



## An operational performance assessment of Turkish airline companies based on return on invested capital tree model\*

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### ABSTRACT

Studies in the air transportation industry generally consider either financial performance or operational performance regardless of the inevitable correlation between them. Sustaining a higher return on investment is achieved through higher efficiency and effective use of available resources. Thus, the investigation of operational factors as components of ROIC can help assessing the strengths and weaknesses of operations of a company. In this study, ROIC tree model has been identified. Within the model, operational performance factors of capacity utilization, passenger yield, labor cost, labor efficiency and fuel cost are considered and their effect on the profitability of a company is revealed. The assessment of the air transportation industry shows that improvement in capacity utilization and passenger yield can dramatically boost ROIC. However, policy improvements in labor cost, labor efficiency, and fuel cost are exceedingly achievable. This study presents a convenient and effective model for the airlines companies and offers handy directions for improving operational and financial performance. The suggested model enables the linkage of efficiency factors as profitability drivers and helps assessing sources of competitive advantage.

## Yatırım getirisi ağaç modeli kullanılarak Türk havayolu şirketlerinin operasyonel performansının değerlendirilmesi

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### ÖZ

Genelde, hava taşımacılık sektöründeki çalışmalar finansal ve operasyonel performansı, arasındaki bağa bakmaksızın, ayrı ayrı değerlendirmektedir. Sürdürülebilir yüksek yatırım getirisi, var olan kaynakların etkin ve verimli bir şekilde kullanılmasıyla sağlanmaktadır. Bu amaçla, operasyonel faktörlerin, yatırım getirisinin bileşenleri olarak

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**Anahtar Kelimeler:**

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ele alınması şirketlerin operasyon faaliyetlerinin güçlü ve zayıf yanlarını ortaya çıkarmaktadır. Bu çalışmada, yatırım getirisi ağaç modeli geliştirmek amaçlanmıştır. Modelde, kapasite kullanımı, yolcu verimi, işgücü maliyeti, işgücü verimliliği ve yakıt maliyeti olarak operasyon faktörleri ele alınmış olup şirketin karlılığıyla ilişkisi şekillenmiştir. Çalışmada yapılan uygulama sonuçlarına göre, kapasite kullanımı ve yolcu verimindeki iyileşmeler yatırım getirisini önemli ölçüde arttırmaktadır. Yalnız, işgücü maliyeti, işgücü verimliliği ve yakıt maliyetindeki politika iyileştirmeleri fazlasıyla gerçekleştirilebilmektedir. Bu çalışma, hava taşımacılık şirketleri için operasyonel ve finansal performansını iyileştirmek için kullanışlı ve etkili bir model sunmaktadır. Önerilen model, verimlilik faktörlerinin karlılığı olumlu etkileyen bir faktör olarak bağlanmasını sağlamaktadır ve rekabet avantajı kaynaklarının değerlendirilmesine yardımcı olmaktadır.

**1. Introduction**

The remarkable growth of air transportation industry of Turkey is considered one of the main wheels driving the economic growth in the past decade. In which air transportation businesses' services assigned in the first place in the export services list (CAPA, 2018). The globalization and the sharp competition among the airline companies directed them toward improving productivity and controlling cost in order to improve their operational performance. Higher productivity attainment supports the competition strategy of a company with higher competitive advantage. Benefiting from the geographical location of Turkey, the Turkish air transportation industry derives its importance of playing leading role in Turkish economic. The recent success achieved by the Turkish air transportation industry not only reflects the advantage of its geographical location but also the well-organized operating and financial performance of the companies, which highlights on the intensive competition among them to provide challengeable services.

The Turkish aviation network destination currently reaches the most of countries around the world, as in 2018, 171 agreements have been assigned with 171 countries. Turkish air transportation industry consists of eleven civil airline companies, only two of them are listed at Istanbul Stock Exchange which are; Turkish airlines (THY) and Pegasus airlines (PGS). According to annual report of Directorate General of Civil Aviation (DGCA) (2018) the Turkish aviation income is about 65 million Turkish Lira and about 200 thousand employees are working in aviation market. In addition, the annual average passenger growth rate since 2003 reached 13.3 percent. The total seat capacity of the market is 97,351 seats while the total cargo capacity is 2.19 million kg. The THY's domestic and international market shares are 27.1 percent and 41.6 percent respectively, while PGS's domestic and international market shares are 28.3 percent and 9.8 percent respectively (Zuvin and Sozer, 2017).

Due to the importance of the air transportation sector, its assessment has been considered by many researchers employing different methods which include: MCDM methods (Feng and Wang 2000; Berrittella et al., 2009; Perçin, 2018), statistical methods such as panel data analysis and data envelopment analysis (Choi 2017; Kiraci and Yaşar, 2020) and financial ratios (Tekler et al., 2016; Dayi and Ulusoy, 2018). Despite the importance of information impeded in the operational performance measures, less research is directed toward operational performance than financial performance assessment. Moreover, there was no evidence that operational performance measures provide information distinct from financial measures other than earnings and book value (Liedtka, 2002). Many other researches highlighted the importance of both operational and financial performance evaluation (Schefczyk, 1993; Tsiriktsis, 2007; Gyanwali and Walsh, 2020) for a comprehensive assessment.

Mostly, researchers considered the evaluation of operational and financial performance as two separated factors, and examined the mutual effects of these factors. In this study the main operational factors are examined as a Return on Invested Capital (ROIC) breakdown. Following (Lee, 2019), the

most important operational factors of airlines such as capacity utilization, passenger yield, labor cost, labor efficiency and fuel cost are to be measured by ROIC tree model. The proposed ROIC tree is used to assess the two airlines companies in Istanbul Stock Exchange, that is, Turkish airlines and Pegasus. Additionally, sources of low performance are clarified, and suggestions for improvement are proposed for a proper sustainable development tool.

## 2. Literature review

Air transportation industry has been examined in previous studies from different perspectives including service quality (Chen and Liu, 2017; Perçin, 2018; Deveci et al., 2018; Farooq et al., 2018; Gayle and Yimga, 2018; Sweis et al., 2019) performance efficiency, cost and productivity (Berrittella et al., 2009; Ajayi et al., 2010; Miranda et al., 2015; Wang et al., 2017; Choi 2017 Heshmati et al., 2018) social responsibility (Wang et al., 2015) operational and organizational performance (Schefczyk, 1993; Sweis et al., 2019; Kiraci and Yaşar, 2020; Gyanwali and Walsh, 2020) and financial performance (Feng and Wang, 2000; Baker et al., 2005; Teker et al., 2016; Hazarika and Boukareva, 2016; Mhlanga, 2017; Chen et al., 2017; Dayi and Ulusoy, 2018; Trisakti, 2018; Perçin and Aldalou, 2018; Kiracı, 2019). While, fewer studies have looked for both the financial and operational performance (Tsikriktsis, 2007; Lee, 2019).

Airlines companies rely not only on purchases but also on lease of aircraft and encounter different accounting and taxation rules, though, financial based performance assessment is difficult. Schefczyk (1993), suggested the inclusion of nonfinancial data into a data envelopment analysis model. The results of his analysis indicated that improved operational performance is a key driver of profitability, and factors such as passenger load factor, efficient resource acquisition are important for higher performance outcome.

To address whether financial and nonfinancial performance measures of the airline industry supply different information, Liedtka (2002) employed exploratory and confirmatory factor analysis. The results offered evidence that nonfinancial performance measures provide information not captured by financial measures. Such nonfinancial measures include labor efficiency, material efficiency and others.

In this study, the interrelation and overlap of data between financial and nonfinancial measures is driven. Ajayi et al., (2010) proposed measures for evaluating the operational efficiency and investigated the effect of operational efficiency over financial efficiency of U.S. airlines, considering different efficiency levels such as overall efficiency and scale efficiency, and concluded that mostly small companies have higher efficiency levels than large companies.

More recently, Wang et al., (2017) analyzed the efficiency of managing the light resources in order to handle challenges in the global industry benefiting from ROIC, Weighting Average Calculating Cost (WACC) and risk-free rate of return. Integrating the degree of assets lightness into regression analysis provides that a positive relationship excised between degree of assets lightness and dynamic efficiency. Gyanwali and Walsh (2020) considered the factors influencing performance of Nepal Airlines Corporation, and showed that the key performance factors include: motivated employee, collective leadership, entrepreneurial marketing and environmental support. They claimed thus such factors would succeed business in turbulent market.

## 3. Proposed methodology

In this study, the Return on Invested Capital (ROIC) tree model is used to evaluate the operational performance of airline companies as breakdown of ROIC. ROIC tree is a new approach that analyses the operational performance of a company as profitability drivers. It emphases on the main operational factors of an industry that contributes to the competitive advantage as well as the profitability (Damodaran, 2007).

The ROIC is a profitability measure that evaluate the rate of return a company can achieve on each dollar of invested capital. ROIC can be calculated as:

$$ROIC = \frac{\text{Return}(\text{operating income after tax})}{\text{Invested Capital}} \quad (1)$$

Return is calculated as operating income after tax, that is, before the deduction of interest expenses. As return is calculated on all capital thus all earnings to stockholders and lenders are included. In this regard, ROIC is considered a powerful profitability assessment measure where it indicates the ability of an entity to generate benefit to all stakeholders.

From Eq. 1,

$$ROIC = \left( \frac{Revenue - Cost}{Revenue} \right) * \left( \frac{Revenue}{Invested Capital} \right) \quad (2)$$

$$ROIC = \left( 1 - \frac{Operating Cost - other expenses \& taxes}{Revenue} \right) * \left( \frac{Revenue}{Invested Capital} \right) \quad (3)$$

Airline company's revenue represents all the proceeding from services provided to customer and passengers. Revenues can be expressed as in Eq. 4.

$$Revenue = Load Factor * Passenger Yield * Available Seat per Kilometer \quad (4)$$

Where,

Load Factor (LF), is a capacity measure shows the usage of passenger capacity of an airline company,

Passenger Yield (PY), the average fare paid per kilometer, per passenger. It is the result of dividing revenue by revenue passenger kilometers (RPK). RPK shows the number of kilometers traveled by paying passengers,

Available Seat per Kilometer (ASK), is a capacity measure shows the total available passenger capacity of an airline company in kilometers.

The total passenger revenues of an airline company can be calculated by total available passenger capacity multiply by the capacity usage percentage and revenue per unit of kilometer per passenger.

Financial operating performance of airline companies are mostly evaluated considering the same cost factors which categorized into two main categories; direct costs includes all costs associated with fuel cost and flight crew as these costs incurred directly while operating aircrafts as well as other operating and administration expenses and taxes. Direct labor costs can be considered as in Eq. 5.

$$Labor\ costs = \frac{Labor\ Costs}{Number\ of\ Employees} * \frac{Number\ of\ Employees}{ASK} * ASK \quad (5)$$

Where,  $\frac{Labor\ Costs}{Number\ of\ Employees}$  is a labor cost efficiency measure shows the burden associated with the use of labor,  $\frac{Number\ of\ Employees}{ASK}$  is a labor productivity measure shows how much labor is used to produce a unit of ASK.

In the same manner, direct fuel costs can be considered as in Eq. 6.

$$Fuel\ costs = \frac{Fuel\ Cost}{Amount\ of\ Fuel\ (gallon)} * \frac{Amount\ of\ Fuel}{ASK} * ASK \quad (6)$$

Where,  $\frac{Fuel\ cost}{Amount\ of\ Fuel\ (gallon)}$  is a Fuel cost efficiency measure shows the price bargain ability and the effectiveness of fuel acquirement policy of the company,  $\frac{Amount\ of\ Fuel}{ASK}$  is a fuel productivity measure shows how much fuel (gallon) is used per unit of ASK.

Using Eq. 4, 5 and 6. The rate of return for airlines companies can be expressed as in Eq. 7.

$$\frac{Return}{Revenue} = 1 - \frac{\left( (Labor\ Cost\ per\ employee * labor\ efficiency * ASK) + (fuel\ cost\ per\ unit * fuel\ efficiency * ASK) \right)}{(Load\ Factor * Passenger\ Yield * Available\ Seat\ per\ Kilometer)} - \frac{\left( \frac{Selling\ General\ \&\ administrative\ and\ Tax\ expenses}{(Load\ Factor * Passenger\ Yield * Available\ Seat\ per\ Kilometer)} \right)}{\quad} \quad (7)$$

Where,  $\frac{SG\&A+Taxes}{Revenues}$ , is an operational efficiency measure shows the amount of selling, general & administrative expenses and taxes used to produce a unit of revenue.

Invested capital represents all the assets invested in the company which consists of working capital and fixed assets. Working capital amount of investment used to run daily operations. It can be calculated as Eq. 8.

$$Working\ Capital = Accounts\ receivables + Inventory - Accounts\ Payables \tag{8}$$

On the other hand, fixed assets of airline companies consist of capital invested in planes (aircraft capital), aircraft related assets and other long term assets. Based on the extracted operational factors the formula of ROIC tree model as Eq. 9.

$$ROIC = \left( 1 - \frac{\left( \frac{(Labor\ Cost\ per\ Employee * Labor\ Efficiency * ASK) + (Fuel\ Cost\ per\ Unit * Fuel\ Efficiency * ASK)}{(Load\ Factor * Passenger\ Yield * Available\ Seat\ per\ Kilometer)} - \frac{Selling\ General\ \&\ administrative\ and\ Tax\ expenses}{(Load\ Factor * Passenger\ Yield * Available\ Seat\ per\ Kilometer)} \right)}{\frac{Load\ Factor * Passenger\ Yield * Available\ Seat\ per\ Kilometer}{(Working\ Capital + Aircraft\ Capital + Aircraft\ Related\ Capital + other\ Long\ Term\ Assets)}} \right) \tag{9}$$

Note that  $\frac{Revenue}{Invested\ Capital}$  measures the amount of revenue a company can generate per unit of invested capital. Figure 1 shows the ROIC tree model proposed in this study.

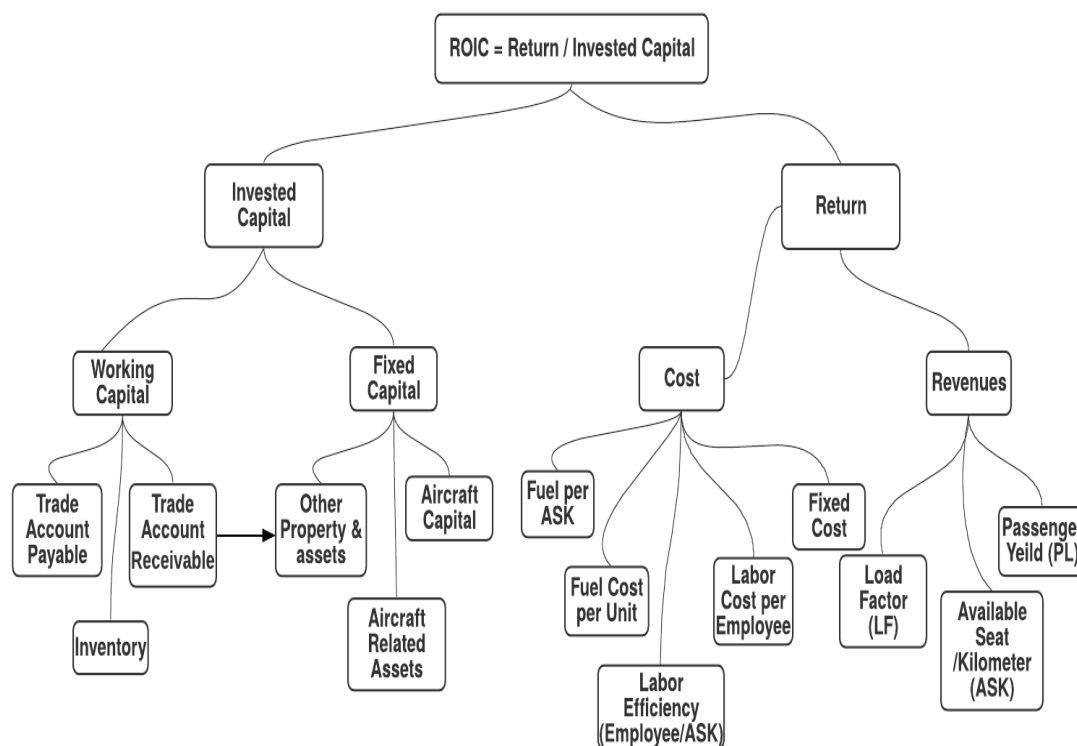


Figure 1. ROIC Tree Model

#### 4. Application and discussion

For the purpose of assessing the effects of operational performance over financial performance, the ROIC tree and its calculations are applied to Turkish Airlines and Pegasus Airlines for 2018. Data is contracted from the annual reports and official websites of both companies. ROIC is calculated and equal to 7.10% for Turkish Airlines and 8.67% for Pegasus Airlines. Before assessing the effects of

operational performance, a comparison between ROIC, return on assets ROA and return on equity ROE is introduced, as shown in Table 1:

Table 1

*A Comparison Between ROIC, ROA and ROE*

Airlines Companies	ROIC	ROA	ROE
Turkish Airlines (THY)	7.10%	3.71%	12.93%
Pegasus Airlines (PGS)	8.67%	3.68%	13.51%

Table 1 shows that Turkish Airlines generates a higher ROA than Pegasus Airlines. However, based on ROIC and ROE it seems that Pegasus Airlines can provide more value to its investors and owners. Data calculated for both companies are shown in Table 2. The amount of return generated out of revenue for THY is a little higher than for PGS. However, the amount of revenue produced out of invested capital is considerably higher for PGS which justifies the higher ROIC ratio.

As can be noticed from Table 2, THY has a higher passenger yield (PY=0.421) for 2018, while, PGS has higher capacity utilization (LF=0.855), however in most efficiency measures considered earlier, PGS showed a better performance as; less costs are paid per employee, less labor forces are used per ASK, lower amount of fuel is used per ASK and lower amount of operating costs are paid to produce a unit of revenue. All of which minimized the effect of a very higher PY rate of THY over PGS. Plane capital per plane for PGS is considerably lower than THY. In general, despite the higher ability of THY to gain a higher yield per passenger, the higher efficiency and productivity components of ROIC for PGS lead to higher benefit generated to stakeholders.

Table 2

*Results of ROIC Tree for Both Companies*

Factor	THY	PGS
Revenues TL	62853000000	8296736033
PY	0.421	0.273
LF	0.819	0.855
RPK	149169213042	30389265000
ASK	182030828951	35543000000
Labor Costs TL	6637000000	788828099
Number of Employees	30719	5621
Cost per Employee TL	216055	140336
Labor Efficiency	0.036	0.022
Fuel Cost TL	18478000000	2729667414
Fuel Amount	5277311	780101
Fuel Unit Cost TL	3501	3499
Fuel Efficiency	0.102	0.077
Selling G.&A. Efficiency	0.506	0.482
Working Capital TL	-1373000000	-289829778
Plane Capital TL	61321000000	7209935976
Number of Planes	332	82
Invested Capital per Plane TL	184701807	87926048
Total Fixed Capital TL	85370000000	9252807145
Invested Capital TL	83997000000	8962977367
Return/Revenue	0.0949	0.0937
Revenue/Invested Capital	0.748	0.926

In order to assess the effect of operational performance over financial performance, five operational performance factors are considered. 5% improvement is considered on each factor separately.

Table 3

*The Effects of Improving Operational Factors on ROIC*

Operational Factors	THY	PGS
The Calculated ROIC	7.10%	8.67%
5%↑ Capacity Utilization (Load Factor)	10.84%	13.30%
5%↑ Passenger Yield	10.84%	13.30%
5%↓ Labor Cost	7.48%	9.09%
5%↑ Labor Efficiency	7.48%	9.09%
5%↓ Fuel Cost	8.15%	10.12%

Based on Table 3, the 5% improvement in capacity utilization or passenger yield result about more than 50% improvement in ROIC for both companies. While, 5% improvement in ROIC resulted from improving in labor cost or labor efficiency, and 5% improvement in fuel cost results an approximately 15% improvement in ROIC. Not to forget that most of capacity usage improvement methods come with lower return and higher prices lead to lower capacity utilization. Thus, the company needs to be very careful seeking capacity and yield policies for return improvement. Of course, labor training, and fuel hedging might mean more cost to the company. However, the higher labor efficiency may lower the labor usage to cover for these costs and achieve a higher efficiency. In the same regard, the cost of a fuel option or agreement might be much lower than the increase in prices. For which, focus of such matter may represent a key to new efficiency levels.

Additionally, two factors are selected to connect efficiency factors of ROIC tree and productivity factors, that is; labor productivity and plane capital productivity. Both productivity measures are calculated for both companies and shown in Table 4.

Table 4

*Labor and Plane Capital Productivity*

Operational Factors	THY	PGS
Labor Productivity	9.470	10.518
Plane Capital Productivity	1.025	1.151

As can be noticed from Table 4. PGS has higher labor and plane capital productivity than THY. That is; it can produce more revenues per dollar invested in labor. These results are the same as results obtained from ROIC tree.

## 5. Conclusion

The recent success achieved by the Turkish air transportation industry not only reflects the advantage of its geographical location but also the well-organized operating and financial performance of the companies, which highlights on the intensive competition among them to provide attractive services. In this regard, the assessment of airline companies needs to consider both operational and financial performance factors. This study develops a ROIC tree model to link the operational factors of an airline company such as labor and fuel efficiency to the ROIC.

Factors such as; capacity usage, labor cost per employee, labor efficiency, fuel cost per unit, fuel efficiency, operational efficiency, profit generation, assets usage and other factors can be tracked by the breakdown of ROIC ratio. Such effort helps addressing the strengths and weaknesses of a company and clarifies its sources. It also provides a proper development tool that determine the area of development and how to measure the expected assessment results.

The application of the proposed assessment showed a very higher PY for THY. Yet, higher LF, less costs are paid per employee, less labor forces are used per ASK, lower amount of fuel is used per ASK and lower amount of operating costs are paid to produce a unit of revenue for PGS resulted in higher rate of ROIC for 2018.

The operational components of ROIC tree model can provide the information that are obtained by normal efficiency measure. That is the labor efficiency factor shows the amount of labor used per ASK provide a parallel information with labor productivity measure.

This study presents a convenient and effective model for the airlines companies that offers handy directions for improving operational and financial performance. Future researches may consider the application of ROIC tree model to other sectors.

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