GERMAN AIRPORT PERFORMANCE

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Optimal Food & Beverage Mix at Full Service Airline and Low Cost Carrier Terminals[1]

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Abstract This paper investigates the optimal space and product mix for Food & Beverage service (F&B) at airport terminals which serve mainly full service airlines (FSA terminals) and terminals where the dominant airlines are low cost carriers (LCC terminals). Behind this question is the more general question about how much space to put aside for commercial activity at airports. The question addressed in this paper is how this space is to be allocated to different commercial activities as the differences across types of airports can be quite large . At LCC terminals, sit down restaurants, bars and lounges occupy 47 % of the total F&B space. At FSA terminals they occupy only 26 % of F&B space. A data sample of North American airports from 2002 to 2008 was used for an econometric panel data analysis to identify the reasons behind this difference.

Our findings for FSA terminals are, that while F&B services are important, the particular division between sit down restaurant, bars and lounges or other uses is less crucial. Our analysis also shows that a further increase of F&B services in the form of sit down restaurants, bars and lounges would reduce the F&B gross revenue per square foot,. On the contrary, a further increase of other F&B service would benefit F&B gross revenue . For LCC terminals our results suggests an excess supply of F&B services in the form of sit down restaurants, bars and lounges. A more profitable strategy would involve a change of the F&B mix.

Key Words: Airports, Commercial revenues, Non-aviation, Panel data analysis.

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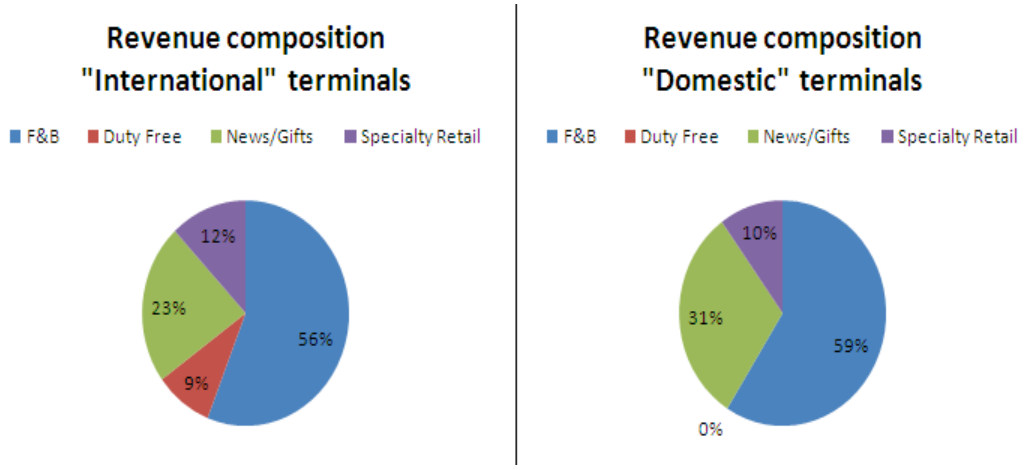
Introduction

An important question for terminal planers is first how much space to put aside for commercial activity and second, how this space is to be allocated to different activities. What are the criteria for optimal allocation? This is the main issues to be addressed in this paper.

Data

To look at this issue empirically we use data from the ARN Fact Book, which is published by the Armbrust Aviation Group (AAG). The ARN data set contains revenue details of 100 North American airports on a terminal-by-terminal basis and covers more than 250 terminals during the years 1999 and 2008. We focus on F&B revenue and concessions, because sales from food and beverage represent the largest part to the non-aeronautical revenue at North American airports, both at domestic and international terminals (Fig 1). .

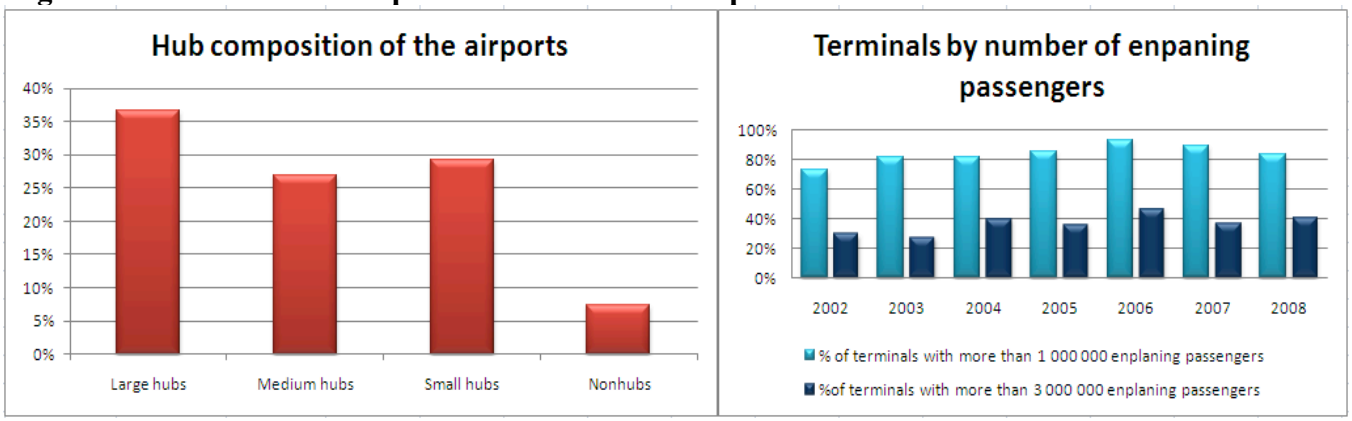
Fig.1 Revenue composition at US Airports (from ARN Fact Book)



For our particular research objective the original ARN data set was reduced to a smaller number of altogether 71 terminals at 41 airports for the period 2002 to 2008. According to the Federal Aviation Administration (FAA) categorization, 15 airports in our sample belong to the group of large hub airports, 11 to medium hubs, twelve to small hubs and three are non-hub airports[3]. Between 2002 and 2008, 85% of the terminals in our sample had more than 1,000,000 enplaning passengers and 35% of them had more than 3,000,000 enplaning passengers (Fig.2).

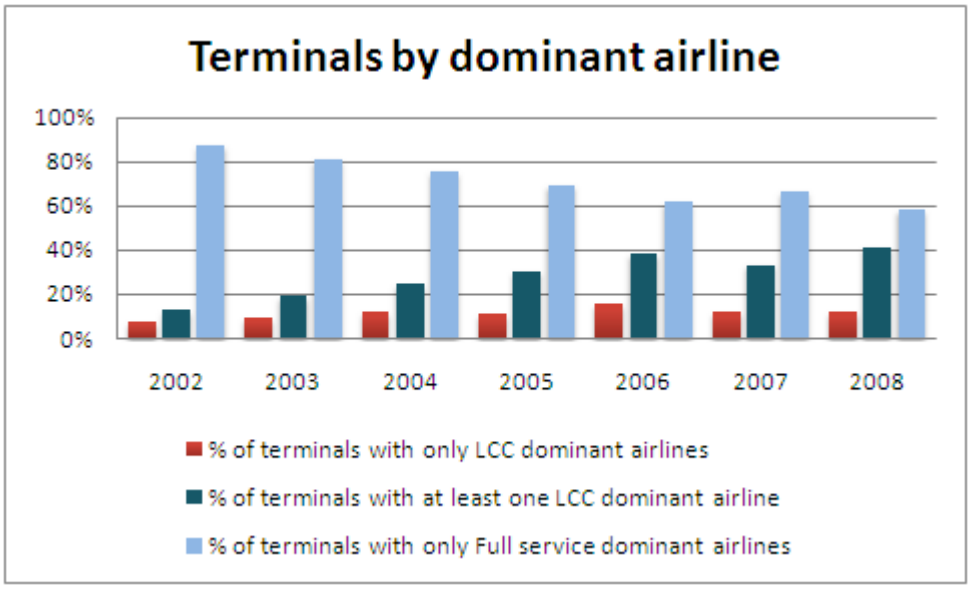
[3] The FAA defines large hubs as airports with worldwide more than one percent annual passenger boarding, medium hubs with at least 0.25%, but less than 1% annual passenger boarding, small hubs with at least 0.05%, but less than 0.25% and non-hubs have less than 0.05% annual passenger boarding.

Fig.2 Size distribution of airports in the reduced sample



Of the terminals analyzed 71% were used only by Full Service Airlines and 11% of the terminals served exclusively as LCC terminals[4]. (Fig.3).

Fig.3



The objective of this study is to investigate the revenue performance for F&B outlets at different types of airport terminals, differentiating between those used mainly by full service airlines and by low cost

[4] AirTran, Frontier, JetBlue, Midwest and Southwest were treated as low cost carriers

carriers. The aim of our quantitative investigation is to see how the F&B mix changes across airport types and if the mix can be further optimized.

Table 1 Summary Statistics

	only LCC		only FSA		difference
	obs	mean	obs	mean	
Emplaning pax	31	3178823	200	3792586	19.31%
Food/Beverage Gross Revenue per square foot p.a. in $	31	1025.827	198	934.6331	-8.89%
Food/Beverage Rental Revenue to the Airport (per square foot p.a.) in $	31	56.96073	197	54.62712	-4.10%
Food/Beverage average space in square foot per operational unit	27	1212.201	195	2166.473	78.72%
Sit down restaurants/Bars/Lounges average space per unit in square foot	25	1926.82	124	2097.493	8.86%
Other Food/Beverage units, average space per unit in square foot	23	807.9524	190	1929.187	138.77%
Food/Beverage (number of locations)	31	7.419355	200	9.055	22.05%
Sit down restaurants/Bars/Lounges (number of locations)	31	1.516129	200	2.085	37.52%
Other Food/Beverage units (number of locations)	31	5.903226	200	6.97	18.07%

Table 1 shows that FSA terminals are larger then LCC terminals, with 19.3% more enplaning passengers. Assuming there is no difference between these types of terminals, the number and area of F&B units should increase more or less proportionally with size as measured by number of passengers (pax).

But passenger characteristics as well as services offered are different between LCC and FSA terminals. From Table 1 we see that together with the higher number of enplaning passengers, FSA terminals have a higher number of all types of F&B locations, but with a smaller average size. At the same time we observe a growing difference in number of locations of Sit down restaurants, Bars and Lounges with an increase in number of enplaning pax. This greater difference could make sense because passengers of FSA terminals on average have higher incomes and prefer a more comfortable atmosphere and higher quality food than what they will receive on board, even taking into account that meals on board are included in the price of the ticket.

Bars, Lounges and Sit down restaurants have a similar average unit size, but the average size of all other types of F&B places is significantly greater at FSA terminals. Does this difference in size, i.e. in F&B offerings of Bars/lounges/Sit down restaurants and other types of F&B units at LCC terminals represent a response to greater passengers demand for Sit down restaurants, Bars and Lounges and does it bring additional revenue to LCC terminals? In the sample both F&B revenue per square foot and F&B rent payments per square foot are higher at LCC terminals. We'll try to answer the reasons for this in the empirical part of this research below.

Empirical results

In the econometric estimations Food/Beverage Gross Revenue per square foot was used as a dependent variable and the number of locations of Sit down restaurants/Bars/Lounges and number of Other Food/Beverage places were chosen as independent variables. Only a limited number of F&B places are branded (like Starbucks Coffee or Burger King) and these companies have therefore several locations in a terminal. Therefore the number of locations of Sit down restaurants/Bars/Lounges and Other Food/Beverage places can be used as an indicator of specialization. The idea here is that with increasing specialization, i.e. with more food and beverage places available, a greater variety of food is being offered with more chances to satisfy the different demands of each passenger. We therefore expect a positive relation between the number of F&B locations and F&B revenue per square foot. Average unit size , i.e. Food/Beverage Square Footage was included in the model as a proxy for size.

The number of locations per terminal is explained by two components: first it is an indicator for specialization and second it is related to terminal size (more F&B places when the terminal is larger (and larger terminals have a bit different structure of passenger flows, etc.) So after adding in the model the variable Food/Beverage Square Footage, we assume that variable "number of F&B locations" accounts only for specialization.

Two models for LCC and FSA terminals were estimated (Table 2).

We can see that in both types of terminals the increase in variety of F&B units contributes to Food/Beverage Gross Revenue per square foot. The next step is then to explain the revenue differences between Sit down restaurants/Bars/Lounges and other kinds of F&B like Fast Food, Coffee, Kiosk, Walk Away etc. This is an attempt to understand the effectiveness and optimality in locating this or that types of F&B units in LCC and FSA terminals. From the descriptive analysis we saw that the mix and space occupied by these categories is different in LCC and FSA terminals.

Table 2. Random effects regression for LCC and FSA terminals				
Food/Beverage Gross Revenue per square foot	**Model 1 (31 observations) LCC terminals**		**Model 2 (198 observations) FSA terminals**	
	Coef.	**Std. Err.**	**Coef.**	**Std. Err.**
Food/Beverage (number of locations)	140.84	(32.65)***	12.93	(6.50)*
Food/Beverage Square Footage	-0.09	(0.03)**	-0.008	(0.003)**
Const	1317.04	(672.52)*	851.57	(119.12)***

"***" Significant at the 0.1% level. "**" Significant at the 1% level. "*" Significant at the 5% level. "^" Significant at the 10% level.

The first model (Model 3) was estimated for LCC terminals.(Table 3)

Table 3. Random effects regression LCC terminals		
Food/Beverage Gross Revenue per square foot	**Model 3 (31 observations) LCC terminals**	
	Coef.	**Std. Err.**
Sit down restaurants/Bars/Lounges (number of locations)	-305.93	(148.36)*
Other Food/Beverage (number of locations)	161.90	(24.06)***
Sit down restaurants/Bars/Lounges Square Footage	-0.02	(0.08)
Other Food/Beverage Square Footage	-0.06	(0.04)^
Const	874.80	(134.43)***

"***" Significant at the 0.1% level. "**" Significant at the 1% level. "*" Significant at the 5% level. "^" Significant at the 10% level.

The proxy for size in the model estimated for LCC terminals was the square footage for Sit down restaurants/Bars/Lounges and Other Food/Beverage units.

The coefficient for the variable "number of Sit down restaurants/Bars/Lounges" is statistically significant and negative and the coefficient for the variable "number of Other Food/Beverage" is significant and positive. So we see that an increase in Sit down restaurants/Bars/Lounges decreases

Food/Beverage Gross Revenue per square foot and an increase in Other types of Food/Beverage increases Food/Beverage Gross Revenue per square foot. This mean that it would probably be more profitable for the LCC terminals to change F&B mix, i.e. decreasing the number of Sit down restaurants/Bars/Lounges and increasing number of Other types of Food/Beverage places.

Similar relations were tested for FSA terminals (Table 4)

Table 4. Fixed and Random effects regression FSA terminals

Food/Beverage Gross Revenue per square foot	**Model 4 (198 observations)** ***Fixed effects regression***		**Model 5 (198 observations)** ***Fixed effects regression***		**Model 6 (198 observations)** ***Random effects regression***	
	Coef.	**Std. Err.**	**Coef.**	**Std. Err.**	**Coef.**	**Std. Err.**
Sit down restaurants/Bars/Lounges (number of locations)	-64.31	(70.40)	-33.67	(33.04)	-6.06	(26.82)
Other Food/Beverage (number of locations)	32.81	(16.94)^	30.93	(13.80)*	11.89	(10.77)
Sit down restaurants/Bars/Lounges Square Footage	0.01	(0.03)	No	No	No	No
Other Food/Beverage Square Footage	-0.0006	(0.013)	No	No	No	No
Dummy_3 (takes the value 1 if the terminal has more than 3 000 000 passengers)	No	No	454.51	(145.82)***	584.58	(118.15)***
Const	803.39	(93.82)***	612.88	(94.78)***	561.30	(108.62)***

"***" Significant at the 0.1% level. "**" Significant at the 1% level. "*" Significant at the 5% level. "^" Significant at the 10% level.

In the estimated models for FSA terminals the proxy for size was the square footage for Sit down restaurants/Bars/Lounges and Other Food/Beverage. However, because of the low significance of the model the variable for size was changed to a dummy variable which takes the value 1 if the terminal has more than 3 mio passengers and 0 otherwise.

The Hausman test statistic for models 5 and 6 is equal to 7.74 with $P> X^2 = 0.0517$. So .at the 5% level of significance we reject the null hypothesis and choose the fixed-effect model instead, but with a lower level of significance (for example with 6% or 10%) we accept the null hypothesis and choose random-effect model.

Let's look on both these models, since for both models the variable "number of Sit down restaurants/Bars/Lounges" is statistically insignificant. The variable "Number of Other types of Food/Beverage places" is significant at the 5% level in the fixed effect model and insignificant in the random effect model.

Taking into account that in Model 2 (Table 2) the variables "total number of Food/Beverage locations" and "total Food/Beverage space" were significant, we can conclude that in general specialization and variety of F&B is important for the level of revenues at FSA terminals, but the particular division in Sit down restaurants/Bars/Lounges and Others is not so important. This could be explained by the differences in structure of passenger flows. Passengers at FSA terminals are much more different from each other or less homogeneous than passengers of LCC airlines, because full service airlines have more international and intercontinental flights (so passengers of full service airlines are more multinational with wider variety of habits and tastes). Also the dispersion of ticket price is higher for FSA than for LCC, because LCC airlines compete mainly on price, while FSA compete over a wider range of dimensions and can afford larger differences in the ticket price. This is why in FSA terminals the division into Sit down restaurants/Bars/Lounges and Other Food/Beverage Square Footage is not so important, both types their face equal demand.

Conclusion

Revenue from Food&Beverage accounts for a major part of non-aeronautical revenue of the US airports and it significantly grater than revenue from Duty Free or Specialty retail. This is why airport management should pay attention to the space allocation for F&B and the associated product variety in order not to loose sales.

The focus of this study was on differences in F&B performance in terminals where the dominant airlines are only LCC types (LCC terminals) and terminals which serve only Full service airlines (FSA terminals). LCC terminals have a larger difference between average size of Sit down restaurants/Bars/Lounges and the average size of Other types of Food/Beverage places. In LCC terminals this difference is 1119 square feet and in FSA terminals only 168 square feet. Sit down restaurants/Bars/Lounges occupies 47% of total F&B space in LCC terminals and only 26% in FSA terminals.

Our econometric analysis showed that an increase in Sit down restaurants/Bars/Lounges decreases Food/Beverage Gross Revenue per square foot. An increase in Other types of Food/Beverage increases Food/Beverage Gross Revenue per square foot. Taking in to account results of descriptive analysis it is possible to conclude that LCC terminals have an excess supply of Sit down restaurants/Bars/Lounges. It

could be more efficient for the LCC terminals to change the F&B mix, i.e. decreasing the number of Sit down restaurants/Bars/Lounges and increasing the number of Other types of Food/Beverage places or at least to decrease total area occupied by Bars, Lounges and Sit Down Restaurants. This could be explained by the structure of passenger flows, as passengers of LCC terminals prefer to eat in places other then Sit down restaurants/Bars/Lounges, because they are more price sensitive than passenger of Full service airline and price level could be more important for them than comfort or the quality of food.

Our statistical estimation for a of sample of FSA terminals showed that specialization and variety of F&B is in general important for explaining revenue a FSA terminals, but the particular division in Sit down restaurants/Bars/Lounges and Others is not so crucial. The optimal mix of F&B in FSA terminals could depend on more complicated factors because of different structure of demand and lower price elasticity of passengers.