eXclusive e-JOURNAL
ISSN 1339-4509

ECONOMY & SOCIETY & ENVIRONMENT

Air accidents, their investigation and prevention

Ing. Vladimír Socha
Czech Technical University in Prague, Faculty of Biomedical Engineering
Nám. Sítná 3105, 272 01 Kladno, Czech Republic
Technical University in Kosice, Aeronautical Faculty
Rampová 7, 041 21 Kosice, Slovakia
ing.vladimir.socha@gmail.com

Ing. Luboš Socha, PhD., PhD.
Technical University in Kosice, Aeronautical Faculty
Rampová 7, 041 21 Kosice, Slovakia
lubos.socha@tuke.sk

doc. Ing. Stanislav Szabo, PhD. MBA
Czech Technical University in Prague, Department of Air Transport
Horská 3, 128 03 Prague 3, Czech Republic
szabosta@fd.cvut.cz

Ing. Vladimír Němec, Ph.D.
Czech Technical University in Prague, Department of Air Transport
Horská 3, 128 03 Prague 3, Czech Republic
nemec@fd.cvut.cz

Abstract

The contribution is dealing with the issue of air transportation safety in view of the potential causes resulting in air accidents and their prevention. It classifies the causes of the accidents by the separate phases of flight. Further it focuses on air accidents investigation and possible prevention. The conclusion characterizes some international organizations dealing with the issue of safety in civil aviation.

Keywords: Aircraft, safety, air accident, prevention, investigation, human factor.

1. INTRODUCTION

Accidents in air transport are dominated by the failure of human factor failure, i.e. that of the aircrew. Despite of a positive development in the trend of accidents recorded since the beginning of the 21st century, the number of air accidents is still insatisfactory. Consequently, it is of paramount importance to do everything that would contribute to substantial reduction of the human factor failure in air trasportation. A system of models appears to be an important tool for overall understanding of the complexity of human factors, serving as starting-points to an analythical and clasificational research of the human factor. At the same time, these models enable qualified investigation and assessment of the causes of air and accidents, thereby preventing them from reapeated occurrence.

2. CLASSIFICATION OF THE CAUSES TO AIR ACCIDENTS

Throughout the world, civil aviation authorities are distributing a large number of publication and surveys on air accidents and incidents, according to which aviation prouds itself in the most favourable statistics in terms of air transoprtation safetyAthe rate of accidents in air transportation is currently representing one accident per million takoffs. It is still alarming that air safety has not improved despite of substantial progress made in many of the areas affecting air transportation. The progress was most remarkable in seclection and training of the aircrew, aircraft design and manufactuiring of aircraft, weather monitoring and forecasting, improving mechanical reliability, system monitoring, communication, precision and scope of navigation aids, cockpit instrumentation and travellers´ compartments, safety equipment, air traffic control, utilization of radars and lighting and other airport equipment.

Here it is considered important to state the defininiton of an air accident and incidents:

- Air accident is an event related to the operation of an aircraft, taking place from the time the passenger boarded the plane with the intention to carry out a flight till all the persons has left the aircraft and during which:
  - Some of the person have been fatally or heavily injured,
  - The aircraft have beeb destroyed or damaged,
  - The aircraft is lost or is at a completely inaccessible place.

An incident is an event quite different form of an air accident related to the operation of the aircraft, which has and could have affected the safety of operation. It is understood mostly as a faulty action of persons or improper operation of airborne or ground-based equipment supporting air operation the consequences of which as a rule do not require premature termination of flight or performing non-routine emergency procedures.

Causes affecting the accident rate in air transportation can classified from various factors and points of view. The most general and probably the most transparent way of classification is dependence on human action or failure, technical and meteroroligcal factors. As far as the organizational or legislative shortcomings are concerned, they could also be instrumental in supporting the factors mentioned , mostly as a result of poor adherence to legislative procedures or mismanagemnt of air operation.

There is a range of causes to air accidents. In view of the fast development taking place in almost all the field of aviations, the occurence of air accidents caused by aiviation technology is reducing. The development, however, is adding to the complexity of systems and raising the level of seriousness, all that to be managed by the aircrew. This very cause appears to be increasing in direct prorportion to the accidents caused by human factors. Currently its contribution is at about 80 %.

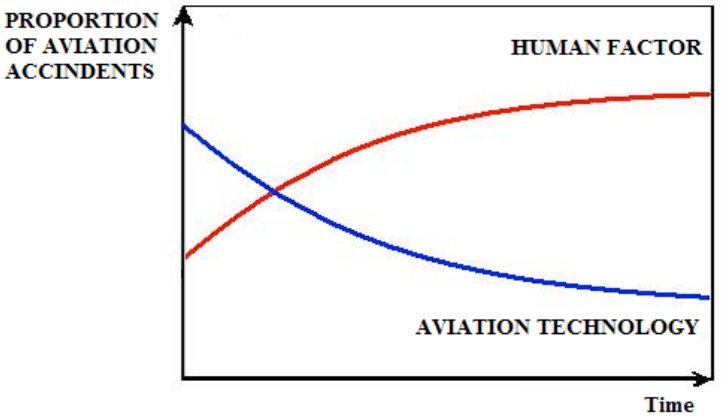


Fig. 1 Factors contributing to air accidents

The graph in Fig. 1 is illustrating the development of air accidents in relation both to human factor and aviation equipment. Based on it, one can conclude that in the light of the development of aviation technical systems, aviation technology is still on the declining course whereas the share of human factor on air accidents is increasing.

The category of most serious air accidents is made up of the so called: CFIT (Controlled Flight Into Terrain). It involves accidents at which the aircaft is flying on a final approach course for landing at poor visibility or when flying in clouds, or even by night. Despite of the perfect status of the aircraft, it hits the ground. The fact that high-capacity aircraft are most involved in them results in very high numbers of casualties, as a rule.

Another category of serious accidents is loss of control over the aircraft (against caused by human factor). With the majority of accidents, more than one factor or cause is involved. There often comes to the so-called cumulation of errors, whereas the single errors by themselves appear to bear almost no importance (statistics prove that at every flight of an aircraft the comes to an occurrence of errors, at an average of 1,9 attributed to the aircrew. As soon as the aircrew by taking appropriate measures fails to eliminate or stop further negative development of events, control over the aircraft is doomed to be lost.

Based on ICAO statistics, the classification of errors is as follows:

- Procedural errors 40,8 %,
- Communication errors 9,7 %,
- Knowledge, experiences 9,2 %,
- Incompetence of the staff 40,3 %.

The cause to failures and the follow-up loss of control over the aircraft can be attributed to the incompetence of the aircrew (lack of experiences, insufficient training or errors in the cooperation, lack of attentiveness, misunderstandings etc.).

Further important types of accidents are caused by e.g. windshear, frost or collision of two aircraft. These and the causes meantioned earlier came into the focus of the ICAO programme of prevention.

It is important to point out that at air accidents are not only monitored in terms of their direct causes, but also in terms of the phase of flight when they occur.It has been found out that as much as 50 % of all the accidents took place during the approach to landing, which represents only 4 % of the total flight time. Another 27 % of accidents occured during takeoffs and initial climbs representing only some 2 % of the flight time. A simple addition of the percentages reveas that more than ¾ of all air accidents occur wtihin a relatively short legs of flight.

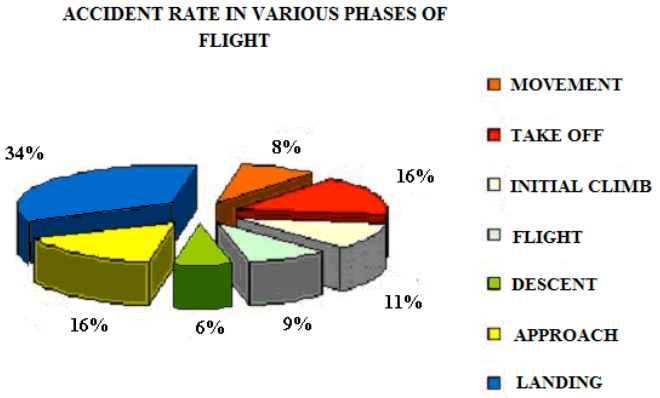


Fig. 2 Accident rate by phases of flight

3. INVESTIGATION OF AIR ACCIDENTS

Determining of the causes of air accidents and preventing them from occurence is an important part of the flight safety system.

The most serious consequences of air accidents are those related to losses of human lives, while those of material are of secondary nature. For airline companies, even material loses are very importatnt. To them an air incident or accident means high financial load, as not small ammounts are payd out as compensations for victims, and the average price of a transport aircraft is in excess of 50 mil. USD, an amount representing a serious problem to tackle. As a more, each air accident can cause loosing thrustworthiness, causing drop in the volumes of customers interested in air travel.

From the manufacturer´s point of view, an air accident is the predecessor of a costly lawsuit. However, it can on the one hand became a stimulus for increasing the level of safety while on the other hand it might lead to involuntariness in eliminating the error, as admitting such an accident can be interpreted as admitting an error in aircraft design or manufacturing. Regardless of the insurance companies and further persons or organizations affected by the accident, one can state the an air accident with its consequences belongs to the worst disasters in transportation.

Investigation of air accidents is a complex process focused on a mosaic of specific phenomena, the consequences of which and mainly their causes as objects of investigaion. Only a consistent and an all-round investigation of an air accident enables accepting and realizing a system of efficient measures for preventing accidents and incidents from reoccuring, thereby maximizing the efficiency of effect in improving the overal level of flight safety.

The act of investigation is left to the competence of appropriate state authorities, whereby their jurisdiction is given predominantly by the area where the accident happened. Coordinated effort in this regard is expected from the manufacturer of the type suffering losses, the airline as the operator of the aircraft, local civil aviation authorities registering the aircraft as well as further subjects involved, depending on the circumstances of the accident. As a rule, the authority to investigate the air accidents and incidents falls to the civil aviation authority, however, there are countries where special organisations enjoy the exclusive right to investigate such accidents. At any rate, participation of organs of criminal investigation is a matter of course, should a suspicion of criminal cause of the accident arises.

3.1 Prevention of air accidents

Investigation is focused on determining and analysing the circumstances of the accident, flight proficiency of the aircrew, organization of the flight, status of the aviation equipment, medical status and professional competence of the aircrew as well.

Measure to prevent accident rate from increasing are developed by operators as a result of an analysis focused on activities and causes of them. Prevention should primarily focus on traning and education of the aircrew, care for the aviation equipment, technical support to air traffic , organizational and control issues as well as the field of care for the labour force etc. However, pPrevention should prove inefficient if not carried out on a basis of planning and steadiness . As its substantial part is made up of the analyses of air accidents, the operator is liable to make constant use of all the technical tools of objective control mostly flight data recorders, magnetophone tapes etc.).

The tools must be held in perfect technical status and follow innovation in time. Some airlines may find it financially too demanding , but investments into prevention are not meant as money throughn out of the window. It it can be said for sure that any air accident is much more expensive than the costs of the preventive measures.

Air accident is seldom a result of a single cause. It is typical for them to originate from a combination of factors. It is the cumlation of these events, which will eventually result in air accident. Thus, by prevention of accidents is meant timely detection and elimination of the causes before it developes into an event.

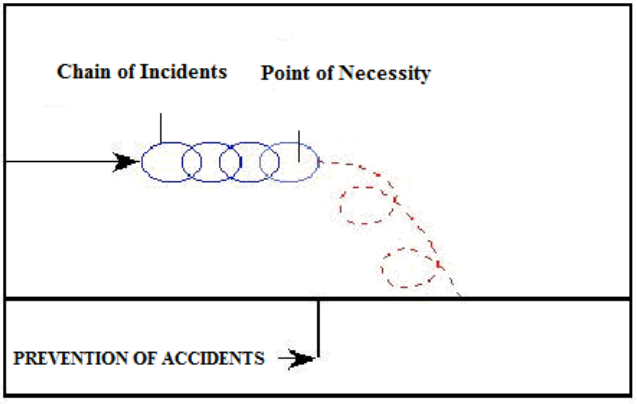


Figure 3 Cummulation of the causes of an air accident

4. INTERNATIONAL ORGANIZATIONS INVOLVED IN THE AREA OF CIVIL AVIATION SAFETY

Every air accident or incident must be apropriately and consistently investigated by organs of Professional investigation with the pourpose of determinig, as precisely as posible, the most probable cause of the air fatality. The conclusions of the investigation are then analyzed by appropriate international organizations, resulting in the development of safety recommendations addressed to airline companies, air operators, manufacturers of aircraft and components or the civil aviation authorities of the states involved.

The most important organization involved in safety and prevention in civil aviation is known as the International Civil Aviation Organization, the ICAO. The beginnings of its foundation can be traced back to the Conference on international civil aviation, which was held in Chicago, in 1944, when it was signed and came into force in 1947.The conference was attended by the representatives of 54 countries following and invitation from the United States of America.

The most elementary articles ustanovenia regarding safety of air transportation can be found in Chapter five of the Chicago Convention, in Articles 31 and 32, which make provisions for the certificates of airworthiness, to be hold by all aircraft carrying out international air transportation and licences of aircrew airworthiness. These certificates and and licences are issued and validated by their respective states. The main emphasis and starting point of the wide-scope international legislation regarding civial aviation safety is however laid down in the Annexes. Each of the 19 annexes (Annex 19 Safety Management – adopted in 2013) is more or less contributory to the improvement of safety standards mostly by way of standards and recommended practices (SARPs) contained in them. These norms and procedures are subjected to continuous revisions and if necessary and required to modifications several times in a year. The most important areas of safety dealt with in the Annexes can be divided into three groups:

1. Certification and Airworthiness of Aircraft and the Aircrew.
2. Safety of Air Operations.
3. Investigation of Air Accidents and Incidents.

All the provisions of the Annexes are of preventive nature, i.e. their unconditional observance by states is aimed to reduce accident rate in air trasnportation. The Annexes can be defined as generally applicable framework provisions, which direct states in their development of safety measures and programmes and in implementation to individual legal rrules. Some of the specific norms addressed to airline companies or aircraft manufacturers can also be objecs of their provisions. As one of the many examples, we can present provisions of part of the Annex 6 to the Convention (Operation of aircraft), which stipulate that the individual states adopt legal acts regarding the maximum allowable times of flights, flight services, and minimum times of rests for the active pilots and the rest of the aircrew, whereas in the legal rules of the Slovak republic these provisions have been implemented in the form of the Guidelines of the Ministry of Transportation, Post and Telecommunication No. 18/96 MDPT SR as of 4th of September 1996 on Norm of flight safety, time of flight service and time to rest for the aircrew of civil aircraft. The notion of the flight safety norm can be defined as an upper limit of the sum of all the times of flights in a determined period of time. Distinguished are daily, monthly and yearly norms of flight safety.

The main body of the ICAO with a mandate to develop safety and preventive recommentdations is the Authority for Air Transportation of the Secretariat. Its competence entails the realization of the adopted safety measures, development of safety prorammes and issuance of safety manuals concerned with practical procedures for solving and preventing safety problems and direct cooperation with regional representatiions of the ICAO. The authority is made up of eight sections and one department of programmes for united strategy.

ICAO has established a Global Aviation Safety Plan. Appart from the ICAO, which is to be considered as the major and crucial organization in the field of civil aviation safety, with several regional international organization active in this field. Among their priority tasks of this organizations are developing norms of safety, standards and procedures, which are defined by the ICAO and the jurisdiction of these organization at their mandatory implementtion into their legal rules with member states. Also important is the role of specialized civil aviation authorities of the individual states, which are to serve among others as organs responsible for the execution of supervision of regular adherence of these safety measures.

The Global System of Aviation and Transport is to great extent dependent on the quality of international coordination and standardization of the aviation and transport related activities and the airlines, of airlines, joint financial systems terminology, performance monitoring and evaluation of air transport, its representation at negotiations with state organs and the ICAO as well. The main of representative of global competence is the International Air Transport Association, is a voluntary, non-governmental organization of airlines, operators of international regular air transortation. Similarly to the ICAO, this organization is dealing with a whole spectrum of issues related to air transportation, however, from the airlens´point of view. It is an association of the regular airlines, which have to fulfill the newly-established criteria in the field of safety and exology.

On the European continent, the most important organization in the field of safety is known as the European Air Safety Agency – the EASA), which was established in 2002 by the Directive of the of the European Parliament and Cuncil No. 1592/2002. Its activities were launched as late as on 28th of September 2003. The Directive No. 1592/2002 was cancelled by issuing a new Directive of the European Parliament and Council (EU) No. 216/2008 of 20th February 2008 on Joint Rules in the Civil Aviation and on Establishing the Eauropean Air Safety Agency. The EASA is the executive body for 31 states. It is the successional organization of the Joint Aviation Authorities, the JAA, which pursued the ICAO in the field of joint safety policy and planning, representing the authorities, regulating civil aviation in the individual European countries, cooperating in the field of

development and implementation of the joint safety an regulatory standards and procedures known as the Joint Aviation Requirements – JARs). The EASA is converting these regulations of the JAR into the Directives of the EU. Currently the JAA is fulfilling the function of a training centre only.

One can speculate that the EASA has been established as a counter-pole to its American model, the Federal Aviation Administration – FAA, which is an agency of the Air Transport Authorities of the United States of America. Among the main activities ensured by the FAA is the development and execution of regulations and minimum standards relating the manufacturing, operation and maintenance of aircraft, certification of active pilots and airports, airspace and air traffic control, building, establishing and maintenance of air navigation aids, cooperation with other organizations in the world, research and develoment of safety systems and registration of aircraft.

Among further regional organization acting in the field of air transport safety can be e .g. the Russian Interstate Committee for Civil Aviation, Economic and Monetary Union of West Africa, the UEMOA, and the Central American Agency for Aviation Safety, the ACSA.

5. CONCLUSION

For a substantial progress in air transportation safety to be achieved, ittis necessary to focus on the most frequently occuring and types of air accidents, such as the CFIT and loss of control over the aircraft. It is also importatnt to focus on the phases of flight especially on its beginning(takeoff) and end (landing) .

When assessing the development in accidents it follows that despite of an enormous progress made in the field of air traffic, its safety fail to develop to satisfaction, with causes identified as incomprehensive approaches to learning and appreciation the human factor.

It is comforting that since the beginning of the 21st century, a remarkable improvement has been recorded and the curent tendency in the development of air transport safety is positive. A view on the air transportation taken from the aspect of the shares of the continents in terms of accidental rate shows that safety of air transportation in the USA, Canada and EUrope is more favourable compared to the world average, however, even at these continents it is still necessary to accelerate efforts for further and substantial improvements.

In vief of the complexity of investigating air accidents and its importance for the measures focused on eliminating the reoccurrence of the idenfied caused, as well as the activity of international organizations of aviation in this field it unambiguously follows that objective determination of the causes of each air accident and consitent anti-accident prevention represent the way that ensure decline in the accident rate of air traffic despite of its estimated growth in performance, all that making air transportation more thrustworthy and attractive for its users.

References

1. Air accidents. Available at http://nehody.webpark.cz
2. KELEMEN, M., 2004. Základné otázky vyšetrovania leteckej nehody a prevencie nehodovosti. VLA GMRŠ, Košice.
3. Annex 19 to the Convention on International Civil Aviation - Safety management. Available at: http://www.ulc.gov.pl/_download/bezpieczenstow_lotow/standardy_sms/aneks_19eng.pdf
4. Directives of the Directives of the European Parlament and Council (EU) No. 216/2008 of 20 February 2008 on joint rules applicable to the area of civil aviation and on establishing the European Agency for Safety of Aviation

5. http://eur-lex.europa.eu/legal-content/SK/TXT/PDF/?uri=CELEX:32008R0216&from=SK
6. Law No. 143/1998 Coll. On Civil Aviation (Air Law)
7. BÁLINT, J., 2005. Analýza priebehy ohrozenia bezpečnosti letu. In: Znižovanie nehodovosti v civilnom letectve - 2005, Medzinárodná konferencia, Žilina: EDIS ŽU, s. 8 – 9.
8. ŠULC, J., 2004. Učebné texty dle předpisu JAR - 66, Studijný modul 9. Akademické nakladatelství CERM, s.r.o, Brno. ISBN 80-7204-364-1
9. HÁČIK, Ľ., 2006. Lidská výkonnost a omezení. Akademické nakladatelství CERM, Brno. ISBN 80-7204-471-0
10. KELEMEN, M., SZABO, S., ČEKANOVÁ, A., 2005. Systémový a situačný prístup k manažmentu bezpečnosti letov / In: Doprava a logistika. Č. 8 (2005), s. 75-85, ISSN 1451-107X
11. KOBLEN, I., 1998. Rozvoj techniky letectva Armády SR/ Development of Aviation Technology in the Armed Forces of the Slovak Republic. In: IDEE 1998 EXCLUSIVE, s.90-91
12. KOLESÁR, J., FERENC, J., 2006. Moderné technológie v oblasti kontroly a zaistenia bezpečnosti v civilnom letectve a nové opatrenia v boji proti terorizmu v leteckej doprave / In: Nové trendy rozvoja letectva., Košice : TU, 9 s., ISBN 8080735204

eXclusive e-JOURNAL
ISSN 1339-4509

ECONOMY & SOCIETY & ENVIRONMENT

Analysis of wage and unemployment in Slovakia

Ing. PhD. Sylvia Jenčová,
Faculty of management
Department of Finance
University of Presov in Presov
Konštantínova 16, 080 01 Prešov, Slovakia
sylvia.jencova@unipo.sk

doc. Mg. PhD. Eva Litavcová,
Faculty of management
Department of Quantitative Methods And Managerial Informatics
University of Presov in Presov
Konštantínova 16, 080 01 Prešov, Slovakia
eva.litavcova@unipo.sk

Abstract
The labor market is a phenomenon that has to be dealt with not only by economists, politicians, and governments, but also by the inhabitants of each country. This phenomenon determines not only their overall standard of living, but it is also linked to the overall mobility of the economically active population. Salary, as a result of the functioning of the labor market, depends on market conditions in the economy. Unemployment in Slovakia is the country's main socio-economic problem. The main problem for Slovakia is long-term unemployment, where more than seventy percent of the unemployed have been home for over a year. The consequences of unemployment and the level of wage rates are subject to confrontation and polemic differences economic science. The aim of this paper is to show the evolution of nominal and real wages in the Slovak Republic. The partial aim is the application of statistical methods to quantify the relationship between the growth rate of real wages and the growth rate of nominal wages as they relate to unemployment.

Key words Key words: unemployment, wage growth, regression statistics

INTRODUCTION

Wages and salaries depend on many factors, for example education, length of service, type of employment, the employer's origin, etc., i.e. there are many factors. The average amount of wages varies across countries, even within a particular country. Unemployment in Slovakia is not only a serious economic problem but also a social indicator, as it represents the lost potential value of the whole economy. The goal of a state in this area is particularly crucial to maintaining social peace. One such goal is full employment, i.e. the creation of a situation where whoever wants to work and accepts the pay offered by their employer under a given set of conditions, will always find employment

LABOUR MARKET AND EMPLOYMENT

There is a direct link between the number of employees a company will employ and the production goals of their production plan. During a boom period of economic growth, permanent employees may work three shifts. Each additional employee increases overall production, but additional products

produced per each additional employee declines. When the company employs many workers and produce a larger number of products, this usually reduces the price of the product in order to sell an additional amount of products. This causes a decrease in marginal revenue. The demand curve for labor will copy this decrease in marginal income and will therefore be decreasing. The labor demand curve follows general rules applicable to the general demand for the product. If wages increase, the quantity of labor demanded decreases and then wages decrease. The quantity of labor demanded then increases. Demand for labor thus shifts the entire product demand curve, which will ultimately depend on the fundamental fact that the prices of products that the company sells depends on the prices of other factors of production, s.a. technology and capital. The higher the price of the products offered, the higher the demand for labor, as higher prices often lead to higher profits, which companies are trying to achieve over time. The demand curve in this case moves to the right.

Prices change other factors of production. Labor demand changes, but only in the long run, when all factors of production may also change. There are substitutes and complements to fulltime work and when changes in their costs occur, this will affect aggregate demand. If the price of substitute for workers grow, for example machines that could replace humans become more expensive, then the demand for labor will grow and this curve shifts to the right. In the case of technology or capital there are similar analogies. New technologies will automatically destroy many jobs, and the demand for labor thus decreases. The demand curve then shifts to the left. The effect of the elasticity in the demand for labor in terms of the Quantity Demanded should be measured in response to a change in wages for this work.

Elasticity quantifies the change in the income of workers due to changes in the supply of workers. The more people who are available, the lower the hourly wage. If the demand for them is inelastic, then the increased supply automatically reduces hourly wages and leads to a decline in overall wages. On the other hand, if demand is elastic, while the hourly wage may decrease, the overall worker pension increases. One pair of important facts affecting the elasticity of the demand for labor's affect, are whether the manufacturing process is labor intensive, and whether it involves a little or a lot of capital.

If the work is difficult manual labor, then the more elastic is the demand for workers. The higher the elasticity of demand for products also increases the elasticity of demand for workers. The greater the ability to replace capital work, the easier it is in production to process capital, the greater the long term labor demand making the system more elastic.

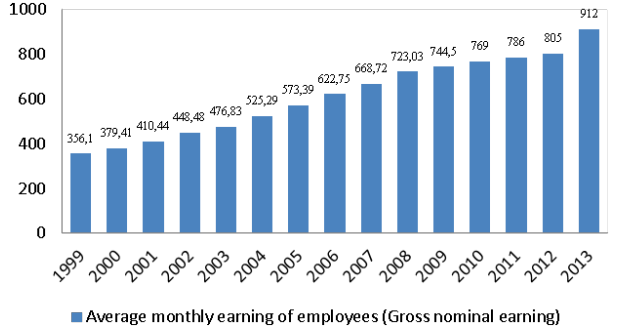
Worklife depends on how people divide their time between work responsibilities and relaxation. Overtime is usually driven by a desire for a higher total income, although the hourly wage does not change, while part-time work may be for those who have a high hourly wage and need a job to raise revenue by working a greater number of hours. For these reasons, the fact that the labor supply curve has an interesting course, i.e. the supply curve in the upper part is curved to the right. The curve can be explained by the substitution effect and pensions. The higher the wage, the worker is able to work more, to the detriment of their free time. Hourly wage basically represents an opportunity cost of leisure time. The worker therefore substituted leisure time for work. After a certain amount of extra money is earned, workers can indulge in more goods and products and free time. It is therefore decided to rest more than work, hence the supply of labor at a higher wage becomes a less prevalent wealth effect. The ability to keep a job is determined by various factors such as: population growth; more workers means the supply curve moves to the right; changes in technology; and capital accumulation at home. If you bring new technology to replace the human factor, there is an increase in labor supply. Market equilibrium is created where the supply and demand curves intersect.

NOMINAL AND REAL WAGE

Árendáš (1997), Mankiw (2009), Parkin (1990), defined wage labor costs as resulting from the operation of the labor market and is the result of the relationship between demand and supply. The concept of pay is a generic term for wages, salaries and other forms of remuneration arising from

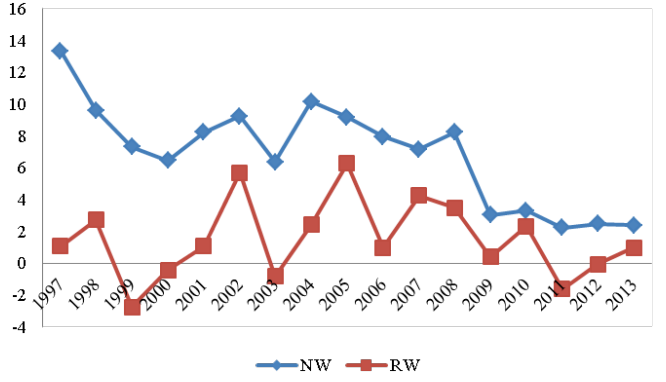
the implementation of a production factor labor. Outwardly, wages appear in two forms. Historically older, the time wage, which lead to piece wages. Tancošová (2013, p.127) detailed in herpublication quantification of the types and forms of wages. Time wage is the reward for time worked (eg. Per hour, day, week, year). We distinguish hourly, daily, weekly and annual wages. Piece wage is a reward for the average number of products or transactions made per worker over time. Any product or act may be limited in time, so we say that it is converted in the form of time wage. In addition to the various forms of wage, it distinguishes even the wage level. It may be both a nominal and real wage.Nominal wage is the amount of money that a worker receives for their work regardless of the form of wages. Can be expressed as time and piecework wages. Real wage represents the amount of goods and services that the worker can buy for their nominal wage. The level of real wages depends on several factors, such as. amount of nominal wages, high prices of goods and services, tax burden and the like. Based on the development of these factors, it may occur that real wages increase (eg. in nominal wage growth and stability of other factors), decreases (eg. the constancy of nominal wage growth of prices of goods and services), or does not change (eg. the the same nominal wage growth and equitable prices of goods and services).

Figure 1 shows the evolution of average monthly nominal wage in €.
Figure 1



Source: Own processing

Figure 2 shows the evolution of indices of real and nominal wages
Figure2



Source: Own processing

Figure 3 shows the evolution of the unemployment rate (%)

Source: Own processing

On the basis of quarterly data on the rate of growth of real wages and the unemployment rate from January 1997 to the second quarter of 2014, Table 1 shows the estimated regression analysis between the growth rate of real wages and unemployment rates, which is given by the equation $y = 9.182 + 0.488\ x$.

The link between rate of growth of nominal wages on the unemployment rate based on annual data 1997-2014 is given by a linear non-linear model of the form: $y = 16.725$ to $0.142.\ x - 0.2486.\ x^2$.
The coefficient of determination R^2 value acquired for 85.15%, which quantifies the situation in which 85.15% are changes in the dependent variable explained by independent variables. The correlation coefficient R = 72.51% significance level $\alpha = 0.05$; $p = 0.000$.

Table 1 *Regression Statistics* Growth rate of real wages and unemployment rates

Multiple R	0,390226
R Square	0,152276
Adjusted R Square	0,141122
Standard Error	3,331987
Observations	78

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	151,5646	151,5646	13,65183	0,000412648
Residual	76	843,7626	11,10214		
Total	77	995,3272			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	9,182291385	1,948135053	4,713375	1,08E-05	5,302244159	13,06233861
X Variable 1	-0,488747762	0,132278507	-3,69484	0,000413	-0,752203242	-0,225292283

Source: Own processing

Table 2 *Regression Statistics* The rate of growth of nominal wages and unemployment

Multiple R	0,851562
R Square	0,725158
Adjusted R Square	0,717828
Standard Error	2,003174
Observations	78

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	794,0491	397,0246	98,9418	9,23939E-22
Residual	75	300,9531	4,012708		
Total	77	1095,002			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	16,72517597	1,299694634	12,86854	1,14E-20	14,13605149	19,31430045
X Variable 1	-0,142623893	0,010173181	-14,0196	1,19E-22	-0,162889908	-0,122357877
X Variable 2	-0,248677473	0,080307905	-3,09655	0,002753	-0,408659024	-0,088695922

Source: Own processing

CONCLUSION

The labor market impact fields such as economic, social and other interests. In Slovakia unions opened to workers is the Association of Confederation of Trade Unions. The presence of unions in the labor market often changes the demand for labor, sought to raise. However, the influence of trade unions is also evident in the efforts to raise the minimum wage.(Tancošová 2013, p.129), In addition to the foregoing, the labor market and wage determination in individual economies are also affected by other factors: such as arising wage gaps and wage discrimination. The amount of wages in each country is different and depends on the professions, skills, qualifications, experience and so on. Wage differences arise most often on the basis of:

-compensatory differences that the wage is an example of, when working in difficult conditions, i.e. a deleterious environment, handled the strain of our unequal and underpaid work environment. To compensate for wages in these unfavorable working conditions;

-differences in the quality of work related to the large differences between people, which depends both on innate abilities and particular skills or knowledge (eg. Top scientists, experts from renowned universities, etc.);

-exceptional skills associated with predisposition, which can not be learned, and represents exceptional skills (top artists, scientists, athletes, etc.).

These differences are due to differences in wages, which are compensated by monetary or non-monetary benefits. They are quite natural. However, differences arise from other, non-essential reasons of personal characteristics, which we call wage discrimination. This may occur for example. racial discrimination, religious discrimination, job discrimination between women and men and the like. These are differences that do not have logical reasoning, and must be combated. Post highlighted the importance and

significance of macroeconomic indicators in the unemployment rate, the development of growth of nominal and real wages, the growth rate and the unemployment rate, as well as their relationship. The relationship between these economic metrics is only one forecasting tools for economists and politicians in the labor market. In essence, this is a very simplified model perspective, but also a very effective tool in the issue of unemployment and labor market studies.

This paper is supported by project **VEGA 1/0760/13** "Analysis and design of streamlining decision-making processes for investment decisions by regional governments."

Post is one of the outputs **KEGA 037PU-4/2014**, "Curriculum documents for e-learning based and their implementation in teaching disciplines of quantitative methodology, Information Management and Finance."

References

ÁRENDÁŠ, M., E.LORINCOVÁ, I. ZENTKOVÁ, A. ŠŤASTNÁ, a M. GERGEĽ, 1997. Základy ekonómie. Nitra: SPU. ISBN 80-967842-7-7.

ČAPLANOVÁ, A. and M. MARTINCOVÁ, 2014. *Inflácia, nezamestnanosť a ľudský capital z makroekonomického pohľadu.* Bratislava: Wolters Kluwer ISBN 978-80-8078-598-7.

DIRGOVÁ, Eva, 2009. Nezamestnanosť ako fenomén modernej society. In: ŠLOSÁR, Dušan, eds. Migrácia – chudoba – nezamestnanosť: zborník príspevkov z vedeckej konferencie s medzinárodnou účasťou, 11.12.2009. Košice: Košický samosprávny kraj, Katedra sociálnej práce Filozofickej fakulty UPJŠ Košice, s. 95-100. ISBN 978-80-970306-0-5.

HOLMAN, R. 2013. *Makroekonómie*. Praha: C.H Beck. ISBN 978-80-7400-485-8.

JENČOVÁ, Sylvia, Eva LITAVCOVÁ, 2014. Macroeconomic consequences of the Slovak Republic. In: ŠTEFKO, Róbert, Miroslav FRANKOVSKÝ a Ján VRAVEC, eds. In: *MANAGEMENT 2014 . BUSINESS, MANAGEMENT AND SOCIAL SCIENCES RESEARCH: zborník z V. medzinárodnej vedeckej konferencie.* Prešov: Bookman s.r.o., s. 46-52. ISBN 978-80-8165-053-6.

KOŠTA, Ján. 2011. *Aktuálne problémy trhu práce v Slovenskej republike po vstupe do Európskej menovej únie.* Bratislava: Ekonomický ústav SAV. ISBN978-80-7144-190-8.

MANKIW, N. Gregory, 2009. *Zásady ekonómie*. Praha: Grada Publishing, ISBN 978-80-7169-891-3.

PARKIN, M. 1990. *Macroeconomics.* Ontario: Addison – Wesley Publishing Company. ISBN 0-201-09445-2.

TANCOŠOVÁ, J. 2013. *Ekonómia* . Bratislava: Iura Edition, spol.s.r.o. ISBN 978-80-8078-598-7.

Štatistická ročenka Slovenskej republiky, 2013 Bratislava: VEDA, SAV

eXclusive e-JOURNAL
ISSN 1339-4509

ECONOMY & SOCIETY & ENVIRONMENT

Application of CAPM for the evaluation of Cost of Equity

Identification of CAPM inputs

Ing. Jarmila Horváthová, CSc.
Ing. Martina Mokrišová, PhD.

Katedra účtovníctva a controllingu,
Fakulta manažmentu PU v Prešove,
Ul. 17. novembra č. 15, 080 01 Prešov;
jarmila.horvathova@unipo.sk,
martina.mokrisova@unipo.sk

Abstract
CAMP seems to be the most suitable one of all Models of Equity valuation, due to acceptance of systematic risks of capital market. This may be at the same time one of its shortcomings because it would be more appropriate if the general Equity valuation model accepted also non-systematic risks. The aim of this paper is to define input parameters of Capital Asset Pricing Model, to focus on the definition of Equity Risk Premium – ERP and Country Risk Premium – CRP and to estimate β coefficient for systematic risks. The contribution of this paper is in summarizing CAPM modifications for Equity valuation used in Slovak businesses.

Key words: Capital Asset Pricing Model, β coefficient, Economic Value Added, Country Risk Premium, Equity Risk Premium

1. INTRODUCTION

CAPM (Capital Asset Pricing Model) is nowadays, despite all the problems which it incorporates, the basic model for estimating Cost of Equity (Mařík, 2011). This price is important for market valuation of the company. When calculating the Cost of Equity, this model is not used in its original format as it was processed by J. Treynor (1961 - 1962), W. Sharpe (1964) and J. Lintner (1965). These authors published articles about the CAPM model, which were processed in articles and publications of H. Markowitz who dealt with the portfolio theory and risk diversification. W. Sharpe, H. Markowitz and M. Miller shared the Nobel Prize for the application of CAPM model. In the following contribution various modifications of CAPM are processed and the proposal for processing input data useful in this model is prepared.

2. DATA PROCESSING AND METHODS USED

When defining the input data for the CAPM as a Model for Equity valuation, we refer to the basic method of calculating the expected Return on securities.

$$E(r_i) = r_f + \beta * [E(r_m) - r_f] \quad (1)$$

Where:

- $E(r_m)$ - Expected Market Return - the mean expected Return on the securities market (for example mean average of market index DJIA – Dow Jones Industrial Average),
- $[E(r_m) - r_f]$ = ERP (Equity Risk Premium) - indicates how much is the expected Return on stocks in the market higher than the Return on risk-free investment,
- r_f - Risk-free Rate of Return – Return on Treasury Bonds,
- β - beta coefficient – risk rate or volatility of stocks in the market. It measures systematic risk of the asset.

However in today's conditions more appropriate for Equity evaluation is modified model:

$$r_e = r_f + \beta_L * ERP + CRP \quad (2)$$

Where:

- r_e - Cost of Equity,
- β_L - Levered beta for Equity in the firm,
- ERP - Equity Risk Premium,
- CRP - Country Risk Premium.

Risk-free Rate of Return - r_f

In general we can say that there are no absolutely Risk-free Assets. In the USA as the least risky treasure bills are considered „T_Bills". However the valuation by their profitability is mainly used when we appreciate shares. For the evaluation of business Equity it is rather recommended to use Return on 10-year government bonds „T_Bonds". Under the Slovak conditions it is appropriate to determine profitability of at least 10-year government bonds (www.nbs.sk). However according to recommendations of many authors (Petřík, 2009; Mařík, 2011) US Treasury Bonds should be used in order to ensure that market risk, for which r_e is calculated, is not incorporated twice in the Cost of Equity calculation.

Equity Risk Premium - ERP

ERP expresses revenue valuation of risk level of market portfolio. Direct estimate of this Premium is not possible. However, to determine Equity Risk Premium we choose the method of estimating the future value by deriving from the values previously achieved on the capital market. It should be noted that past period has to be sufficiently long. In the USA there are databases which date back to 1926 (for example Ibbotson). Discussions are held on whether to apply arithmetic or geometric mean when calculating average profitability, while we can say that in this field academics did not reach a clear conclusion. Data on ERP for individual markets are updated on the Damodaran´s website (Damodaran, 2014a).

Specific procedure for ERP determination:

- To find out long-term level of Stock return on the capital market, for this purpose we select some commonly published Stock market index (NYSE, S&P, DJ in the USA, FTSE in United Kingdom, DAX in Germany, limited PX in Czech Republic) - R_m,
- to find out average Return on 10-year government bonds - r_f,
- to derive Equity Risk Premium (ERP) from the difference $R_m - r_f$.

Based on mentioned procedure applying Damodaran´s databases and calculations, ERP for Slovak market is in 2014 equal to 5%. This information arose from geometric average of Equity Risk Premiums for the years 1928-2013, which was 4.96%.

Country Risk Premium – CRP

Nowadays is promoted an opinion that the calculation of Risk Premiums should be based on the US stock market, but at the same time it is necessary to adapt these Risk Premiums to national conditions. There are several methods for modifying Risk Premiums to national conditions. Relatively simplest is adjustment for Country Risk Premium.

Procedure of calculating Country Risk Premium:

1. To find out rating of analysed country. The ratings of countries provide rating agencies, for example Moody´s or Standard & Poor´s. According to both agencies (www.moodys.com, www.standardandpoors.com) Slovakia received A2 rating.
2. Rating of analysed country should be reflected in the Risk Premium called Country Default Spread. The best way how to determine this Risk Premium is to calculate difference between Return on bonds with the same rating as the country rating is and US Government bonds.

$$CRP = Default\ Spread * \frac{Standard\ deviation\ in\ the\ Equity\ market\ in\ the\ country}{Standard\ deviation\ in\ the\ long-term\ bond\ issued\ by\ the\ country} \quad (3)$$

Country Risk Premium for the Slovak Republic in 2014 is equal to 1.28%

2.1 Estimating β

β coefficient for the future period can be estimated in three ways:

1. Historical β
2. Method of analogy
3. β estimation based on factor analysis

Ad 1) Historical β

The basic procedure how to estimate beta is to find relationship between Stock return and Market return as a whole and to use the slope of the regression line, respectively regression coefficient as β parameter. Then **β coefficient can be calculated as the ratio of covariance between Market return and Stock return and Market variance *(4)*.**

$$\beta_i = COV(R_m, R_i)/Sm^2 \quad (4)$$

Where:

- R_m - Market return,

- R_i – Stock return,
- S_m^2 – Market variance.

In the case of historical β we have to refer to the fact that applying this way of calculation we obtain only historical β, not forecasted one. Historical β is suitable only for businesses which shares are traded on the capital markets. Only β for English, American and German capital market can be considered as reliable (Mařík, 2011).

Ad 2) Method of analogy for β estimation

In the case of method of analogy, for analysed business can be used β according to β of similar businesses, shares of which are traded on the capital market, but their activities are not diversified. For this method it is necessary to consider different business and financial risk, which is dependent on the capital structure. To record these differences it is essential to recalculate **unlevered β (β_u) to levered β (β_L) *(5)*.**

Method of conversion is as follows:

$$\beta_L = \beta_u * (1 - t) * \frac{D}{E} \quad (5)$$

Where:

- β_u - Unlevered beta of the firm,
- t - Tax,
- D - Debt,
- E – Equity.
- D/E - Debt/Equity Ratio

β values determined on the basis of method of analogy for chosen sector in which the analysed business operates are as follows: $\beta_u = 0.96$, $\beta_L = 1.18$.

Ad 3) β estimation based on the factor analysis

We will discuss a procedure for estimating β coefficient, which is currently the most commonly used valuation technique in the USA. During this process it is necessary to define following factors, which substantially influence β coefficient:

- Business area
- Operating leverage
- Financial leverage

Business area – generally businesses which are susceptible to the economic cycles have higher β coefficient than businesses which are not susceptible to the economic cycles, therefore food businesses have lower β coefficient than construction companies (for the comparison of β for selected sectors see Table 1).

Table 1 β for selected sectors

Sectors which are susceptible to the economic cycles	β	Sectors which are not susceptible to the economic cycles	β

Information and communications technologies	2.06	Banks	0.53
Software	1.90	Food businesses	0.69
E- Commerce	3.07	Non-alcoholic beverages	0.41
Air transport	1.34	Precious metals	0.41
Telecommunication equipment	2.64	Mechanical engineering	0.65

Source: Authors based on Mařík, 2011

Operating leverage influences β coefficient in such a way that higher proportion of fixed costs causes higher variability of operating profit, which is reflected in the higher value of β coefficient.

Financial leverage influences β coefficient based on the share of foreign capital in the total capital. The higher is the share of foreign capital, the higher the β coefficient is – we can prove it applying method of analogy.

Estimating β for businesses without the possibility of diversification - Total β

If the precondition of risk diversification is not fulfilled, the problem arises because:

- Cost of Equity should be extended by non-systematic risk,
- The impact on non-systematic risk is calculated using a number of Risk Premiums, there is possibility of errors occurrence, since we are not able to consider which risks are included and which ones are not taken into account,
- there is no market for non-systematic risks,
- If we know coefficient of determination, we can calculate Total β, which reflects the impact of systematic and non-systematic risk as follows:

$$Total\ \beta = \frac{\beta}{\sqrt{coefficient\ of\ determination}} \quad (6)$$

Where the $\sqrt{coefficient\ of\ determination}$ is coefficient of correlation. This coefficient is a measure of correlation between the Return on the capital market and Stock return. It is possible to find value of correlation coefficient for selected US and European companies on the Damodaran´s website. We can also directly substitute correlation coefficient into formula (6).

However, this method of calculation results in the high values of β coefficient and therefore to the high values of Cost of Equity.

β prognosis

β coefficient can be forecasted using two approaches:

- With the use of so-called fundamental factors (based on the basic value of unlevered β, to which we add variation coefficient of Operating profit, Price-dividend ratio, Ratio of Debt to Equity, increase of Stock return, Total Assets),
- based on the analysis of operational and financial risk.

2.2 Modifications of CAPM for Equity valuation of Slovak businesses

Table 2 shows modified methods of calculating Cost of Equity used in Slovak businesses, considering all input parameters for the calculation of Cost of Equity and their modifications.

Table 2 Modified approaches to the calculation of Cost of Equity

Model	*Calculation*	*Description*
CAPM	$E(r_i) = r_f + \beta * [E(r_m - r_f)]$	The historical model, Jack Treynor (1961, 1962), William Sharpe (1964), John Lintner (1965a,b) and Jan Mossin (1966) published articles on CAPM. These articles were based on theory of Harry Markowitz, who adressed the risk diversification.
CAPM with CRP of Damodaran – approach 1	$r_e = r_f + \beta_L * ERP + CRP$ $\beta_L = \beta_u * (1 + (1 - t) * (D/E))$	Damodaran`s model based on the introduction of CRP.
CAPM with CRP of Damodaran – approach 2	$E = r_f + CRP + \beta * (US\ premium)$	Modification of CAPM with CRP of Damodaran – if we assume that every company in the country is equally exposed to country risk.
CAPM with CRP of Damodaran – approach 3	$E = r_f + \beta * (US\ premium + CRP)$	Modification of CAPM with CRP of Damodaran – if we assume that company`s exposure to country risk is similar to its exposure to other market risks.
CAPM with CRP of Damodaran – approach 4	$E = r_f + \beta * (US\ premium) + \lambda * CRP$	Modification of CAPM with CRP of Damodaran – if we treat country risk as a separate risk factor and allow companies to have different exposures to country risk (perhaps based upon the proportion of their revenues coming from non-domestic sales).

Source: Authors based on Petřík, 2009; Damodaran, 2014b

Table 3 shows modifications of Cost of Equity calculation for national markets. Within these modifications it is recommended to increase Cost of Equity by the value of inflation on the national market.

Table 3 Modified approaches to the calculation of Cost of Equity for national markets

Model	*Calculation*	*Description*

Complex CAPM of Mařík and Maříková	$E(r_i) = r_{f\ USA} + \beta * US\ premium + CRP + R_2 + R_3 + R_4 + R_5$ R_2 - Premium for market capitalization R_3 - Premium for limited liquidity R_4 - Premium for companies with uncertain future R_5- Premium for specific risks	It is possible to supplement Damodaran`s model with aggregate Risk Premiums related to small companies, lower marketability of securities and others. In the case of analysed energy companies it is necessary to add $R_2$ - Risk Premium for lower stock`s liquidity in the market and may be R_3 - Risk Premium for failure to repay the obligations.
CAPM with inflation	$r_e = r_f + \beta_L * ERP + (CRP + I)$ I - Inflation	According to Damodaran it is necessary to add inflation of the country to Country Risk Premium.

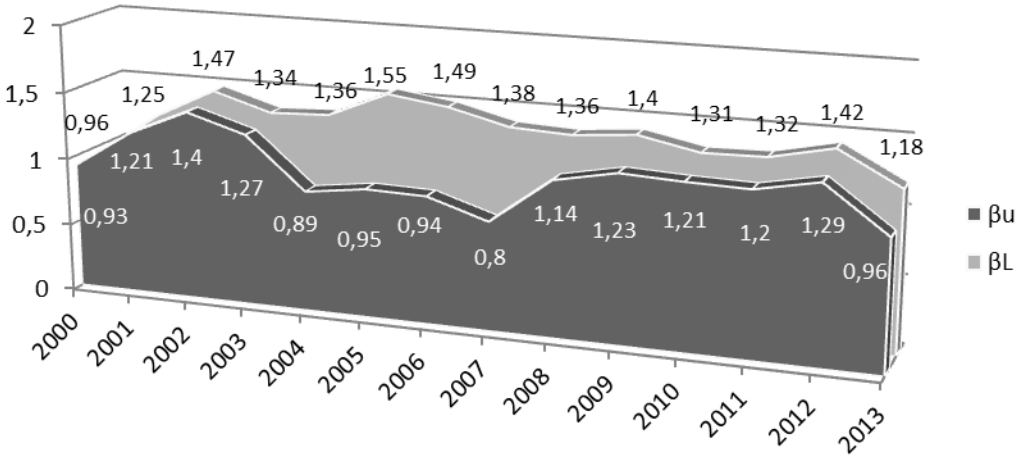
Source: Authors based on Petřík, 2009; Damodaran, 2014b; Mařík, 2011

3. RESULTS AND DISCUSSION

In this part of the paper we compare Cost of Equity calculated based on different approaches listed in Table 2 and Table 3.

Figure 1 shows a comparison of levered β and unlevered β for analysed business. When evaluating the impact of factors Business area, Operating leverage and Financial leverage on the value of β coefficient we can conclude that with increasing proportion of external funds, the value of β raises too, what confirms impact of factor 2 and factor 3 on β. Since analysed business operates in the sphere of everyday use – energy, we can conclude that this fact positively affects β coefficient.

Figure 1 Comparison of levered β and unlevered β for analysed business in the period 2000-2013



Source: Authors based on Damodaran, 2014a

Table 4 shows the results of Equity valuation which enter the calculation of performance value represented by EVA indicator.

Table 4: Values of Cost of Equity calculated applying different methods of calculation

Model	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*
r_e (CAPM)	11.86	12.02	11.53	11.51	12.11	10.46
r_e (CAPM with CRP 1)	11.11	11.48	11.13	11.10	11.49	10.23
r_e (CAPM with CRP 2)	10.82	12.18	10.48	9.78	11.49	10.23
r_e (CAPM with CRP 3)	11.58	12.72	10.88	10.19	12.11	10.46
r_e (CAPM with CRP 4)	8.75	10.85	9.21	8.51	10.01	8.96
r_e (CAPM with inflation)	15.01	12.38	11.83	15.20	15.19	10.93
r_e (GCRPM of Inka and Ivan Neumaier)	9.12	9.72	9.06	20.21	18.92	18.15

Source: Authors

Calculated values of this indicator point out the fact that in the case of the highest Equity valuation applying CAPM with inflation, we obtain the worst value of EVA indicator. CAPM with inflation in addition to systematic risks, included also in CAPM, takes into account inflation of given country. We can see that inflation causes significant deviations from historical CAPM. Best results are achieved applying CAPM with CRP 4 in which we assume that market risk and country risk have different impact on Equity valuation. The best performance values were achieved in 2011, when we reached the lowest Equity valuation, however these results were negatively influenced by Slovak inflation which attained the highest value in this year. From the perspective of balance of the EVA indicator development, the most appropriate appears CAPM with CRP 1. The results of CAPM application were compared with the evaluation calculated applying Gradual Counting Risk Premium Model (GCRPM), which accepts only non-systematic risks. This model reports different results from model with CAPM application. It evaluates the years 2008-2010 more positively than CAPM and vice versa years 2011-2013 more negatively than CAPM. The deterioration of performance in the mentioned years was caused by deterioration of business liquidity, which resulted in lower company rating. Calculated performance values are given in Table 5.

Table 5: Values of business performance

Model	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*
EVA (CAPM)	-39 154.51	-39 099.60	-28 867.80	-18 147.97	-46 035.36	-35 498.84
EVA (CAPM with CRP 1)	-33 077.95	-34 782.74	-25 603.88	-14 972.64	-41 235.36	-33 754.25
EVA (CAPM with CRP 2)	-30 780.85	-40 393.97	-20 247.97	-4 812.95	-41 235.36	-33 754.25
EVA (CAPM with CRP 3)	-36 857.41	-44 710.83	-23 511.89	-7 988.29	-46 035.36	-35 498.84
EVA (CAPM with CRP 4)	-14 100.91	-29 702.43	-9 936.58	4 898.17	-29 978.76	-24 255.24
EVA (CAPM with inflation)	-64 453.45	-42 005.05	-31 317.20	-46 456.38	-69 539.44	-39 014.24
EVA (GCRPM of Inka and Ivan Neumaier)	-17 081.40	-20 633.96	-8 691.63	-84 940.78	-98 101.92	-93 290.54

Source: Authors

4. CONCLUSION

Based on the above mentioned it is possible to set the following conclusions:

1. Despite numerous problems with the application of CAPM, this model represents a single theoretically based model of Equity valuation. It is also model recognised throughout the world as a model of calculation discount rate of market valuation.
2. It is recommended to apply this model in such a way that market risk and β were applied based on the US data and these were supplemented by Risk Premium of given country.
3. It is recommended to modify and supplement Cost of Equity by significant Equity Risk Premiums of particular business, with emphasis on replenishment of unsystematic risk.
4. If the requirement of diversification is not met, it is recommended to use calculation of Total β. However, this method of calculation leads to high values of equity valuation. In this case it is recommended to apply Gradual Counting Risk Premium Model.

References

1. DAMODARAN, A., 2014a. The data page [online]. [cit. 2014-06-20]. Dostupné z: http://pages.stern.nyu.edu/~adamodar/.
2. DAMODARAN, A., 2014b. *Equity Risk Premiums: Looking backwards and towards…* [online]. [cit. 2014-06-29]. Dostupné z: http://pages.stern.nyu.edu/~adamodar/.
3. DOMINANTA.sk, 2014. *Economic Value Added* [online]. [cit. 22. 02. 2014]. Dostupné z: http://www.dominanta.sk.
4. HORVÁTHOVÁ, J. and M. MOKRIŠOVÁ, 2014. Determination of Cost of Equity for Selected Enterprises of the Energy Industry Applying the CAPM Model and its Comparison with the Model with Gradual Counting Risk Premium. In: *Journal of Management and Business: Research and Practice.* Vol. 6, no. 1. ISSN 1338-0494.
5. HORVÁTHOVÁ, J., M. MOKRIŠOVÁ a A. SUHÁNYIOVÁ, 2013. Hodnotenie výkonnosti podniku s využitím creditworthy modelu. Prešov: Bookman, s.r.o. ISBN 978-80-89568-95-6.
6. LINTNER, J., 1965. The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets, In: *Review of Economics and Statistics,* Vol. 47, no. 1, pp. 13-37.
7. MAŘÍK, M., 2011. Metody oceňování podniku: Proces ocenění - základní metody a postup. 3. vyd. Praha: Ekopress. ISBN 978-80-86929-67-5.
8. NBS.sk, 2014. Štatistika dlhodobých úrokových sadzieb. [online]. [cit. 2014-01-20]. Dostupné z: http://www.nbs.sk/sk/statisticke-udaje/menova-a-bankova-statistika/statistika-dlhodobych-urokovych-sadzieb.
9. NEUMAIEROVÁ, I. a I. NEUMAIER, 2002. Výkonnost a tržní hodnota firmy. 1. vyd. Praha: Grada Publishing. ISBN 80-247-0125-1.
10. PETŘÍK, T., 2009. Ekonomické a finanční řízení firmy. Praha: Grada Publishing. ISBN 978-80-247-3024-0.
11. SHARPE, W. F., 1964. Capital asset prices: A theory of market equilibrium under conditions of risk. In: *Journal of Finance*. Vol. 19, no. 3, pp. 425-442.
12. TREYNOR, J. L., 1961. Market Value, Time, and Risk. Unpublished manuscript.
13. TREYNOR, J. L., 1962. Toward a Theory of Market Value of Risky Assets.
14. www.zsdis.sk.
15. www.moodys.com.
16. www.standardandpoors.com.

This paper was prepared within the grant scheme **VEGA no. 1/0596/14 – Creditworthy model formation with the use of financial and sectoral indicators in the energy industry of the European Union and forecasting the indicators development.**

eXclusive e-JOURNAL
ISSN 1339-4509

ECONOMY & SOCIETY & ENVIRONMENT

Bankruptcy prediction models and their application in Slovak's hotel

Ing, Beáta Šofranková, PhD.
Department of Finance
Faculty of Management
University of Presov in Presov
Konstantinova 16
080 01 Presov, Slovakia
beata.sofrankova@unipo.sk

Abstract

In times of financial crisis plays an important role prediction of the development financial - economic situation of most enterprises. There are predictive models that can help us detect early deterioration of the financial situation. The analysis was based on the financial statements of selected Slovak's hotel for the years 2008 - 2011 and the financial situation have been selected bankruptcy models as Altman model (AZ2), Index IN (IN05), Index creditworthiness (IB), Taffler model (TM), Springate model (SM) and Fulmer model. In conclusion we can say that Fulmer model is not suitable for assessing the financial health of the hotel and we recommend to using the model Index Creditworthiness (IB), where we can see the changes in the development of Net Income.

Key words Bankruptcy and Creditworthy model, Indicator, Hotel

1. INTRODUCTION

At present, the negative developments in the global economy reflected in the financial results and financial position of most enterprises and company management looking for ways to detect as early as possible causes of the deterioration of their financial situation. One way is the application of appropriate models for forecasting financial situation, using information from financial - economic analysis.

There are several models to assess the financial health of companies, which are created from various financial indicators are a tool for early detection of adverse financial developments. Predictive models are among the instruments of financial prediction and divided into creditworthy and bankruptcy. (Horváthová – Bednárová 2012, Jenčová 2014, Kotulič et al. 2010, Marinič 2008, Růčková 2011, Vochozka 2011, Zalai et al. 2010)

The essence of creditworthy models is selected financial ratios score entering the individual models. On the basis of a numerical scale, we can determine the level of the financial health of the company.

Bankruptcy models are among the mathematics-statistical methods. They have greater representation in comparison with creditworthy models and the difference lies in the fact that the creditworthy models are used on the significance of individual preference indicators weight, entering into the model and evaluate the financial situation with the possibility of prediction of the financial situation of the enterprise.

Creditworthy models are based on diagnostics of the financial health of enterprises. Their aim is to the determination whether enterprises are among good or bad enterprises. (Růčková, 2011, p. 72)

The aim of bankruptcy models according (Knápková – Pavelková 2010) is to identify whether, in the near future, enterprise threatened by bankruptcy and based on the premise that the enterprise has problems with liquidity, the height of net working capital and return on invested capital.

Table 1 Prediction models

CREDITWORTHY MODELS	*BANKRUPTCY MODELS*
▪ **ARGENTI MODEL** ▪ **BALANCE ANALYSIS OF DOUCHA** ▪ **QUICK TEST** ▪ **TAMARI RISK INDEX**	▪ ALTMAN MODEL ▪ BEERMAN MODEL ▪ FULMER MODEL ▪ CH – INDEX ▪ INDEX CREDITWORTHINESS ▪ INDEX IN ▪ SPRINGATE MODEL ▪ TAFFLER MODEL

Source: own processing by Horváthová – Bednárová 2012, Jenčová 2014, Kotulič et. al. 2011, Knápková – Pavelková 2010, Vochozka 2011, Zalai et al. 2010

2. BANKRUPTCY MODELS

In this article we will focus on the description of selected bankruptcy models, which will be applied to selected Slovak hotel. From the analysis we necessary to exclude two models - Beerman model, because this model is designed for craft and manufacturing companies and CH - index, which was created for agribusinesses.

For the analysis of the Altman **Z-SCORE** (Altman 2012) we have chosen variant of model AZ2. We excluded variant of AZ1, which is created only for stock companies with publicly marketable securities, variant of AZ3 have different scales and one indicator less than model AZ2 and variant AZ4 for the calculation of the X6 needs input indicator - past due liabilities whose values are not separately identified item balance sheet and we did not have that information available.

Table 2 ALTMAN MODEL

Equation of model and description of indicators
$\mathbf{AZ2 = 0{,}717X_1 + 0{,}847X_2 + 3{,}107X_3 + 0{,}42X_4 + 0{,}998X_5}$ X_1 = *Current Total Assets - Short-term liabilities / Total Assets* X_2 = *Retained Earnings / Total Assets* X_3 = *EBIT/ Total Assets* X_4 = *Equity/ Liabilities* X_5 = *Sales / Total Assets*

Source: Altman 2012

Inka and Ivan Neumaier are the authors of the model **INDEX IN** (IN), for which they created its modification by 4 (in 1995 - creditor variant IN95, in 1999 - ownership variant IN99, in 2002 - complex variant IN01, in 2005 - modified complex variant IN05). (Vochozka, 2011, p. 93) Comparing individual modifications INDEX IN models, we can conclude that the highest weight is an indicator of return on assets (ROA) in the all modifications. The different models differ from each other by individual weights. A significant change has occurred only for models IN95 and IN99 (number of indicators decreased from 6 to 4). The evaluation of enterprise by model IN99 uses a different classification than the other variants; divided enterprises into groups create or do not create value.

The main differences between the models INDEX IN are the following:

- model IN95 is a view of the creditor evaluates the rating enterprise,
- model IN99 is the owner of the view on the creation of value,
- model IN01 is a combination of the two previous models for the industry. (Kotulič et. al., 2011, p. 124)

For analysis of the financial situation of selected hotel, there was chosen modification model INDEX IN - model IN05. Models IN01 and IN05 are identical in terms of indicators and are the slight difference in weight for the third indicator. Changes are different in criteria for the evaluation of financial situation of enterprises, where the model IN05 is stricter than the model IN01.

Table 3 Index IN

Equation of model and description of indicators
$\mathbf{IN05 = 0{,}13X_1 + 0{,}04X_2 + 3{,}97X_3 + 0{,}21X_4 + 0{,}09X_5}$
X_1 = *Total assets / Debt capital*
X_2 = *EBIT / Interest expense*
X_3 = *EBIT / Total assets*
X_4 = *Total revenues / Total assets*
X_5 = *Current Total assets / Short-term debt capital*

Source: Vochozka 2011

Model **Index Creditworthiness** (IB) consists of six indicators, of which the greatest weight is an indicator of return on Investments – ROI). Company's financial situation is better than IB is the higher. Model IB shares to creditworthy and bankruptcy enterprises and the break point is for IB = 0.

The total assessment of the financial situation of enterprises is based on the condition that the inclusion of the businesses profit – making or non profit-making at the point where the index value reaches 0. Assessment offers a 7 - speed scales, which divides firms only a group of profit-making and non profit – making, but the financial situation achieves a value of 7 different levels.

Table 4 Index Creditworthiness

Equation of model and description of indicators
$\mathbf{IB = 1{,}5X_1 + 0{,}08X_2 + 10X_3 + 5X_4 + 0{,}3X_5 + 0{,}1X_6}$
X_1 = *Cash Flow / Total liabilities and Equity*
X_2 = *Total Capital / Total liabilities and Equity*
X_3 = *EBIT / Total Capital*
X_4 = *EBT /Revenues*
X_5 = *Inventory /Total Assets*
X_6 = *Equity/Total Capital*

Source: Zalai et. al. 2010

Taffler model (TM) is consisting of four indicators, which were selected from 90 ratio indicators. If the evaluation financial health by model TM achieves a positive value is a creditworthy enterprise, in the case of negative values is a enterprise in bankruptcy. Model TM moves evaluation as follows: creditworthy undertaking has for TM value higher than 0,3 and enterprise in bankruptcy achieves TM less than 0,2. The evaluation in the interval 0,2 to 0,3 classifies enterprise into a gray zone.

Table 4 Taffler model

Equation of model and description of indicators
$\mathbf{TM = 0{,}53X_1 + 0{,}13X_2 + 0{,}18X_3 + 0{,}16X_4}$
X_1 = *EBT / Short-term Debt Capital*
X_2 = *Current Total Assets / Debt Capital*
X_3 = *Short-term debt capital / Total Assets*
X_4 = *Sales / Total Assets*

Source: Vochozka 2011

Springate model (SM) was based on principle Altman model, originally had 19 ratio indicators and in final form consists of four indicators. Springate model has only one criterion for the evaluation of the financial situation and this is where SM is less than 0,862, then we can expect the some problems in enterprise.

Table 5 Springate model

Equation of model and description of indicators
$\mathbf{SM = 1{,}03X_1 + 3{,}07X_2 + 0{,}66X_3 + 0{,}4X_4}$
X_1 = *Net Working Capital / Total Assets*
X_2 = *EBIT / Total Assets*
X_3 = *EBT / Liabilities*
X_4 = *Sales / Total Assets*

Source: Kotulič et. al. 2011

Fulmer model (FM) consists of 6 indicators. The first indicator has the highest weight, one of the indicators (fifth) has a negative weight and the model has a negative absolute member which is not present in other models. Fulmer established as a single criterion for the evaluation the financial situation of enterprises and that is when the model reaches a negative value then the enterprise has the potential to problems in the future.

Table 6 Fulmer model

Equation of model and description of indicators
$\mathbf{FM = 5{,}528X_1 + 0{,}212X_2 + 0{,}073X_3 + 1{,}27X_4 - 0{,}12X_5 + 2{,}335X_6 + 0{,}575X_7 + 1{,}083X_8 + 0{,}894X_9 - 6{,}705}$
X_1 = *Retained profit / Total Assets*
X_2 = *Sales / Total Assets*
X_3 = *EBT /Equity*
X_4 = *Cash Flow / Debt Capital*
X_5 = *Short-term debt capital / Total Assets*
X_6 = *Current Liabilities / Total Assets*
X_7 = *Total Assets*
X_8 = *Net Working Capital / Debt Capital*
X_9 = *EBIT / Interest Expense*

Source: Miklovičová- Gurčík 2008

Table 7 Rrecapitulations' of Evaluation selected bankruptcy models

ZONE	**AZ2**
„SAFE" ZONE	AZ2 ≥ 2,9
„GREY" ZONE	1,23 < AZ2 < 2,9
„DISTRESS" ZONE	AZ2 ≤ 1,23
ZONE	**IN05**
ENTERPRISE CREATES VALUE	IN05 ≥ 1,6
GREY ZONE	0,9 < IN05 < 1,6
ENTERPRISE IS GOING TO BE BANKRUPTED	IN05 ≤ 0,9
ZONE	**IB**
EXTREMELY GOOD FINANCIAL SITUATION	IB > 3
VERY GOOD FINANCIAL SITUATION	2 < IB ≤ 3
GOOD FINANCIAL SITUATION	1 < IB ≤ 2
SOME PROBLEMS	0 < IB ≤ 1
BAD FINANCIAL SITUATION	- 1 < IB ≤ 0
VERY BAD FINANCIAL SITUATION	- 2 < IB ≤ - 1
EXTREMELY BAD FINANCIAL SITUATION	IB ≤ - 2
ZONE	**TM**
ENTERPRISE CREATES VALUE	TM > 0,3
GREY ZONE	0,2 ≤ TM ≤ 0,3
ENTERPRISE IS GOING TO BE BANKRUPTED	TM < 0,2
ZONE	**SM**
ENTERPRISE CREATES VALUE	SM > 0,862
ASSUMPTION OF FUTURE PROBLEMS IN THE ENTERPRISE	SM < 0,862
ZONE	**FM**
ENTERPRISE CREATES VALUE	FM > 0
ASSUMPTION OF FUTURE PROBLEMS IN THE ENTERPRISE	FM < 0

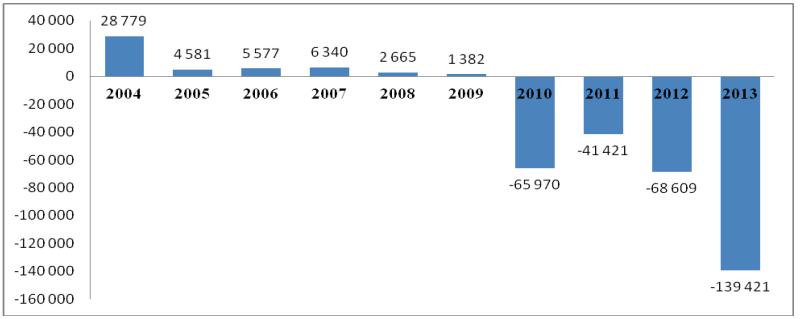
Source: own processing by Jenčová 2014, Kotulič et. al. 2011, Knápková – Pavelková 2010, Vochozka 2011, Zalai et al. 2010

3. RESULTS AND DISCUSION

In this article we focused the financial situation of the selected hotel in Slovakia for the period 2004-2013using data from the financial statements. In the article, we used the method of analysis, synthesis and comparison. Processing input data and calculations modifications prediction bankruptcy model was used MS Excel 2007.

On the following graph we can see the development of the profit of the hotel and we can conclude that this is a adverse situation in the development of net income of the hotel. We can see that in 2004, the hotel is making profits in the amount of € 28,779 in 2010, the hotel achieved a loss of € 65,970 and the situation in the following years was again only worse.

Figure 1 Development of Net Income



Source: own procesing

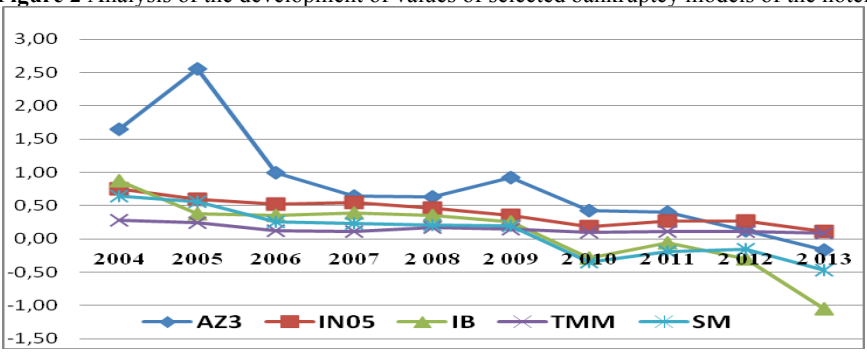
The following table shows results of the evaluation selected of bankruptcy prediction models on the basis of financial data for the years 2004 -2013 and we can conclude that:

Table 8 The development of values selected bankruptcy models of the hotel

MODEL	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
AZ3	1,65	2,56	0,99	0,64	0,64	0,92	0,43	0,40	0,13	-0,17
IN05	0,75	0,59	0,52	0,55	0,46	0,35	0,19	0,27	0,27	0,11
IB	0,88	0,37	0,36	0,39	0,35	0,26	-0,29	-0,06	-0,30	- 1,05
TM	0,28	0,25	0,12	0,12	0,17	0,15	0,10	0,11	0,11	0,08
SM	0,64	0,56	0,25	0,23	0,21	0,20	-0,35	-0,19	-0,15	-0,47
FM	719	826	1 665	1 678	2 122	2 624	2 204	2 099	2 049	1 965

(Note: FM in thousands) *Source: own processing*

Figure 2 Analysis of the development of values of selected bankruptcy models of the hotel



Source: own processing

- Fulmer model failed to detect progressive worsening of the situation, because the hotel is still evaluated as a prosperous.
- Model IN05 evaluated hotel in the gray zone throughout the period and did not record a significant worsening of the results achieved since 2010.
- An interesting result has contributed AZ2 model, which recorded a shift in the distress zone, in the year 2006 when it was first a significant overall decrease in profit. Since 2006, the hotel belongs to the zone distress also there is a gradual reduction in the value of Z-score and in 2013 amounted to a negative value.
- Model IB in evaluating the financial position of the selected hotel recorded movements from the gray zone to the worse zone in 2010, when the hotel had a negative value in the results of Net Income.
- The financial situation of the hotel by SM model was evaluated constantly in the zone "ASSUMPTION OF FUTURE PROBLEMS IN THE ENTERPRISE", but since 2010 this model achieves a negative value.
- The financial situation of the hotel by the TM zone change observed in 2006, but in the following years has not resulted significant worsening that we see in the development of net income from 2010.

4. CONCLUSION

In conclusion we can say that Fulmer model is not suitable for assessing the financial health of the hotel and we recommend to using the model Index Creditworthiness (IB), where we can see the changes in the development of Net Income.

References

1. ALTMAN, E. I. 2012. *The Use of Credit Scoring Models and the Importance of a Credit Culture.* [online]. [cit. 2 012-02-01] <http://people.stern.nyu.edu/ealtman/3-%20CopCrScoringModels.pdf>
2. ALTMAN, E.I., SABATO, G., WILSON, N. 2010. *The value of non-finacial information in small and medium-sized enterprise risk management.* Journal of Credit Risk, 2010, 2.6: 95-127. ISSN 1744-6619. [online]. [cit. 2012-02-01] <http://pages.stern.nyu.edu/~ealtman/Altman-Sabbato-Wilson-JCR_2010.pdf>
3. HORVÁTHOVÁ, J. and Ľ. BEDNÁROVÁ. 2012. Finančná analýza a finančné plánovanie. Prešov: Bookman, s..r.o. ISBN 978-80-89568-32-1.
4. JENČOVÁ, S. 2014. Finančno –ekonomická analýza podnikateľských subjektov. Prešov: Grafotlač Prešov. ISBN 978-80-8165-051-2.
5. KOTULIČ, R. et al. 2010. Finančná analýza podniku. Bratislava: Iura Edition, spol. s. r. o. ISBN 978-80-8078-342-6.
6. KNÁPKOVÁ, A. and D. PAVELKOVÁ. 2010. Finanční analýza: Komplexní průvodce s příklady. Praha: Grada Publishing, a. s. ISBN 978-80-247-3349-4.
7. MARINIČ, P. 2008. Plánovaní a tvorba hodnoty firmy. Praha: Grada Publishing, a. s. ISBN 978-80-247-2432-4.
8. MIKLOVIČOVÁ, J. and Ľ. Gurčík. 2008. Aplikácia ukazovateľov a modelov finančnej analýzy na vybrané mliekarne. Nitra: SPU. ISBN 978-80-552-0133-7.
9. NEUMAIEROVÁ, I. and I. NEUMAIER. 2005. Index IN05. In: *European Financial Systems: Proceedings of the International Scientific Conference.* Brno: Masaryk University in Brno. p. 143-146. Available at: http://is.muni.cz/do/1456/sborniky/2005/evropske-financni-systemy-2005.pdf.

10. RŮČKOVÁ,P. 2011. Finanční analýza metódy, ukazatele, využití v praxi. Praha: Grada Publishing, a. s. ISBN 978-80-247-3916-8.
11. VOCHOZKA, M. 2011. Metódy komplexního hodnocení podniku. Praha: Grada Publishing, a. s. ISBN 978-80-247-3647-1.
12. ZALAI, K. et. al. 2010. Finančno – ekonomická analýza podniku. Bratislava: Sprint dva. ISBN 978-80-89393-15-2.

eXclusive e-JOURNAL
ISSN 1339-4509

ECONOMY & SOCIETY & ENVIRONMENT

Critical view on identification of competitiveness attributes and dimensions for choosing a travel destination

Ing. Lenka Zajacova
Faculty of management
Department of Marketing and International Trade
University of Presov in Presov
Konštantínova 16, 080 01 Prešov, Slovakia
lenka.zajacova@smail.unipo.sk

Abstract
Tourism destinations around the world are finding themselves competing against other destinations more then ever before, especially those emerging destinations. Due to global mobility of tourists the competition is no longer just local, but rather fully global. Therefore key attributes – which could provide competitive advantage - need to be investigated to provide the destinations with understanding in which area they could develop in order to keep up with global competition. Several streams of research has been done in the area and couple of key foundings can be used as a basis for further studies. Understanding of the attributes and dimension can be of a considerable help to tourism industry.

Key words Decision criteria, Destination attributes, Competitiveness

1. INTRODUCTION

Travel destinations are defined, from the destination management perspective, as a geographical space in which a cluster of tourism resources exist, rather than a political boundary (Pike 2008). Clusters are in this context „an accumulation of tourist resources and attractions, infrastructures, equipments, service providers, other support sectors and administrative organisms whose integrated and coordinated activities provide customers with the experiences they expected from the destination they chose to visit“ (Rubies 2001, p. 39).

The topics of travel destinations and destination management have currently become center of attention in Slovakia due to the Act No. 91/2010 Coll. on Support of Tourism which is being intensively implemented. The Act has greatly contributed to the development of destination management and structured support of tourism in the country. Slovak regions and municipalities have changed their mindsets moving from single initiatives into coordinated destination management and marketing. In order to be competitive; the newly emerged destination management organizations (DMOs) deep dive into the topic of destination attractiveness as one of the challenges in becoming and strenghtening their competitive postitions in tourism industry. There are two streams of study in relation to their interest in destination competitiveness reflecting two major components of tourism: destination and tourists (consumer-travelers) themselves.

Firstly, the destinations thrive for understanding what are the criteria defining the reasons why the individual travelers decide to travel to particular destination - destination decision criteria as a set of attributes that individual destination should contain to be appealing for consumer-travelers. The main focus is the destination itself in the product sense, or more broadly, in the sense of marketing mix. Product orientation aims to increase the competitivenes of the destination. The product of the tourism sector is generally an experience that is delivered by a destination to its visitors. This experience is produced not by a single firm but by all players, which impact the visitor experience (Crouch 2007). Therefore the destination attributes come from several perspectives. All the research in this stream are considered as destination-specific.

Second area of interest is tourist-specific: travel motivations of people. Here, the emphasis is put onto individual motivations and needs, the factors that influence the decision-making process. These factors cannot be influenced by a particular destination itself, but should be recognized and understood as well. Many researches in the area resulted in classification of tourists into several types based on specific motivations.

In the beginning, researchers started to treat both stream as extremes, distinct and independent of each other in their empirical studies (Chon, Pizan, Mansfeld 2012). The choice of tourist destination was considered as being determined by two factors: pull factors composed of attributes associated with the destination, and push factors consisting of personal characteristics of tourists (Ritchie and Crouch 2003).

However, the further studies from 1990s went beyond the bi-polar understanding, fusing the streams together. The reason behind was the destination competitiveness when tourism researchers began to consider how destination competitiveness ought to be understood and measured.

In terms of competitiveness, the attributes should be assessed based on their relative importance. As Crouch (2011, p.1) identified „the impact of a competitiveness attribute on the relative performance of a destination is a function of both the importance of the attribute as well as the degree to which destinations vary on the attribute.“ Therefore, important attributes should be considered also from the perspective whether they are a determinant of competitivenes. The focus of studies shall focus on ‘determinant attributes’ which are the factors that exert the strongest influence on the competitiveness of tourism destinations (Crouch 2011).

The paper aims to elaborate on the combination of streams mentioned hereinabove - destination choice criteria as perceived by individual consumer-travelers. The main focus is *vacation* destination, that is where predominant purpose of travel is for non-business purposes (leisure time).

2. REVIEW OF RESEARCHES

Destination attributes and criteria has been object of the studies for over thirty years. In general sense, Cromption (1979) has already addressed the topic in his study focusing on students’ image attributes of Mexico and attributes considered as important in choosing vacation destinations. Hunt (1982) tried to elaborate on the topic in the area of USA, but with the constraint that he concentrated purely on American citizens (residents from other states that the one being evaluated) and their perceptions of particular US states. Haahti and Yavas (1983) investigated perception of Finland in terms of some salient choice criteria.

First deep-dive into the multidimensional approach was given in study of Yau and Chan (1990) where they explored the underlying dimensions of vacation destination criteria by factor analysis. 7 key factors (dimensions) resulted the research: 1. Shopping and transportation, 2. Entertainments and attractions, 3. Services in hotels and restaurants, 4. Price, 5. Foods, 6. Weather and 7. Friends and relatives.

The basic studies in the area following multiattribute approach concentrated on determining *if* and *to what degree* particular product attributes are important. More elaborate approach was introduced by Klenosky, Gengler & Mulvey (1994) known as the means-end approach which focuses on *why* and *how* product (destination) attributes are important by assessing the sequence of means-end relations linking product attributes to personal values.

Starting from the 1990s, where the combined approach was adopted and the interest in destination competitiveness increased, destination attributes have been examined by research studies with various focuses.

First group of studies diagnozed the competitive positions of specific destinations, such as the United States (Ahmed & Krohn 1990), cultural tourism in Toronto (Carmichael 2002), a casino resort (d'Hauteserre 2000), Australia (Dwyer, Livaic & Mellor 2003), Hong Kong (Enright & Newton 2004), Asia-Pacific (Enright & Newton 2005), Spain and Turkey (Kozak 2003), European cities (Mazanec 1995), Mediterranean resorts (Papatheodorou 2002), southeast Asia (Pearce 1997) and others.

As stated hereinabove, the main focus of this paper, are vacation destinations, but it is worth mentioning that there were also event studies focusing on convention destinations and defining their determinant attributes (e.g., Crouch & Ritchie 1998, Breiter & Milman 2006 and others).

Other research aimed at particular aspects of destination competitivenes, such as destination management systems or price competitiveness, but these were not related directly to defining determinant destination attributes.

Higher contribution to the destination management research has provided the third stream which concetrated their activities on development of general models and theories connected with destination competitiveness and determinant attributes aiming at developing more comprehensive understanding. The lead studies in the area were done by Crouch and Ritchie who developed a conceptual model tailored to the distinctive characteristics of destination competition, illustrated in figure 1 (Ritchie & Crouch 2003), tailoring general theories of competitiveness to destination management.

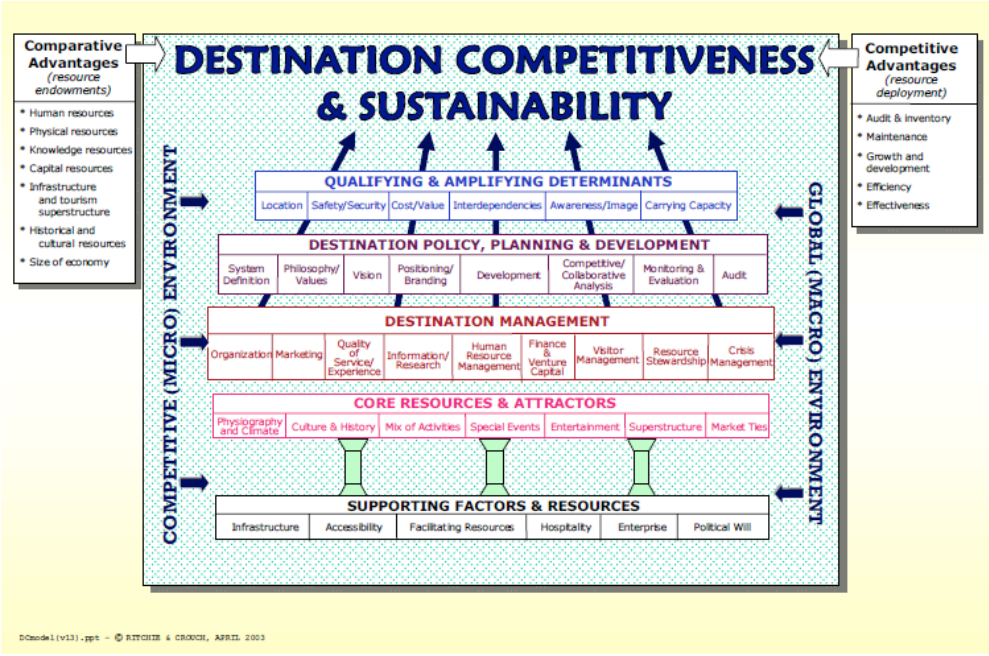


Figure 1: Crouch and Ritchie Conceptual Model of Destination Competitiveness
Source: Crouch 2011

The model is complex, covering all influences and factors of attraction. However, as the model is conceptual, it doesn't provide with determinant attributes directly and doesn't reflect research needs to better understand the relative importance of the destination attributes of competitiveness. To cover the gap Crouch has conducted specific study (Crouch, 2011) which extensively explored the model. Based on synthetis of „expert" judgement, 36 destination competitiveness attributes were examined to identify the most determinant ones on general destination competitiveness. The Crouch study (2011) is the most current and extensive study regarding the destination competitiveness attributes.

3. ATTRIBUTES – KEY FINDINGS

As the result of the researches, studies and model mentioned hereinabove, several results in form of determinant attributes emerged. Two key findings can be presented. First basic list was presented as the outcome of research by Decrop (2006) ordered based on number of occurences in the questionaire responses as presented in Table 1.

Attribute	Number of occurrences	Attribute	Number of occurrences
Climate	93	Friendliness	3
Crowded/deserted	23	Language	3
Nature: geology	22	Mentality	3
Infrastructure	20	Nature: holiday	3
Visits	14	Economy	2
Change of scenery	13	Holistic	2
Quietness	8	Localization	2
Cost	8	Nature: fauna	2
Surroundings	7	Security	2
Space	7	Social	2
Comfort	6	Social intervention	2
Monuments	6	Ambience	1
Authenticity	5	Cleanliness	1
Culture	5	Image	1
Attractions	4	Light	1
Food	4	Nature: flora	1
History	4	Smells	1

Table 1: Key attributes by Decrop
Source: Decrop 2006

Second, more elaborate foundings are presented by Crouch (2011). He exploited his conceptual model of 36 destination competitiveness attributes to examine them and provide with 1) determinant attributes of destination competitiveness that are found to be statistically more significant than average (see Figure 2), and 2) the rank orders for the main factors and sub-factors of destination competitiveness in terms of both the estimated importance weights as well as their respective determinance measures (see Table 2).

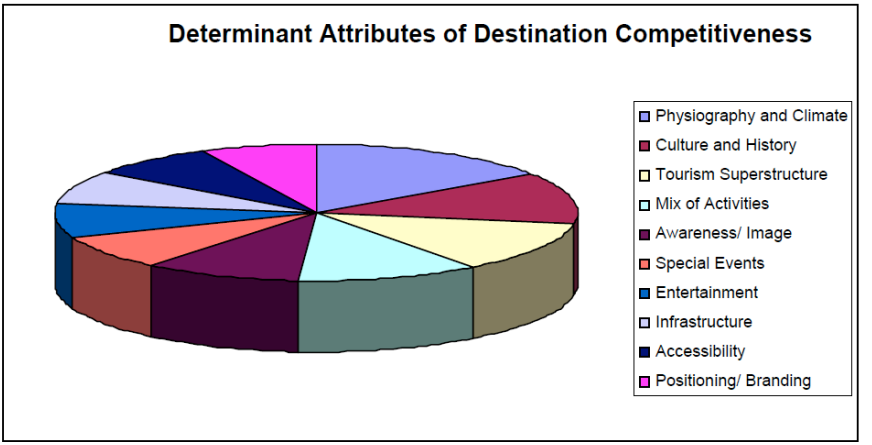


Figure 2: Determinant Destination Competitiveness Attributes
Source: Crouch 2011

Attribute Level	Attribute Label	Importance Ranking	Determinance Ranking
Main Factors	Core Resources and Attractors	1	1
	Destination Management	2	4
	Qualifying and Amplifying Determinants	3	5
	Destination Policy, Planning and Development	4	2
	Supporting Factors and Resources	5	3
Sub-Factors	Physiography and Climate	1	1
	Mix of Activities	2	4
	Culture and History	3	2
	Tourism Superstructure	4	3
	Safety/ Security	5	13
	Cost/ Value	6	14
	Accessibility	7	9
	Special Events	8	6
	Awareness/ Image	9	5
	Location	10	11
	Infrastructure	11	8
	Hospitality	12	20
	Market Ties	13	12
	Entertainment	14	7
	Quality of Service/ Experience	15	19
	Political Will	16	15
	Positioning/ Branding	17	10
	Enterprise	18	17
	Facilitating Resources	19	18
	Carrying Capacity	20	24
	Marketing	21	16
	Interdependencies	22	30
	Development	23	26
	Information/ Research	24	29
	Resource Stewardship	25	23
	Vision	26	21
	Monitoring and Evaluation	27	27
	Audit	28	32
	Organisation	29	22
	Philosophy/ Values	30	28
	Competitive/ Collaborative Analysis	31	25
	Human Resource Development	32	34
	Visitor Management	33	36
	Finance and Venture Capital	34	33
	System Definition	35	31
	Crisis Management	36	35

Table 2: Ranking of Destination Competitiveness Attributes
Source: Crouch 2011

4. CONCLUSION

The literature review and the results of Crouch study suggest that the attributes that comprise a destination's core touristic resources and attractiveness are the cornerstone of a destination's competitiveness. Significance of these fundamentally important elements should be understood by the destination management organizations in order to be competitive. Only by addressing the key attributes and developing them may lead to competitiveness, sustainability and further development of tourism industry in Slovakia. The potential in understanding the attributes is especially significant for undeveloped regions and should be subject to further studies.

References

1. AHMED, Z.U. - KROHN, F.B., 1990. Reversing the United States' Declining Competitiveness in the Marketing of International Tourism: A Perspective on Future Policy, Journal of Travel Research, 29(2): 23-29. ISSN: 0047-2875.
2. BREITER, D. - MILMAN, A. 2006. Attendees' needs and service priorities in a large convention center: Application of the importance–performance theory. Tourism Management, 27(6): 1364–1370. ISSN: 0261-5177.
3. CARMICHAEL, B., 2002. Global Competitiveness and Special Events in Cultural Tourism: the Example of the Barnes Exhibit at the Art Gallery of Ontario, Toronto, The Canadian Geographer, 46(4): 310-325. ISSN: 1541-0064
4. CHON, K. S. – PIZAM, A. – MANSFELD, Y., 2012. Consumer Behavior in Travel and Tourism. New York: Routledge. ISBN: 978-1-136382710
5. CROUCH , G. I. and RITCHIE, J. R. B. 1998. Convention site selection research: A review, conceptual model, and propositional framework. Journal of Convention & Exhibition Management, 1(1): 49–69. ISSN 1094-608X.
6. CROUCH, G.I., 2007. Modelling destination competitiveness : a survey and analysis of the impact of competitiveness attributes. [online]. [cit. 2014-11-16]. Available at: http://www.sustainabletourismonline.com/awms/Upload/Resource/bookshop/Crouch_modelDestnComp-web.pdf
7. DECROP, A., 2006. Vacation Decision Making. Oxon: CABI Publishing. ISBN: 978-1-84593-040-0
8. D'HAUTESERRE, A., 2000. Lessons in Managed Destination Competitiveness: The Case of Foxwoods Casino Resort, Tourism Management, 21(1): 23-32. ISSN 0261-5177
9. DWYER, L. – LIVAIC, Z. – MELLOR, R., 2003. Competitiveness of Australia as a Tourist Destination, Journal of Hospitality and Tourism Management, 10(1): 60-79. ISSN 1447-6770.
10. ENRIGHT, M.J. – NEWTON, J., 2004. Tourism Destination Competitiveness: A Quantitative Approach, Tourism Management, 25(6): 777-788. ISSN 0261-5177.
11. ENRIGHT, M.J. – NEWTON, J., 2005. Determinants of Tourism Destination Competitiveness in Asia Pacific: Comprehensiveness and Universality, Journal of Travel Research, 43(4): 339-350. ISSN 0047-2875.
12. KOZAK, M., 2003. Measuring Competitive Destination Performance: A Study of Spain and Turkey, Journal of Travel and Tourism Marketing, 13(3): 83-110. ISSN 1054-8408.
13. MAZANEC, J.A., 1995. Competition among European Tourist Cities: A Comparative Analysis with Multidimensional Scaling and Self-Organizing Maps, Tourism Economics, 1(3): 283-302. ISSN 1354-8166.
14. PAPATHEODOROU, A., 2002. Exploring Competitiveness in Mediterranean Resorts, Tourism Economics, 8(2): 133-150. ISSN 1354-8166.
15. PEARCE, D.G., 1997. Competitive Destination Analysis in Southeast Asia, Journal of Travel Research, 35(4): 16-25. ISSN 0047-2875.
16. PIKE, S., 2008. Destination marketing. Oxford: Elsevier. ISBN: 978-0-7506-8649-5.
17. RITCHIE, J.R.B. – CROUCH, G.I., 2003. The Competitive Destination: A Sustainable Tourism Perspective. Oxon: CABI Publishing. ISBN: 978-0-85199-664-6
18. RUBIES, E. B., 2001. Improving public-private sectors cooperation in tourism: A new paradigm for destinations. Tourism Review, 56(3/4), 38–41. ISSN: 1660-5373.

eXclusive e-JOURNAL
ISSN 1339-4509

ECONOMY & SOCIETY & ENVIRONMENT

Globalization elements and their impact on air traffic

Ing. Vladimír Socha
Czech Technical University in Prague, Faculty of Biomedical Engineering
Nám. Sítná 3105, 272 01 Kladno, Czech Republic
Technical University in Kosice, Aeronautical Faculty
Rampová 7, 041 21 Kosice, Slovakia
ing.vladimir.socha@gmail.com

Ing. Luboš Socha, PhD., PhD.
Technical University in Kosice, Aeronautical Faculty
Rampová 7, 041 21 Kosice, Slovakia
lubos.socha@tuke.sk

Ing. Peter Kaľavský, PhD.
Technical University in Kosice, Aeronautical Faculty
Rampová 7, 041 21 Kosice, Slovakia
peter.kalavsky@tuke.sk

Ing. Iveta Šebeščáková
Technical University in Kosice, Aeronautical Faculty
Rampová 7, 041 21 Kosice, Slovakia
iveta.sebescakova@tuke.sk

Abstract
The article focuses on the issue of globalization and its impact on aviation. Respective globalization elements which take place in the field of aviation are studied. Also, the issue of terrorism and the elimination of possible risks resulting from this issue are paid attention to. The work further focuses the issue of safety, information technologies, systems of quality management in aviation and pays attention to the field of environment.

Key words: Globalization, safety, environment, terrorism, quality, information technologies

1. INTRODUCTION

Aviation is an important stimuli for globalization elements in the world´s economy, politics, as well as in social field. It has significant qualitative and quantitative impact on tourism, international trade, direct international investments, economic structure and productivity on national, as well as on international scale. Besides air transport, the most critical part of aviation are airports and navigation service, if viewed in broader terms. When it comes to airports, air transport and navigation service, the most important globalization elements perceived more closely are environmental policy, terrorism and related safety, information, data and navigation technologies from the point of view of informatization, and on the other hand, from the point of view of economics, global alliances. The stimuli for globalization is technological development, liberalization of trade, culture and the Internet, preservation of the environment forming of common conscience. Globalization thus stands for the process of unifying

countries, cultures, and monetary economics. Its advantages lie in internationalization (access to flows), liberalization (causing immense growth of international trade) information technologies saving costs and time due to time-space compression, competition (increase in the variability of offer, quality and suppressing price levels). On the other hand, the disadvantages of globalization are „green issue" (energy crisis), unemployment, unstable economics and economic gaps between countries, and dominant role of monopols.

2. GLOBALIZATION ELEMENTS

Aviation industry and air traffic itself is a prototype of safety, speed, effectiveness and constant development tendencies and interconnecting information. All these attributes characterize globalization and separately define globalization elements. Elements, by which the effect of one provokes arising and impact of the other. They present a cycle with sections.

2.1 Terrorism

The phenomenon of terrorism under the conditions of today´s society knows no boundaries between countries and includes in itself more and more complicating and developing relations. Aviation nowadays becomes a more and more frequent target of terrorist acts from among all fields of industry.

Airplane hijack
Airplane hijack represented actually the only serious form of illegal action in aviation, threatening lives of the passengers and crew up to the 70s. An airplane served only its primary function of "means of transport" and passengers became hostages back then, enabling hijackers to demand conditions, especially economic and political. This form became a part of the arsenal of terrorists and included all traits of terrorist act:

- political nature and motivation,
- influencing public opinion and the objective of medialization
- threats of using violence,
- creating fear and panic.

Hijacking a plane is the most outstanding proof of the international nature of terrorism, since it exceeds state borders and people fall victims regardless of their nationality. Tactics and process of hijacking a plane had been improving by terrorists, however safety precautions and acceptance of a number of international conventions aimed against air travel misuse resulted in a decrease in the number of hijacked planes since mid-80s.

The threat of crashing a large size plane on a major city first emerged in December 1994, when members of Algerian terrorist group called GIA took over Airbus A300 owned by Air France. The plane, after a series of complicated events landed at an airport near Marseille, and when French investigators were told by the released hostages, that terrorist have suicidal plans and that they aim to crash the plane in the center of Paris, an anti-terrorist assault took place. Hijacking other means of transport than a plane does not even come close to the number of hijacked planes. A breaking point in the history of terrorism, which is also connected to a change in the nature of international safety, is considered to be the attacks on World Trade Center and Pentagon, the seat of the Ministry of Defense on September 11th 2001. In this moment, an aircraft itself became an instrument and air travel became a means of committing an act of terrorism. September 11th 2001 changed the perception of the world and terrorist acts, and deeds from this era present a new level of safety issues in aviation and misuse of air travel. A number of international airports, such as Jalalabad (Afghanistan, February 28th), Burgass (July 14th 2002), Beijing (July 20th)2012). The highest number of victims (37 dead and 190 wounded) resulted after a bomb attack on January 24th 2011 at an international airport Domodedovo in Moscow.

2.2 Security

International terrorism represents a rather high potential risk for aviation. A modern international airport cannot operate without a high level of safety and revealing possible illegal actions. Globalization element of improving safety during air travel can be for instance using so called intelligent passports, or cards with safety chip, which includes a photo, biometrics and other necessary data required to identify a passenger.

A modern system for passengers´ identity control and check, CAPPS II, serves to set the level of risk and possible thread which a passenger represents even before they board a plane. The system is also able to evaluate mutual relatedness of individual passengers, their connection to some of the existing terrorist groups etc. In case of a detected thread, a passenger is not allow to board a plane. The issue with using CAPPS II is the possible personal data misuse, false alarms, as well as the level of effectiveness of the program itself, which is uneasy to be traced.

Another safety element, which starts to spread globally to international airports is the whole body scanner, designed by a British research center. Via this, dangerous objects mounted to the body of a passenger are made visible. It was originally designed to improve orientation of soldiers and pilots in fog, however after the terrorist acts and endangering public aviation, it found use at airports´ check-ins.

Biometrics technology is a standard in aviation as one of safety elements. It is based on identifying a person using biometric data. Biometrics include checking people on the basis of clear physical traits or unique characteristics such as face, fingerprints, eye color, DNA etc. Biometric scanners are designed to provide for a high level of safety, transparency, reliability and easy use. ICAO accepted biometric data as a means for biometric identification in passports and other machine-read documents in May 2003. Identification by face was chosen as a global biometric identification trait to prove personal identity.

2.3 Information technologies

Focusing on the future perspective of aviation, design, implementation and use of new information modules becomes a necessity.

Scheme of the integrated system of operation inspired incorporating a complex aviation information system KLIS into information-communication structure.

Integrated information system of operation in the field of aviation KLIS represents a multimodular system implemented in two phases:

- in the phase of introduction, the module of archiving collects important aviation, transport and other data
- in the phase of realization, the system is used with integrated information systems of operation:
    - AFTN – worldwide system of telecommunication circuits aiming to facilitate data transfer between AFTTN communication centers,
    - SITATEX – communication system serving to pass information mutually among air travel companies and airports used in aviation,
    - AMS – automatic monitoring system,
    - DCS – departure control system.
    - TWR – control tower enters the system by serving the function of taking the control over an airborne or landed aircraft

2.4 Navigation and data-information communication

The most frequently used cosmic technology in everyday life are satellite navigation systems, commonly known as Global navigation satellite system (GNSS). The whole world recently uses and utilizes a military solution of the American army known as GPS.

The world is however not a monopoly and various countries try to research and develop their own GNSS. For instance, there are Russian GLONASS, Chinese Beidou, Indian IRNSS, Japanese Quasi-Zenith, or European Galileo.

GNSS are vital for smooth and safe aviation and they take a significant place in it. This is exactly the reason which makes it one of the important globalization elements for the future, since with heavier and heavier traffic not only in the field of aviation they play an important role, and their importance is only about to grow. These systems will have to provide for speed, accuracy and availability of electronic data in a given time and place without any errors. Navigation in aviation, therefore availability of data and information, is necessary in all phases of flight. GNSS plays its role especially in the most critical phase, which is landing.

Recent GNSS systems and their development

GPS
The existing position system GPS was developed by the US army in 70s. The main condition is the ability to receive signal from at least four satellites. GPS is divided into three basic segments:

- Space segment – comprising satellites at the height of about 20,230 km above the surface of Earth, with a basic frequency of 10.23 MHz,
- Operating segment – land monitoring and radio centers worldwide (total of 12), which monitor satellites and their trajectories, set system time and navigation message for each satellite.
- User segment - devices to receive GPS signal

GPS system is constantly modernized, while the expected utilization will last till 2030.

GLONASS
Russian GLONASS was developed as a reaction to the American GPS. It comprises of, similarly, the following segments:

- Space segment – consisting of satellite at the height of 19,100 km, with a relatively short lifespan, which slowly degrades the system.
- Operating segment – in contrast with GPS, they are located exclusively in Russia
- User segment - compared to GPS, since the future of GLONASS is unclear, the number of the types of devices for receiving the signal is limited

EGNOS
Represents the first degree of European global navigation system (GMSS-1), extending the existing GPS and GLONASS, created as a mutual project of ESA, European Agency and EUROCONTROL (project began in 1996). Its purpose is to provide guaranteed navigation service based on navigation systems GPS and GLONASS to secure high accuracy, integrity and availability. Space segment consists of three satellites and processes signals from GPS and and GLONASS satellites. The land segment comprises of a site of monitored stations located in Europe.

EGNOS serves for testing use, to remove all errors and so that its successor, Galileo system (GMSS-2), is launched fully functional.

Outlook for the future tells us, that it is important to finish testing EGNOS and launch Galileo. To fulfill this task it is still necessary to launch a sufficient number of satellites to orbit, build the entire land infrastructure, introduction, testing and fine-tuning the system and following establishment among the competition, especially GPS. Planned functionality of the system is assumed in 2016. [7,8]

GALILEO
The main reason, besides lower and lower transport capacity, for the introduction of Galileo is to make this system independent from any state and army. EGNOS system does not meet this requirement. Galileo is supposed to be better than the contemporary systems in every way, even if it brings only a few innovations and new characteristics, however it pushes the recent ones a few steps ahead. This system shall be completely independent from other navigation systems, however they shall be compatible and it will use them. The system´s conception follows these components::

- Global – shall consist of 30 satellites 23,616 km above Earth and land operation segment
- Regional – shall provide information on the integrity of signals, possible to combine with other GNSS and improved power
- Local – improvement of quality of services provided by regional component
- User – adjustment to the needs of users and devices receiving signal.

Galileo represents new European satellite navigation system developed in cooperation with European countries, as a request from civil sector and for civil use. Not even in cases of military or political crises it shall be blocked, which is important to secure smoothness and safety of aviation. It will be able to use the most modern technologies to inform on position and time and guarantee adequate availability and provide higher accuracy then the recent navigation systems, and shall offer the guarantee of continuity and quality of signal, which is a condition for the applications in aviation. Cooperation with the American GPS and Russian GLONASS is also crucial, which shall significantly improve the availability and reliability of navigation services, since all satellites in a given area shall be used. Another significant advantage is a warning in case the signal is not correct, which represents an immense utility for applications in the entire aviation process, where safety comes first.

2.5 Quality

Based on AS/EN 9100, AS/EN 9110, AS/EN 9120, AS/EN 9003 and other international norms, systems of quality management are used in the field of aviation.

AS/EN 9100 is a model of a quality system in aviation industry to secure quality in development, construction, manufacturing, service and installation.

AS/EN 9110 Quality system model in aviation industry to secure quality during repairs, general repairs and maintenance in the field of aviation.

AS/EN 9120 Quality system model in aviation industry during distribution and storing components.

The norms rely on the need to create a global harmonized norm meeting requirements of society in aviation industry worldwide. The norm ISO 9001 became the basis for AS/EN norms.

For the requirements of AS/EN 9100 to be accepted not only by American aeronautics manufacturers and repair companies, but also by manufacturers and repair companies in Europe, South America and Asia, IAQC (International Aerospace Quality Group) was created, which expresses ideas of world aeronautics manufacturers and repair companies in the field of quality. Its objective is to add a higher level of quality at all levels of the distributions chain. The core of IAQC is comprised of three

independent groups of the airspace quality:

1. AAQG (American Aerospace Quality Group):
2. APAQG (Asia-Pacific Aerospace Quality Group):
3. EAQG (European Aerospace Quality Group):

Each segment sets normalization organs responsible for checking the match with the respective standards. .

2.6 Strategic global alliances

The most preferred and the most favorite way of cooperation among aviation entrepreneurs recently are alliance groups, which result in covering the globalization demand for air travel and in broadening air traffic services. Basic part of the globalization cooperation is a unified idea of "the possibility of air travel to any part of the world"

Global alliance groups rely on the basic principle of the integration of air travel entrepreneurs, while any of them may offer their services in a specific part of the world or region and is coherent with the others.

Depth and scope of cooperation differs with different alliance groups, however the following fields are the common:

- Merger of check in and reservation systems – using Loyalty Programme – creation of a single alliance loyalty programme, or make it possible for the customer to use mutual benefits of loyalty programmes from each company
- Offering continuous prices do the alliance destinations: mutual agreement between alliance members connected with the transfer of passengers on a price, sum of which is lower than two companies tariffs combined.
- Harmonization of capacities offered for flights to major destinations and coordination of flight plans.
- Unified plane supply and repairs capacities
- Alliance offer of optional services for passengers
- Sharing and unification of other activities

The choice for the final decision of a company to join the alliance group should be made based on the evaluation of its contemporary position at the market of air travel, as well as on possible contribution coming from being a part of global alliance, however the most important condition for admission is a real evaluation of the possibilities of the company itself.

In the field of air travel, there are three major global multilateral alliance groups: Star Alliance, SkyTeam and OneWorld.

2.7 „The green issue " of air travel

An element which is significantly affected by human is the issue of the environment. Environment and its preservation was always an issue, and always will be, in relation to other fields of industry as well in relation to aviation. Air travel burdens the environment mainly as for noise pollution and fumes.

Possibilities for lowering noise levels in air traffic may be reflected in the following four areas:

- regional planning,
- traffic limitations,
- lowering at the source,
- operation procedures

More serious and palpable effect of aviation on the environment are fumes, producers of which are not only aircraft. Fumes do not come only from planes, but also by operating vehicles in aviation, vehicles serving to commute between airports, and passengers´ buses. Other sources of this kind of pollution should not be omitted as well, such as electricity generators or air conditioning devices, terminal buildings, power plants etc.
The initial idea is related to the fumes coming from the actual aviation means of transport, exclusively from plane engines. Global aviation produces about 2% of the global CO2 fumes, which is a direct result of combustion. Recently, there are several alternatives to resolving the issue, which are mutually supported, and eventually contribute to one whole. Foremost, it is using aircraft with lower gas consumption. Connected to this are also innovations in the field of technical development and the design of new construction solutions for planes, mainly engines.

Pressure connected to resolving the "green issue" of aviation is put not only on the world aircraft producers, but touches also air travel entrepreneurs and countries´ politics. Within EU member countries, one of the key instruments lowering the greenhouse effect fumes levels is the European system for emissions trading, issued based on Kyoto Protocol aiming to enable EU member countries meet the requirements stated in the protocol.

3. CONCLUSION

Aviation industry and air traffic itself is a prototype of speed, safety, effectiveness and Aviation industry and air traffic itself is a prototype of safety, speed, effectiveness and constant development tendencies and interconnecting information. All these attributes characterize globalization and separately define globalization elements. Elements, by which the effect of one provokes arising and impact of the other. They present a cycle with sections. Globalization is the current trend, which represents the unification of countries, cultures and economies. Negative effects of globalization, particularly terrorism and threat, leading to the implementation of new features aimed at enhancing aviation security and elimination of risks or threats eventually.

References

1. KOLESÁR, J., LENGYELOVÁ, P., 2011. Modern Aviation Safety. In: Acta Avionica. roč. 13, č. 21, s.75.
2. VITTEK, P., NĚMEC, V., KURTULÍK, L., 2010. UML and Risk assessment tools – Safe and secure future for international airports. In: Acta Avionica. roč. 12, č. 17, s. 74.
3. SZABO, S., 2005. Riadenie leteckej dopravy. In: Riadenie dopravy, Košice, Technická univerzita, 2005, s. 109-129, ISBN 8080732973.
4. SEDLÁK, P., SOCHA, L., BAJUSZ, P., 2010. New generation of Integrated information management system – THE IIMS. In: Acta Avionica. roč. 12, č. 19, s. 68.
5. ROZENBERG, R., SZABO, S., 2009. Základná letecká terminológia, Košice : Letecká fakulta TU v Košiciach, 116 s., ISBN 978-80-553-0304-8.
6. PRUŠA, J. a kol., 2008. Svet leteckej dopravy. Prvé vydanie. Praha: Galileo CEE, 2008. 179 s. ISBN 978-80-8073-938-6.
7. SZABO, S., GAVUROVÁ, B., 2011. Vplyv vývoja svetovej ekonomiky na rozvoj leteckej dopravy. (CD-ROM). In: Aeronautika 2011: Medzinárodná vedecká konferencia : 20. - 21. októbra 2011 Herľany, Slovensko. Košice: TU, s. 1-6. ISBN 978-80-553-0758-9.
8. SCHÓBER, T., KOBLEN, I., SZABO, S., 2012. Present and potential security threats posed to civil aviation / In: Incas Bulletin. Vol. 4, no. 2 2012, p. 169-175, ISSN 2066-8201

eXclusive e-JOURNAL
ISSN 1339-4509
ECONOMY & SOCIETY & ENVIRONMENT

Online advertising revenue – the current state of the domestic market

PhDr. Radovan Bačík, PhD. MBA,
Mgr. Richard Fedorko, PhD.
Faculty of management
Department of Marketing and International Trade
University of Presov in Presov
Konštantínova 16, 080 01 Prešov, Slovakia
radovanbacik@gmail.com
richard.fedorko@gmail.com

Abstract
The aim of the article is to describe the specific aspects of online advertising as a tool of marketing communication. In the evaluation, the direction of the topic article summarizes the theoretical bases of internet marketing. The contribution also focuses its attention on the area of Internet advertising revenue in the domestic market, where on the analysis describes the current state of the proceeds of this form of promotion. Another object of the article is to evaluate and demonstrate the possible further developments in this field and to point out the pitfalls.

Key words Marketing, Internet Advertising Online advertising revenues, Trends

1. INTRODUCTION

It is important to highlight the fact that more than last fifteen years has seen the striking emergence of new internet platforms for social-media, e-commerce, online media, marketing and other activities. Without any arguments we can state that growth of these platforms can be named as dramatic. These and other internet platforms all take advantage of how the internet has lowered a range of economic costs: the cost of creating and distributing certain types of products and services, the cost of acquiring information about these goods, the cost of collecting and using data on consumer preferences and behavior. These changes have helped make internet platforms particularly dynamic and innovative, and inspired a great deal of economic research (Levin 2011). In relation to the use of modern technology to distinguish several concepts, Kotler (2007) defines e-business (online business), which is understood as the use of electronic platforms (intranet, extranet and internet) for the implementation of business organizations. Author adds that the Internet and other modern technologies allow organizations to realize their business activities more quickly and efficiently. E-business then includes the total electronic exchange of information in an organization or between a company and its customers.

The internet and its online environment develops rapidly and it gives marketers many modern and more effective options of realisation as well as provides options to measure the efficiency of their marketing campaigns. Together with technological development of this new media tool, this enables to create further opportunities for reaching target groups. The importance of online marketing is growing, as we can observe changes in the ways people communicate, but also in the ways they spend their free time. Suhányi (2011) states that in most cases, the competitive advantage does not lie only in a quality product or a great idea, but it is actually marketing and an optimal use of its tools that can on a decisive level decide about the success or failure of a product or service in the market. In this plane can be Internet marketing tools considered as a highly relevant. Internet marketing is also a specific part e-business (online business), a strategic process of creation, distribution, promotion and pricing of products offered to target markets through the Internet, electronic tools and smart mobile devices – smartphones (Kurtz 2011; Kotler 2009).

As Scott (2010) states, with the advent of the Internet, a new platform has opened up for the organisations to promote their products, services or brands. New and modern rules that the Internet has brought into marketing, have contributed a new dimension into the communication between the organisation and the consumer, especially by creating direct and effective relations. The online environment of the Internet offers opportunities to reach a narrow customer segment directly, while the costs represent only a fraction of large advertising budgets. Online Internet environment represents a dimension of continuous progress, which constantly pushes the possibilities for marketers and their marketing strategies, online advertising area including. Technological progress develops opportunities online advertising, as marketers offer a wide range of options for creative use, cost-effectiveness and immediate monitoring of progress of advertising campaigns.

Online Internet environment for marketing activities offer organizations a wide range of possibilities of promotion, dissemination of information about the product, service or brand, which represents an undeniable advantage and strong position of the communication channel. It should be emphasized that the funds invested in marketing activities in the online environment are compared to those of other forms of promotion negligible, while internet advertising is available continuously. Targeting of online marketing to selected target groups that the organization intends to reach, in comparison with conventional methods much better targeted. High level of interaction helps to efficiently build good relationships with customers (Janouch 2011).

Literature offers different views on the issue of internet marketing, such as the definition of the author Nondek (2000), who perceives e-marketing as a process. He stated that marketing on the Internet is qualitatively new form of marketing that can be characterized as a process control satisfying human needs information, services or merchandise using the Internet. Author Sedláček (2006) most accurately defines the concept of Internet marketing, which defines as the use of the Internet to achieving marketing objectives. In practice, we can meet also with the concept of e-marketing, which is used as a synonym for another internet marketing, in which we include also mobile marketing. In the case of this wider conception can about e-marketing speak of using the Internet and other information and communication technologies to achieving marketing objectives of the organization.

It can be said that electronic marketing has over other forms of promotion many advantages. Author Kobiela (2009) in this regard that e-marketing allows accurate targeting of advertising campaigns, where with the help of the Internet it is possible to hit a large number of potential customers with a relatively small volume of invested funds. At the same time, these e-marketing tools have the possibility of accurately measuring their efficiency.

Implementation of e-marketing on the other hand, it also has its drawbacks, the authors Karlíček - Král (2011) for major disadvantages internet promotion authors considers that internet marketing affects only Internet population. For further serious disadvantage author considers saturation of online advertising. More and more users become resistant to this form of promotion, which means that users are learned overlook advertisements. This phenomenon is called banner blindness. The organization that chooses to implement e-marketing should follow the rule of thirds "should determine the budget for its online marketing and then allocate one third of the creation of websites, one-third on their promotion and one third for their maintenance." (Levinson 2011, p. 184)

The authors Lošťáková (2009); Janouch (2011) appropriately notes that the Internet has fundamentally contributed to mass customization when the customer has the opportunity to create their product from standard components. Or mass personalization in case, where the customer is approached individually, while he offered a standard product. Internet environment can focus attention not only to customers with the greatest value for the organization, but also increasingly to smaller customers, respectively customers who do not bring the organization to such a high value. And also the immediacy of response that takes place between the participants in the communication process (organization - the target group). The objective in this case is to follow the target groups in their work on the Internet in a way that their attention was directed us set way.

It should be emphasized that the implementation of the web page itself is not enough. In this regard, the author Scott (2009) recommended that the marketing strategy organization which uses only a web page should develop marketing activities in the online environment and the strategy to include as many other tools that have the potential customer can now get. Under this extension of e-marketing tools Author includes: webpage; e-mail marketing; corporate blog; profiles on social networks (Facebook, Twitter, LinkedIn, etc.); search results (SEM - search engine marketing; SEO - search engine optimization) and products of the search engines (Google); online videos (YouTube).

The individual components of the marketing mix and online communication in the Internet environment are areas that are very closely linked, which significantly helps in promoting new products and services, reaching out to new target groups of customers as well as help build a positive image. This form of communication has certain positive characteristics, it is mainly the possibility of precise targeting, personalization, interactivity, multimedia content usability, simple measurability and efficiency at relatively low cost (Karlíček - Král 2011, p. 171).

2. CURRENT STATUS OF THE ISSUE ON THE DOMESTIC MARKET

Consider a firm promotes its products or itself through several Internet media with a fixed Inter-net marketing budget and models the budget allocation decisions as a competitive game, in which each firm

formulates its own optimization model that is influenced by the competitor's moves as well. Internet marketing refers to the strategies of selling products or services online. The basic problem of forming such strategies is to determine the marketing efforts on selected online marketing channels, such as search engine submission, banner purchase, website design, online promotions and e-mail marketing (Zao – Zhu 2010). Online Internet environment has become for marketers areas with increased importance, reflecting annually increasing marketing expenditure in this area, as well as increased revenue. What is essential to emphasize is that the statistics from recent years supported the views of experts expect in the years to even stronger growth promotion in this area and the associated expenditure growth.

The trend, which we describe can also be seen in terms of our market, where the confirmation of our claims we present results of analysis of revenue from online advertising in Slovakia for 2013 by the Association of IAB Slovakia (2014), whose members are obliged to report every half its revenue from the web advertising. IAB Slovakia (formerly the Association of Internet Media) has been operational since May 2005 as an association of entities operating in the Slovak Internet market, whose main objective is to inform about Internet and its possibilities as an advertising medium. It currently has 37 members IAB Slovakia. Volumes published data relevant reported 21 members. The data consist of media-net-net value of advertising on member servers IAB Slovakia and qualified estimate sales IAB Slovakia Slovak and international non-servers. The reporting is anonymous and subsequent disclosure takes place every six months. As shown in Figure 2 in 2013, expressed in absolute terms, Net / Net Internet advertising market recorded an annual increase of 17.5% (9.8 million EUR) from 56 million in 2012 to 65.8 million EUR in 2013. It is important to emphasize that these values represent net value-media space, without including agency commissions and bonuses, as well as media partnerships. It is worth noting that the average annual growth in revenue from online advertising starting in 2007 is 33.58%. As Figure 3 indicates the largest annual growth in revenue was recorded in 2011, which accounted for 80.08%. On the other hand, in 2009 due to the global economic crisis was recorded on-year decline in revenue from online advertising of 5.42%.

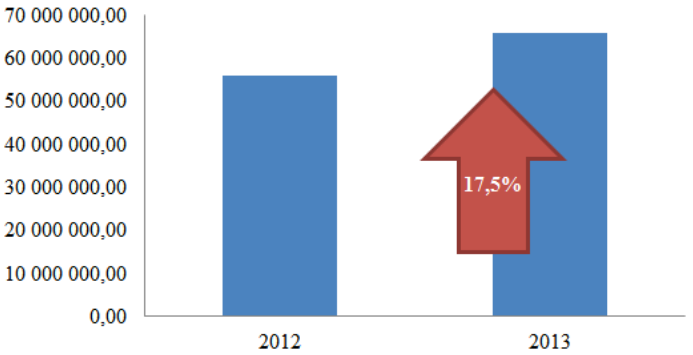


Fig. 2 The growth in revenue from online advertising in Slovakia
Source: Own elaboration according to IAB Slovakia

For a closer view of the individual instruments making up the absolute values of income dominates in the period of 2013 search segment (Paid for search - search by keyword, text link at the top or side of a

search result page as a predefined expression) with a share of 38.26% (25 2 million EUR) and the annual growth rate of 24.49%. Other segments exceeding 30% share threshold is banner advertisement (Display Advertising) with a share of 35.86% (23.6 million EUR) and the annual growth rate of 10.67%. Observed Classifieds & Directories segment, representing the line advertising - text advertising for the specific product or service (eg. website with job vacancies estate websites, Online Listings, auctions, etc.) recorded a share of 24.01% (3.4 million EUR) with an annual growth rate at 26.99%. Other studied group of instruments constituting a share of revenues 1.87% (1.2 million EUR), with an annual decrease in revenue 38.70% (IAB Slovakia, 2014).

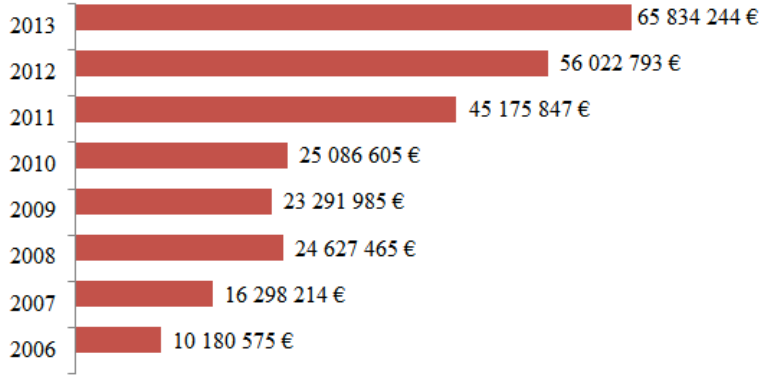


Fig. 3 Total revenue from online advertising in Slovakia
Source: Own elaboration according to IAB Slovakia

According to estimates by media networks ZenithOptimedia (Czwitkovics 2014) achieve real spending on Internet advertising in Slovakia for 2013 € 45 million. Annual growth in their amounted to 28.6%. For comparison (to IAB value of growth), expenditure has risen faster in Russia (26.8%) and Turkey (24.3%). On the other hand, grew more slowly in the case of the United Kingdom (16.2%), Hungary (16%), Austria (15.7%), Norway (14.7%), Italy (13.3%) and Romania (13%).

3. CONCLUSION

Internet marketing has undergone life cycle of excessive vitality and investment slump and failure to stable maturity. This is evidenced by the fact that customers are increasingly seeking products, services and prices comfortably in the Internet environment (Kotler 2007). The opportunities offered by online Internet environment, not only for marketing agencies are possible ways of creative use of a wide variety of ad formats, cost-effectiveness, immediate monitoring of progress, monitoring of advertising campaigns, and their management in real time. Those factors push the online environment of the Internet as a medium to the forefront against traditional media and forms of advertising. The proof is achieved revenue from online advertising within the Slovak market, where annual growth of revenue in 2013 amounted to 17.5% of the final value of 65.8 million EUR, which was the third highest annual jump among other European countries. Our present is characterized by constant innovation in the field of technology in order to minimize costs, as well as global efforts to maximize the penetration of Internet connection than in developed countries and even to the remotest corners of the world. With the growing

number of households, individuals - potential customers daily acceding to this new medium, we observe the associated growth advertisers growth of invested funds in this area, as well as overall growth in importance of the online environment in terms of its use of advertising. It should be noted that the potential of this medium in terms of marketing activities is not particularly limited. This marketing tool and its components can be used not only in sales but also with proper segmentation in image building and promotion of products, brands, or even entities regional government administration.

Research purpose, Project
This article is one of the partial outputs currently addressing scientific-research grant VEGA 1/0760/13.

REFERENCES

1. JANOUCH, V., 2011. Internetový marketing. Prosaďte se na webu a sociálních sítích. Brno: Computer Press ISBN 978-80-251-2795-7.
2. NONDEK, L. a L. ŘENČOVÁ, 2000. Internet a jeho komerční využití. Praha: Grada Publishing. ISBN 80–7169–933–0.
3. KARLÍČEK, M. a P. KRÁL, 2011. Marketingová komunikace: Jak komunikovat na našem trhu. Praha: Grada. ISBN 978–80–247–3541–2.
4. SEDLÁČEK, J., 2006. E–komerce, internetový a mobil marketing od A do Z. 1. vyd. Praha: BEN – technická literatúra. ISBN 80–730–0195–0.
5. SCOTT, D. M., 2010. The New Rules of Marketing and PR. New Jersey: John Wiley & Sons. ISBN 978–0–470–54781–6.
6. SCOTT, D. M., 2009. Nová pravidla marketingu a PR. Brno: Zoner press. ISBN 987–80–86815–93–0.
7. IAB Slovakia. 2012. Nahlasovanie finančných príjmov členmi AIM. [online] [cit. 2014-04-05] Dostupné z: http://www.iabslovakia.sk/index.php?context=20&p=17
8. KOBIELA, R., 2009. 200 tipů, které musíte znát. Brno: Computer Press. ISBN 978–80–251–2300–3.
9. LEVINSON, J. C., 2011. Guerilla marketing. Nejúčinnější a finančně nenáročný marketing. Brno: Computer Press. ISBN 978–80–251–3546–4.
10. LEVIN, J., 2011. The Economics of Internet Markets. [online]. [cit. 2014-10-05]. From: http://www-siepr.stanford.edu/repec/sip/10-018.pdf
11. Suhányi, L. (2011). E-recruitment in the Conditions of Slovak Republic. Tudományos mozaik. Vol. 8, 255-261.
12. ZHAO, L. and J.ZHU, 2010. Internet marketing budget allocation: from practitioner's perspective. In: International Journal of Information Technology & Decision Making. Vol. 9, Issue 5, p. 779-797 ISSN 1793-6845.
13. CZWITKOVICS, T., 2014. Rast výdavkov do online reklamy bol vlani na Slovensku tretí najvyšší v Európe. [online]. [cit. 2014-11-05]. From: http://medialne.etrend.sk/internet/rast-vydavkov-do-online-reklamy-bol-vlani-na-slovensku-treti-najvyssi-v-europ LOŠŤÁKOVÁ H., 2009. Diferencované řízení vztahů se zákazníky. Praha: Grada. ISBN 978–80–247–3155–1.e.html

14. KOTLER, P. a K. L. KELLER, 2007. Marketing management. Praha: Grada Publishing. ISBN 978–80–247–1359–5.
15. KOTLER, P. a G. ARMSTRONG, 2009. Principles of Marketing. New Jersey: Pearson Education. ISBN 978–0–13–700669–4.
16. KURTZ, D. L., 2011. Contemporary Marketing. Mason: South Western. ISBN 978–0–538–74689–2.
17. LEVINSON, J. C., 2011. Guerilla marketing. Nejúčinnější a finančně nenáročný marketing. Brno: Computer Press. ISBN 978–80–251–3546–4.
18. LOŠŤÁKOVÁ H., 2009. Diferencované řízení vztahů se zákazníky. Praha: Grada. ISBN 978–80–247–3155–1.

eXclusive e-JOURNAL
ISSN 1339-4509

ECONOMY & SOCIETY & ENVIRONMENT

Quantification of efficiency and company performance

Ing. PhD. Sylvia Jenčová
Faculty of management University of Presov in Presov
Department of Finance
Konštantínova 16, 080 01 Prešov, Slovakia
sylvia.jencova@unipo.sk

doc. Mgr. PhD. Eva Litavcová
Faculty of management University of Presov in Presov
Department of Mathematical Methods and Managerial Informatics
Konštantínova 16, 080 01 Prešov, Slovakia
sylvia.jencova@unipo.sk

Abstract

The current competitive environment requires companies to maintain healthy functioning so they may control the business and financial aspects of their operations. One of the cardinal roles of financial analysis of businesses is that it allows for an analytical and systematic approach to study their individual activities. The purpose of this analysis is to prepare a document containing the framework for quality decision making and enhancing the functioning of the company. This analysis allows the continuous evaluation, whether ex ante or ex post, of the financial situation of a company. The aim of this paper is to show the importance and structure of financial performance metrics in business. It also introduces efficiency indicators in a matrix of parallel systems of financial indicators.

Key words Model, Profitability Indicator, Return on Assets

INTRODUCTION

Proper decision making in financial management can only be accomplished after financial and economic analysis has been performed. A necessary condition for any manager to succeed is for them to understand financial theory. Financial analysis is an integral part of financial management as it provides feedback about the progress a company has made in various areas and goals the company was able to meet under those conditions and vice versa when there was a situation that they did not expect. It also acts as a source of information for further decision making and assessment, providing important information on what the management of the company should do next. Effectiveness analysis is very challenging to perform, but is likewise important for businesses and plays an irreplaceable role in applying transformation processes to production. Therefore, it must be interpreted correctly.

DEFINITION OF PERFORMANCE AND EFFICIENCY

Business performance is characterized as "The ability of a subject company to produce in a given period summary goods and services and the company that wants to succeed, must have at least twice the performance as the average of the industry." (Soucek 2010, p. 105).

Company performance is evaluated from several perspectives: that of owners and founders, s. j. shareholders and stockholders; managers; employees; customers; consumers; suppliers; and other entities.

Owners have a particular interest in their companies with regards to the capital they have invested in their businesses and the ability of their company to generate income, with a special interest in business indicators, s.a. ROE, EVA and other indicators of market value. Managers evaluate the Company pursuant to the functioning of its information system, technical construction, etc., with an interest in their company's production strength. The manager is concerned with marshalling the available resources to generate the greatest profit for the owners' of the company, giving them the best return for their investment in the business. The interests of individual owners and founders can be differentiated. For example, shareholders prefer a business-oriented company. In particular, they are interested in the performance of financial indicators, especially income. On the other hand, a company's founders, for example of a teaching hospital, would assess the performance of the hospital depending on the type and quality of hospital care being provided, the resources available to patients, the quality of education provided to students and on the nature of its scientific achievements (Soucek, 2010, p. 106).

Productivity is the efficiency with which production is achieved. What is measured to gauge productivity is generally a manufacturing system, or respectively: a subsystem; a system defined unit of production outputl; production inputs and production processes for new requirements; assessment and management of enterprise systems; and their innovations. Besides quantifying the level and evolution of productivity, it is usually even more important to quantify the level and evolution of total and partial productivity (share value output, sales vs. the economic costs of consumption), (Klečka 2008).

Productivity, according to Soucek (2010), is defined as "performance at each point in time", while more closely this defines the productivity of labor, capital and production factors. Veber (2003) defines productivity as the ratio of the output compared to input. When applying value indicators to measure input versus output, we are talking about efficiency. Efficiency (Effectiveness) is one of the key criteria for assessing the performance of a company. Itreflect Figure 2 The matrix system of financial metrics s the degree to which there is fulfillment of set objectives, as well as creating the conditions for the fulfillment of these objectives in the future (Tumpach 2008, p. 10).

According to (Synek 2000, p. 45) effect is the basis of the word efficiency, that is result, effect or consequence. The effect of the undertaking are the provided goods and services, in other words output. Products and services arise from consumption of production factors, which forms the input to the enterprise. Efficiency thus represents the ratio of output to input. Input consists of the cost, materials, energy, labor and so on. And, output consists of income, sales, value added, and the like. Efficiency interprets how many units of output are produced by one unit of input (Jenčová 2014).

Cost-effectiveness is calculated taking into account both production and financing. In connection with the production factors that fuel an economy, salient concepts include efficiency and effectiveness, as well as productivity. The aim of each business entity is productivity, maximizing efficiency and performance, i.e. ensuring the share attributable to input per unit of output is minimized. Factors to be assessed include total capital in the business, generating income, indicators s.a. ROE, EVA and other indicators of market value, (Kiseľáková, Šofránková, Čverhová 2014).

Table 1 Possibilities of increasing efficiency in time

↓ input / → output	→ input / ↑ output	↓ input / ↑ output	↑ input / ↑ output	↓ input / ↓ output
fall input, output does not change	input does not change, output rises	input falls, output rises	growth of input with output rising, but at a slower pace than output	decrease of input with output falling, but at a slower pace than input

Zdroj: Viac KOTULIČ, Rastislav, Peter KIRÁLY a Miroslava RAJČÁNIOVÁ, 2007. *Finančná analýza podniku*.

Table 2 Corporate Performance

Author	The definition of business performance
Kislingerová (2010)	Business performance as the ability of the business entity for a given period to achieve such results on the basis of certain criteria with the results of the other units.
Nenadál (2004)	Corporate performance is identified with "degree of achievement of individuals, groups, organizations and their processes."
Sulák a Vacík (2005)	Corporate performance is understood as "the ability of the enterprise to best evaluate embedded investment in entrepreneurial activities."
Wagner (2009)	Corporate performance characteristics describing how, respectively, the course by which the studied entity carries out certain activities on the basis of similarity with the reference method's implementation (during) this activity.
Roghanian, Rasli, Gheysari (2012)	Corporate performance is equivalent to the concept of corporate productivity.
Procházka (2006)	Recovery of economic resources invested in a business is the result of targeted efforts and action of business management for the period.

Source: BEREŠOVÁ, Veronika and Lilia DVOŘÁKOVÁ, 2013. Modern trends in corporate performance management.

Different approaches for performance evaluation of a company,

1. Access: => profit criterion,
2. Access: => criteria: asset growth, steadily increasing proportion of firms in the market, the discounted return on assets must be greater than the level of the cost of capital,
3. Access: => criteria: customer satisfaction, cash flow, market share, value added,
4. Pathway 4: => criteria: individual variables prediction models,
5. Access: => criteria: performance evaluation of each significant process, which assesses % of lost customers versus acquired % of customers % Recovered customers: % of customers who recommend your company to other firms.

(Soucek 2010, p. 17) states "the principles of successful businesses of the 21st century:
absolute customer orientation, strong top management, management of the company as a whole, actively generating demand and creating new markets, specific strengths and perception of the value orientation of the top results, high performance, the right products and brand knowledge as a basis for success, effective portfolio and core business, speed and flexibility, performance incentive system, centralization, process management, innovation, force generation enterprise mergers, acquisitions, alliances, networks, forming virtual enterprises, using the most modern methods of management, comprehensive system management and planning, use of modern information technology, respect for the Corporate Governance, the principles of ethics, social responsibility and ecology, qualified strategic direction. "

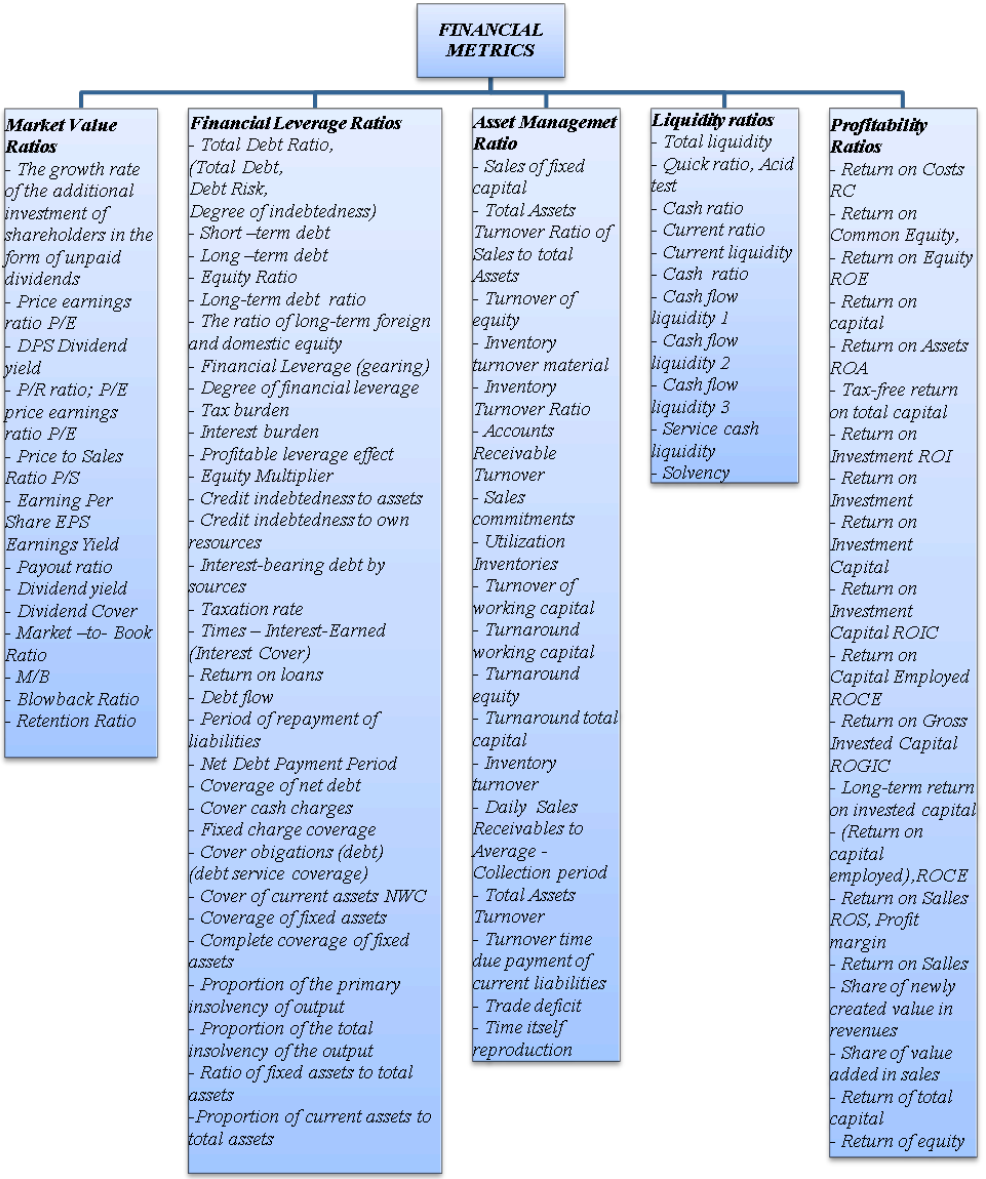


Figure 1 Financial metrics
Source: Own processing

A MATRIX ARRAY OF FINANCIAL RATIOS

The matrix system of indicators is characterized in such a way that it can be constructed such that various indicators, that we would otherwise never include in a horizontal and vertical matrix, can be evaluation indicators of economic phenomenon. An example would be a matrix system of indicators of

efficiency. A matrix system to evaluate the efficiency of an enterprise can be created by combining six indicators, which are stored in the vertical and horizontal headers, that is there is a combination of vertical and horizontal indicators. Half of those indicators are a representation of an accession of economic categories, and the same is also represented by indicators measuring outcomes.

Nut efficiency consists of four quadrants:

- the first quadrant (performance indicators) expresses the efficiency indicators such as the relationship between input and output in the production process,
- the second quadrant expresses the relationship between different forms of input (number of employees and the book value of fixed assets)
- the third quadrant contains relationships between different forms of output with each other,
- fourth quadrant consists of indicators of performance and the economy.

Total staff costs, production, income

		Outputs			Inputs		
		Earnings After Taxes	Production	Revenues	Total staff	Assets (A)	Costs C
		I.			II.		
Inputs	Total staff	EAT/ TS	Q/P	V/TS	1	A /P	C/TS
	Assets	EAT/ A	Q/ A	V/ A	TS/A	1	C/ A
	Costs	EAT/C	Q/N	V/C	TS/C	A/C	1
Outputs		III.			IV.		
	Earnings After Taxes (EAT)	1	P/EAT	R/EAT	P/EAT	A/EAT	N/EAT
	Production (P)	EAT/P	1	R /P	TS/P	A /P	EAT/P
	Revenues (R)	EAT/ R	P/ R	1	TS/ R	A / R	C/ R

Figure 2 The matrix system of financial metrics
Source: Jenčová (2014)

CONCLUSION

Increasing a company's performance in terms of achieving its basic objective, i.e. its competitiveness with regards to other companies, it is possible to:
Use indicators, that until now had been commonly related to the past, to adequately represent the future competitiveness of an enterprise. It is recommended to utilize an ex ante analysis and perform an evaluation of the quality of workmanship and effectiveness of their strategy. The company, which does not have a strategy going into the future, is going into the unknown.
Supplement Financial Indicators with non-financial indicators of performance, such as the evaluation of an enterprise's relationships with customers, such as customer satisfaction, number of lost customers, products, share of total purchases by customers, claims assessment, expected development of individual customers and the like

Gauge what has been the cardinal shortcoming in this analysis, which is the lack of a firm estimate of a company's intangible assets (expertise, intelligence, knowledge, agility and so on).
Navigate what has been a considerable mystery, whether a company's performance with regards to shareholders, stockholders, or lobby groups can be measured and how to measure it.

Currently, most enterprises have, in addition to traditional financial metrics, attempted tmeasure business performance using modern financial assessment methods which provide performance data such as economic value added (EVA) and market value added (MVA). For efficiency one should guide each company through these methods to quantify the impact of determining factors by performing factor analysis of financial indicators, with the goal of increasing the efficiency of financial management.

This paper is supported by project **VEGA 1/0760/13** "Analysis and design of streamlining decision-making processes for investment decisions by regional governments."

Post is one of the outputs **KEGA 037PU-4/2014**, "Curriculum documents for e-learning based and their implementation in teaching disciplines of quantitative methodology, Information Management and Finance."

References

BEREŠOVÁ, Veronika a Lilia DVOŘÁKOVÁ, 2013. Moderní trendy v řízení podnikové výkonnosti. In: MAJTÁN, Štefan, eds. *Aktuálne problémy podnikovej sféry 2013: zborník vedeckých prác.* Bratislava: Ekonóm. s.40-44. ISBN 978-80-225-3636-3.

JENČOVÁ, S. 2014. *Finančno-ekonomická analýza podnikateľských subjektov*. ISBN 978-80-8165-051-2.

KISEĽÁKOVÁ, Dana, Beáta ŠOFRÁNKOVÁ a Miroslava ŠOLTÉS, 2014. Analýza finančných rizík s dôrazom na ukazovatele likvidity a zadlženosti podnikateľských subjektov. In: *eXclusive JOURNAL.* Prešov: eXclusive marketing. Roč. 2, č. 3. p. 4-11. ISSN 1339-0260.

KLEČKA, J., 2007. Nové hodnotové ukazatele produktivity jako faktoru tvorby EVA. In: *Acta oeconomica* Pragensia: Vědecký časopis Vysoké školy ekonomické v Praze*,* 2007. č. 2, s. 44-54. ISSN 0572-3043.

KLEČKA, J., 2008. Produktivita a její měření – nové *přístupy.* In: *Ekonomika a management*. sv. 2, č. 1, s. 16-29. ISSN 1802-8470.

KOTULIČ, Rastislav, Peter KIRÁLY a Miroslava RAJČÁNIOVÁ, 2007. *Finančná analýza podniku*. Bratislava: IURA Edition. ISBN 978-80-8078-117-0.

SOUČEK, Zdeněk, 2010. *Firma 21. století (Předstihneme nejlepší!!!).* Praha: Professional Publishing. ISBN 978-80-7431-007-2.

SYNEK, Miloslav a kol., 2000. *Podniková ekonomika.* Praha: C. H. Beck. ISBN 80-7179-388-4.

TUMPACH, Miloš, 2008. *Manažérske a nákladové účtovníctvo*. Bratislava: IURA Edition. ISBN 978-80-8078-168-2.

VEBER, J. 2003. *Vodítko pro měření výkonnosti firmy.* In Politická ekonomie : Teorie modelování, aplikace. Praha, 2003. č. 5, s. 758-761. ISSN 0032-3233.

VOCHOZKA, Marek, 2011. *Metody komplexního hodnocení podniku.* Praha: Grada Publishing. ISBN 978-80-247-3647-1.

ZALAI, Karol a kol., 2013. *Finančno-ekonomická analýza.* Bratislava: Sprint dva. ISBN 978-80-89393-80.

eXclusive e-JOURNAL
ISSN 1339-4509

ECONOMY & SOCIETY & ENVIRONMENT

Research on the impact of selected marketing methods for change consumer behavior by using audiovisual recordings

PhDr. Martin Mudrík, PhD.
University of Prešov in Prešov
Konštantínova 16
Martin.mudrik@unipo.sk

Ing. Ľudovít Nastišin
University of Prešov in Prešov
Konštantínova 16
ludovit.nastisin@smail.unipo.sk;

Mgr. Nella Svetozarovová
University of Prešov in Prešov
Konštantínova 16
nella.svetozarovova@smail.unipo.sk;

Abstract
Presented paper deals with the issue of changing customers behaviour by using a series of audiovisual experiments. Consumer behaviour is a complex, multi-faceted phenomenon which can be defined in a number of different ways. Therefore the main aim of paper is to determine the apparent existence of differences in the resulting behavior of people in the same situation but with different input recommendations under the condition, that the final consumer behavior is assessed in several groups providing by the real, positive, negative or no recommendations of audiovisual record..

Key words Consumer behaviour, media, movies, recommendation

INTRODUCTION

Technology has changed the supply of entertainment for public consumption, progressing from live theater to the movies and adding home entertainment in the form of radio, television, watching movies and ultimately the internet. Entertainment defined as that which has the effect pleasurably diverting the psyche, thus competes for - and is ultimately limited by the amount of free time available. Beyond these generalities are several frequently observed industry characteristics (Vogel, 2004). Entertainment industry responded to the demands of the public and adapted the latest technologies in an effort to capitalize on the growing demand for entertainment services (Haupert, 2006). The film industry is one of the biggest, if not the biggest, player in the broader entertainment sector, it is considered a cornerstone of the industry and number of consumers is still growing. Before deciding to watch a movie many people turn to film critics to see whether the movie is worth the money and time.

1. THEORETICAL BACKGROUND OF CONSUMER BEHAVIOR

Consumer behaviour is a complex, multi-faceted phenomenon which can be defined in anumber of different ways. According to Yadin (2002) consumer behaviour is the observation of the decision-making, purchasing patterns and habits of the general public. Hawkins (2007) suggests, that the costumer behaviour is the study of individuals, groups, or organisations and the processes they use toselect, secure, use, and dispose of products and services, experiences or ideas to satisfy needs and the impacts that these processes have on the consumer and society. In the mean time, Kotler and Keller (2011) highlight the importance of understanding consumer behaviour and the ways how the customers choose their products and services can be extremely important for manufacturers as well as service providers as this provides them with competitive advantage over its competitors in several aspects. For example, they may use the knowledge obtained through studying the consumer behaviour to set their strategies towards offering the right products and services to the right audience of customers reflecting their needs and wants effectively.

The recognition of a need by a consumer can be caused in different ways. Different classifications are used: (Perreau, 2014)

- **Functional need**: the need is related to a feature or specific functions of the product or happens to be the answer to a functional problem. Like a computer with a more powerful video card to be able to play the latest video games or a washing machine that responds to the need to have clean clothes while avoiding having to do it by hand or go to the laundromat.
- **Social need**: the need comes from a desire for integration and belongingness in the social environment or for social recognition. Like buying a new fashionable bag to look good at school or choose a luxury car to “show” that you are successful in life.
- **Need for change**: the need has its origin in a desire from the consumer to change. This may result in the purchase of a new coat or new furniture to change the decoration of your apartment.

Integral part of consumer behaviour process is the foundation of current consumer decision theory, which were laid in the 1960s with the Nicosia (1966), Engel et al. (1968) and Howard and Sheth (1969) (In Lye et al., 2005) integrated models of consumer decision making. The simplest and perhaps earliest theoretical form of consumer decision model was the "black box" (Kotler et al, 2004, p. 244). The black box provides a simplified model focused on exogenous variables. The black box model avoided any supposition associated with identifying processes and variables embedded in the minds ofconsumers.

In consumer behaviour, researchers are investigating the consciousness and the unconsciousness of purchase decisions of a consumer. In one of the most important models of consumer behaviour, “the consumer buying process”, a five stage decision-model is developed (Engel, Blackwell, and Kollat, 1978; In Huige, 2008). These five steps can help a marketer to give an insight in which steps a consumer makes, before he chooses a particular product. The five stages used in this model are problem recognition, information search, alternative evaluation, making the choice, and evaluation of the outcome. In the seventies and eighties of the previous century, a lot of research was done in the area of consumer behaviour.

A consumer’s buyer behaviour is influenced by four major factors: (Kotler, 2004)

1) Cultural,
2) Social
3) Personal
4) Psychological.

Research of identifying factors affecting consumer decision making behavior in cinema/movie context was conducted by Dyna Herlina (2012). Firsth insight of cinema audience behavior from marketing perspective was realized by Bruce Austin (1981, In Herlina 2012). Based on that research findings, the proposed taxonomy of the factors that influence the decision to choose the movie. Consumers consider a few things before selecting a movie that:: marketing communication (advertising, publicity); neutral information source (film review, word of mouth); film characteristic (genre, director, remake production, country of origin, actor, adaptation works, production house, title); content (story, objectionable content, technology); ease (screening schedule, title).

Herlina (2012) further provides a specific cinema/movie audience segmentation devided into the two part, which are film consumer and place consumer how shows table 1.:

Segment	Watch movie purpose	Mainly decision making source	Behaviou after watching
Movie consumer (Home)	• new experience • get moral message • life values	• their own taste according to intensive information search • willing to watch movie alone	Becoming movie communicator by writing opinion/ recommendation/ criticism in blog, social network, forums e –communication.
Place consumer (Cinema/theatre)	• new experience • entertainment • spare time with friends	• group/ pair decision • maximize movie watching enjoyment	Talking about movie with friends, interpersonal communication.

Table 1: Cinema/movie audience segmentation (Herlina, 2012)

2. RESEARCH OF REFERENCES IMPACT TO THE FINAL ASSESSMENT

The main objective of the research was to analyze whether and to what extent it is possible by the appropriate procedure in advance to influence the resulting consumer behavior. For this reason we decided to selected groups of respondents reflected the same audiovisual work,. Each group was intentionally influenced other information before watching.

2.1 Methods and methodolgy

A short film Six Shooter, directed by Martin McDonagh, was selected for an experiment. This film was chosen for several reasons. Because of the respondents were students, length of the film (27 minutes) is perfect for bringing input information, an opportunity to see and follow-up assessment.during the one lesson. It is also a genre, which is likely to be not seen before by many respondents, what might, using the better known film, significantly affect respondents evaluation.

We used four group of respondents for the research. Providing different information for each group we conducted with the help of a web portal Czechoslovak Film Database (CSFD) which is the largest proportion of the films portal in Slovakia and the Czech Republic. Rating of the selected film was 79 % an the time of research. We have provided previews of various assessments that have previously been properly adjusted to the study groups. One group saw the real rating (79%) before watching the movie,

in the next group we display lower rating (44%), higher ranking (91%) was dispayed in the third group and last group did not receive before seeing any input.

For even greater objectivity of the obtained results, was the name of the film as well as other characteristics that make possible to distinguish the name of the movie blurred. We also launched the film after the opening credits, becoause to not show the name of the film. In this way, we tried to avoid that respondents seek more information about the film while watching, or to previously come to that provided informations were rigged. After watching the film, respondents were tasked to fill a short questionnaire, which consisted of seven questions.

2.2 The research sample

The actual research and data collection took place from April 2014 to November 2014 (with a break during the summer holidays). During this period we managed to collect data from 259 respondents. Approximately three-fourths of the survey sample were women (N = 196;75,68 %) and the remaining quarter were men (N = 63; 24,32 %).

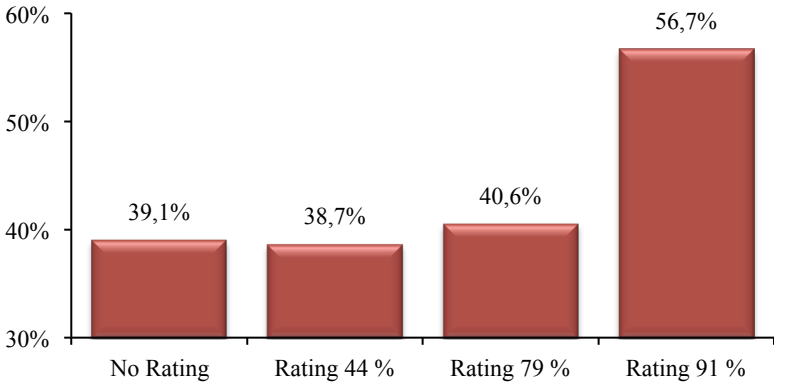
Within the examined groups we tried by about equal representation. Representation of respondents in each group are presented in the following table.

The information provided	Number of respondents	Percentage
44 % (lower rating)	68	26.26 %
79 % (real rating)	64	24.71 %
91 % (higher rating)	46	17.76 %
No rating	81	31.27 %
Total ∑	***259***	***100.00 %***

Table 2. Types of respondents in the surveyed groups
(Source: own processing)

2.3 Selected results of research

One of the basic surveys of research was the overall evaluation of the film. To maintain continuity of the ČSFD evaluation, respondents had the opportunity to rate the movie by mark 0-10 (0 = all bad, 10 = best). This evaluation gave us the opprtunity to easily express the average rating using the percentage. The final rating of each group (converted to percentages) are presented in the following graph.



Graph 1. The final rating of the film in the surveyed groups
(Source: own processing)

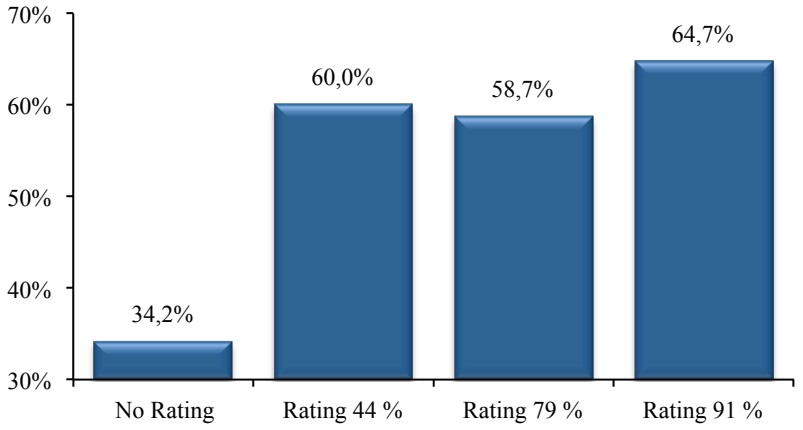
From the presented results can be reported that there are some differences among the surveyed groups. It was found that the lowest average rating was assigned to the movie by just the groups which have been granted the worst input information before watching (44 %). The average rating 38.7 % was assigned to the watched movie by these respondents. The next is a group of respondents which has no informations before watching the movie. They assigned the film average rating 39.1 %.

The group, which we provide real input data (79 %) attributed the film average rating 40.6 %. Although the order of these results would indicate that at least the negative outcome should have some impact to the final evaluation, we conclude that the measured differences between the average assessments are very small and therefore they can not assign a high informative value.

A significant difference in outcome assessment was found in the group of those respondents which were displayed the best input information before watching the film (91 %). This group assigned after wathing the film average rating 56.7 %, which is significantly higher than it was in previous groups. Thus, a different result undoubtedly creates a rather strong argument to confirm the assumption that positive referencies can have relatively large effect on the outcome of the evaluation consumers.

For the sake of completeness we deliver that average rating of watched film of all of those who participated in the research, reached the value of 42.5 %.

In examining the issue we also focused our attention on the question whether and to what extent is the the force of references different while taking into account the gender of the respondents. In this case is quite interesting the comparison of results within each group separately between men and between women. We present them in the following graphic processing, first results are measured in groups of men and second in groups of women.



Grapf 2. The final rating of the film within the surveyed groups of men
(Source: own processing)

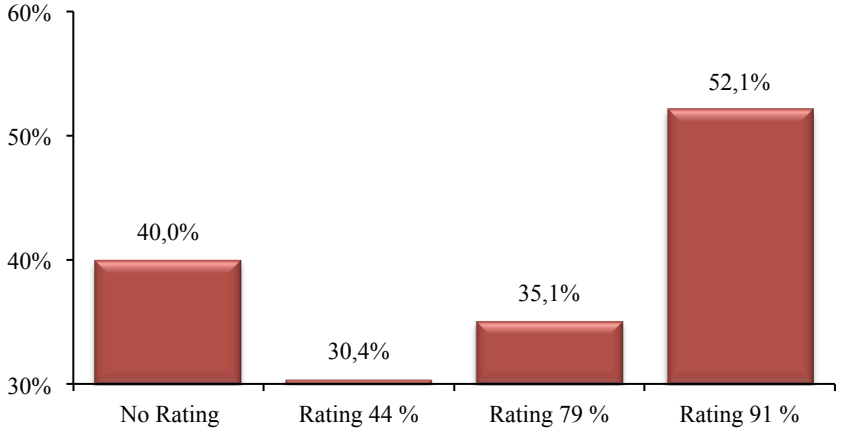
There are interesting findings.in the results suggest among men. Unambiguously the lowest average rating to the film (34.2 %) was assigned by that group, who had no previous information. This result is significantly different from the results measured in the remaining groups, but this may be partly due to the relatively small sample size, which belonged to this group.

While watching the results of the following three groups surveyed, is observable from the graph that in the average evaluations were noted no significant differences.

The group of respondents which were given worst input information before watching (44 %) assigned the film an average rating 60.0 %. Respondents with the correct input information (79 %) assigned after watching the movie average rating 58.7 %, which is even a little lower than in the group in which were displayed negative references. Highest average rating to the film was assigned by the group, which also has the most positive references (91 %). These respondents assigned the film average rating 64.7 %, but this is not very far from the other groups.

After comparing the measured results we conclude that there were found no significant diferencies in the final ratings by men in three focus groups, which were before watching the film given different references, The difference between the worst and best evaluation represents only 6 %. Based on this result, it appears that the references are probably not have a significant impact to the men.

Average rating of watching the in all male respondents reached the final value at 56.0 %.
The results presented in the following chart shows how the impact of various input references to the female respondents.



Grapf 3. The final rating of the film within the surveyed groups of women
(Source: own processing)

Looking at the results of female respondents is evident that compared to men in the responses can be fairly significant differences occured. The lowest average rating (30.4 %) was assigned by this group in which was the the worst input references presented (44 %). The next is group of respondents in which were factual information respectively presented (79 %) and who assigned the resulting rating 35.1 % after seeing the film. The group of respondents who have no information before watching, assessed average rating 40.0 %.
Best final rating (52.1 %) are in this case recorded at the group which we have the best reference input before watching dislplayed (91 %).

If we focus on the final evaluation of the three groups, which were before watching different references granted, we conclude that in the context of women's responses are quite noticeable results in significant differences. This is essentially the opposite of what was observed in male respondents. In this case are the differences between the worst and best evaluation 21.7 % (in group of men it was only 6 %, or about 3.5 times less).

Such a difference in the measured values might suggest two conclusions It turns out that women are rather influenced by force references under the consumer behavior. Comparison of the results in the context of gender also indicates that the value of the input references can probably affect women to a greater extent than men.

Even at the end of the description of the results of the group we present average rating of the film in all female respondents. In this case, is the resulting rating 39.4%.

CONCLUSION

Research results suggest that the recommendations or references should have considerable influence to the final consumer behavior. Product or service can be discredit in the eyes of consumers by using the negative references. On the contrary, positive references may consumers influence such that the product or service is perceived much positive. As the results indicate, this effect is manifested stronger in women than in men.

This issue implies considerable potential and accordingly we consider to be meaningful to deal with it in the future. In any case, it is possible to conclude that the proper use of the reference marketing in the right consumer is able to some extent to change their attitude, which brings many opportunities to be successful in the world of sales.

This article is published as one of the outputs of the Slovak research grant project GAMA14/5 Influence of selected marketing methods for change of consumer behaviour, granted by Faculty of Management UNIPO.

References

1. Hawkins, D., 2007. *Consumer Behavior: Building Marketing Strategy - 10th edition.* McGraw Hill (International Edition). ISBN: 978-0071-315-12-8.
2. Haupert, J. M., 2006. *The Entertainment Industry*. United States: Abc-Clio. ISBN: 978-0313-321-73-3.
3. Herlina, D. S. 2011. *Identifying Key Factors Affecting Consumer Decision Making Behavior in Cinema Context: A Qualitative Approach*. In International Conference on Business, Economics, Management and Behavioral Sciences. Held on: Jan. 7-8, 2012 Dubai. Journal of Contemporary Issues in Business Research. Volume 3, Issue No. 3, Pg. 547-551. ISSN 2305-8277.
4. Huige, A., 2008. *Consumer decision making process in Cinema markets: the role of service and quality.* Erasmus Universiteit Rotterdam. available at: <thesis.eur.nl>
5. Kotler, P. et al., 2004. Principles of Marketing, 6th ed., Pearson Education Canada. ISBN: 978-01312-1619-8.
6. Kotler, P. – K. Keller, 2011. *Marketing Management.* 14th edition, London: Pearson Education. ISBN: 978-0132-102-92-6.
7. Lye, A. et al., 2005. *Decision waves: consumer decisions in today's complex world*. In European Journal of Marketing. Vol. 39, Iss. ½, Pg. 216-230. ISSN 0309-0566.
8. Perreau, F. 2014. *The 5 stages of Consumer Buying Decision Process*. accessed on: [25-10-2014] available at: <http://theconsumerfactor.com/en/5-stages-consumer-buying-decision-process/>
9. Vogel. H. L., 2001. *Entertainment Industry Economics: A Guide for Financial Analysis.* 8th Edition. Cambridge University Press. ISBN: 978-1107-003-09-5
10. Yadin, D., 2002. *The International Dictionary of Marketing: Over 100 professional Terms and Techniques.* London: Kogan Page. ISBN: 978-0749-43532-5.

eXclusive e-JOURNAL
ISSN 1339-4509

ECONOMY & SOCIETY & ENVIRONMENT

The analysis of the indicators of the innovative environment development in the Slovak republic

Ing. Mariana Dubravská, PhD.
Department of Economy and Economic Sciences
Faculty of Management
University of Prešov in Prešov
Slovenská ul. 67
080 01 Prešov
mariana.dubravska@unipo.sk

Abstract
The aim of the proposed Paper is to review the development of the innovative environment in the Slovak republic. By using scientific-cognitive methods, i.e. issue analysis, gained data synthesis, comparison a deduction chosen indicators of the development of the innovative environment of the Slovak republic. Based on the results, we can state that there is a place for improvement in the all rated areas

Key words Innovative environment, indicators, development, Slovak republic

1. INTRODUCTION

Investment in human resources, research & development is essential for developing knowledge and new technology. The EU growth and jobs strategy stresses the importance of information and communication technologies (ICT), and the 2010 strategy for a European information society for growth and employment supports the social inclusion, better public services and quality of life. Following indicators are used to evaluate innovative environment on the national level and and they serve to control the use of public and private sources in the field of innovations:

- **Persons of the age 20 to 24 having completed at least upper secondary education**

An upper secondary school education is generally considered the minimum for taking part in a knowledge-based society, either for entering the labour market or further/higher education.

- **Science and technology graduates by gender**

A secondary objective is to increase the enrolment rate in scientific and technical studies. Europe needs mathematicians and scientists to maintain its competitiveness.

- **Gross domestic expenditure on R&D**

Investment in the creation of new knowledge is essential for developing new and improved products and processes.

- **Patent applications to the European Patent Office (EPO)**

Innovation and ideas must be adequately rewarded, particularly through patent protection.

- **Venture capital investments by type of investment stage**

This measures how obstacles to investment in entrepreneurship are being removed – to encourage a genuine European risk capital market.

- **Broadband penetration rate**

High-speed internet access is an important factor in productivity growth and stimulating innovation – ensuring Europe stays a leading player in the internet age (Eurostat 2014).

2. ANALYSIS OF THE CHOSEN FACTORS IN THE SLOVAK REPUBLIC

Persons of the age 20 to 24 having completed at least upper secondary education

The indicator is defined as the percentage of young people of the age 20-24 years having attained at least upper secondary education attainment level, i.e. with an education level ISCED 3a, 3b or 3c long minimum (numerator). The denominator consists of the total population of the same age group, excluding no answers to the questions "highest level of education or training attained". Both the numerators and the denominators come from the EU Labour Force Survey (LFS) (Statistics Estonia 2014).

Table 1: *The percentage of young people (age 20-24) that have completed at least upper secondary education in chosen EU countries*

Country	2008	2009	2010	2011	2012	2013
EU (28 countries)	78,7	78,8	79,2	79,6	80,3	81,0
Czech Republic	91,6	91,9	91,9	91,7	90,9	90,9
Germany	74,1	73,7	74,4	75,3	75,6	76,8
Hungary	83,6	84,0	84,0	83,3	83,5	84,3
Poland	91,3	91,3	91,0	90,1	89,8	89,7
Austria	84,5	86,0	85,6	85,4	86,6	87,4
Slovakia	92,3	93,3	93,2	93,3	92,7	91,2
Switzerland	82,6	79,0	82,3	83,0	84,3	85,2
France	83,8	83,6	83,3	83,9	84,5	86,44
Spain	60,3	60,3	61,5	62,0	63,0	63,8
Iceland	53,6	53,6	53,4	56,9	58,3	59,1
Croatia	95,4	95,2	95,7	95,6	94,8	94,2

Source: http://www.stat.ee/71736

Science and technology graduates by gender

Due to the lack of data, the table below shows the number of doctoral graduates in the Slovak Republic by gender as a ratio of the total population.

Table 2: *The number of doctoral graduates in the SR by gender as a ration of the total population*

Indicator	**2010**		**2011**	
	Slovak Republic	**EU average**	**Slovak Republic**	**EU average**
New doctoral graduates (ISCED 6) per 1 000 population aged 25-34	3,1	1,5	1,9	1,7
Graduates (ISCED 6) per 1 000 of the female population aged 25-34	3,1	1,4	1,9	1,6
Graduates (ISCED 6) per 1 000 of the	3,1	1,6	1,8	1,8

male population aged 25-34				

Source: own processing according to Deloitte 2014

Gross domestic expenditure on R&D

In terms of gross domestic expenditure on R&D, Slovak Reepublic is characteristic by longterm underfunding. It has been caused by the privatization of the large enterprises and the following R&D workplaces separation from practice. The share of the gross domestic expenditure on R&D in the Slovak Republic gained around 0,5 % of GDP in the years 2002-2009 (see Table 3). There was a growth of the gross domestic expenditures on R&D to the 0,63 % of GDP in 2010. The growth continued even in 2011 to the 0,68 % of GDP. Amount of financing of the domestic expenditure on R&D in the Slovak Republic is one of the lowest in the European Union (Veda a technika 2013).

Table 3: *Domestic expenditure on R&D in the Slovak Republic*

Indicator	2008	2009	2010	2011	2012*
domestic expenditure on R&D (thousand €)	316 459	302 994	416 369	468 439	585 225
Capital expenditure	29 261	31 137	63 073	94 799	109 337
Current expenditure	287 198	271 857	353 296	373 641	475 889
Share of the domestic expenditure on R&D of GDP	0,47	0,48	0,63	0,68	0,82

Source: Veda a technika 2013

We can state that comparing to the other EU member states, domestic expenditure on R&D are one of the lowest ones. The lower expenditure has spent only Bulgaria (0,57 %), Cypress (0,48 %) and Romania (0,5 %). Within the EU, Finland (3,78 %), Sweden (3,37 %), Denmark (3,09 %), Germany (2,84 %) and Austria (2,75 %) has spent significantly higher share of the domestic expenditure on R&D of GDP (Veda a technika 2013).

Expenditure on R&D, number of universities, scientific indexed journals and research publications and following patents and high/tech export present the most important factors influencing the growth of the knowledge economy (Meo – Usmani 2014). Expenditure on R&D as a share of GDP in EU 27 in 2011 presents Figure 1.

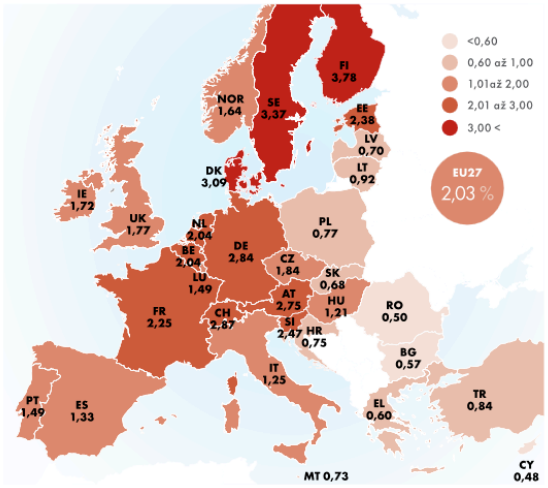


Figure 1: *Expenditure on R&D as a share of GDP in EU 27 in 2011*
Source: http://www.czso.cz/csu/2013edicniplan.nsf/c/2D00319FF4/$File/1804130324_25.pdf

Patent applications to the European Patent Office (EPO)

The European Patent Organisation is an intergovernmental organisation that was set up on 7 October 1977 on the basis of the European Patent Convention (EPC) signed in Munich in 1973. It has two bodies, the European Patent Office and the Administrative Council, which supervises the Office's activities.

As a rule, the Council meets four times a year. Its languages are English, French and German. The states (sorted alphabetically) in Table 4 are currently members of the European Patent Organisation (EPO 2014).

Table 4: *Members of the European Patent Organisation*

Code	Member state	Since
BE	Belgium	7 October 1977
DE	Germany	7 October 1977
FR	France	7 October 1977
LU	Luxembourg	7 October 1977
NL	Netherlands	7 October 1977
CH	Switzerland	7 October 1977
GB	United Kingdom	7 October 1977
SE	Sweden	1 May 1978
IT	Italy	1 December 1978
AT	Austria	1 May 1979
LI	Liechtenstein	1 April 1980
GR	Greece	1 October 1986
ES	Spain	1 October 1986
DK	Denmark	1 January 1990
MC	Monaco	1 December 1991
PT	Portugal	1 January 1992
IE	Ireland	1 August 1992

FI	Finland	1 March 1996
.....		
CZ	Czech Republic	1 July 2002
SK	Slovakia	1 July 2002
.....		
SM	San Marino	1 July 2009
AL	Albania	1 May 2010
RS	Serbia	1 October 2010

Source: EPO 2014

Number of patent applications is rather indicator af an applied research than theoretical one. Results show that situation in the Slovak Republic is not good.

For comparison, Slovak Republic had 5,32 patents per million inhabitants in 2009, in the Czech Republic it was 16,73 patents per million inhabitants and in the European technology leader – Switzerland – 392 patents per million inhabitants.

Table 5: *Number of patent applications of the chosen countries, 2010 a 2011 estimated*

Country/Year	2006	2007	2008	2009	2010	2011
EU 27	57930,92	57716,45	56021,1	55673,57	54921,12*	53989,34*
Czech Republic	153,21	185,11	207,89	175,74	183,25*	182,63*
Slovak Republic	40,56	37,55	35,87	28,86	27*	23,48*
Switzerland	3308,71	3244,84	3082,4	3051,94	2999,68*	2917,96*

Source: Eurostat 2014

Broadband penetration rate

The Organisation for Economic Cooperation and Development keeps track of broadband penetration statistics and publishes them every six month. In 2011, the methodology changed. Data for fixed and wireless broadband subscriptions are no longer published together but rather are now separate.

According to the OECD, fixed wired broadband subscriptions grew 4,1% in 2011 over 2010 and reached a total of 314 millions people by the end of 2011. The highest growth was registered in Chile (12.6%,) the lowest in Denmark (0.4%,) who has already reached a higher-than-average penetration rate. In the Slovak Republic there was a growth of fixed wired broadband about 7.5 %.

For the first time, Switzerland came first in the fixed broadband ranking, with 39.9 subscribers per 100 inhabitants. The Netherlands followed in second place (39.1) and Denmark was third (37.9). The OECD average was calculated at 25.6. The Slovak Republic was calculated at 13.7.

Like in 2010, Korea topped the ranking for wireless broadband subscriptions per 100 inhabitants (100.6) and Sweden remained in second place (98.0.). The Slovak Republic has gained 35.9.

Overall, wireless broadband subscriptions in OECD countries totaled 667 million by the end of 2011 (Global Finance 2014).

3. CONCLUSION

Present state of the innovation structure can be evaluated as not satisfactory. Slovak republic has gained inadequate results in all searched indicators. We can consider innovations as one of the most important tool of the knowledge economy development and the high economic growth provision. This can approximate our economy to the most developed ones. Implementation of the objectives and priorities of the Innovation Strategy of the Slovak Republic contributes to the creation of conditions for positive development of the innovative processes.

References

1. DELOITTE. 2014. Researchers' Report 2014. Country Profile: Slovak Republic, 13p.
2. EPO. 2014. List of Contracting States sorted according to the date of accession. Innovation and research. [online]. 2014 [cit. 2014-10-28]. Available at: http://www.epo.org/about-us/organisation/member-states/date.html
3. EUROSTAT. 2014. Innovation and research. [online]. 2014 [cit. 2014-10-28]. Available at: http://epp.eurostat.ec.europa.eu/portal/page/portal/structural_indicators/indicators/innovation_and_research
4. EUROSTAT. 2014. Patent applications to the EPO by priority year at the national level. [online]. 2014 [cit. 2014-11-10]. Available at: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=pat_ep_ntot&lang=en
5. GLOBAL FINANCE. 2014. Global Broadband Penetration Rates. [online]. 2014 [cit. 2014-11-10]. Available at: https://www.gfmag.com/global-data/non-economic-data/broadband-penetration
6. MEO, S. A. - USMANI, A. M. 2014. Impact of R&D expenditures on research publications, patents and high-tech exports among european countries In: EUROPEAN REVIEW FOR MEDICAL AND PHARMACOLOGICAL SCIENCES Volume: 18 Issue: 1 Pages: 1-9
7. MH SR. 2008. Upravené nové znenie návrhu Inovačnej stratégie SR na roky 2007až 2013[online]. 2014 [cit. 2014-11-10]. Available at: http://www.siea.sk/oldweb/inovacie/subory/inovacna_strategia.pdf
8. Správa o stave výskumu a vývoja v SR za rok 2012 s vyhodnotením úspešnosti a efektívnosti grantových schém na podporu výskumu a vývoja financovaných z verejných zdrojov [online]. 2014 [cit. 2014-11-10]. Available at: https://www.vedatechnika.sk/SK/VedaATechnikaVSR/Rada%20vldy/Rokovanie%20vlady%20SR%2024.%209.%202013/Stav_VaV_uspesnost/vlastny_material_12.pdf
9. Statistics Estonia. 2014. Persons of the age 20 to 24 having completed at least upper secondary education by sex. [online]. 2014 [cit. 2014-10-28]. Available at: http://www.stat.ee/71736
10. Výdaje na vědu a výzkum v EU27 a ČR. [online]. 2014 [cit. 2014-10-28]. Available at: http://www.czso.cz/csu/2013edicniplan.nsf/c/2D00319FF4/$File/1804130324_25.pdf

eXclusive e-JOURNAL
ISSN 1339-4509

ECONOMY & SOCIETY & ENVIRONMENT

The analysis of the public debt's structure in selected countries

Ing. Elena Širá, PhD.
Department of economy sciences and economics
Faculty of Management, University of Prešov
Slovenská 67, Prešov
elena.sira@unipo.sk

Abstract
This article deals with analysis of public debt's structure in selected European countries. According to quarterly data of European countries we gain detailed information about the public debt development. Thus we can define the minimum, maximum and average values for analysed countries. Next, for better evaluation we used data per one year (2013) for structural analysis of public debt. We analysed the structure of public debt according to the instruments.

Key words Structure of Public Debt, Public Debt

1. INTRODUCTION

The mission of public finance is to ensure the functioning of the public sector and thus contribute to achievement of stability and efficiency of the national economy, mainly during the global economic crisis. (Mihoková 2011), (Kravčáková Vozárová 2012)

There are the differences among individual approaches to define public debt in professional literature. "From the perspective of economic theory, it is necessary to define "public debt" not only as the subject (who owes), but mainly as its content (what liabilities are included in it)" said Dvořák (2005).

In addition to the creation of public debt through budget, there may exist other causes of the debt outside the budget - taking over the liabilities of another entity, or deficits of extra-budgetary funds. (Kiseľaková – Kiseľák 2012) Public debt can be seen as "the cumulative amount of all previously incurred and outstanding government borrowings and interest on those loans." (Liška 2002)

Dvořák states mutually dependence between the public budget deficit and public debt, the budget deficits in many countries are one of the most important cause of the emergence and growth of public debt (i.e. long-term fiscal imbalances). (Dvořák 2005)

1.1 Different views of economic theories on deficit and public debt

Classical theory of Adam Smith refused deficient state economy and promoted golden rule equilibrium of the state budget. (Hečková – Chapčáková – Huttmanová 2014) A significant change occurred in the 1930's, when the birth of a new macroeconomics was influenced by J. M. Keynes. The essence of his teaching was to increase economic growth by increasing demand from the state. Stimulated aggregate demand would be caused by the growth of the state budget. This would result in higher long-term growth of potential and then the current gross domestic product due to larger scale of capital. Thus there was admitted the possibility of the transition of deficits caused by growth of the state budget expenses. The tool of Keynesian fiscal stabilization policy has become in addition to government spending also progressive income taxes designed to have an impact on the amount of disposable income. Already in the 1970s, there appeared a criticism of this theory due to slowing down or stop of economic growth coupled with high inflation and rising unemployment in many countries. Monetarists came with the view that government intervention in the economy is undesirable and it must be fundamentally limited. They criticized the rising inflation rate, which reduces the propensity to invest, restricts economic growth and thereby promotes growth of unemployment. Inflation is caused just by the state budget deficit leading to public debt. Debt is subsequently covered by loans in the money market, which causes an increase in loan demand and thus the rise in interest rates. (Samuelson – Nordhaus 2004)

2. MATERIAL AND METHODS

This paper aims to assess the development of the public debt of European countries. Subsequently, during one selected year to point out the structure of public debt in European countries.

To assess the development of public debt, we chose the period of 2004 - 2013, where based on quarterly data from Eurostat we calculated the minimum, maximum and average values and processed them into graphs.

Based on the current ESA 95 methodology, there are included into the structure of public debt three groups of financial Instruments, used to its clearance. They are:

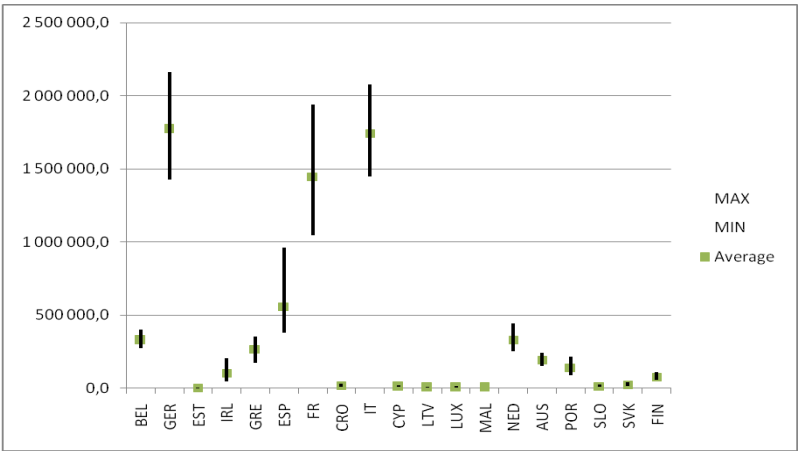
- Securities,
- Loans,
- Currency and deposits. (Dvořák – Lejtnar 2007)

For better analysis and comparison European countries have been divided into two groups, namely the countries that have adopted the € and those that do not have adopted the €.

3. RESULTS AND DISCUSSION

According to quarterly data (2004 – 2013) of public debt in analysed countries in mil. € we calculated the minimum, maximum and average values. We have dividend the countries into 2 groups, according to national currency. In the first group were countries from euro area and in the second, there were countries using thein own currencies (we named them non-euro countries).

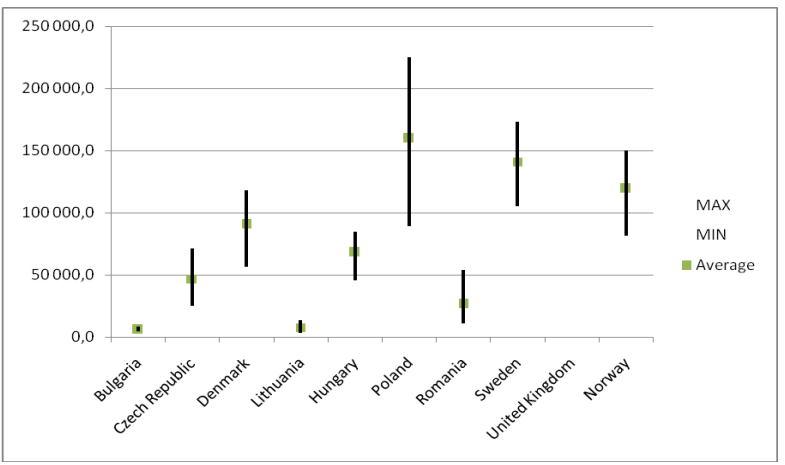
Figure 1 The amount (minimum, maximum, average) of public debt in mil. € in euro countries



Source: own processing according to data from Eurostat

From the figure 1 we can see, that the countries with the lowest amount of public debt (from 0 to 50 000 mil. €) were Estonia, Croatia, Cyprus, Latvia, Luxembourg, Malta, Slovenia and Slovakia. The highest values were obtained in Germany, France and Italy. It may be caused by the amount of the country's economy (population, GDP, …)

Figure 2 The amount (minimum, maximum, average) of public debt in mil. € in non-euro countries



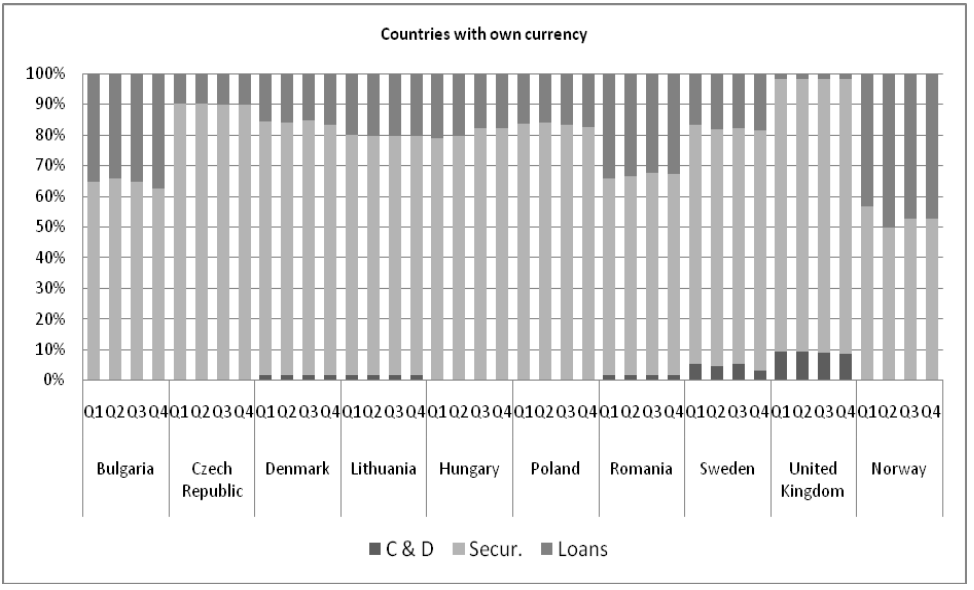
Source: own processing according to data from Eurostat

In the group of non-euro countries, there were the amount of public debt not so different. All countries except United Kingdom became the values from 0 to 250 000 mil. €. So we can say, that Theky are very similar in making debt and in the performance of economy

The dispersion of values are different in both groups. We can find the countries with low dispersion, and on the other hand, there are countries with high dispersion in both groups.

The structure of public debt according to the instrument is divided into 3 types: currency and deposits (C & D), securities and loans. Overall, the proportion of Currency and deposits in the year 2013 in both groups of countries is less important, in some cases it did not occur at all. For most countries, with own currencies, there is the dominant use of securities. In these countries we can see, that public debt was created mainly from securities.

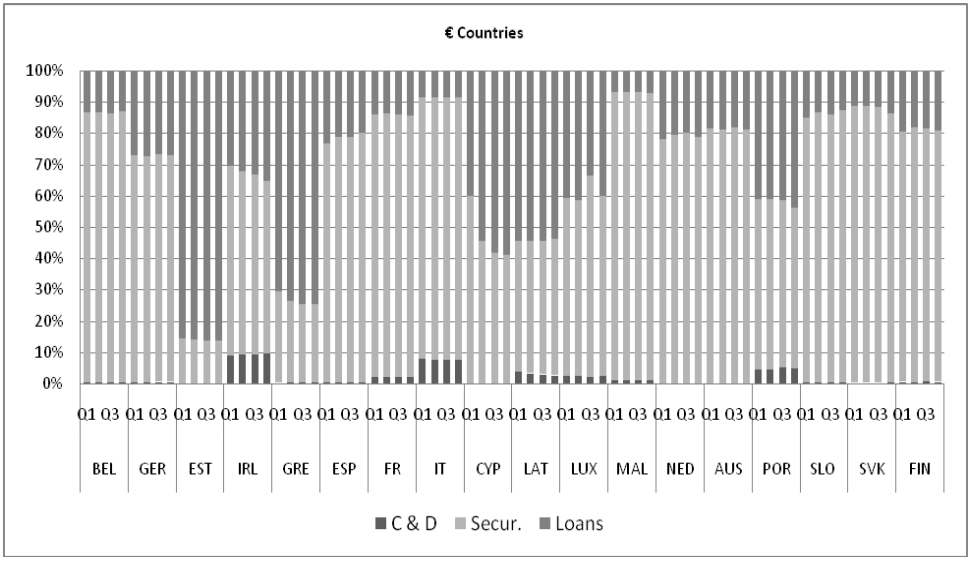
Figure 3 Structure of public debt according to instrument in 2013



Source: own processing according to data from Eurostat

In the case of countries with €, there is different situation. In Estonia, Greece, Cyprus and Latvia, there was covered public debt mainly from loans.

Figure 4 Structure of public debt according to instrument in 2013



Source: own processing according to data from Eurostat

4. CONCLUSION

Public debt in most Euro area countries is unproportionally high and in the near future, we cannot expect its significant reduction. The dispersion of values during the analysed period vary from country to country. The current crisis in public finance continues to deepen, and therefore it is considered necessary to devote more attention to the determinants of public debt.

Acknowledgements

This paper is an output of the project ***KEGA- 032PU-4/201*** and ***VEGA 1/0726/14.***

References

1. DVOŘÁK, P. 2005. *Vybrané problémy hospodárské politiky*. Praha: Oeconomica
2. DVOŘÁK, P. - LEJTNAR, P. 2007. *Tendence ve vývoji veřejného zadlužení zemí EU. ACTA VŠFS*
3. HEČKOVÁ, J. – CHAPČÁKOVÁ, A. – HUTTMANOVÁ, E., 2014. *Hospodárska politika*. Košice : Equilibria, 2014. ISBN 978-80-8143-132-6
4. KISEĽAKOVÁ, D. – KISEĽÁK, A. 2012. *Analysis of impact of global risks of economic environment on economy and business in EU*. In: Management 2012 : research management and business in the light of practical Leeds, Prešov : Bookman, 2012. ISBN 978-80-89568-38-3

5. KRAVČÁKOVÁ VOZÁROVÁ, I. 2012 The impact of the current global financial crisis on the trade cooperation between the Slovak republic and the Russian federation. In: *Proceedings of the International scientific correspondence conference EAEP 2012*, Prešov : Prešovská univerzita v Prešove, 2012. ISBN 978-80-555-0655-5
6. LIŠKA, V. et al. 2002. *Makroekonomie*. Praha: Professional publishing
7. MIHOKOVÁ, L. 2011. [online] Faktory ovplyvňujúce relatívnu váhu verejného dlhu. In: *Mladí vedci 2011*, Košice. Available on http://www3.ekf.tuke.sk/mladivedci2011/herlany_zbornik2011/mihokova_lucia.pdf
8. SAMUELSON, P.A. - W.D. NORDHAUS, 2004. *Economics*. New York: Mcgraw-Hill Education

eXclusive e-JOURNAL
ISSN 1339-4509

ECONOMY & SOCIETY & ENVIRONMENT

The impact of contrails on the environment

Ing. Martin Voráček

Doctoral Student;
Czech Technical University in Prague Department of Air Transport
Horská 3, 128 03 Prague 3, Czech Republic

Abstract
The objective of the research of contrails formed by air transport is to evaluate to what extent the industry influences the Earth's climate. Contrails formed behind an aircraft may disinte-grate within seconds or may cause the formation of cirrus clouds lasting several hours. Those clouds then prevent natural cooling of the Earth, this effect being more pronounced mainly at night. As a result, this effect probably contributes to global warming.

Key words Global warming, cirrus, contrails.

1. INTRODUCTION

Global warming is subtle warming of the Earth, believed to be caused by human activity by some scientists. People cannot feel the small increase in temperature, but its effects can be catastrophic. Some of the effects are water shortage, catastrophic floods, hurricanes and wild-fires.

The world's temperature rose by 0.5°C between years 1800 and 1900. The current rate of warming is estimated at 0.3°C per decade. If the human continues to pollute the atmos-phere, the Earth may warm up by 10 to 50°C in the 21st century.

Global warming is caused by a mixture of gases produced by the nature and the hu-man, which accumulate in the atmosphere and absorb heat energy, which leads to the Earth's warming. Those gases are collectively called greenhouse gases and the impact they have on the Earth is called the greenhouse effect. Greenhouse gases are: carbon dioxide, water vapour, nitrogen oxides, chlorofluorocarbons and methane. Under normal conditions, most of the Sun's energy is absorbed by the Earth and the rest is radiated back to the universe. However, greenhouse gases prevent the reflected radiation of energy. Thus the Earth's surface begins to warm up and the greenhouse effect is created.

Apart from other significant impacts of air transport on the environment such as emis-sions and noise, there is a serious concern that there is one more impact which has not been fully investigated and there are no precise data on it. This effect is the impact of contrails on the Earth's radiation balance. Some aspects of this phenomenon are roughly known, yet the general opinion and estimate of its impact is still insufficient.

2. THE PRINCIPLES OF THE EFFECT

The impact of contrails on the radiation balance is based on the commonly known phenome-non of absorbing different radiation. Contrails absorb long-wave radiation from the Earth and prevent it from leaving the atmosphere to the universe. On the other hand, they absorb short-wave radiation from the Sun, which would otherwise pass to the atmosphere. However, this effect is of less significance to the total thermal balance of the Earth, so it is generally sup-posed that contrails have an impact on the increase of temperature of the Earth. This effect is more pronounced at night when there is no short-wave component of the Sun's radiation and contrails only contribute to the temperature increase.

Figure 1 Contrails: source http://mrbarlow.files.wordpress.com/2011/03/jet-contrails.jpg

The intensity of the increase is subject to long-lasting disputes and the values range from 15mW to 80mW [5] per meter squared. Contrails as such are usually short-lived and cover only a small part of the sky. Therefore their impact is not that significant. The negative aspect is the fact that they can lead to the formation of cirrus clouds, which last for a much longer time period, they cover a larger part of the sky and are more reflective so they result in a greater influence of the Earth's radiation balance. High danger of aviation is mentioned in all IPCC reports [4].

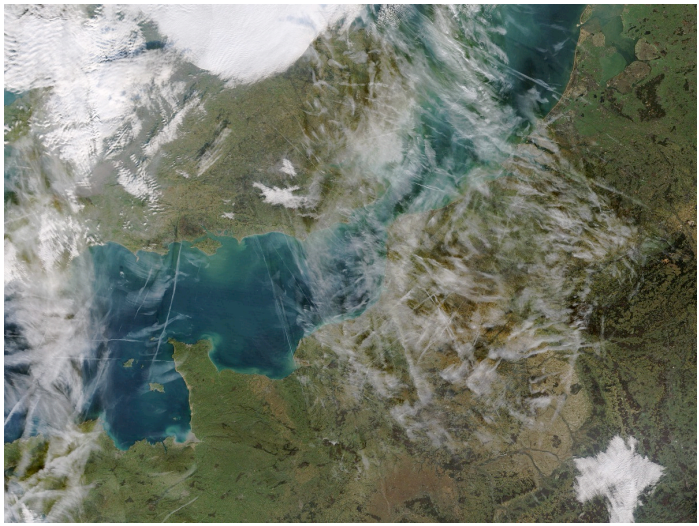


Figure 2 Contrails over Europe Jacques Descloitres, MODIS Rapid Response Team, NASA/GSFC

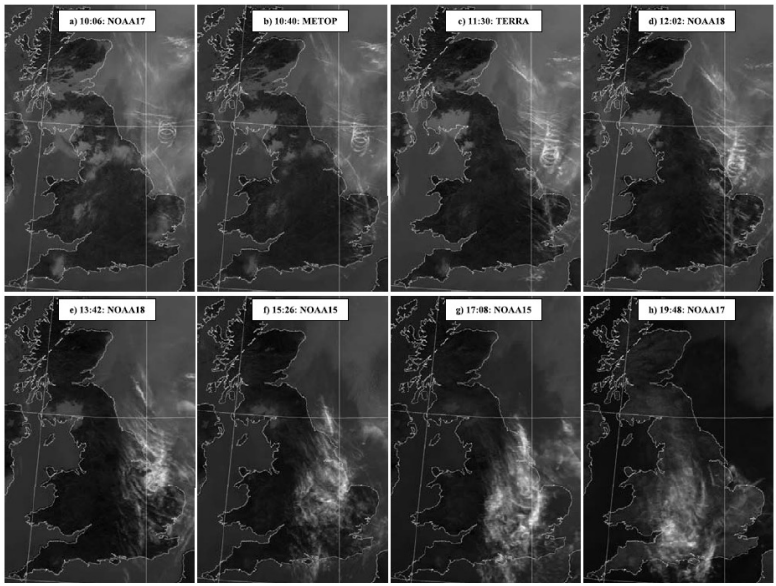


Figure 3 The conversion of contrails into cirrus clouds

Figure 3 shows an IR spectrum record of gradual build-up of contrails and their con-version to cirrus clouds. The area covered and the amount of heat reflected from the cirrus clouds is several times greater than for linear contrails. [1]

To estimate the radiation balance, it is necessary to know the optical depth of the clouds, the composition of crystals and the time period of existence. All those variables are, however, also difficult to determine.

There are various models based on a global approach to this problem. According to [2], there is a clear relationship between the formation of long-lasting contrails and so called ISSR. ISSR (Ice Supersaturated Regions) are areas of air supersaturated with ice with temperatures below 0°C with no clouds present.

3. OUR APPROACH

The approach we are introducing here is based on collection of data from optical recording. We expect to distribute several data collection stations to record the state of the sky. Using automated technology, they will determine the percentage of sky covered by contrails and roughly estimate their optical depth. The next step will be to evaluate the formation of cirrus clouds and determine the conditions in which they form. The result will therefore be a short-term forecast of contrail and possibly cirrus cloud formation.

A similar system was developed several years ago at the Institute of Atmosphere DLR in the German city of Munich. This forecast tool is called COCIP and its inputs are current atmospheric data, which are difficult to collect regularly at different altitudes. The advantage of our system is that it does not require input variables of current meteorological conditions because it is based on data collected from optical observation. However, the disadvantage of our method is the necessity for optical observation. Thus the method is unusable in bad weather conditions.

4. PROJECT FRAMEWORK

At the moment we are investigating the technology required to set up the monitoring stations and their locations. We would ideally like to place the stations in places where aircraft usually change direction because the radius of turn of the contrail should be reflected in the shape of the induced cirrus cloud so that they can be better distinguished from other clouds. The chal-lenge is to record the whole process of induced cirrus cloud formation to be able to differenti-ate between induced and naturally formed clouds. This is one of the reasons why the effect of cirrus clouds is not commonly included among the impacts of air transport.

A monitoring station will be set up to monitor contrails during the day. Ideally, it will be equipped with four video cameras to record the sky continuously at an angle of 120°. The recorded image will not be distorted at the edges and it will be processed in a format further usable in Matlab.

Matlab should be able to distinguish between contrails and cirrus clouds in the inserted image based on image processing. For image processing we plan to use matlab functions from Computer vision toolbox and Image processing toolbox. With this tools we presume that we will be able to find characteristic curvature in cirrus shape which would have origin in curved contrails from aircraft which changed heading. For this reason we are going to place monitor-ing station near high altitude air routes navpoints where aircrafts is going to change heading more often.

The monitoring station will be firmly installed in a place where the sky is not obstruct-ed, preferably on the rooftop of a building where the surrounding does not cover the view. It will be enclosed in a protective box to protect it from the environment.

Initial observation will be used to collect sky images at a frequency of one image per ten seconds. The frequency will be progressively increased as the project is developed further.

The image will be transferred for further processing via the Internet.

This primary research should provide the first data on contrails already this year, show-ing above all their average time of duration, average dimensions and the number of days when significant contrails are formed. We will further try to establish the relation between the type of airplane and properties of contrails as there is an assumption that four-engine airplanes lead to the formation of more distinctive contrails. This phenomenon was researcher in article [3], but this research was focused on 4 engine jet A380 which has, because of modern construc-tion, quiet economic fuel flow, it is possible to presume that we will be able to identify air-planes in FIR Praha with higher fuel consumption and even with higher creation of contrails.

At the moment, there is research in progress at DLR that focuses on the impact of con-trails and induced cirrus clouds on rain shadow in certain regions. Condensation nuclei are used up in cirrus cloud formation and are not present when later needed for precipitation for-mation. As a result, there is less precipitation amount in the region. If this assumption was ver-ified, contrails would become a more serious problem as their impact on regions near major airways would be even more significant. This would probably result in necessary legal re-strictions.

References

1. Haywood, JM, A., RP, Bornemann, J, F., PM, Francis, PN, Milton, S, R., G, Rap, A, Shine, KP, Thorpe, R (2009). A case study of the radiative forcing of persistent con-trails evolving into contrail-induced cirrus. Journal of Geophysical Research - Atmos-pheres, 114 (D24). D24201. ISSN 0148-0227
2. Hospodka J., (2012). Forecast of Contrails. Acta Avionica. 25 , pp.70-71, ISSN 1335-9479
3. P. Jeßberger, C. Voigt, U. Schumann, I. Sölch, H. Schlager, S. Kaufmann, A. Petzold, D. Schäuble, and J.-F. Gayet Atmos. (2013). Aircraft type influence on contrail proper-ties (11 Dec 2013), Chem. Phys., 13, 11965-11984
4. Solomon,S. et al. (2007). The Physical Science Basis: Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, In-tergovernmental Panel on Climate Change (IPCC), ClimateChange 2007, Cambridge Univ. Press, Cambridge, U. K
5. Blockley, Richard. (2010). Encyclopedia of Aerospace Engineering : Volume 6. Hoboken, NJ :Wiley, 2010. 1 s. , p 3683-3689, ISBN 9780470686652.
6. Nečas,P., Szabo, S., Bučka,P., (2006). Crisis management and security in simulation envi-ronment, Science & Military., Roč. 1, č. 1, 2006, s. 33-37., ISSN 1336-8885
7. Cehlár,M., Pašková,M., Szabo,S. (2010). Geothermal power plant utilization of east Slo-vakia potential, Acta Avionica. Roč. 12, č. 20, 2010, s. 13-19., ISSN 1335-9479