Fair and Equitable Distribution of Duties	Person-Independent Pairings	3
	Leg Fee	4

As shown in Table 1, the themes of the crew planning departments of the two airlines are similar, but the issues they consider important to achieve their goals differ. The only difference between the themes identified is the fact that low-cost airline employees do not have the right to make a collective bargaining agreement. The fact that similar codes

group under different themes is due to the different priorities caused by the procedures, safety management practices, and business models of the two airlines.

6. Discussion

The studied flag carrier airline and the low-cost airline are the leading airline companies in Turkey. The flag carrier airline ranks first in terms of fleet size, the number of passengers carried, and employed personnel, while the low-cost airline ranks second. The flag carrier airline adopts a full-service provider business model in line with the differentiation strategy, while the low-cost airline adopts the cost leadership strategy.

Competition strategies may cause practices specific to different organizational structures, organizational culture, and business models. Different competition strategies are adopted in order to gain a competitive advantage by dividing the market in the airline industry where competition severity is high. However, airline companies may increase the severity of competition by entering each other's market sections for reasons such as saturation of occupancy rates on the lines they operate. For example, while the flag carrier airline operating in Turkey and the low-cost airline initially offered services to different market segments, today they compete with each other by scheduling simultaneous flights to many destinations.

The fact that full-service airline companies pay attention to expense management as much as low-cost airlines may enable them to gain a competitive advantage against their competitors. The two major items of expenses of airline companies are fuel costs and personnel wages, respectively. The crew planning department strives to ensure that the company achieves the highest efficiency using the resources at its disposal by planning the schedules of cockpit and cabin crews, which have a significant share of personnel wages, as well as scheduling the flight sequences of aircraft in the fleet. For this purpose, crew pairing and crew rostering activities are successively performing to reach the targets.

Cost management may be counted among the issues that are important for the effective execution of flight planning activities. In addition, these flight planning activities should be in compliance with criteria such as the airline's business model, fleet structure, instructions of civil aviation organizations, communication structure, organizational culture, airline procedures, trade union rights, fair and equitable distribution of duties.

Flag carrier airline companies usually strive to differentiate by keeping the quality of service high. Low-cost airlines generally strive to keep the perception of quality lower level than flag carrier airlines and aim to incur the lowest possible costs on all expense items. Therefore, the amount resources allocated by the flag carrier airline to the crew planning department may be more than the low-cost airline. For example, even if the aircraft is similar to the low-cost airline in terms of the number and frequency of flights, the number of the cockpit crew and cabin crew employed in the flag carrier airline is usually higher due to the expectation of a higher quality. In addition, there may be advantages such as the number of accommodated duties planned, the conclusion of accommodation agreements with multiple hotels within the same city, and the faster fulfillment of requests due to the more intensive use of airport facilities. From this point of view, it is possible to conclude that the activities of the crew planning department of the flag carrier airline are less challenging than the activities of the crew planning department of the low-cost airline. Although an FSC might have more resources, its crew scheduling problem is almost always more difficult than that of an LCC because of extensive use of the hub and spoke network structure which is a tool for maximizing connections. However, in the light of the data obtained in the research, it was seen that the crew planning departments of the flag-carrier airline and the low-cost airline prioritized different concepts when attempting to achieve similar goals and had to deal with different challenges in both business models.

Within the scope of the business model of the flag carrier airline crew planning department, attention is paid to the conditions for the coexistence of senior and junior crew members for flights in order to provide high-level quality service in full-service airline companies. The low-cost airline aims to increase safety by identifying the areas where senior and junior cabin crew members are responsible on the plane.

The crew planning department of the low-cost airline tries to keep the number of accommodations of the cockpit and cabin crews to a minimum in accordance with its philosophy of taking mitigating measures on all items of expenses within the scope of its business model. In this way, it is aimed to control the hotel and transfer fees, aircraft parking rentals, and subsistence paid to the crew members. Flag carrier airline considers the same practice within the scope of airline procedures. In addition, the high number of connected flights of full-service airline companies is effective in this decision.

Within the scope of the procedures of the flag carrier airline, short-term flights are combined to reduce the number of accommodations, while on the other hand, as few four-legged flights as possible are planned to ensure safety and not to burden the human resources at hand. In the low-cost airline, on the other hand, the same application is covered within the scope of FTL and safety management. Whereas attempts are made to make the most flights with the least number of crews, changes and interventions are made to the crew planning within the scope of safety management based on the analyses towards fatigue management.

Both airlines emphasized that DCGA inspections have increased under the FTL instruction. It is of approximately the same importance that the work performed is monitored remotely with frequent intervals by an authorized organization. Similarly, the degree of importance attached to planning the most objective flight schedule possible by making pairings independent of people within the scope of fair and equitable duty distribution is similar.

Many of the different practices seen between the flag carrier airline and the low-cost airline's crew planning departments are caused by the trade union activities. Since the majority of the flag carrier airline's staff are trade union members, they are able to conclude a collective bargaining agreement. However, in the low-cost airline there are no collective bargaining rights. Therefore, the rule of notification of a change in duty at least 24 hours before the start of the duty in the flag carrier airline, within the scope of the trade union, is applied in the form of notification at least 10 hours before the start of duty in the low-cost airline in accordance with the procedures.

Although crew planning activities show similarities within the scope of the goals to be achieved, they differ in terms of the reasons for achieving these goals. As a result of the analysis, it was found that there are small differences between the goals of the crew planning departments of the two airlines,

but their practices differentiate from each other on many issues.

7. Limitations and Recommendations for Future Research

The decline in the airline industry after COVID-19 pandemic and the fact that airlines have turned mainly to cargo services in addition to transporting passengers further increases the importance of crew planning. The main reason for this is the growing demand for cargo in addition to the decreasing passenger capacity, and the increasing importance attached by airlines to cargo services, so they are switching to aircraft suitable for carrying larger hulls and cargo. For this reason, the crew planning department also manages the transition process while determining the needs of these new types of aircraft. In addition, crew planning also plays an important role in determining the need for training. In the subsequent research, it is planned to investigate the effect of this structure on the process, which has changed and taken shape after COVID-19 pandemic.

In addition, the fact that the research was carried out only with the crew planning departments of two airlines, and that exclusion of the flight management, cabin crew, and technical departments that constantly interact with the crew planning department constitutes the limitations of the study. Consideration of the mutual relations of the activities of these departments in future research will contribute to the literature and the industry. In this context, as shown in Figure 1 below, a model is proposed for future research.

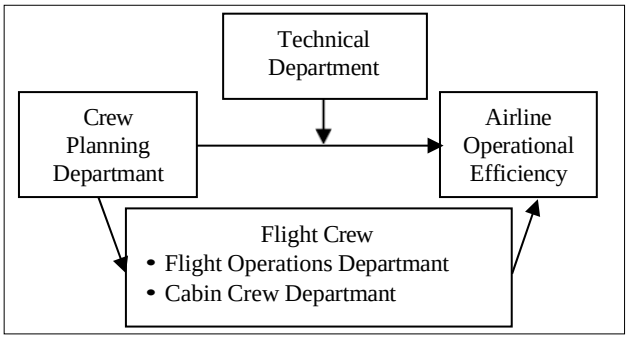

Figure 1. The Proposed Research Model for Future Research

In the proposed model, the mediating role of the flight operations department and the cabin crew department, which are defined as the flight crews, and the regulatory role of the technical department are investigated in the impact of the activities of the crew planning department on the operational efficiency.

Ethical approval

Not applicable.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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