TECHNICAL UNIVERSITY OF CLUJ-NAPOCA

ACTA TECHNICA NAPOCENSIS

Series: Applied Mathematics, Mechanics, and Engineering
Vol. 61, Issue IV, November, 2018

FACTORS IN THE LIFE CYCLE OF AIRPORT ACTIVITIES

Adrian PISLA, Raluca-Dorina BAIDOC, Lorand KACSO-VIDREAN, Daniela Corina JUCAN

Abstract: *In Romania, Cluj Avram Iancu International Airport is the second important international, and the first important regional airport. This position must be preserved in the competition with the national and international, international airports but also as regional airport having "around" other 5 regional airports at a radius of 180 km. Situated in the middle of Transylvania (about 7.000.000 inhabitants), Cluj International Airport, is one of the Europe modern regional airport, the second one in the country, regarding the number of passengers embarked/disembarked, after Bucharest "Henri Coandă" International Airport, and therefore comparable with similar cities like Geneva or Stuttgart. Approaching the life cycle of airport activities is made in the face of what is called Product Lifecycle Management (PLM). One of the features of the PLM concept is Collaborative Product Development, which is the first phase of the product life cycle, assuming that "new products can be based on components or concepts of older products", fully justified because in most cases product development is based on aspects and / or components of products already developed, tested or even used.Following the analysis of the principles and requirements for the development of a questionnaire, a questionnaire was generated that would bring a complete and consistent set of data. For the application of the questionnaire, the Cluj Avram Iancu International Airport agreement was obtained. The final form of the questions was developed and confirmed by the Cluj Avram Iancu International Airport appointed representatives. Data and time intervals have also been selected together with the Cluj Avram Iancu International Airport designees.*

Keywords: *life cycle, airport, questionnaire, analysis*

1. INTRODUCTION

Cluj county has about 700,000 inhabitants. From this point of view, Cluj airport can be compared to airports in European cities like Geneva and Stuttgart, which every year have around 12 million, respectively 9 million passengers. In 2017, for the first time, Cluj Avram Iancu International Airport reached the number of 2,000,000 passengers. At this point, Cluj airport is the 2nd in Romania in terms of passenger numbers, after Bucharest Airports National Company. Within a radius of 170 km around the city live about 3 million potential passengers whose service is a fundamental concern for Cluj airport. Cluj Avram Iancu International Airport (CAIIA) is a public organisation. In the last 10 years CAIIA suffer multiple changes in order to provide the public (passengers and accompanying persons) with adequate and sufficient services in a continuous evolving environment and within a highly competitive situation.

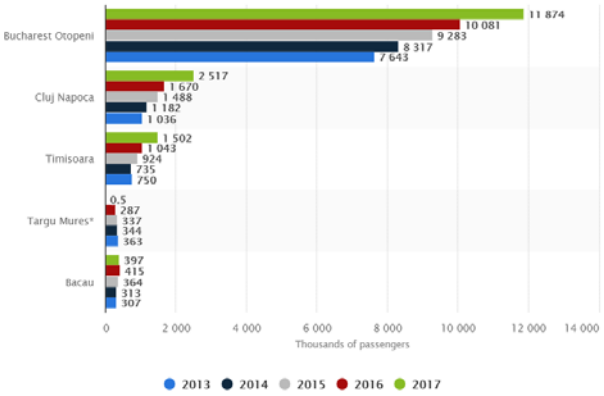

Fig.1: Number of passengers utilising each of Romania's most popular airports from 2013 to 2017.

The beginnings of civil aviation at Cluj-Napoca dates back 83 years ago in 1932, when the

Military Aerodrome Someşeni started to operated flights carrying passengers. After a period of prosperity in the interwar years, Cluj airport was destroyed at the end of the Second World War, in 1944. Subsequently rebuilt and developed in successive stages, Cluj airport is today an important driver for economic development of the region. The identification of problems and opportunities within the CAIIA can only be done in relation to a stated purpose. In the case of the present study the goal is to define the increase in the number of passengers over 3 Million, having as secondary elements the achievement of the increase in the number of passengers with the increase of the passengers' satisfaction (dual component purpose and instrument) and the provision of the growth resources by making the use of the existing facilities more efficient, based on identifying the lifecycle of airport activities and eventually changing it to make the two objectives more effective, reducing the resources allocated for implementation: time and money. From 1996 until 2017, Cluj Avram Iancu International Airport registered high growth rates of passenger air traffic. This increase was determined by an effective and efficient management, by the adoption of marketing strategies that generated the development of air traffic and attracted new air operators on Cluj market (Tarom, Wizz Air, Lufthansa, Vueling, Lot Polish Airlines, Blue Air, Turkish Airlines, Aegean Airlines). Also, the Cluj Avram Iancu International Airport have three airlines that operate international cargo transport: Silver Air and Swift Air. In the graphics below is presented the evolution of air traffic passengers embarked/ disembarked at Cluj Avram Iancu International Airport:

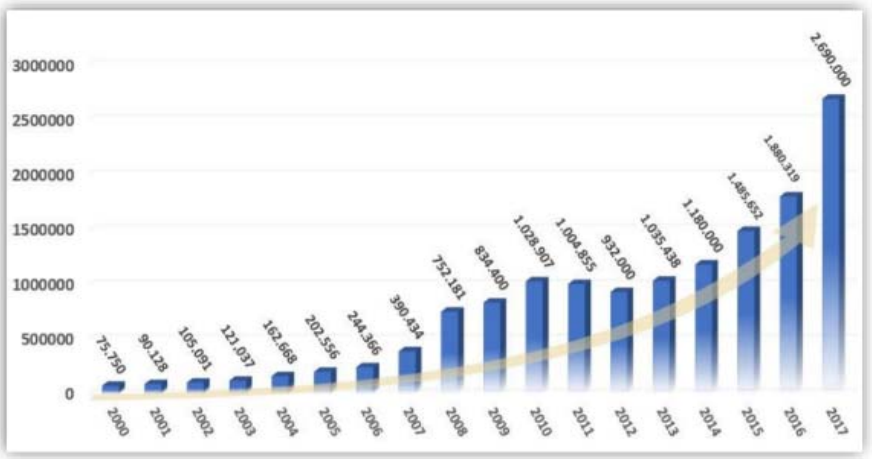

Fig. 2: Cluj Avram Iancu International Airport passengers traffic evolution 2000-2017

2. LIFE CYCLE FOR TECHNOLOGICA-LLY INNOVATIVE PRODUCTS

The life of a product is usually considered to begin when it is made available, or first shipped to a customer. The life of a product ends when the producer stops production, or no longer services or supports the product. The length of this cycle varies for each product or type of product. For hardware, the life cycle may depend on the complexity and power of the hardware, innovation built into the product or the pace of new technology. For software, the life expectancy is longer, as many producers support multiple versions of a product. Higher-end products tend to have longer life expectancies, as they have more speed and innovation built in.

Approaching the life cycle of airport activities is made in the face of what is called Product Lifecycle Management (PLM). One of the features of the PLM concept is Collaborative Product Development, which is the first phase of the product life cycle, assuming that "new products can be based on components or concepts of older products", fully justified because in most cases product development is based on aspects and/or components of products already developed, tested or even used.

Simultaneous coordination of certain product development activities results in shorter product

development and marketing time, as shown in Figure 3.

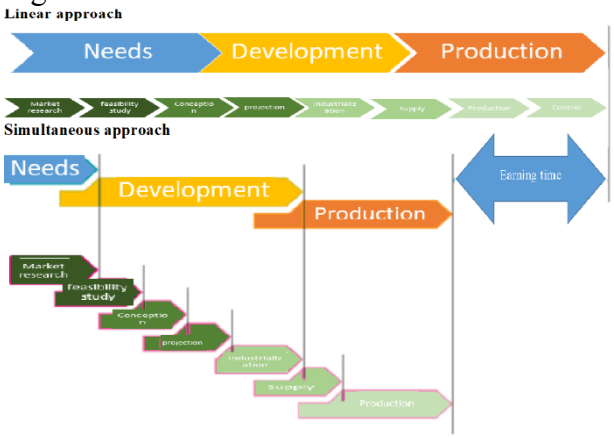

Fig.3: The approach of linear and simultaneous development of a product

As stated, in the literature, the product's lifecycle covers the product's life cycle, which is strictly related to the phases a product goes through when it is identified as necessary and until it is withdrawn from the market.

In current practice, any product development is performed in one of the following directions (Musca, 2010):

• customer-oriented development;
• Directed entrepreneurial development.

In the case of customer-oriented development (which takes into account the classical approach to product lifecycle), the customer specifies, to a greater or lesser extent, the following product-related aspects (Musca, 2010):

• requirements;
• functionality;
• geometry;
• specifications;
• product features.

The product developer is located between the following two situations:

• when it receives the "geometry" of the completely defined product, the specifications and characteristics of that product, sometimes even technological and process specifications, the purpose is to transform the information into palpable material elements;

• When the customer only provides the "requirements" of the product, the developer is responsible for transforming these requirements into constructive elements, specifications, features, etc. In the case of the targeted entrepreneurial development, the product developer is the one who "generates the requirements", assuming hypotheses (sometimes risky), assuming that the projected requirements will meet the needs of a set of potential customers (imposing a requirement).

Where new or innovative technologies are used, the product developer may be surprised to find that the mass of potential customers is widening considerably as the technologies in question increase their functionality. In both development situations, there is a "collaborative" client-developer manifested through a common understanding of product requirements.

Just as a product has a life cycle and the life cycle of airport activities has its own way of evolution going through different stages that need to be well understood so that they can intervene with the right strategies at the right time. The concept of 'airport life cycle' refers to the development of a service (technology) in a way similar to the development of a product. By the term technology it is possible to designate a product, service or process as a component-method binom.

In the introductory phase, there will be high spending on implementation and promotion, with no or no gain.

In the growth stage, new knowledge can accumulate and various experiments can be carried out to improve service.

In the maturity phase, it is becoming increasingly difficult to make improvements to the service reaching a stabilization, desired or considered as a tagline

The phase of decline is the stage in which physical limits are reached, appearing to migrate to other solutions or locations as a result of assessing the limits reached.

Typically, the technologies (services) existing at one point are inherently spiraling, as shown in Fig. 4. (Viardot, 2004). At this time, large investments are required to replace the old technology with a new one, investments that are largely affected by existing competition.

Introductory Phase

In this phase, sometimes called “bleeding edge,” the technology product is first introduced. This phase generally lasts until the product is fully tested and any bugs and

compatibility issues are fixed. The length of the introductory phase depends on how revolutionary the product is, how much change customers need to make to their existing technology to use the product and what type of support is needed for the new product. Innovative or expensive products using new technology often have longer introductory phases than a product that is merely an upgrade of an existing technology.

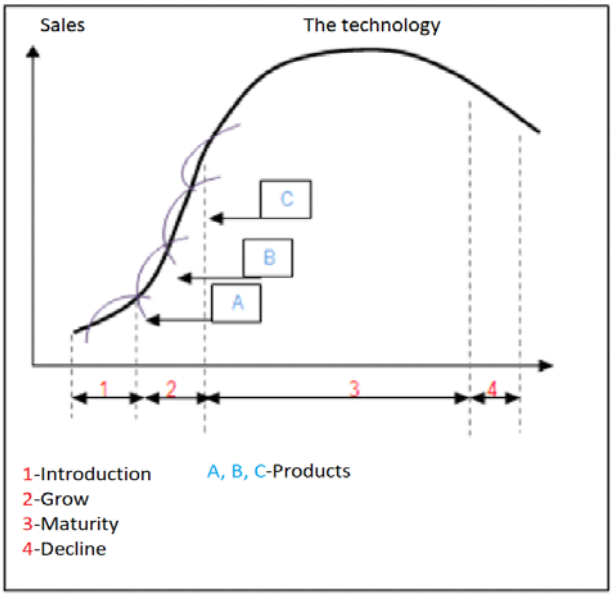

Fig. 4: The life cycle of the technology (service considered as product)

High-viability Phase

Technology products reach this phase once all the bugs have been ironed out and more companies or individuals begin to purchase the product. The manufacturer can then begin producing and selling in larger volumes. The technology is stable, the benefits of the product have become more apparent, and so more companies and individuals feel it is safe to buy the product. This is when the majority of sales occur–the product is being produced and sold in high volume.

Product Phase-out

This phase begins when the manufacturer releases a new product that targets the same customers as the existing product and is designed to replace it. This can also happen when a different manufacturer releases a product designed to compete with the existing product. The new product ideally contains some advantages or innovation over the old product. The length of this phase depends on how long the introductory phase of the new product lasts, and on when the manufacturer decides to stop making the old product.

End of Life

This phase begins when the manufacturer stops making and selling the product, and it finishes when the manufacturer stops offering support for the product. For expensive or large hardware products, this phase can last many years, as manufacturers may have contracts with large customers to continue offering support services. For software, this phase may be much shorter, as it is easier and cheaper to upgrade software with a new version. Most technology producers make sure this phase is long enough to allow customers to move to the new product.

Reference stages considered within the life cycle of Cluj "Avram Iancu" International Airport are:

1996 The Cluj County Council (subordinated to CAIIA) started the extension of the terminal building, completed in August 1997.

2006 The Cluj officials have declared their intention to develop the airport to allow a stronger increase in air traffic in the area.

2008 An investment of over 15 million Euro has been completed, which led to the construction of a new passenger terminal for Cluj International Airport.

2009 The management of the airport has completed an investment of 25.8 million euros in the construction of a new 16,000-square-foot passenger departure terminal with a processing capacity of 750 passengers per hour.

The new terminal, with a capacity of 1.5 million passengers per year, is intended for both domestic and foreign flights, with facilities at international standards.

2013 On October 26, the new route of the Cluj "Avram Iancu" International Airport, with a current length of 2,100 m, was opened, is planned to be extended to 3,300m.

2015 5 February 2015, ACI Europe (ACI - Airport Council International) classifies the International Airport "Avram Iancu" Cluj in the top of the European airports with the largest increase in the number of passengers in 2015.

10 September 2015, the International Airport "Avram Iancu" Cluj celebrated the achievement

of the 1 million passengers for the fifth year in the history of the airport.
2016 10 August 2016, 1 month earlier than in 2015, the passenger number 1 million is celebrated.
2017 September 21, 2017, Cluj Avram Iancu International Airport celebrated for the first time the passenger number 2 million.
Product lifecycle notions and technology lifecycle are borrowed from biological and demographic evolution studies, the analysis of such cycles is particularly useful to the management of the organization in order to make the best decisions regarding the range of products that follow (Mitran, 2007), the product series and the strategies to be adopted in the research and development (CD) field of new products, implementation, marketing,(Mitran, 2007).
The product life cycle can be used to analyze a product class, a product type, or even a product mark. It should be considered that the subject of the analysis will have a life span of several years, but the effectiveness of an analysis may be lower in very long or very short life cycles. Due to the speed of technical and technological change, some specialists consider the conventional theories about life cycles signaled in the industrial environment as a result of shorter cycles, and by increasing the information mass consumer behavior and lifestyle change rapidly and fundamentally, industry (as well as the whole economy), being in a process of continuous and accelerated change.
In life cycles, diffusion models are similar to epidemiological models or demographic demographic models that study the growth rate of products, the proportion of new demand and replacement demand, average use times, etc.
Determining new types of phases and the life cycle stage in which a product is present at a given moment with the estimation of its future evolution is a complex problem, due to a set of factors identified: (Mitran, 2007)
• the multitude of data on the evolution of products on the market;
• the difficulty of generating and accurately assessing product-specific information;
• the lack of an purpose adaptive information system, etc. In this respect, studies and analyzes related to the life cycle of the product appeal to a series of methods using decision makers such as: (Mitran, 2007)
• the degree of product spread on the market (determined by the number of consumers);
• the degree of penetration of the product into consumption (expressed by the quantity and value of the specific purchase and the frequency of the purchase);
• Product delivery speed on the market (determined as the ratio between the geographical area covered by the distribution of the product and the time it takes to do so);
• the number of companies manufacturing the product.
An "ideal" life cycle is only a theoretical notion that is not checked in most practice cases because: (Mitran, 2007)
• are generated incomparable depending on:
- type of product (industrial, consumer, sustainable, etc.);
- the level of aggregation (applies to a class of products, a form of product, a trade mark);
• is influenced by a number of factors:
- technical-scientific progress;
- the dynamics of the demand-offer ratio;
- type of market and degree of saturation;
- the novelty of the product;
- Applied marketing mix, etc.
In the introduction and growth phases, the most "innovative" of consumers will adopt technology and the product very quickly.
Mature stage increasingly more consumers 'cautious' will buy the product, until finally there is a new product whose characteristics are more efficient and therefore will reorient guide consumers towards the product incorporating new technology. The fundamental issue is to determine the maturity phase's longevity and decision patterns on consumer behavior. This problem makes the application of the life cycle of the product with a predictive purpose to be done with great caution. Finally, all products grow old and die and it is therefore necessary to develop new products continuously.

3. IDENTIFY THE APPLICATION IMAGE FROM CLIENTS

3.1 Principles of questionnaire elaboration

Data collection is a complex process that can be defined as a formal activity through which, with the help of scientific concepts, methods and techniques, the data are specified, measured, collected, analyzed and interpreted for the management of the organization to know the environment in working, identifying opportunities, evaluating alternatives. (Aaker, David A., V. Kumar, George S. Day, 1998,).

The questionnaire was developed on the basis of the ten principles formulated by Pierre Lubois and Alain Jolibert:

1 to stimulate the interest of the interviewee;

2 to reflect through its content all the issues that need to be known.

questions:

3. must be clear to be understood and interpreted;

4. to be realistic and not to have a high degree of difficulty;

5. be neutral, unintentional, to have a logical succession and progressive character;

6. be short (one question to refer to only one problem);

7. to determine responses that can be repeated and easily recorded;

8. be easily reformulated to see if they can carry out different responses;

9. not to be vague, hypothetical or insinuating;

10. The answers are not influenced by the call to memory, desire, prestige.

For these questions to lead to good quality information, the following requirements must be met:

a) be appropriate to the purpose of the research;

Questionnaires seek to obtain information that is impossible (or much harder) to obtain otherwise, with the help of which they are trying to solve specific problems targeted by the marketing research that involves them.

However simple and as clearly worded as a question, and as easy and sincere as the answer that might be given to it, it will be totally inappropriate if it is not related to the subject of the research.

b) be easy to understand by all subjects to be addressed;

For a question to be clearly formulated, the following requirements must be met:

- the meaning of each word used is known;
- respondents to interpret the question in the same way;
- the interpretation of the question is the one that the formulator wishes.

c) respondents should have answers to them (be aware);

In order to prove their usefulness in research, it is not enough for the questions to be included in the questionnaires to be adequate, clear and easy to understand or interpret. It is equally important that those to whom they are addressed be able to respond to them. For a person to be able to answer the questions correctly, some requirements are met:

- Be aware of it;
- to be able to remember what is required;
- to have their own opinions, etc

d) not generate (among some respondents) the tendency to distort the answers. Some people to whom the questionnaire is addressed have a tendency to deliberately respond.

The probability of getting unscientific answers is very high if we use the following questions:

- "What income do you have?" (Addressed to a person who opts out of the tax);
- "How many houses you have" (assigned to a Romanian parliamentarian);
- "Where do you work?" (Addressed to a black worker);
- "To what address do you live" (a man afraid of thieves);
- "Do you often buy alcoholic beverages?" (to a alcoholic);
- "What is your age?" (To a lady over 42), etc.

Therefore, whenever the interviewees have the interest to conceal reality, they will be tempted to answer innocuously. That is why the questions we have referred to will have to be reformulated in such a way as to remove any restraint or suspicion, or accompanied by assurances that the answers will enjoy the greatest confidentiality. Additionally, there are also a number of requirements to anticipate possible variants of response.

Addressing ways to complete the questionnaire:

- by traveling to interviewees (on the street, at exhibitions) by direct contact;
-by phone;
-by mail;
- via internet.

	Do you find Cluj Avram Iancu International Airport attractive?
yes	112
no	16
Total	128

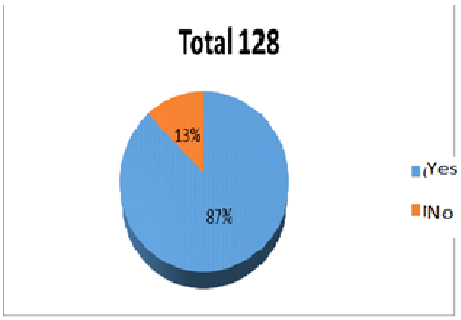

Fig. 5: The attractiveness of CAIIA

	Have you ever been traveling by plane?
yes	125
no	3
Total	128

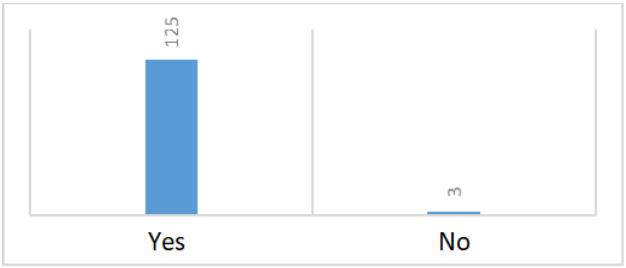

Fig. 6: Using the airplane as a means of transport

	How many times do you travel by plane over a year?
0	2
1	20
2	25
3	22
4	17
5	9
6	6
7	5
8	3
10	9
12	3
40	1
56	1
Frequently	2
monthly	3
Total	128

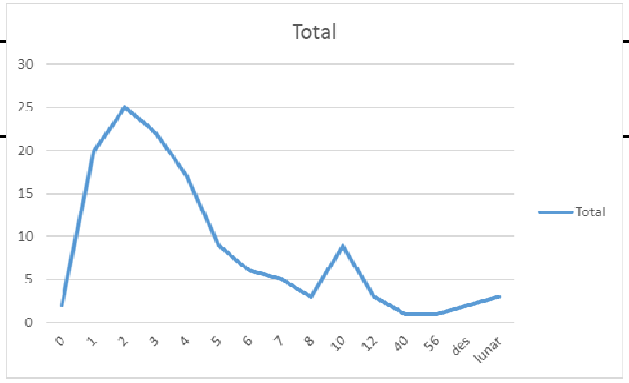

Fig.7: Using the airplane as a means of transport

	Lack of transoceanic flights is a problem for CAIIA?
Yes	85
indifferent	32
no	11
Total	128

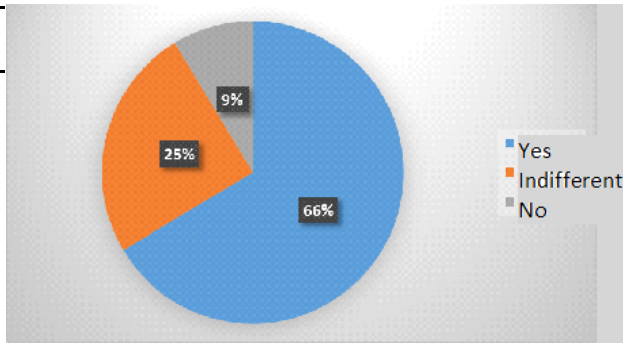

Fig. 8: The lack of transoceanic

	Agglomeration is a problem for CAIIA?
yes	73
indifferent	32
no	23
Total	128

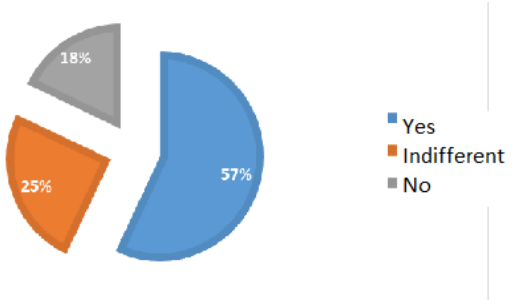

Fig. 9: Agglomeration

	Competition is a problem for CAIIA?
yes	31
indifferent	66
no	31

Total	128

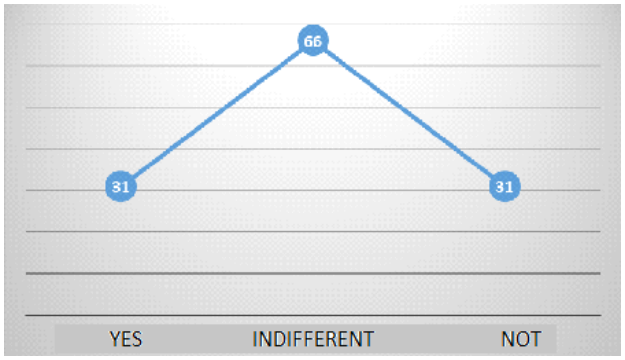

Fig. 10: Competition is a problem

	The quality of the internet is a problem for CAIIA?
yes	30
indifferent	67
no	31
Total	128

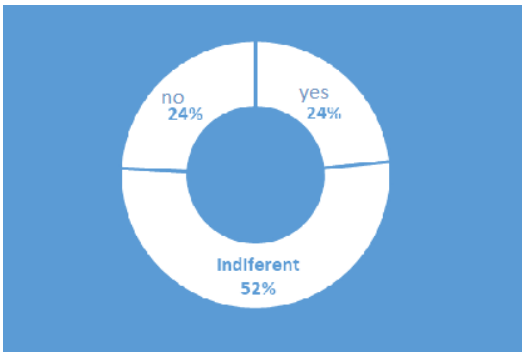

Fig. 11: The quality of the internet

	Competition is a problem for CAIIA?
Agreement	50
Total agreement	34
Disagreement	6
Total disagreement	1
Indifferent	7
Total	128

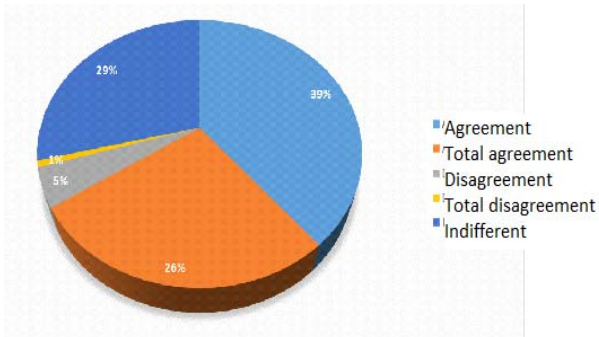

Fig. 12: Events from Cluj

3.2 Making the questionnaire

Following the analysis of the principles and requirements for the development of a questionnaire, a questionnaire was generated that would bring a complete and consistent set of data. For the application of the questionnaire, the CAIIA agreement was obtained. The final form of the questions was developed and confirmed by the CAIIA appointed representatives. Data and time intervals have also been selected together with the CAIIA designees.The questionnaire was distributed to the CAIIA Departure Terminal and applied to a sample of 128 respondents. It is made up of two parts, namely the first part that includes the actual research issue and the second part contains questions to identify the subject being interviewed. The questionnaire predominates closed questions, especially multithreaded questions, which give respondents the choice to from several predefined variants of answers. And those with scale response, using a five-point scale, ranging from "total disagreement" to "total agreement."

The predominant use of the questions closed in the questionnaire is due to the advantages of this type of question: it facilitates easier coding of the answers and a faster analysis of data, avoids bias in coding, contributes to the anonymity of the respondent, and in case of questions closed with scale responses add the advantage of allowing the measurement of the intensity of opinions expressed by the respondents.

At present, Cluj "Avram Iancu" International Airport is one of the most important airports in Romania, being served by several important airlines. Following the analysis of the principles and requirements for development, a questionnaire was generated that would bring a complete and consistent set of data.

The questionnaire is made up of two parts, the first part contains the actual research issue and the second part contains questions to identify the subject being interviewed.

The questionnaire was distributed to the CAIIA Departure Terminal and applied to a sample of 128 respondents on one day of the week and the peak of the day of peak agglomeration. CAIIA it is considered attractive by 112 respondents out of 128, which results also from the massive increases in traffic.

The people who were in the airport and completed the questionnaire, also traveled by plane, however, for a number of 3 people would be their first flight. Most passengers travel twice a year, but out of the 128 passengers who completed the questionnaire, one of them travels 58 times on the park of a calendar year. There are also people traveling on a plane monthly.

The lack of transoceanic flights is considered a problem, precisely in this sense, the CAIIA has the strategic objective of conducting a Carpathian flight from Cluj, the extension of the runway is the only impediment to reaching this target, because the high capacity aircraft operating on these races would need a track longer than the current one.

From November 2017, passengers from Cluj can fly directly to Lufthansa, the largest hub in Frankfurt. With this route, it can be easier to reach in intercontinental destinations such as Cape Town, Bangkok, Buenos Aires, Singapore, Hong Kong, or Rio de Janeiro. From the inauguration, the traffic at Cluj-Napoca Airport has doubled.

It has reached its maximum capacity of 1 million and a half passengers per year. Normally, it should not be more than 750 passengers per hour.

The CAIIA ended 2017 with over two and a half million passengers, which meant a 50% increase over the previous year. Ashew has increased the number of streams and expanded the areas so that the tail is as short as an extraordinarily high effort.

The busiest day in the history of Cluj airport was June 26, 2017: 10,189 registered passengers, almost as much as the population of Huedin. However, the operational director Iuliu Pop says for "actualdecluj.ro" that the number of 10,000 passengers transported per day will be exceeded frequently from now on, especially during the summer, when the airport also takes off tours.

The busiest routes are to London - 4 daily races - and Bucharest - 7 races every day. The main competing airports of CAIIA are: Maramureş International Airport, Oradea Airport, Satu Mare International Airport and Târgu Mureş Airport, but passengers are more indifferent on this issue.

Avram Iancu Cluj International Airport offers free internet access in the public areas of Arrivals and Departures Terminals, as well as VIP and Business Lounges. The city in the heart of Transylvania is appreciated as the "capital of the film" in Romania thanks to the already famous International Film Festival Transylvania. Cluj International Music Festival, International Festival of Interference Theater, Temps d'Images Festival, Transylvania International Film Festival, Comedy Cluj International Film Festival, Mozart Festival, Jazz in the Park, Spring of Cafes, Chamber Music Festival "SonoRo", the Modern Cluj Festival, the Sigismund Toduță International Festival, the Lucian Blaga International Festival

of Poetry or the Transylvania Jazz Festival complete the city's image of the festivals that Cluj has already created.

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FACTORI DIN CICLUL DE VIAȚĂ A ACTIVITĂȚILOR DE AEROPORT

Abstract: *În România, Aeroportul Internaţional Avram Iancu Cluj este al doilea important aeroport internaţional şi primul aeroport regional important. Această poziţie trebuie păstrată în competiţia cu aeroporturile naţionale şi internaţionale, dar şi ca aeroport regional care are "în jurul" altor 5 aeroporturi regionale, pe o rază de 180 km. Situat în mijlocul Transilvaniei (circa 7.000.000 de locuitori), Aeroportul Internaţional Cluj este unul dintre aeroporturile regionale moderne din Europa, al doilea în ţară, în ceea ce priveşte numărul de pasageri îmbarcaţi / debarcaţi, după Bucureşti "Henri Coandă" Internaţional Aeroport şi, prin urmare, comparabile cu oraşe similare precum Geneva sau Stuttgart. Abordarea ciclului de viaţă al activităţilor aeroportuare se face în faţa a ceea ce se numeşte Managementul ciclului de viaţă al produselor (PLM). Una din trăsăturile conceptului PLM este dezvoltarea de produse colaborative, care este prima fază a ciclului de viaţă al produsului, presupunând că "produsele noi pot fi bazate pe componente sau concepte ale produselor mai vechi", justificată pe deplin, deoarece în majoritatea cazurilor dezvoltarea de produse este bazate pe aspecte şi / sau componente ale produselor deja dezvoltate, testate sau chiar utilizate. În urma analizei principiilor şi cerinţelor pentru elaborarea unui chestionar, a fost generat un chestionar care ar aduce un set complet şi consistent de date. Pentru aplicarea chestionarului a fost obţinut acordul de la Aeroportul Internaţional Cluj Avram Iancu. Forma finală a întrebărilor a fost elaborată şi confirmată de reprezentanţii numiţi ai Aeroportului Internaţional Cluj Avram Iancu. Intervalele de timp şi date au fost selectate împreună cu designerii de la Aeroportul Internaţional Avram Iancu din Cluj.*

Adrian PISLA, Department of Design Engineering& Robotics, Technical University in Cluj-Napoca, C. Daicoviciu,Cluj-Napoca, RO-400114, Romania

Raluca-Dorina BAIDOC, Department of Design Engineering& Robotics, Technical University in Cluj-Napoca, C. Daicoviciu,Cluj-Napoca, RO-400114, Romania

Lorand KACSO-VIDREAN, Department of Design Engineering& Robotics, Technical University in Cluj-Napoca, C. Daicoviciu,Cluj-Napoca, RO-400114, Romania

Daniela Corina JUCAN, Department of Management and Economics Engineering, Technical University in Cluj-Napoca, C. Daicoviciu,Cluj-Napoca, RO-400114, Romania