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The Value of Decision Making to the Airlines: An Analysis of Passenger Preferences on Check-ins

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ABSTRACT

The nature of business environment in airports has made speed of operations crucial. From this standpoint, check-in areas in airports have become the most important place for monitoring the speed of operations. Airline companies offer many methods for check-in processes to the passengers and along with that there has been a huge increase in usage of self-check-ins. In this phase, decision making comes into play. This study is an attempt to reveal the value decision making for the airlines by analysing the passenger preferences on check-ins. Based on the quantitative data, correlational analysis method is performed and RStudio is used for all computations. Hence, some decisions are made based on that analysis.

Havayolları İçin Karar Vermenin Değeri: Check-in'lerde Yolcu Tercihlerinin Bir Analizi

Anahtar Sözcükler :

Karar Verme

Havayolu

Check-In

ÖZ

Havalimanlarındaki iş ortamının doğası operasyonların hızını önemli hale getirmiştir. Bu noktadan hareketle, havalimanlarındaki check-in alanları operasyonların hızının gözlemlenmesi için en önemli yer haline gelmiştir. Havayolu şirketleri check-in işlemleri için yolculara birçok yöntem sunmakla beraber self-check-in'lerde büyük bir artış söz konusudur. Bu aşamada karar verme devreye girmektedir. Bu çalışma, check-in'lerde yolcu tercihlerini analiz ederek havayolları için karar vermenin değerini ortaya koymaya yönelik bir girişimdir. Sayısal veriye dayanarak korrelasyonel analiz yöntemi uygulanmış ve tüm hesaplamalarda RStudio kullanılmıştır. Sonuç olarak, bu analize dayanarak bazı kararlar verilmiştir.

1. Introduction

There is a link between decision makers and business and operational activities in the airport. With the widespread use of computers in business and operations today, many information needs are organized into a management information system (Banerjee, 2005). Today, Management Information Systems (MIS) has many definitions. Research in the past has shown that there is no universally accepted definition of MIS. Although, definitions existing today reflect prejudices of their authors (Adeoti-Adekeye, 1997; Lucey, 2005). MIS supports the planning, control and operation functions of an organization by furnishing uniform information in the proper time frame to assist the "decision makers" (Asemi, Safari, & Zavareh, 2011). Today, many businesses rely on a management information system.

O'Connell (2016) stated that many advancements have occurred in airline industry and some of those advancements are worthy of special consideration; such as check-ins, space allocation and service quality. Technology has always played a major role in the development of the airport industry (Halpern & Graham, 2013). It was around the year 2001 when self-service-check-in kiosks started appearing at airports. Nonetheless, they were installed by airlines for their own use (Halpern & Graham, 2013). This has changed today. Lee, Castellanos, & Chris Choi (2012) spotted that self-service kiosks are increasingly becoming an option for airline passengers. According to Chang & Yang (2008) one of the reasons for that is the airline companies themselves since air passengers spend a great deal of time checking in during peak hours therefore airlines are eager to promote self-service check-in-kiosks to achive benefits of cost-saving, space-saving and even time-saving.

In this study, the value of decision making to the airlines is examined and an analysis of passenger preferences on check-ins is given. In the analysis, correlation analysis method is used and all computations are computed in RStudio in order to make decisions based on the data.

The rest of this study is organized as follows. In the second section, related literature on check-ins and nature of business in airlines is reviewed. In the third section, method is introduced and findings are presented. Finally, discussion and conclusion part is presented in the fourth section.

2. Literature Review

Airports are important locations for business activities (Schultz, Schulz, & Fricke, 2010). However, in Airline Industry both planning and control is big and complex problem. The value of control lies in relation to planning while planning establishes strategy to achieve goals and develops a framework to integrate and cordinate business activities (Curry, Flett, & Hollingsworth, 2006).

Nowadays, increasing business performance through information technology solutions is a common process (Lipaj & Davidavičienė, 2013). Purnell (2012) relates IT and Business side of the airport to the organizational needs of Airline companies. Lipaj & Davidavičienė (2013) find that the role of IT in airline industry is huge; yet there has been a change in IT's strategic importance from automation of repetitive process to process management and management control since the main reason of growing

role of IT is the complexity and the volume of creating and distributing passengers' airfares.

Purnell (2012) states that the business environment in airports are unique and business and financial management systems are needed to be specifically tailored to fit this environment as the administrative staff in airports benefit from these systems since these systems save time, costs and they help with the decision making procedures. Regarding to the uniqueness and complexity of the airline business, Lee-Partridge & Law (2004) claimed that airport management has functions which involves both terminal and airside operations but those operations are actually complex. Authors also claim that numerous parties should be working together (such as airlines and ground handling agencies) if check-in operations to work. When this is the case, improving check-in procedures is needed in order to improve the efficiency of terminal operations. Using self-service systems allows more efficient systems and fast-changing passenger numbers can be managed while it reduces passenger waiting times and save money, lessen activity at the airport (Barich, 2011).

A proper MIS in airlines industry can help to build a passenger profile (Jawadekar, 2013). By doing that, meeting the expectations of maximum passengers can be possible since the decisions can be made based on the passenger profile. Which would require a a well-designed information systems as a well-designed Management Information System allows fast access to relevant data (Kisielnicki & Gwiazda, 2007).

2.1. Decision Making in Airlines

In travel industry, many organizations use decision support systems to improve decision making. In Airline Industry, companies even calculate the value of passengers who will miss a connection because of a flight delay and they determine the impact of booking the passenger on the next flight (Stair & Reynolds, 2013). In aviation area, there are studies that has examined the aspects of decision making processes such as airline profitability, revenue management, airline service quality performance and so on (Bruce, 2016; Wu & Cheng, 2013; Hung & Chen, 2013). A good example would be ''the decision making based on passenger self-tagging.'' Self-Service kiosks, web-based check in and mobile boarding passes are actually a part of a larger term which is known as the passenger self-tagging. Compared to past, today airline companies offer more through web check-in and self-service kiosk check-in. In addition to that, depending on the airline and/or flight passengers can even enter their meal preferences by choosing one of the options or they can simply pay for improvements in the service they will experience during the flight.

Check-ins are crucial since at check-in, the customer comes contact with the airline for the first time on the journey. "It is here that perceptions of quality can be communicated" (Edwards, 2005). A simplified passenger check-in procedures help airline companies by saving time therefore reducing the costs and in the meantime customers getting charged with extra fees depending on their luggage, therefore reducing the number of baggage subject to handling (Gross & Schröder, 2007). Additionally, the airline self-service technologies are also very effective at minimising company labour costs, occupancy of space, time and queues. On the contrary, the studies have shown that customers often accept the use of self-service technologies

but they make customers anxious when the kiosks malfunction (Lee et al., 2012; Lin & Hsieh, 2006).

2.2. Passenger Behaviour

Passenger behaviour needs to be predicted before all else. Because if passengers do not want to use self-service, there will be a problem. According to Ueda & Kurahashi (2014) attaining higher cognition of self-service is a necessity because reducing hesitation of passengers is possible by using lobby service agents as they can urge passenger to use self-service kiosks.

Technology readiness is an important factor when it comes to prediction of customer behaviour (Parasuraman, 2000). In their research, Lin & Hsieh (2006) confirmed that the more satisfaction customers experience while using self-service technologies, the more likely they are going to use it again and going to recommend others. Therefore, firms need to understand the customer readiness to use self-service technology services. Additionally, the role between customer and self-service check-in kiosks must be assessed frequently so the effectiveness of IT investment strategies can be calculated by the airline (Lee et al., 2012).

3. Methods, Findings and Results

The main purpose of this study is to show the relationship between check-in types and passenger preferences according to the data set obtained, and to present the effects that decision-making has on airlines based on this relationship. The data set that has been used for this research is mentioned in Table 1 and the data was collected from a commercial airline company's Information Technology (IT) department's database logs which based in Turkey and the data includes the check-in numbers and check-in types between the years 2013-2015. There are 5 check-in types and descriptions of check-in types are mentioned in Table 2. The strength and direction of relationship between check-in types and total number of passengers are measured by using correlation coefficients. Additionally, evaluation is performed in RStudio (RStudio Team, 2015).

Table 1. Check-in numbers

Flight (Months)	Mobile	Mobile App	Internet	Kiosks	Counter	Total Pax
2013-01	20098	0	165850	43827	758293	1064050
2013-02	22200	0	164656	42918	722413	1035910
2013-03	25056	0	194446	49449	788139	1166327
2013-04	27236	0	211814	59710	861071	1258146
2013-05	29973	0	243049	58961	948173	1400737
2013-06	30875	0	233762	56774	996908	1445741
2013-07	34379	0	243502	49183	1037381	1517561
2013-08	53672	0	243170	55310	1154630	1654664
2013-09	54636	0	214933	57400	1103513	1557758
2013-10	56546	0	227211	53295	1082947	1553314
2013-11	32058	0	221583	52126	938519	1351030
2013-12	25534	0	217711	50222	881638	1305194

Flight (Months)	Mobile	Mobile App	Internet	Kiosks	Counter	Total Pax
2014-01	23228	0	222604	54017	976558	1387725
2014-02	20322	5161	218964	47600	916099	1313982
2014-03	44200	21265	204191	51806	954810	1395313
2014-04	52970	25109	235169	64606	1073938	1599186
2014-05	61560	31167	244888	67116	1106964	1657137
2014-06	68576	38632	229277	72834	1195108	1761255
2014-07	67197	42629	252724	55391	1154503	1778357
2014-08	79511	48359	241290	62192	1348585	1968641
2014-09	74168	49444	221146	66626	1210727	1787844
2014-10	60076	57207	236278	52535	1158952	1735881
2014-11	38184	55879	224818	48332	975755	1472335
2014-12	36289	57872	229024	51552	952399	1489251
2015-01	37238	60577	223769	53339	1013542	1530403
2015-02	34060	60307	209901	52046	919596	1422796

Table 2. Descriptions of check-in types

Check-in Type	Remark
Mobile	Check-in using mobile web site
Mobile App	Check-in using mobile device applications
Internet	Check-in using internet web site
Kiosk	Check-in using kiosks at airports
Counter	Check-in using counter at airports

3.1. Correlation and Scatter Plots

Correlation is a technique for exploring the relationship between two quantitative variables and measuring the strength of the relationship between them. Additionally, graphical visualization of the data on a scatter plot is the first step for exploring a relationship between two variables (Bewick, Cheek, & Ball, 2003). Pearson correlation coefficient is used for linear relationships and Spearman's rho is used for nonlinear relationships to measure the strength and assess the shape and direction of the relationship (Holmes & Rinaman, 2014). Firstly, scatter plots are shown based on check-in types and total passengers data for whether relationship exists by using plot() function.

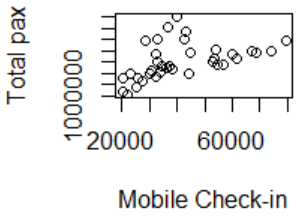

Figure 1. Scatter plot of mobile check-in and total pax

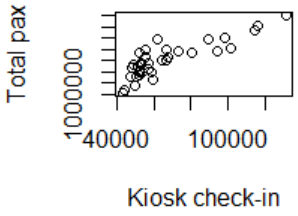

Figure 2. Scatter plot of kiosk check-in and total pax

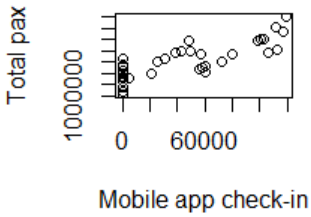

Figure 3. Scatter plot of mobile app check-in and total pax

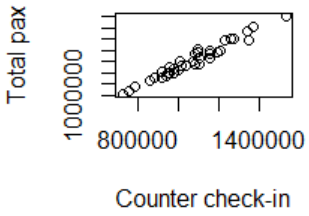

Figure 4. Scatter plot of counter check-in and total pax

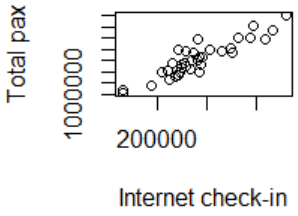

Figure 5. Scatter plot of internet check-in and total pax

Weisburd & Britt (2007) claimed that to see whether relationship is linear, a simple way is to look at scatter plots, or scatter diagrams, representing different types of relationships. In Figure 4 and 5, the scatter plots show positive linear trend between check-in types and total pax. In Figure 1, 2 and 3, the scatter plots show some positive linear trend but the trend is not as clear as that of other figures.

3.2. Performing Correlation Coefficients

Correlation coefficients can be calculated to measure the strength of the relationship (Bewick et al., 2003). Pearson's product moment correlation coefficient and Spearman's rank correlation coefficient are the two main types of correlation coefficients and the correct usage of correlation coefficient type depends on the types of variables being studied (Mukaka, 2012).

Hauke & Kossowski (2011) argued that Spearman's rank correlation coefficient which suggested by Charles Spearman to measure the relationship between two variables is a nonparametric (distribution-free) rank statistic and Spearman's rank correlation coefficient isn't a measure of the linear association between to variables for some statisticians. Pearson's product moment correlation coefficient assumes that the data follow a bivariate normal distribution (Helsel & Hirsch, 1992). Furthermore, Spearman's rank correlation coefficient is a non-parametric equivalent to Pearson's correlation coefficient (Sedgwick, 2012).

Before performing the correlation coefficients, data is tested if normally distributed or not. Royston said that Shapiro and Wilk's W test is a powerful procedure for detecting departures from univariate normality (Royston, 1983). Therefore, normality is tested by using shapiro.test() function.

Table 3. Results of Shapiro-Wilk's W test

Data	W	p-value
Mobile	0.93299	0.03087
Mobile App	0.85259	0.0002184
Internet	0.94885	0.09619
Kiosk	0.82035	4.241e-05
Counter	0.9852	0.9015

In Table 3, p-value for Internet and Counter check-in are greater than 0.05. According to Shapiro-Wilk normality test, they are normally distributed and Pearson's product-moment correlation coefficients are obtained using cor() function.

Table 4. Pearson's Product-Moment correlation coefficients

Relationship between	Pearson's Product-Moment Correlation Coefficient	Strength of Relationship
Internet check-in and total passenger	0,9067661	Strong
Counter check-in and total passenger	0,9777209	Strong

According to Table 4, there are strong positive relationships between Internet check-in and total passenger and between Counter check-in and total passenger.

In Table 3, p-value for Mobile, Mobile App, and Kiosks is smaller than 0.05. According to Shapiro-Wilk normality test, they are not normally distributed and Spearman's correlation coefficients are obtained using cor() function.

Table 5. Spearman's correlation coefficients

Relationship between	Spearman's Correlation Coefficient	Strength of Relationship
Mobile check-in and total passenger	0.6368082	Moderate
Mobile App check-in and total passenger	0.7796128	Moderate
Kiosk check-in and total passenger	0.839897	Strong

According to Table 5, there are moderate positive relationships between Mobile check-in and total passenger and between Mobile App check-in and total passenger. In addition to that, there is a strong positive relationship between Kiosk and total passenger.

4. Discussion and Conclusion

Results show that when passenger number has an increase trend; internet, mobile, mobile app, kiosk check-in and counter check-in numbers will increase. When the counter check-in numbers increase, it may cause queues in check-in areas in airports and airlines will need to employ more check-in agents. In this case, labour costs will increase. However, by opening more self-service kiosks and promoting mobile check-in, mobile app check-in and internet check-in, against the counter check-in will reduce the need of check-in agents therefore, labour costs will be minimized. Minimising labour costs is a potent source of competitive advantage and many leading organizations have found it more effective to achieve competitive advantage through customer service improvements (Wright, 2004). Since faster service and/or less queue is a customer service improvement, this will help the airline to achieve competitive advantage.

Due to the uniqueness of the business environment in airports a proper management of information systems is needed for a proper decision making. Since this study highlights the value of decision making to the airlines giving an example by analysing the passenger preferences on check-ins, the gravity of understanding this relationship is crucial for information systems area and it might be the key in this sector.

There are many airline companies in business, but this study only focuses on the data from one specific company. Therefore, this is the limitation of this study. Additionally, passenger behaviour may change time to time. In the future depending on the circumstances there may be changes about passengers' check-in preferences. This means that a constant research is needed in order to get accurate results for a proper decision making.

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