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Comparison of Airports and Airlines Services by Analysis of Variance

Dr. Roshli Aniyeri[1], Dr. C. Ratnam Nadar[2]

[1]Department of Mathematics, M. G. G. A. College Mahe, Affiliated to Pondicherry Central University
purerose2007[at]rediffmail.com

[2]Dean Students Welfare, Noorul Islam University Kanyakumari

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1. Introduction

This endeavors to explore and focuses on the novel approach of the framework for developing categories of queuing models related to strategic, tactical and operational problems of an airport terminal in the international airport in Kerala.

This research highlights a triumphant application of queuing theory. It is intended to focus on finding the authentic relevance and theoretical contribution based on real applications. Thus, this study scrutinizes, the queuing theory applications over a spectrum of vicinity in airport systems. A mathematical queuing replica is developed in this study and comparisons are made using analysis of variance (ANOVA).

The airline industry is vital for the worldwide economy. Airfields, in particular core airports, are the spin of air hauling. Transportation plays a imperative role in the altering worldwide economy, connecting citizens and places, making easy trade, tourism, and cheering economic rivalry and specialism.

The aviation system bids one of the most noteworthy engines for national economic escalation. If controlled well, this economic benefit will become vital, as there is sustained movement towards a worldwide economy.

The airport forms an imperative part in the aviation scheme, because, at this point in the scheme, the mode of haulage transforms from the air mode to land mode. Therefore, it is the point of interaction of the three major gears of the air haulage system: The airports (with related air traffic control), the airlines and the user.

This study contains the scrutiny of queuing systems for the experiential data of airport terminal. One of the predictable gains from studying queuing scheme is to appraise the efficiency of the replica in terms of consumption and waiting length. Hence raising the number of queues so passengers will not have to loiter longer when servers are too eventful.

In other words, trying to approximate the waiting time and span of queues, is the aim of this research. This cram requires an experiential data which may include the variables like, influx time in the queue of check in operating unit (server), exit time, overhaul time, etc. A questionnaire is urbanized to amass the data for such variables and the response of the passengers separately.

The replica contains five wine waiters which are check in counters, Immigration Customes, Security, Baggage clearance attached to each server in a queue. In any overhaul scheme, a queue forms whenever contemporary stipulate exceeds the offered ability to serve. This happens when the check in process is too busy to serve the incoming passengers, immediately.

2. Objectives of Study

The purpose of this cram is to appraise the queuing theory and its experiential scrutiny based on the observed data of airport terminal in the international airports in Kerala

The focal idea of this application of a mathematical replica is to gauge the expected queue span in terminal service unit (server) and the overhaul rate provided to the passengers. Another gist is to give insight view of the stable-state activities of waiting method. Metaphors of events are given i.e. the influx and service rate in each terminal and how they can be generated in working hours.

A characteristic of analysis of variance is the partition of the total variation or sum of squares of various factors and the degrees of freedom each associated with a factor of the experimental design.

Treating the airports as the replication and the Airlines can be considered as the treatments which are the objects of comparison. There are three Airports under this study namely Kozhikode, Cochin.Trivandrum.

There are five Airlines operate from these Airports hence these are the treatment. It is presumed that all the three airports in Kerala provide services of internationally accepted standard. And there is no reason to believe which one is better, since they provide all the required infrastructure and services to the passengers. Similarly the Airlines are highly reputed and attain the international standard. Therefore the null hypothesis is that there is no significant difference in services provided by the airlines. Assume that the waiting time of each passenger is a function of efficiency of the airport, the service of Airlines, Mathematical structure will be

$Wg_i = f(Ap_i, Al_j)$ where i=1, 2, 3 j = 1, 2, 3, 4, 5

The structure of the model is of the form
$Xij = \mu + \alpha i + \beta j + €ij$

where i= 1, 2, 3,…….a and
j = 1, 2, 3,…..b

€ij = the random error term which follows a normal distribution N(0 ,σ)

$$\sum_i a_i = 0 \qquad \sum_j \beta_j = 0$$

Here α_i represent the Airlines(t) and β_j represent the Airports (replication,(r)) μ be the mean In analysis of variance ,the total sum of squares can be partitioned in to the variation due to Airlines and the variation due to Airports, the balance if any will be the error.

Using the F ratio tests for significant row effects and for significant column effects can be under taken.

H0 : No difference between the airport service	H0 : No difference in service of airlines service
H1 : There is a difference in the airport service	H1 : Ther is a difference in the airlines service
Critical region	Critical region
$F > F\alpha_{r-1,(r-1)(c-1)}$	$F > F\alpha_{c-1,(r-1)(c-1)}$
Test Statistic	Test Statistic

ANOVA Table Karipur Airport

Table: Lq of Karipur Airport

Source of variation	Sum of Squares	Degree Of Freedom	Mean sum of squares	F Ratio	
				F cal Table	F 0.05
Between the Terminals	39.25511	3	13.085	FT = 1.324NS	3.49
Between the Airlines	75.7178	4	18.9294	FA = 1.916NS	3.26
Error	118.5731	12	9.88109		
Total	233.54	19			

Table: Wq of Karipur Airport

Source of variation	Sum of Squares	Degree of Freedom	Mean sum of Squares	F Ratio	
				F cal	F table
Between the Terminals	398.5486	3	132.8495	FT =0.0182^N	^{S}3.49
Between the Airlines	1948.7612	4	487.194	FA = 3.612*	3.26
Error	1618.6976	12	134.8925		
Total	3952.8965	19			

*-- significant at p = 0.05
NS -- No significant difference

ANOVA table in Kochi Airport TableLq of Kochi Airport

Source of variation	Sum of Squares	Degree Of Freedom	Mean sum of square	F Ratio	
				F cal	Table 0.05
Between the Terminals	8.829133	3	2.943044	FT = 0.8260^N	^{S}3.49
Between the Airlines	21.474199	4	5.36854995	FA = 1.5068 ^{N}	^{S}3.26
Error	42.753625	12	3.56280208		
Total	73.056958	19			

Table: Wq of Kochi Airport

Source of variation	Sum of Squares	Degree Of Freedom	Mean sum of squares	F Ratio	
				F cal Table	F 0.05
Between the Terminals	278.97521	3	92.99173	FT 1.7616^{NS}	3.49
Between the Airlines	1911.17857	4	477.79565	FA= 2.917 ^{NS}	3.26
Error	1965.79543	12	163.81628		
Total	4155.949212	19			

*-- significant at p = 0.05
NS -- No significant difference

ANOVA table Trivandrum Airport Table: Lq of Trivandrum Airport

Source of variation	Sum of Squares	Degree Of Freedom	Mean sum of squares	F Ratio	
				F calculated	F Table 0.05
Between the Terminals	46.12254	3	15.37418	FT = 1.647^N	^{S} 3.49
Between the Airlines	335.7423	4	83.93558	FA = 3.990*	3.26
Error	112.0447759	12	9.33706		
Total	493.909617	19			

Table: Wq of Trivandrum Airport

Source of variation	Sum of Squares	Degree of Freedom	Mean sum of squares	F Ratio	
				F cal	Ftable 0.05
Between the Terminals	1437.88403	3	479.1119	F_T = 3.9185*	3.49
Between the Airlines	543.306329	4	135.8266	F_A = 1.1108^{NS}	3.26
Error	1467.241942	12	122.2702		
Total	3447.8840314	19			

*-- significant at p = 0.05
NS -- No significant difference

3. Interpretation of Results

From the table 7.1 it is found that the F value is significant at 5% level in the case between the Karipur airport terminals, it can be inferred that there is a no significant difference in the service of the terminals and there is no significant difference between the airlines. From the table 7.2 it is found that the F value is significant at 5% level in the case between the Karipur airport terminals, it can be inferred that there is no significant difference in the service of the terminals and also there is a significant difference between the airlines. From the table7.3 it is found that the F value is significant at 5% level in the case between the Cochin airport terminals, it can be inferred that there is no significant difference in the service of the terminals and also there is no significant difference between the airlines. From the table7.4 it is found that the F value is significant at 5% level in the case between the Cochin airport terminals, it can be inferred that there is no significant difference in the service of the terminals and also there is no significant difference between the airlines. From the table 7.5 it is found that the F value is significant at 5% level in the case between the Trivandrum airport terminals, it can be inferred that there is no significant difference in the service of the terminals and there is a significant difference between the airlines. From the table7.6 it is found that the F value is significant at 5% level in the case between the Trivandrum airport terminals, it can be inferred that there is a significant difference in the service of the terminals and also there is no significant difference between the airlines.

4. Conclusion

Though the results are of mixed responses it is inferred that all the airports are fully equipped and there is no delays in their service but the service of airlines vary in certain cases. In Karipur airport and Trivandrum airport it can be inferred that there is no significant difference in the service but there is a significant difference in the between the airlines. But in Cochin airport there is no significant difference between the service and the airlines.

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