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Evaluation of costs and profitability of services applying the SAS Activity-Based Management system with the Airport as an example

Introduction

The costs and profitability analysis is one of the basic tools providing managers with information for decision-making in the product portfolio development and in relations with suppliers and clients. In many cases the application of traditional cost accounting methods leads to the generation of distorted information on the manufacturing costs of the goods and services offered as well as the customer service costs and, as a result, to a mistaken evaluation of their profitability. Such statement concerns mostly the companies with a high share of indirect costs in the total costs and a high variation in the goods, services and clients. The organizations in which there occur the two conditions are recommended to apply Activity-Based Costing) [Kaplan, Cooper, 2000].

Unlike in production companies, in service companies most of the costs are considered indirect costs, namely common for various services rendered and for various clients served. Service companies are thus an ideal candidate for the ABC method to be applied, which has been already paid attention to by the ABC method authors – Kaplan, Cooper [2000, p. 280-283].

The Activity-based costing in the service sector has been covered quite inconsiderably in the applicable literature. The scarce papers include e.g., the publications by Karmańska [2003, p. 148-239], Januszewski, Kosinska [2004, p. 13-19], Shanahan [1995, p. 60-64] and Rotch [1990, p. 4-14].

The aim of the research covered in this paper was to calculate the costs of providing the service to carriers using 1 of the 12 biggest airports in Poland and determining their profitability, considering respective routes¹. For the airport it is especially important to know the actual costs

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¹ The research was performed with the use of the 2009 data.
of providing service to flight connections since they constitute the springboard for negotiating airport taxes collected from carriers.

The research method was made up by the Activity-Based Costing and the research tool – ABC modeling software - SAS Activity-Based Management (SAS ABM) which is one of the most appreciated cost and profitability management systems and, according to the ABC/M methodology (Activity-Based Costing/Management) [Vesset et al., 2007], [Hamerman, 2009].

1. Characteristics of the research object

The Airport described is 1 of the 12 biggest airports in Poland certified by the Civil Aviation Authority. In 2009 the company employed 131 people, including:
- 4 people in management,
- 41 people in the operational department,
- 14 people in the technical department,
- 4 people in the financial department,
- 68 people in the security and protection department.

The Airport operation is based on three major market segments. The first and the most essential one is the service rendered to regular domestic and international connections and then to seasonal charter flights and, finally, to the smallest segment, the service provided to irregular flights, namely General Aviation; mostly commercial flights by private carriers.

Throughout 2009 the Airport cooperated with the Irish carrier, Ryanair, which is the key carrier using the services of the Airport, and with smaller airlines, Jet Air, operating e.g., on the routes to Warsaw, Copenhagen, Vienna and Łódź. Besides, during the holiday season charter flights were operating to Turkey, Tunisia and Egypt. In 2009 the flight schedule covered 18 destinations served by Ryanair (London Stansted, Dublin, Birmingham, Liverpool, Dusseldorf Weeze, East Midlands) and Jet Air (Warszawa, Łódź, Vienna, Krakow, Zielona Góra, Gdańsk, Copenhagen, Berlin) as well as charter flights (Antalya, Hurghada, Monastir, Tunis).

In 2009 the company’s mainstay operating activity was highly non-profitable and it generated more than 20 million losses. The airport services were used only by 275 352 passengers. In that situation the primary objective of the Airport was to increase the number of the passengers served, to run the adequate price policy, cost analysis and
cost-cutting. The company intended to develop the flight network with the then partners and to start cooperation with new carriers. To run the adequate price policy, it is necessary to know the costs of providing the service to carriers and flights on respective routes and, mostly, it is necessary to determine where there exist destinations the service of which is profitable and which destinations generate the greatest losses and why. Such information can be acquired if one applies the right cost calculation method which is offered by Activity-Based Costing.

2. Structure of the ABC model developed and its implementation in the SAS ABM environment

The execution of the research objective required the development of the ABC model which facilitates answering the following questions:

– How much is the service of a specific route (arrivals and departures of the aircraft on a specific route) in a given period (e.g., in a given year)?
– How much is the service of all the routes of a given carrier?
– What is the average unit cost of the service of a given route (a single arrival and departure on a specific route)?

The model developed includes three modules (Fig. 1):

– The module of resources in which 11 various resources were defined in 10 groups;
– Module of activities in which 6 processes and their 43 various activities were differentiated;
– Module of cost objects in which 61 cost objects broken down into 13 groups were defined.

In the cost object module 12 groups are the ones referred to as “Carrier” and one is the cost object referred to as “Infrastructure”. In each group type “Carrier” respective cost objects are made up by the destinations served (broken down into the route “to” and “back”). Besides, each of them identifies a cost object also referred to as “Carrier” to which the costs of all the activities concerning the cooperation with the carriers but not logically connected in any way with a specific route were assigned with.

Having determined the ABC model structure, it had to be implemented in the SAS ABM system. To do so, there were first defined the measurements with the use of which for each group of resources, each process as well as each group of objects the cost centers were created and
for each resource, activity and cost object the cost accounts were established. Figure 2 demonstrates 10 cost centers for the resource groups defined as well as 12 cost accounts for the resource “Outsourced Services”.

Figure 1. General structure of the ABC model for the Airport

Resources
- Employees (5 resources)
- Buildings and structures (21 resources)
- Means of transport (8 resources)
- Equipment (7 resources)
- Airport maintenance equipment (8 resources)
- Airport equipment (17 resources)
- Protective equipment (10 resources)
- Office equipment (11 resources)
- Intangible assets (8 resources)
- Outsourced services (12 resources)

Processes
- Operation and security (6 activities)
- Other activities (4 activities)
- Sales (3 activities)
- Financial service (5 activities)
- Departure (13 activities)
- Arrival (11 activities)

Cost objects
- Ryanair (routes+carrier)
- Corendon (routes+carrier)
- Karthago (routes+carrier)
- Jet Air (routes+carrier)
- Free Bird (routes+carrier)
- Air Memphis (routes+carrier)
- Sun Express (routes+carrier)
- Nouvelair (routes+carrier)
- Tunisair (routes+carrier)
- Sky Airlines (routes+carrier)
- Aurelia Airlines (routes+carrier)
- General Aviation (routes+carrier)

Source: [Januszewski, 2011, p. 143].
Figure 2. Cost centers in the resource module

Figure 3, however, demonstrates the cost centers for 6 processes as well as 13 cost accounts for the activities executed as part of the “Take-off” process.
The cost centre structure as well as cost accounts for one of the cost object groups, namely Ryanair carrier, are given in Fig. 4.

The ABC model implementation in the SAS ABM environment at successive steps involved defining the resource cost driver and the
activity cost driver as well as pointing to the cost accounting paths from resources through activities to cost objects.

Figure 4. Cost centers in the cost object module

Source: Own elaboration.

2 Examples of resource cost drivers, activity cost drivers and cost flow paths, as well as characteristics of dimensions used for cost centres and account centres defining are presented in [Januszewski, 2011, 141-151].
3. Analysis of costs and profitability of the carriers and destinations served

Having introduced data on costs by nature and the values of resource cost drivers, activity cost drivers into the SAS ABM system, the activity costs and cost object costs were automatically calculated. Then the revenue (turnover) from sales of services for respective routes were determined and totaled as broken down into carriers. The carrier service cost data breakdown according to the ABC costing with revenues made it possible to evaluate the profitability. The calculation results are given in Table 1.

<table>
<thead>
<tr>
<th>Carrier</th>
<th>Service costs</th>
<th>Revenues</th>
<th>Result</th>
<th>Profitability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ryanair</td>
<td>3 359 764</td>
<td>2 928 470</td>
<td>- 431 294</td>
<td>-14.7%</td>
</tr>
<tr>
<td>Jet Air</td>
<td>3 720 821</td>
<td>589 198</td>
<td>- 3 131 623</td>
<td>-531.5%</td>
</tr>
<tr>
<td>Charter flights, including:</td>
<td>1 537 428</td>
<td>992 052</td>
<td>- 545 376</td>
<td>-55.0%</td>
</tr>
<tr>
<td>Sun Express</td>
<td>156 859</td>
<td>138 837</td>
<td>- 18 023</td>
<td>-13.0%</td>
</tr>
<tr>
<td>Sky Airlines</td>
<td>193 038</td>
<td>194 266</td>
<td>1 227</td>
<td>0.6%</td>
</tr>
<tr>
<td>Corendon</td>
<td>160 369</td>
<td>162 589</td>
<td>2 220</td>
<td>1.4%</td>
</tr>
<tr>
<td>Free Birds</td>
<td>49 351</td>
<td>25 440</td>
<td>- 23 911</td>
<td>-94.0%</td>
</tr>
<tr>
<td>Aurelia Airlines</td>
<td>386 270</td>
<td>225 335</td>
<td>- 160 935</td>
<td>-71.4%</td>
</tr>
<tr>
<td>Nouvelair</td>
<td>154 826</td>
<td>57 988</td>
<td>- 96 838</td>
<td>-167.0%</td>
</tr>
<tr>
<td>Karthago</td>
<td>156 688</td>
<td>52 890</td>
<td>- 103 798</td>
<td>-196.3%</td>
</tr>
<tr>
<td>Air Memphis</td>
<td>198 813</td>
<td>93 078</td>
<td>- 105 736</td>
<td>-113.6%</td>
</tr>
<tr>
<td>TunisAir</td>
<td>81 214</td>
<td>41 630</td>
<td>- 39 584</td>
<td>-95.1%</td>
</tr>
<tr>
<td>General Aviation</td>
<td>2 480 488</td>
<td>17 346</td>
<td>- 2 463 143</td>
<td>-14200.4%</td>
</tr>
</tbody>
</table>

Source: Own elaboration.

The analysis of the data presented clearly shows that it is Ryanair which is the carrier serving a regular connection which generates the lowest losses, while the cooperation with Jet Air is highly unprofitable and over the period investigated it generated more than PLN 3m loss. Two of the carriers, Sky Airlines and Corendon, serving charter flights, reveal a little profit and profitability of about 1%. Very high losses were generated by the service rendered to General Aviation commercial connections. High service costs mostly result from a high number of flights (departures and arrivals of light aircrafts) and a similar, as in the case of regular connections served by Ryanair and Jet Air, use of human
resources in the process of passenger service and the process of securing each departure and arrival. Surprisingly low revenues, in turn, come from the exemption from airport taxes of most light aircrafts and charges for departure or arrival service at the amount of about PLN 100.

As one could have expected, the service of each Jet Air destination was highly unprofitable. However, one of the destinations served by Ryanair was profitable (Table 2).

<table>
<thead>
<tr>
<th>Item</th>
<th>Destination</th>
<th>Service costs</th>
<th>Revenues</th>
<th>Result</th>
<th>Profitability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>London Stansted</td>
<td>1 386 510</td>
<td>1 284 582</td>
<td>-101 928</td>
<td>-7.93%</td>
</tr>
<tr>
<td>2</td>
<td>Liverpool</td>
<td>458 487</td>
<td>526 300</td>
<td>67 812</td>
<td>12.88%</td>
</tr>
<tr>
<td>3</td>
<td>Dublin</td>
<td>573 813</td>
<td>408 787</td>
<td>-165 026</td>
<td>-40.37%</td>
</tr>
<tr>
<td>4</td>
<td>Birmingham</td>
<td>383 510</td>
<td>354 180</td>
<td>-29 330</td>
<td>-8.28%</td>
</tr>
<tr>
<td>5</td>
<td>Dusseldorf Weeze</td>
<td>438 129</td>
<td>302 975</td>
<td>-135 154</td>
<td>-44.61%</td>
</tr>
<tr>
<td>6</td>
<td>East Midlands</td>
<td>119 311</td>
<td>51 645</td>
<td>-67 666</td>
<td>-131.02%</td>
</tr>
</tbody>
</table>

Source: Own elaboration.

**Conclusion**

The application of the adequate method of cost calculation and profitability evaluation as well as the tool which provides the possibilities of the cost structure analysis in various cross-sections gives the grounds for defining the causes of generating profits or losses by the products manufactured, services provided or the clients served.

The article presents the application of the Activity-Based Costing method and the SAS Activity-Based Management tool as well as the results of profitability of the service given to carriers using the services of one of the Polish airports.

The results are a springboard for a detailed analysis which will answer the question: what are the causes of high losses generated by the service of most destinations and what affects the positive profitability of three of them only. The cost calculation method applied as well as the SAS ABM specialist software make such analysis possible. It is key important to determine the structure of costs of the destinations served in the cross-section of activities as well as in the cross-section of resources used when providing that service. The comparison of those cost structures for respective destinations will facilitate diagnosing the causes of generating
losses on most of the destinations served. Unfortunately performing such analysis with presenting the possibilities offered by the SAS ABM software goes beyond this paper.

**References**


**Evaluation of costs and profitability of services applying the SAS Activity-Based Management system with the Airport as an example**

The article discusses the results of research of the costs of services rendered to carriers by one of the twelve biggest airports in Poland. It also presents the results of the evaluation of the profitability of providing service to respective carriers and destinations. The selection of the Activity-Based Costing as a method of calculating the costs of services offered by the airport has been justified. There has been presented the structure of the ABC model developed for a given facility
and its implementation in the SAS Activity-based Management system environment.

**Keywords**
activity-based costing, SAS Activity-Based Management, profitability analysis, airport