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The Importance of Knowledge Transfer to Industry

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Abstract The paper examines the specific knowledge universities transfer to industry, reflecting to creative industry needs. As results shows, the most asked alumni competences should be tacit knowledge and divergent thinking. Divergent thinking influence the creativity. Creativity is often defined as the ability to develop new and useful ideas, but in deep literature review, we can see few irregularities and different definitions of creativity. The paper also evaluates the importance of creativity from business environment point of view and from the creative industry perspective and creative firm owners. As point of view. Another key finding is, that to educate creative people will be one of the key competitive advantage, because mainly the ability to create and disseminate knowledge is often at the heart of the organization's competitive advantage not only in creative industry, but in transport industry as well.

Keywords Creativity, education, knowledge transfer

JEL A12

1. Introduction

On the one hand, companies approached universities, particularly research-intensive universities, to get innovations to sustain their competitiveness. Universities, facing financial constraints, commodified their knowledge to serve companies, in what has been christened as*academic capitalism* " or *entrepreneurial universities* [1,2,3]. On the other hand university has to prepare graduate, who stands the labor market. As research shows, only the technical knowledge is not sufficient any more, graduate should be creative and have divergent thinking and dispose of tacit knowledge. Tacit knowledge was originally defined by Polanyi in 1966. It refers to intuitive, hard to define knowledge that is largely experience based [4]. Tacit knowledge is also regarded as being the most valuable source of knowledge, and the most likely to lead to breakthroughs in the organization [5]. Frost links the lack of focus on tacit knowledge directly to the reduced capability for innovation and sustained competitiveness. On the other hand, explicit knowledge is type of knowledge which is formalized and codified, and is sometimes referred to as know-what. It is therefore fairly easy to identify, store, and retrieve. This is the type of knowledge most easily handled by KMS, which are very effective at facilitating the storage, retrieval, and modification of documents and texts [6]. Analysing the process of creativity, there is a decisive force deriving from the usefulness and the appropriateness in terms of change, renewal and updating. The criteria are visible in the definition of MacKinnon , according to which "creativity is a process that takes place over time and is characterized by originality, adaptability and the spirit of caring for a particular realization" [7]. The creative person is able to make a viable idea, develop it in detail, to improve it, to complete or even make it attractive [8].

In a very schematic manner, it can be said, that creativity can be compared to a system developed by humans based on standards to govern life in society. Csikszentmihalyi's work summarizes this idea [9]. He defines creativity as the sum of "interactions of a system made up of three elements: a culture featuring symbolic rules, a person who introduces something new into this symbolic domain and experts who acknowledge and validate the innovation." In his system, the dovetailing of the standards of four universes must be considered, starting from the central core of individual creativity, moving to fields of creativity, then to domains of creativity, with all of these included in a broader system represented by cultural creativity.

Aside from the relationship of creative individuals to rules, creativity is not limited to a cognitive activity. For Kind and Kind, creativity should be analyzed as a social problematic by examining collaboration relationships among members of a team [10].

The idea to foster the student creativity in the education process is not new. Back in 1965, Bruner was arguing that children should be encouraged "treat a task as a problem for which one invents an answer, rather than finding one out there in a book or on the blackboard" [11,12,13].

The necessity of creative education can be mainly justified by the need of creative workers in the creative sector. Narrower definition of the creative economy gives priority to the creative sector consisting of creative industries, which have gradually evolved from the so-called cultural industries and closely related to the artistic and cultural creativity [11]. In this context, the creative industries are seen as a new key sector of the economy which is a source of employment growth and profits. However, this approach can be applied only in those countries, or regions whose economy is oriented in this direction [12].

2. Literature review

Education can be considered as one of many tools to achieve economic growth. Nowadays, more and more authors argues, that the education process does not support creativity. The creativity is essential to the process of creating something new and unique [15].

Past research shows that the creativity applied to the education system has produced positive results in several countries. One example is the China whose system requires constant innovation and prosperity and the education system has established a creative approach in education, what brings a positive results [16,17].

We could see a tendency to integrate creativity in curriculum frameworks [10]. As written before, especially Asian countries like Hong Kong, Mainland China, Taiwan, Singapore or South Korea, have imposed curriculum reforms, which emphasized creativity development in their primary and secondary schools. One common feature of these countries is that they all recognize the importance of creativity across the curriculum, such as science, language, arts and so on. To cultivate creative citizens, Asian countries are undergoing vigorous education reform in a top-down process, in the strong support of their governments [18].

The aforementioned arguments of several authors affirm the necessity of the presence of creativity, respectively creativity in education. Creative thinking should be a priority in higher (third-level) education as well [19]. Higher educational institutions, is responsible for, the creation and dissemination of knowledge [20]. Currently rising unemployment rate and decreasing the percentage of graduates in the labor market has resulted in the higher education system should do more to promote the development of students' creativity [17].

E. P. Torrance defines the creativity as the process of producing hypotheses and their verification and communication of results. This definition implies the creation of something new, something that the individual did not know before, or what existed before. It implies also such things as inventiveness, discovery, curiosity, imagination, experimentation, manipulation etc. Creative ideas become evident through such things as: scientific theories, inventions, better quality products, novels, poems, projects, paintings, sculptures etc. [20,21,22].

The creative process is one in which the action occurs through a new relational product , growing from the uniqueness of an individualism on the one hand , and the things , events, people or circumstances of his life on the other hand [23].

American psychologist J.P. Guilford has even expressed and verified the hypothesis that the creativity is not identical with the intelligence measured by IQ tests) , but the extention of creativity can be seen as a sign of intelligence [24].

The difference between intelligence and creativity describes Getzels and Jackson (Table 1). In this table, Getzel and Jackson describes the characteristic reactions showing up creative and intelligent behavior. Both, intelligence and creativity are mental abilities. But, the basic difference between the two is that intelligence is a general capacity or ability of an individual, whereas, creativity requires different thinking.

Table 1. Intelligence vs. Creativity

Intelligence	Creativity
- Ability to remember	-Divergent Thinking
- Ability to remember the content	-New, original ideas
- Deductive reasoning	-Ability to invent
- Convergent thinking	-Constructing what can happened
- Selective Retention	-Willingness to take risk
- Defensiveness	

Source: Getzels, J. W. & Jackson, P. J. (1962). Creativity and Intelligence: Explorations with Gifted Students. New York: John Wiley and Sons, Inc.

3. Methodology

The research was intended to describe an importance of new knowledge transfer of graduate student at the labor market in the area of firms acting in the creative industry, consequently the existence of student´s creativity and divergent thinking at the engineering student programs. The primary research consisted of qualitative research – In Depth Interviews, Questionnaires and personal observation.

Depth Interviews consisted of interviews with experts from the creative industry, concrete advertising agencies and architect ateliers. Interviews were realized in four advertising agencies, operating in Žilina region. All the advertising agencies operate more than 10 years at the advertising market. Architect ateliers in number of four, where leaders in architecture in Žilina region as well.

The student questionnaire contained 50 questions arranged into groups according to personal characteristics connected to creativity. The individual questions were

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divided into the following areas: flexibility, intuition, curiosity, deep faith in own work, extensive knowledge, autoregulation, perseverance. 350 respondents attended the questioning. Respondents were students of the Faculty of Operation and Economics of Transport and Communications attending study programs: Postal Technology and Services, Postal Engineering, E-Commerce and Management. The students were not accidentally chosen from these study programs. The aim of this survey was to choose respondents educated for creative and non-creative industry as well. The survey was subsequently evaluated so that higher score indicates a higher degree of respondent creativity.

Data were also analyzed by cluster analysis, hierarchical clustering, using Euclidean and Manhattan distance metrics. Single linkage method was used, where distance between groups is defined as the distance between the closest pair of objects, where only pairs consisting of one object from each group are considered:

$$D(r,s) = \text{Min} \{ d(i,j) \} \quad (1)$$

where object *i* is in cluster *r* and object *j* is cluster *s*.

The research also applies survey research methods to a large systematic random sample, contributing to the generalizability of the research findings. This study takes an integrative approach to qualitative research, applying methods and theory from creative economy, psychology and sociology.

4. The Results

Creativity, as follows not only from theoretical approaches but also from this research, is affected by many different factors. Not only education but also leisure activities, place where we grew up, environment where we currently operate, are the key factors influencing creativity.

4.1. Education and it´s impact on degree of creativity

Comparing students at different study levels (see Figure 1), different score can be seen. Master program students achieved lower score in intuition, Curiosity, Deep faith in own work. Surprisingly, master program students are no longer so curious. Not very positive is also declining of Deep faith in own work score of 2,4 % in master programs. This score can also reflect of the education system, where the characteristic of Deep faith in own work should increase, not decrease.

4.2. Necessity of creativity in business practice

More are people interested in particular area and acquire wisdom or knowledge, more creative they will be. They have greater insight into the possibilities that are important for the creativity development. The research proves, that a higher level of education (including both "leisure and out school" activities) promote a higher level of creativity. Education is important. It is still important to acquire wisdom and knowledge but it is important to be interested in other areas to advance one´s creativity as well. (See Figure 1)

As the survey showed, some owners of the architectural studios as well as advertising agencies had graduated in completely different study program in which they currently operate. 70 % of respondents graduated in more than one different study programs. For many owners was not a problem to graduate at different universities. The survey showed that owner´s education related to their profession is beneficial to make the business, the education made them professionals in the field of advertising and architecture, however, additional education in other fields is beneficial and needed for making creative ideas and thoughts.

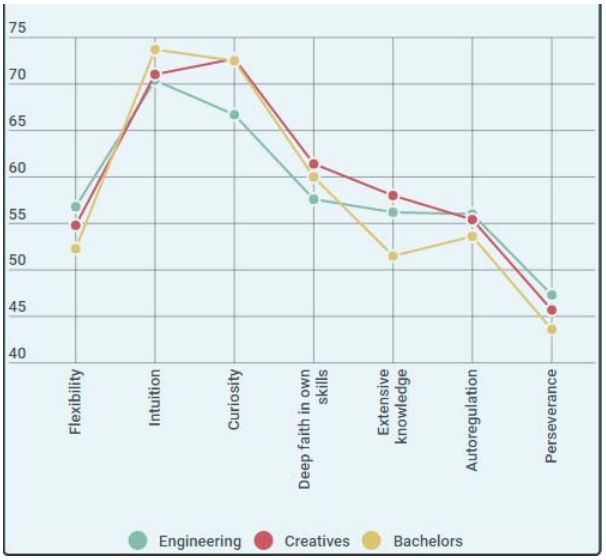

Figure 1. Personal characteristics of different groups

Before setting up own business, the respondents did not operate in the field of advertising or architecture. The previous sphere of business varied as well. Most advertising agencies and architecture studios was set up for the reason to cover the free market space. Some other reasons for setting up own business were: meeting new interesting people, multiplicity of tasks or abolition of previous working position and looking for new job in another sector.

4.3 Competitive advantage - creativity

The survey shows, that there are two positions of creative employees: first, individuals able to artistic expressions, secondly individuals who use creativity as managing tool of the company activities. All respondents regards creativity as a firm success factor. For example,

architects not only give to architectural works rendering but also the "soul". For the architects is typical to bring pleasant feelings to their work, in view of the fact, that they have (or are said to be able) developed sense of orientation in space. In such conditions, firm intellectual capital is characterized by 90 % of the results (projects) of their work is based on their talent and inseparable part of their work is to develop their talent.

4.4 Cluster analysis

The results shows, that for deep cluster analysis larger sample of respondents is needed. We can see few related factors, but this relation cannot be generalized. As Figures 2 and 3 show, there is no difference between Euclidean and Manhattan distance metrics, interesting cluster arose between Extroverts and their personal characteristics like curiosity, deep faith in their own work, extensive knowledge and autoregulation, perseverance. As we supposed, introverts are less creative than extroverts.

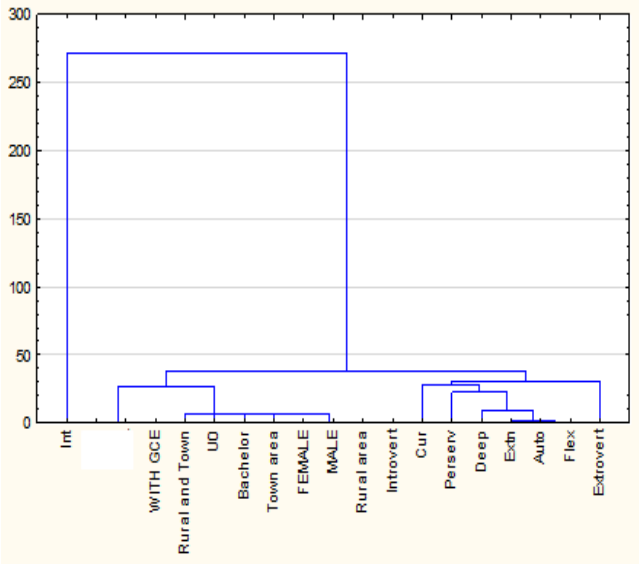

Figure 2. Dendogram using Euclidean distance metrics

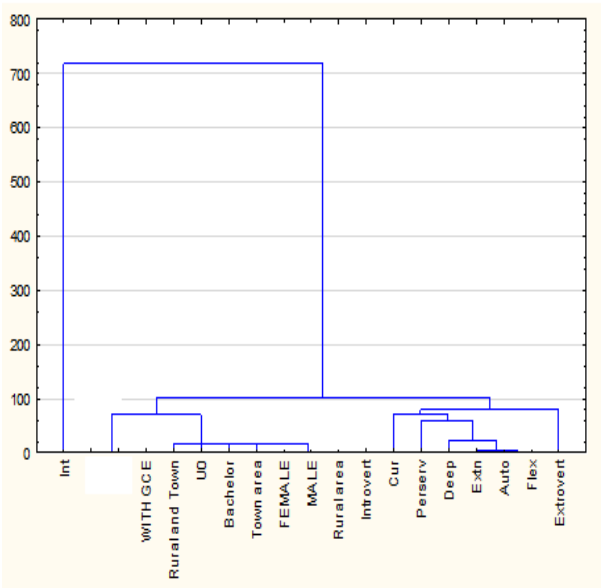

Figure 3. Dendogram using Manhattan distance metrics

4. Conclusion and discussion

The survey confirmed a high degree of creativity, creative ideas, creative thinking in interviewed firms. Employees of these firms benefits from the creative ideas from various sources. Interestingly, with creative ideas come these mainly in their free time. It is also interesting confirmation interlacing creative and knowledge economy. Besides necessity of having creative ideas is also knowledge important. To be only educated, or only trained or only creative in the field of creative industry is not enough. The combination of interlacing creativity and education is in these creative industries necessary and very important.

Education at the technical study programs is based on academic knowledge. However, there are sectors and industries where creativity is more important than knowledge or at least important than knowledge. The research confirmed the demand from employers for creative employees, resp. demand for "creative abilities". Not very positive fact remains, that master study program students reached lower levels of intuition, curiosity and especially deep faith in their own work compared to bachelor study program students.

As the survey showed, the majority of respondent, the owners of advertising agencies and architectural studios graduated at several universities and different study programs. All these need creative employees, who would be able think and act creatively. The survey has also brought new findings about the cohesion of man intelligence and creativity, resp. necessity to learn how to act and think creatively, which till now have not been infused into the education system adequately. For many reasons mentioned above, the education promote the creativity and creative thinking.

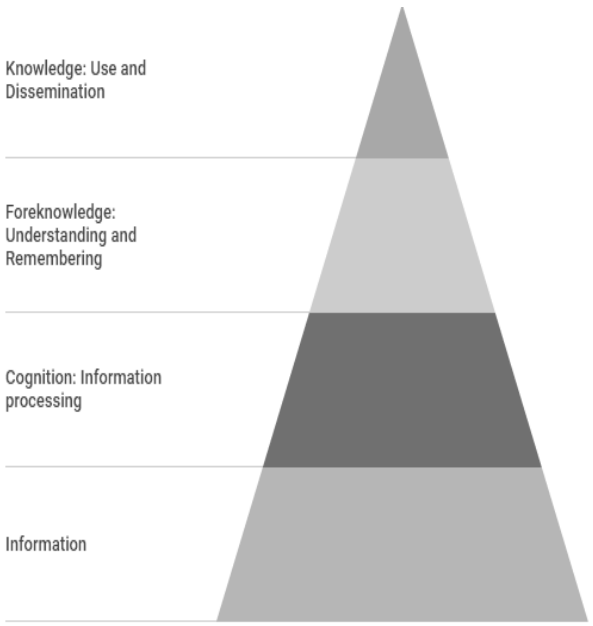

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Figure 4. The knowledge creation process

As research shows, the most important is to dispose of the tacid knowledge. In this meaning, the tacid knowledge is the part of the end of the pyramid shown in figure 4. The figure presents the knowledge creation flow from the information to the knowledge, when one can use and disseminate the knowledge.

Author of this paper degree with Alan Frost that knowledge creation depends upon the mechanisms described in the subsection on knowledge sharing, combined with the ability to put knowledge into practice in an environment which supports interaction and experimentation.

The creative process is a delicate one, and it is easily ruined by strict adherence to rules and regulations, or by bureaucracy.

To educate creative people will be one of the key competitive advantage, because mainly the ability to create new knowledge is often at the heart of the organization's competitive advantage in any industry.

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Aeronautical Telecommunication Network

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Abstract This paper summarizes the results of a study of modern telecommunication technology in the Aeronautical Telecommunication Network. The article deals with the integration of modern telecommunication technology into the still developing sector of aeronautical telecommunication. The ATN is a data communications inter-network that provides its users a robust and reliable Air/Air, Air/Ground and Ground/Ground communications service.

Keywords AMHS, message, communication, information architecture.

JEL O3

1. Introduction

Europe is contributing much to the development of the ATN. This is being achieved by participating in standardizing the system and validating the technical and operational and by preparing implementation plans. A large effort to certify the system has also started recently. All actors in the ATS arena, the Commission of the European Community (CEC), EUROCONTROL, European ATSOs, airlines, equipment manufacturers, and communication service providers are involved in that process.

2. Aviation Messaging (AMHS)

The aviation industry is adopting AMHS (Air Traffic Services (ATS) Message Handling Services) to support ground to ground communications for services such as flight plans and meteorological data. This will eventually replace the current AFTN (Aeronautical Fixed Telecommunication Network) and CIDIN (Common ICAO Data Interchange Network) based systems. AMHS-based systems are now being deployed around the globe with a large majority of countries who have so far made the switch, using solutions from Isode partners, based on Isode servers and APIs.

The state company Letové prevádzkové služby Slovenskej republiky štátny podnik (LPS SR) had implemented Basic ATSMHS capability and gateway facilities to AFTN in 2008. Migration of the international CIDIN circuits to AMHS started with COM centres in Vienna and Budapest. AMHS connections to other centres like Madrid, Warsaw, Zagreb have been implemented and other will follow. Military will be connected to the AFTN/AMHS through the ANSP – LPS SR.

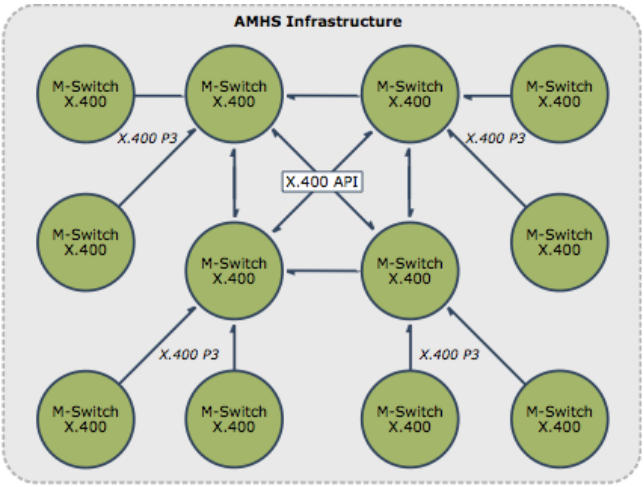

Figure 1. AMHS infrastructure. [1]

3. AMHS Architecture

AMHS provides a distributed message switching and storage infrastructure, to enable transfer of ATS messages, such as flight plans, NOTAM (Notice to Airman) and Meteorological information. The AMHS service is accessed by users, using AMHS terminals, and applications (such as Meteorological applications), in order to exchange ATS messages. AMHS Terminals and AMHS Applications connect to the AMHS infrastructure using X.400 protocols as shown in the diagram below.

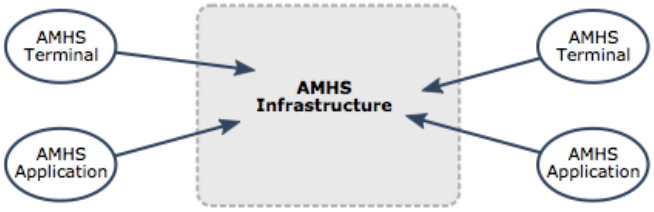

Figure 2. AMHS infrastructure using X 400 protocols. [1]

4. AFTN Transition and Co-Existence

As ground to ground messaging moves from AFTN to AMHS, it is important that full connectivity is maintained. This is achieved by use of an AFTN/AMHS gateway, which is formally known as an MTCU (Message Transfer and Conversion Unit). MTCUs are critical to enabling full connectivity while both AMHS and AFTN are being used.

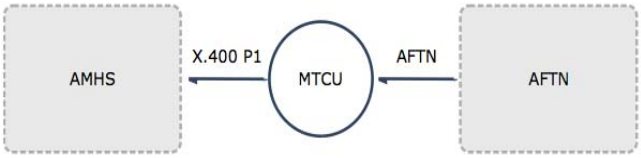

Figure 3. MTCU connection of AMHS and AFTN. [1]

MTCUs are available from Isode partners. Isode provides the AMHS side of an MTCU, to enable development of an MTCU.

5. The ATN Directory and Extended ATS Service

AMHS defines two services:

- The Basic ATS Service, which provides functionality equivalent to AFTN.
- The Extended ATS Service, which provides additional services and functions, including security based on digital signatures; binary attachments; large attachments.

The Isode servers and integration APIs provide full support for both the Basic and Extended ATS Service. A key element of the Extended ATS Service is use of the ATN Directory. Isode provides a full set of products for constructing an ATN Directory solution.

6. Further Information

For further information on the overall architecture of an AMHS solution, see the AMHS Architecture page. Isode has written a number of whitepapers that give more information AMHS:

- Why use a P7 Message Store? Getting X.400 messages to and from end-users. The goal of this paper is to give an understanding of what an X.400 Message Store, such as Isode's M-Store X.400 does, and where and how it should be used. In order to do this, the paper looks at general requirements for sending and receiving (X.400) messages, and looks at various approaches that can be taken.
- Why X.400 is good for high reliability messaging. X.400 was specified in the 1980s, with the expectation that it would be the universal standard for email. While this did not happen, X.400 is still used for many applications, particularly where high reliability is required. This paper summarizes the key features of X.400 that make it good for applications needing high reliability, with particular focus on capabilities not available with Internet email.
- AMHS Security The Aeronautical Traffic Services (ATS) Message Handling Service (ATSMHS) defines a set of security services for use as part of the Extended ATS Message Service for providing that ATS Message Handling System (AMHS). This White Paper describes these security services, how they are provided and how they can be deployed. The paper concludes that AMHS Security is needed now, and should be pursued urgently as a part of AMHS deployment.
- Delivering the ATS Message Service to the End User using AMHS. AMHS (Air Traffic Services (ATS) Message Handling Services), as specified in the ICAO ATN (Aeronautical Telecommunications Network) SARPs, is the new standard for ground to ground messaging communications. The "ATS Message Service" is the end to end message service that AMHS provides. AMHS specifies the service, and the underlying infrastructure that is used in order to provide this service. To build a complete system, the ATS Message Service needs to be provided to end users, sitting at terminals. This paper looks at various approaches to doing this.

7. Conclusions

LPS SR had implemented infrastructure which was required for AMHS communication in 2008. The Slovak aviation industry had finally adopted AMHS to support ground communication in 2014, so whole process of implementation had taken more than 6 years. AMHS system is fully capable of AMHS airport what is essential for future development of whole aviation industry of SR.

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The Effectivness of Suporting Public Passenger Transport from Public Funds

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Abstract The paper deals with the issue of efficiency of financial support for public passenger transport from public funds from the perspective of improving road safety. The aim is to verify the hypothesis that financing public passenger transport from public funds is a significant tool to influence the number of passengers carried by individual automobile transport, and thus it can be a tool for influencing road safety in a particular territory. The first part of the paper analyses the sources for financial support of public passenger transport. The last part analyses possible impacts of financing public passenger transport on the road safety in relation to the specified hypothesis.

Keywords: transport, financing, safety, factor, region, public

JEL Classification: R48, H40

1. Introduction

Regular public passenger transport cannot be provided on a commercial basis without the support from public funds (Poliak, 2013). Therefore, there are mechanisms through which public passenger transport can be ensured. Service operators may provide transport services either based on the award of exclusive rights to operate regular passenger transport in a certain territory or they have possibility to obtain the financial support for transport service provision. Public funds are used worldwide to finance the difference between revenue from fares and operating costs (Tscharaktschiew and Hirte, 2012). In the U.S., public funding contributes to cover 57 – 89 % of operating costs of bus service. In area of rail passenger transport, this proportion represents 29 – 89 % of operating costs (Parry and Small, 2009). Within the EU, operating costs are covered from public funds in the range of 23 – 50 % depending on the funding system in a particular EU Member State (Buehler and Pucher, 2011a, b). A prerequisite for the support of public passenger transport is provision of the sustainable system of transport serviceability. By the support of public transport, there is also an assumption that the population will use passenger cars to a lesser extent. For this reason, the following benefits can be achieved:

- Reduction of CO2 emissions because road transport is considered to be a significant contributor to greenhouse gas emissions (Figlus et al., 2014).
- Road safety increase because the accident rate of passenger cars is higher compared to the average accident rate of vehicles (Komackova and Poliak, 2015).

When considering that the number of passengers using public transport is increasing with the increasing financial support for public transport, there is an assumption that higher number of passengers carried will increase revenue from fares. Therefore, it is possible to expect the reducing need for funding transport serviceability in future under the increase in revenue from fares (Storchmann, 2001).

The aim of the paper is to verify the hypothesis that financing public passenger transport from public funds is a significant tool to influence the number of passengers carried by individual automobile transport, and thus it can be a tool for influencing road safety in a particular territory. Verification of the hypothesis is even more significant because the regions where public transport is entirely financed from public funds exist within the EU for the support of road safety, and thus the residents may use public transport for free (e.g. some cities in Estonia, Czech Republic, and a similar system is being prepared also in Zilina in Slovakia). The first part of the paper analyses the sources for financial support of public passenger transport. The next part describes the assumptions for improving road safety through increasing the support of public passenger transport. The last part analyses possible impacts of financing public passenger transport on the road safety in relation to the specified hypothesis.

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2. Sources for Financial Support of Public Passenger Transport from Public Funds

In general, public passenger transport cannot be financed only from revenue from fares and other revenue generated while service provision such as advertisement. This fact was already confirmed by the studies elaborated before 1990; for instance Bly et al. (1980), Pucher and Markstedt (1983) or Bly and Oldfield (1986). But, the conditions have not changed even in the present as it is demonstrated by Tscharaktschiew and Hirte (2012), Poliak (2013) or Drevs et al. (2014). The mentioned studies also point to the fact that the financial support from public funds tends to decrease the level of fares and to increase the frequency of public transport links. Lower fares make public transport more accessible for low-income population groups (Tisat, 1998) as well as groups of people with specific needs such as the disabled and elderly (Asensio et al., 2003). Higher financial support from public funds also allows using vehicles with a larger capacity in the provision of transport serviceability (Proost and Dender, 2008).

The most common financial support from public funds (state or local government budget) is in the form of compensation (van de Velde, 2008) that is also referred to subsidies in some literature (Black, 1995). A subsidy or compensation represents a payment that does not require a direct exchange of goods or services in the market economy. It is used to achieve a specific social objective or a specific intended effect (Black, 1995). It represents a payment transfer, however, it is not a gift because there are certain rules that must be kept in order to obtain subsidies for public transport provision.

In most EU Member States, public passenger transport is financed traditionally from general taxes (Ubbles and Nijkamp, 2002). State or local government generates revenue from various taxes which include direct and indirect taxes. Within the EU, indirect taxes represent in general the highest proportion of incomes of state budgets. Under this support, there is no direct link between the source of incomes and their allocation to financing transport serviceability. The main problem of this form of financing is that there is considerable competition between the requirements for subsidies from public funds (van de Velde, 2008). Public passenger transport is often financially supported from one budget together with other public services such as education, healthcare, and etc. (Storchmann, 2001). It is very difficult to maintain the financial support for public passenger transport because this support represents high financial resources provided for a long time period. For this reason, new forms of obtaining funds from public sources are being sought in the area of public passenger transport in some states. These are linked to specific incomes of public budgets. The possibilities for direct connection of public transport financing with the incomes are as follows:

- Fees for using road infrastructure – a traditional reason for introducing road fees is to obtain the incomes for construction of new roads and maintenance of the existing roads. The second and even more significant reason is to cope with traffic congestion and air pollution (Komackova and Poliak, 2015). Linking the incomes from the fees for using road network with the support of public passenger transport would be a good instrument for financing public transport in case if passenger cars are subjected to those fees. The use of such a method of financing is common in Scandinavian countries (Farrell, 1999), (Storchmann, 2001) and the U.S. (Small and Gomez-Ibanez, 1998).
- Excise duties – excise duties can be defined in general as indirect taxes of the selective character. These taxes apply only to selected goods. In the EU, Member States must apply excise duties to alcoholic drinks, tobacco products, mineral oils and energy (e.g. coal, electricity, natural gas). Given that consumption of mineral oils (gasoline, diesel) is directly dependent on the extent of transport, some of states (e.g. Germany, Switzerland) have introduced a specific proportion of collected excise duties on mineral oils as a source of the financial support of public passenger transport (Farrell, 1999). Thus, the higher fuel price assumes lower fares in public passenger transport and it also assumes reductions of traffic congestion and greenhouse gas emissions. Besides some EU Member States, this method of financing public transport is also used in the U.S. (Ubbels and Nijkamp, 2002).
- Motor vehicle tax – it is a tax which is compulsory within EU Member States and it applies to all vehicles that are used for business (Poliakova, 2010). In some EU Member States, this tax applies to all vehicles regardless they are used by entrepreneurs or private persons. Although the tax is related to transport, its collection in the EU is not directly linked to financing public transport. Incomes from collecting taxes on motor vehicles are directly used for the financial support of public transport in some regions in the U.S. and Canada.
- Income tax for legal entities and natural persons – incomes from these taxes represent the income of state or local budgets according to a particular state. A direct link between the revenue of income tax and financial support of public transport is applied mainly in the U.S. (e.g. Portland and Eugene) but also in some EU regions such as France (Wallis et al., 2010) and Germany (Beck et al., 2011).
- Property tax – as an instrument of creating sources for financing public transport, it is a commonly applied method in the world and it is used in several states in Europe, Asia and North America (Ubbels and Nijkamp, 2002). The principle of linking property tax with the support of public transport is that owners or users of properties may benefit from the fact that the territory, where their properties are located, is served by public passenger transport. This benefit is reflected in the increased value of the properties. Therefore, a higher property tax is applied to those properties (the tax includes a

fixed part which is determined for the financial support of public passenger transport).

- Parking fees – these fees are only exceptionally directly determined for the financial support of public passenger transport. However, there are regions, especially city centres, where parking fees or their part are directly determined for financing public transport in order to reduce traffic congestion and to reduce occupation of space by passenger cars in cities. For example, this method of the financial support of public transport have been applied in France since 1973 (Predki and Wilk, 1999).

It is impossible to clearly identify which method of the financial support of public transport is most effective or which combination of sources would bring the best results. Efficient use of funding sources is addressed in detail by Pawlak (1991), Slowinski (1995), and Beck (2011).

3. Possible Impacts of Financing Public Passenger Transport on the Road Safety

Based on previous analyses, it can be stated that public authorities are able to find financial resources for the support of public passenger transport. Thus, if passengers changed their way of transport (from passenger cars to public transport), the road safety would be increased. This part of the paper examines whether financing public transport from public funds motivates passengers to change their way of transport. Molander et al. (2012) pointed out that there is a relationship between the financial support of public transport from public funds and willingness of passengers to pay for using public transport. The importance of this relationship increases with the significance of the debate on transparency in public spending (Hilgers, 2012; Hilgers and Ihl, 2010). According to available sources, direct impact of the increasing financial support from public funds on the willingness of passengers to pay for transport has not been examined yet. However, the results of research on the impact of the financial support for cultural events from public funds show that such financial support may increase as well as reduce the willingness of the private sector to finance cultural events (Bekkers and Wiepking, 2011; Borgonovi, 2006; Maddison, 2004). Considering public transport, it is possible to increase the willingness of passengers to pay fares if the passengers will understand the financial support from public funds as sufficient support alongside incomes from fares. Therefore, public authorities must present the reasons for the financial support of public transport in an appropriate manner. There are also cases when willingness of passengers to pay fares decreased with the increased financial support from public funds. Those passengers had an opinion that they already paid for public transport in the form of taxes and the fares were understood as an additional payment for the same services. The similar problem is also addressed by Souche et al. (2012) and Tscharaktschiew and Hirte (2012).

In terms of verifying the hypothesis, it is necessary to address the issue whether the increased number of passengers and increased road safety can be achieved through increasing the financial support of public passenger transport. The increased financial support from public funds increases also the willingness of passengers to pay fares (Chang, 2010). The willingness to pay fares in public transport is defined by Homburg et al. (2005) as an amount of money that customers are willing to spend for provided services in case of knowledge about further support of the service provision from public funds. Phanikumar and Maitra (2006) point out that the willingness to pay for public services includes not only the user's values but also non-user's values. This means that the willingness to pay for public transport services includes the amount of fares and public financial resources which are being spent to ensure transport serviceability. The similar definition can be found in studies elaborated by Kotchen and Reiling (2000), Cooper et al. (2004), Geurs et al. (2006), Humphreys and Fowkes (2006), and Liebe et al. (2011). Horne et al. (2005) emphasized that knowledge of the financial support from public funds influences the opinion on the level of fares which passengers are willing to pay for provided services.

Based on Lai and Chen (2001), it can be stated that passengers are willing to bear with an increase in fares in case that they have sufficient knowledge of the financial support of public transport from public funds. Passengers are more willing to accept a price increase in case they are satisfied with provided services (Kim and Crompton, 2002).

On the other hand, the payment of fares and public funding can be understood as double financing by persons who pay taxes to public budgets (Buckley, 2003). In this context, Andreoni and Payne (2003) pointed out that the financial support of public transport may cause unwillingness to pay fares. The unwillingness is mainly manifested in case of increasing fares. Nyborg and Rege (2003), and Liebe et al. (2011) pointed to the fact that knowledge of financing transport services from public funds elicits the requirement for public transport provision for free.

Taxpayers who do not use public transport may also accept financing public transport from public funds (Chang et al., 2012). In this case, the financial support from public funds is understood as the support of maintaining the availability of services for a taxpayer in case he/she needs the services.

The question is whether the financial support of public passenger transport increases the road safety in that a part of travellers start to use public transport instead of individual automobile transport. A change in the number of passengers under the support of public transport must

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be examined through the elasticity of demand for public transport (Gnap et al. 2006). In general, the elasticity of demand refers to the relationship between the percentage change of the selected factor and the percentage change of demand (e.g. performance in public transport expressed in passenger-kilometres). If fares in public passenger transport decreased due to the financial support from public funds obtained from using passenger cars (e.g. an increase in excise duties on mineral oils), it would be possible to anticipate behaviour of the population based on the elasticity of demand for fuels.

Table 1. Price elasticity of demand for automobile transport and public passenger transport in relation to fuel prices

The purpose of journey	Automobile transport	Public passenger transport
Commuting to work	–0.092	+0.202
Commuting to schools	–0.136	+0.121
Business trip	–0.009	+0.047
Shopping	–0.020	+0.031
Leisure time	–0.120	+0.045
Holiday	–0.240	+0.016
Average	**–0.102**	**+0.070**

Source: Storchmann (2001)

According to the measurements of Storchmannom (2001) the results of which were also confirmed by Gnap et al. (2006) for Slovak conditions, it can be stated that the demand for driving by passenger cars during holiday (-0.240) and leisure time (-0.120) significantly decreases due to fuel price increases. However, those travellers do not change to public transport because price elasticity of demand equals to only +0.016 in case of holiday and +0.045 for leisure time. Price elasticity of demand for the use of passenger cars for the business and shopping purposes is very low (-0.009 and -0.020). This means that number of journeys of those groups of traveller does not change. Comparable elasticity can be seen only in case of commuting to schools where travellers change their type of transport from automobile transport (-0.136) to public passenger transport (+0.121). Development of commuting to work is also interesting. Elasticity of demand for driving to work by passenger cars is significantly inelastic in relation to fuel price increases. Very few of travellers are willing to switch to public transport. However, those, who have already started to use public transport, carry out more than double journeys compared to individual automobile transport. In relation to transport, it is necessary to point out that a price of transport does not represent the most important factor (Gnap et al., 2006). The most important factor is the travel time (Table 2).

Table 2. Factors affecting the volume of public passenger transport

Factors	Elasticity
Regional employment	0.25
Occupancy of city centres	0.61
Offer of transport (volume of vehicle-kilometres)	0.71
Waiting time	–0.30
Travel time	–0.60
Fare level	–0.32

Source: Gnap et al (2006)

Demand for transport services is characterized by inequality during a day. Figure 1 depicts the changes in demand for public transport services. The graph in this figure is processed based on the measurements carried out by the authors in particular regions of the Slovak Republic. The demand is characterized by two periods of peak hours in the morning and afternoon. During peak hours, offer of transport can be lower than demand for transport. Morning peak hours are in the interval from 6:00 till 8:00 when the proportion of nearly 15 % of the total daily number of passengers is transported. The number of vehicles which are need in public transport is determined based on morning peak hours. Maximum utilization of their capacity is taken into account during this period. During off-peak hours, offer of transport exceeds demand and therefore vehicles are not sufficiently utilized in terms of their capacity.

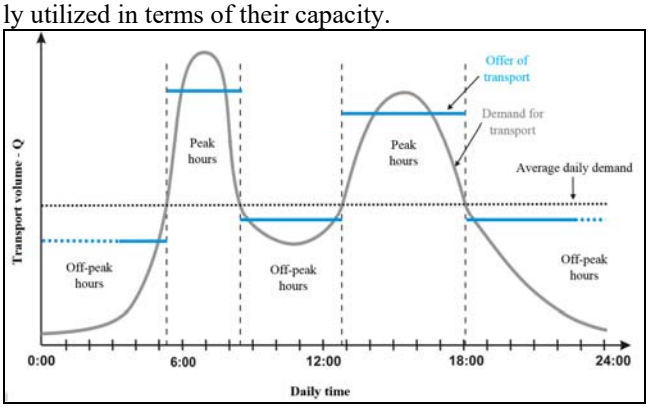

Figure 1. Offer of transport capacity and demand for public passenger transport depending on the daily time; *Source:* authors

If the financial support of public transport increased with the aim to decrease number of travellers in passenger cars, the desired effect would not be achieved because there are other important factors influencing transport mode choice. In the process of decreasing the fares, it is necessary to consider the fact that the increase in the number of passengers will not be uniform throughout a day. A higher increase of passengers can be expected during peak hours. A new passenger during off-peak hours causes below-average marginal costs (there is no need for investment into new vehicles because the existing vehicles are not sufficiently utilized). On the other hand, a new passenger during peak hours causes above-average marginal costs because the existing vehicles are fully utilized under actual conditions. Within a significant decline in fares, the increase in numbers of passengers is related to the fact that the passengers prefer

public transport to walking or cycling. Decreasing fares or public transport provision for free has a greatly limited impact on the road safety. To decrease number of passenger cars, it is necessary to take other measures that make travellers to use public transport. The example can be restrictions on parking vehicles at the traveller's destination or limitations for the ride of passenger cars what results in significantly longer travel time compared to the use of public transport.

4. Conclusion

The road safety is currently a topical issue given the fact that an increase of transport performance still persists and infrastructure capacity is limited mainly in cities. The probability of accidents increases with increasing performance of road transport. This results in decreasing road safety. This paper verifies the hypothesis that road safety improvement can be achieved through the support of public passenger transport from public funds.

The paper analysed the possibilities for financing public passenger transport from public funds. It was concluded that public transport is operated by service operators with the support from public resources. To handle demanding financial requirements for public transport support, several countries have established a financing system which is directly linked to specific taxes and fees. Financial sources are often generated from incomes of public budgets related to transport.

This paper confirmed that if travellers started to use public transport instead of passenger cars, the number of vehicle on roads and the probability of accidents would decrease. It is also possible to state that professional drivers have better prerequisites to handle risk situations on roads with respect to their practise and checks.

However, financing public transport from public funds itself do not directly mean increasing road safety. It is also necessary to address the elasticity of demand of individual groups of the population. Based on the elasticity, it can be concluded that a significant change in the road safety cannot be achieved unless other measures are taken alongside the financial support of public transport (e.g. reserved bus lines, parking bans for vehicles). Decreasing fares or public transport provision for free would attract only walkers and cyclists. Furthermore, it can be expected that the increased demand of those users could occur mainly in morning peak hours, and this could result in the need for investment and further requirements for financial support from public funds.

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The role of human element in aviation safety

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Abstract Each industry is characterized that without human factor will not be able to function. This also applies to aviation, which focuses mainly on human labour. This sense of security what provides staff workers, on what the shoulders are the duty of care not to create a hazard before, during and after the flight. On the civil and military airports they employ staff not only flying but also ground handling. These include: auditors, managers flights, technicians, ground handling runway and apron, cargo department employees, firefighters and other emergency services, personnel service to passengers in the terminals, customs, security, and even people like hawkers, law enforcement officers, managers and managers of the various sectors. Each of these professions is responsible for a different aspect of the airport, and is necessary for the proper conduct of flight operations and passenger services and ensuring security. In the largest airports with lots of terminals with dense air traffic performance characteristics of employed people, the variety of tasks, and thus the level of complexity of the operation resemble a small town. In order for it to function efficiently is all you need is a good organization, through which cooperation between all departments of work is smooth and provides quick action in dangerous situations. Each employee should know their role and perform the desired function best, so to fill up the board and the workforce to reliably performed its duties and to the performance of their work brought economic profits.

Keywords aviation safety, human factors, transport management

JEL L93

1. Introduction

Aviation is one of industry, which is based on the work of the human labour. Man has constructed an airplane, be like a bird fly up into the air, making it later means of transport which can move travellers and wares to distant places in short period of time. The aviation industry has developed and gives employment for many people, who working in factories producing airplanes and on the airports. One of the key elements to maintaining the vitality of civil aviation is to ensure safe, secure, efficient and environmentally sustainable operations at the global, regional and national levels.

With the growth and development this sector of transport has also increased the risk of mistake which is taken from each course. Introduced the concept of "human factor" which is defined as an operation between people and the environment air. It focuses on the people who affected by the direct action involving aviation [10]. It is also based on the problem of a system which is used for determining aircraft maintenance. It also has an impact on flight safety taking into account the risk involved.

In the aviation industry is very easy to make mistakes occur. Risks that may occur involving the safety of the crew operating the aircraft, apply to the management of the organization by air. The process of safe flight focuses on a job people and systems but also contain on it events which include the risk of mistake at the same time resulting in an accident. Airplane crash is never caused by one reason. Usually based only on during the cause-effect, in which each cell contributes to an accident. Avoiding would be possible in the case of interrupted for any reason. However only after the accident we appeared to be wearing this thing, which contributed to this accident. Unreliability of the security system is compared to the model of Swiss cheese. Then compares the causes of the holes in the cheese and in the case that it falls on each other when there is an accident. Should take into account this issue that accidents which occur always contain a cause, which the perpetrators are people [2]. Sometimes it is only sub-factor but in some cases it focuses on yourself all the blame. Therefore, conducted human resources management systems which focus on the analysis of the human and role in the airline industry.

As its primary indicator of aggregate safety in the global air transport sector, ICAO studies the accident rate based on scheduled commercial air traffic with a Maximum Take-off Weight (MTOW) above 2250 kg [14]. Aircraft accidents are categorized using the definition provided in Annex 13 to the Chicago Convention-Aircraft Accident and Incident Investigation. Figure 1 shows the global accident rate (accidents per million departures) over the years 2005-2014.

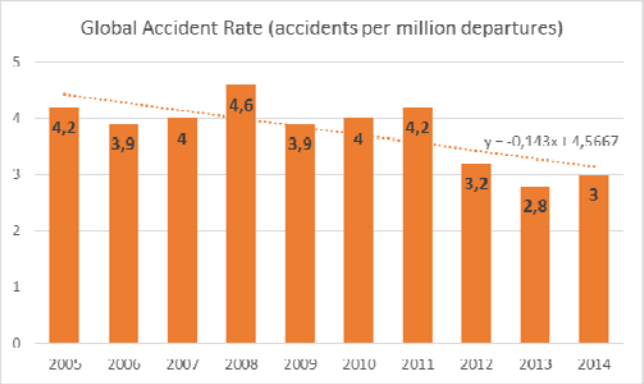

Figure 1. Global accident rate (accidents per million departures) over the years 2005-2014 (Developed on the basis of [14, 15]).

2. The emergence of the concept of human factors and model the formation of accidents

On account of dynamics of development that occurred in aviation, there has been greater focus on the role what made people in this area. Also there was a need to define this phenomenon and set them the concept of the human factor. It was created in the twentieth century by Arthur S. Reber who defined it as a term relationship occurring between human and machine. It includes the psychological aspects and may be related to factors which are the environment, people, work performed. Searching for the causes of air accidents, human action is not treated as an element that could contribute to the tragedy. When started happening cases of disasters, where the human was one of the reasons. Human factors were seen as acting as one of the important roles in the aviation security system. The concept of human reasoning is as knowledge of familiarity with the aircraft, operational systems and equipment for flight attendants, acting in accordance with the rules and based on technical knowledge, operations and logistics. In order to better analyse the human factor they created system HFACS (Human Factor Analysis and Classification System) that allows to explore aviation incidents and accidents. It is based on the creation of drawing conclusions and creation actions what can reduce the risk of occurrence of which is connected to the presence of the human factor.

Based on what says the definition of security, you might say that human is one of the most uncertain elements in aviation, the focus is on it is all the attention, when assessing the safety of the flight [9].

2.1. Swiss Cheese Model

Performing research on disasters we used models, which make it easier to understand the sequence of cause - effect occurs during the tragedy. One of such models is developed by James Reason'a model based on a comparison of Swiss cheese. He says that the crash takes several events, overlapping and forming the so-called chain of events. The investigating aviation accidents are mainly based on this model. In figure 2 shows the "Swiss Cheese Model".

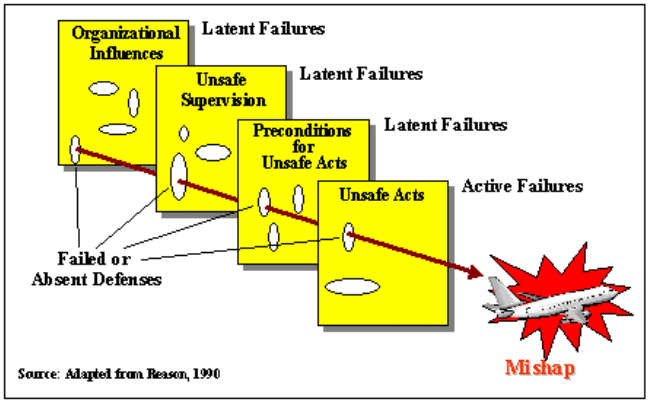

Figure 2. Swiss Cheese Model by James Reason [13].

This allows you to find all the factors that affect the operation of the crew. These include the danger what made the crew, the lack of proper management and wrong supervision of operations. Using the model Reason'a come to the conclusion that, despite upgrades of equipment and systems and the experience of crew, there are mistakes what have tragic consequences. Factors that may lead to an accident can occur at any time during the flight. Therefore, pilots are not the only one who is responsible for the security but also ground handling [9].

2.2. Model SHELL

Another model used in the assessment of safety and risk is the model of Hawkins – SHELL. In figure 3 shows the Hawkins - SHELL theoretical model.

Figure 3. Hawkins - SHELL model [8].

The model name comes from the initials of the components: Software (procedures, symbols), Hardware (machines, aircraft), Environment (environment, the context in which L-H-S system works) and Liveware (the human) [8]. It describes the interaction between the factors associated with the flight.

3. Human activities at the airport

The causes of airplane crashes do not always have a relationship with the proviso that the guilty is the crew, or the

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machine. Their reason may be on the ground and focus on the employees handle. A job at the airport based on the continuously changing factors and forces to adjust their actions. This is due to the fact that there is a situation where at one time happening several adverse events that may occur in the event of unexpected failures or actions are done wrongly. A person undergoes training to be able to cope with stress so that has the ability to some extent collide with the disaster. Even that, not everyone can cope with it. Contributes to the possibility of mental illness and the factors affecting the operation of the employee. These include:

- Vibration equipment,
- Work in noise,
- Severe traffic,
- Temperature.

Person who is working in airport ground handling should be characterized by:

- Auto discipline,
- The ability to perceive risk,
- Impose 'self,
- Knowledge and appropriate preparation for work at the airport,
- Process of thinking and decision-making,
- A willingness to take informed risks.

It is known, however, that the airports are working of inadequate schemes, which are also accepted by the board. It usually affects the relationship between workers who are in difficult situations dump the blame on the pilots [16].

At the airport there are various organizations that have their own goals and objectives. However, primarily focus on providing security, so that the economy airline operates at a high level. There are situations when it comes to making a mistake, which in the worst case ends as disaster. It does not have to come to it in the air, there were cases of the tragedy that occurred at the airport. They are caused by bad weather, poor technical equipment at the airport (mainly small regional airports that are not equipped with modern navigation equipment) or misunderstanding pilot with the controller. The combination of all these circumstances led to the greatest catastrophe that took place on earth. At the airport in Los Rodeos, which at the time of the tragedy was very crowded, on the airport area collided two aircraft, Boeing 747 Pan Am and KLM line. It got to this situation because of the bad weather prevailed. The airport did not have adequate radar and pilot KLM ignored command of controller [7]. In this disaster life has lost 583 people.

Another example of the disaster which occurred at the airport was the collision of aircraft Aeroflot, which upon landing in Omsk collided with preservatives airfield machines. The main cause of taking the fact that the controller snapped a nap and did not inform the plane of the difficulties on the runway [3].

A similar situation occurred during the flight of the Boeing 747 Singapore Airlines. Plane during a stopover in Taoyuan in harsh weather conditions collided with machines repaired standing on the waist. Contributed to the fact that the pilot mistook runway that took turn and additionally renovated portion of the runway was not protected [6]. In this disaster life has lost 83 persons.

4. Human and work on board

In the aviation industry for some time, we will notice that there is a contradiction between security and the economy and profits. It also meets on board airplanes. Requirements what is imposed on staff are in fact treated only in a theoretical way. They focus mainly on the interest in traveling and providing them with all sorts of in-flight amenities. It happens that the event will only focus on safety, which previously was treated as secondary, because important aspect on which the focus is making money, not their issuance. Employees are required to able to control the situation in the case of the tragedy, take care of the passengers, and while the fact that they tried to be kind, with subject to the manners and friendly atmosphere. To make sure the crew performed them duties as well must issue a suitable method of motivation. These include:

- Satisfaction with the work done,
- Financial incentives,
- Issuing a positive opinion.

The most common is the presence of tensions that arise between employees, handling aircraft and passengers. Stewardesses have to deal with variety of travellers and each of them has a different purpose and expectations as to the flight. Their tasks are skilful and communicate with everyone. Conflicts occur on board the aircraft are mainly there of three reasons:

- Flight safety,
- Board as a place of work,
- Excessive demands passenger.

In travels what take long hours travellers can easily divided on several groups:

- Friendly,
- Euphoric,
- Indifferent,
- Frustrated,
- Aggressive.

Of course, employees depend to most of the passengers showed positive features, but there are those that explode aggression. The tasks of the workers should then reassure the person that did not pose a threat to others.

Each employee the aircraft shall receive appropriate training on hazardous behaviour among passengers [11].

4.1. The crew on board and in the cockpit

The technical development of the aviation industry has led to the modification of aircrews. On-board computers are more automated allowed that reduce pilots to two. However, people who are in the crew getting more it's all because most aircraft are wide-run. The work of both teams is done in two ways, despite the fact that the deck crew took over some of the responsibilities of pilots. There have been cases that person did not listen stewardess what result to disaster. It has been extended through training in crew management to both

teams easier to the councils and managed jointly solve problems [11].

4.2. The phenomenon of air terror

In terms of aviation terrorism is an activity that is intended to intimidate and confusion of society. It occurs when sweeping a group want to provide any information. Despite all the security measures which accompany airports and airplanes still occur bringing on board bombs or weapons. One of the biggest terrorist attacks which made the history of the world was the attack of September 11, 2001, when the 4 civilian aircraft have been abducted and eliminated in the United States, depriving life nearly 3000 people. Although outnumbered, they occupy staff and passengers against several bombers on board there is fear, because such people can attack using this for what will be on the board. The fight against terror in the world has been going on for a long time. In spite of better security, do not always possible to prevent the attack, especially since making preparing for it for several years analysing any solution [11].

5. CRM - Crew Resource Management

In order to improve safety training started covering a range of crew resource management. NASA launched it at a conference on management controls. They discussed issues related to the mistakes made by the pilots, the decisions made by the board in the face of tragedy. In Europe, on the other hand, research was conducted that involved human impact on air accidents. Then focuses on providing training for pilots in order to reduce the risk of errors, thus bringing to life the CRM system. Training is carried out in this system were held in several sessions.

CRM program based on the provisions of JAR (Join Aviation Requirement). The definition of what defines them right is skilful and effective use of resources consisting of other employees, and its purpose was to determine demonstrate leadership and communication skills.

Based on the study on the basis of CRM applications received that only by working in a team can get a variety of performance and security. Despite the fact that every person is different and has different restrictions on the physical and psychological issues. Focusing on this, can make a mistake, the result of which there is a tragedy. It is important then to transmit specific information and focus on the individual elements that led to the disaster. Using communication and knowledge of the events that have already taken place is a chance for it to avoid future similar situations.

To be able to talk about CRM training, remember to keep the merits of the content. It contains within it about 10 topics:

- Errors caused by human, a chain of mistakes and decisions in order to avoid,
- Transport security policy,
- Stress and dominion over it,
- To absorb and process information,
- Decision making,
- Agreement and coordination between staff,
- Leadership and synergy,
- The impact of automation on the system,
- Differences in personality,
- Air accidents.

Using the CRM system resulted in improved safety. This is influenced not only the development of aviation, but also the fact that the airline industry is based on companies from different countries that work in environments that require cooperation between sectors [1].

6. Human in the face of the plane crash

The plane crash is a tragedy not only for the families of victims, but also for the entire aviation environment. Conducted the investigation, analysis and research, sooner or later, indicate the circumstances which could have been prevented or not. It is hard to find a single cause, since an accident caused by a series of phenomena. Identifies the main phenomenon causing tragedy.

In the history of aviation there have been aircraft accidents, which took place from the application of the human hand. One of the recent crash of the Airbus A320 German wings line that crashed on March 24 2015 the French Alps. According to the prosecution of French as a cause of mental disorders is given a second pilot, who after leaving the captain's cabin, preceded to the aircraft descent procedure, thereby killing all passengers [17]. A similar situation was faced in 1997, where the plane EgyptAir fell into the Atlantic after the co-pilot in the presence of the captain turned off the engine Boeing 767 machines, saying that Allah entrusted the fate of flight [17].

Another example of an accident caused by humans is the flight of Aeroflot, which took place in 1994. Here primarily to blame stupidity captain, this led to the death of 75 people, including two of their children, which are the cause of this event. The captain let them go into the cabin and pilot the machine on autopilot, not noticing that it has been turned off. The co-pilot tried to save the situation, but the plane was too low to bounce up and hit the forest [17].

To the accident can also help employees handle. One such disaster occurred over the Germans in 2002, when there was a collision of two aircraft in the air. Blamed for the event traffic was controller who serves in performing a single movement control center focused on flights less demanding attention, regardless of the situation, that have on one line two planes. Could also take into account the fact that he had problems with the radar, but in this situation should be more focus on what is happening in the air [12]. Another example of the controller fault and lead to the tragedy was the flight of the Boeing 727 which collided with a light aircraft. The event took place in 1978 and claimed the life of 144 people. It came as a result of late transmission of information to pilots that they are on a collision course with another plane, thinking that he is on view operating the machine. Small plane hook the Boeing in result leading to the fire and collapse to the ground [5].

To the disaster may also help unwell feeling pilot. This event took place at the International Air Demonstrations in

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Radom in 2007, when during acrobatic shows there has been a collision between two aircraft aerobatic team "Iron". Takes up the cause of the fact that one of the pilots who died, was elderly and was flying while under the influence of drugs for hypertension. This was resulted in a delay in response and late effects in the event of a collision. The manoeuvre was to the front bypassing airplanes flying in front of each other [4].

7. Conclusions

The role of the human factor in the aircraft industry is very important. However the term "human error" does not help in the prevention and investigation of aviation events, although it shows us where the system failed it does not tell us anything about the causes that led to the failure [8]. Safety awareness what feel a person who using air services allows them to focus on the pleasures of travel. It also affects the economy and efficiency of services. It should also be remembered above all that human supports surveillance system in air transport. Analysis of accidents and incidents allowed determining the 12 so-called causes of wrong what call dirty dozen. These include:

1. Facilities,
2. Lack of resources,
3. Pressure,
4. Stress,
5. Lack of knowledge,
6. Carelessness,
7. Distraction,
8. Lack of communication,
9. Fatigue,
10. Lack of assertiveness,
11. Routine,
12. Lack of cooperation on the team.

The purpose of understanding why people make errors is to produce safety reports and recommendations that will help prevent aircraft accidents [8].

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160 km/h on the Highway

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Abstract The speed limit on the highways of Slovak Republic is 130 km/h. It is recently considered the increase of this speed on some sections to the 1600 km/h. However this increase brings with it a substantial negative impacts. On the basis of its evaluation appears to increase this speed to 160 km/h as inappropriate

Keywords Speed limit, highway, car accident, consumption, braking distance

JEL R41

1. Introduction

The legislation allows in Slovak Republic the following speeds limits unless local treatment by traffic signs provide otherwise: 50 km/h in town, 90 km/h outside of town and 130 km/h on expressways and highways. It raises recently the question about the increase of the speed limit on certain sections to 160 km/h. It occurs in discussion the opinions that agree or disagree with this increase of speed limit. This problem can be viewed from multiple angles.

One of the basic arguments to increase the maximum speed is saving time. We compare the saving time for section Zilina – Bratislava in the length of 200 km. On this journey is on the section Trnava – Bratislava the running speed limited to 110 km/h, 50 km in length. Assume that the traffic volume is so small that the vehicle could go through the whole section at a constant speed and provided that the area is not restricted measures such as road works, the reduced number of lanes, etc. The vehicle running speed of 130 km/h needs to overcome this section the time of 1 hour 36 minutes and 30 seconds. At a speed of 160 km/h vehicle overcomes this section for 1 hour 23 minutes and 31 second. In the aim would be about 12 minutes and 59 seconds before. This time saving of one vehicle will bring also some negative.

2. Quality of Traffic

The most sections of highways in Slovakia is built as a two-lane and a cars on the straight section must drive at least the speed of 80 km/h and trucks over the 3500 kg and vehicle combinations have a limited maximum speed to 90 km/h. For the slow moving vehicles is added a third lane. Permissible intensity of traffic on dual belt without speed limits according STN 73 6101 is shown in table 1.

Table 1. Permissible intensity of traffic on dual belt without speed limits [1]

The quality level	Permitted traffic intensity outside of the village on the direction of three – lane road [vehicle/h/direction]			Permitted traffic intensity outside of the village on the direction of dual-lane road [vehicle/h/direction]		
	Ratio of trucks [%]			Ratio of cars [%]		
	0	10	20	0	10	20
A	1620	1530	1440	1080	1050	1020
B	2970	2805	2640	1980	1925	1870
C	4050	3825	3600	2700	2625	2550
D	4860	4590	4320	3240	3150	3060
E	5400	5100	4800	3600	3500	3400
F	-	-	-	-	-	-

The same standard classes level of the quality service.

Level A: Free movement of traffic low within compliance its free speed. Vehicles are not limited in its movements inside of the traffic low. Road users are very rarely affected by other participants. The gap between the vehicles is length up to 26 vehicle (about 160 m).

Level B: The movement of the traffic flow and ability to maneuver is within the traffic flow slightly reduced. The need to adapt the speed is barely noticeable.

Level C: Maneuvering of the vehicles is severely limited, changing of lanes require the increased attention of the driver. Smaller incidents in the traffic flow will resolves themselves in the partial local deterioration of movement.

Level D: Free movement speed begins to fall. Freedom to maneuver within the traffic flow is significantly reduced. All participants of traffic must bear the transport constraints because in almost every lane changes the conflict situation.

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Level E: The traffic flow moves on the capacity. It is not able disperse and maneuverability of the vehicles is quite limited. Vehicles moving at low speed, mainly in the columns. Each change of speed causes the disturbance spreading the movement of vehicles.

Level F: It is characterized by degradation of traffic flow of vehicles, such as in a car accident. The number of passing vehicles is greater than that can pass through the monitored segment.

The latest counting of traffic on the ground of the Slovak Republic took place in 2010. To determine the intensity of traffic on the highway D1 we selected counting section 87090 in Nové Mesto nad Váhom and section 87020 at Senec. Intensity of traffic shows the Table 2.

Table 2. Intensity of traffic of census 2010 [2]

Section	87020 Senec	87090 Nové Mesto nad Váhom	87120 Trenčín
Number of lanes	3	2	2
Trucks	9 267	8 592	10 115
Ratio [%]	18,38	38,91	32,72
Cars	41 114	22 081	20 797
Motorcycles	51	0	0
Together	50 432	30 673	30 912
Development index [3]	1,116		
View to year 2015	56 282	34 231	34 497
Real cars./ hour/ direction	2 345	1 426	1 437

Comparing the data in the table 2 and 1, we find that the quality of traffic is at the level of B and we can assume that at peak hours reached a level C, while the assessment is for speed 110, respectively 130 km/h. Increase in speed would lead to the deterioration the quality of the traffic and the vehicle traveling speed 160 km/h would be forced to frequently change direction and speed of its drive.

3. Consumption of the Vehicle

The road transport is one of the main emitters of greenhouse gases. The main representative is carbon dioxide CO_2. When it burns a litre of gasoline is released into the atmosphere 2.5 kg of CO_2. Not quite the last indicator is the economy. One litre of the diesel costs 1.13 €. For the comparison, we use a car with weight 1320 kg with a transmission efficiency of 91%, the size of the frontal area of 2.1 m^2, coefficient of aerodynamic drag 0.3 and coefficient of rolling resistance f = 0.011. Engine efficiency is 35 % and heat of combustion of the fuel is 42 040 kJ and density of the fuel is 0.75 kg/m^3. Comparison of the consumption shows the Table 3. We will assume again that the driver is not restricted. The efficiency of the engine remains unchanged. The consumption resulting from the sum of rolling resistance and air resistance.

3.1. Air Resistance

Unless the vehicle is moving, always is present the air resistance. Its size can be determined using the following equation:

$$O_v = \frac{1}{2} \cdot \rho \cdot v^2 \cdot c_x \cdot S \qquad (1)$$

Where,
v – a speed of the vehicle [m/s],
c_x – coefficient of air resistance [-],
S – the size of the frontal area [m^2],
ρ – instantaneous air density [kg/m^3]. Providing immediate air density corresponding to the particular conditions we can calculate using the following equation:

$$\rho = \rho_n \cdot \frac{273}{273 + t} \cdot \frac{p}{p_n} \qquad (2)$$

Where,
ρ_n - air density at the temperature 0°C and pressure 0.101325 MPa. Under these conditions achieves the value 1.29 kg/m^3,
t - the actual temperature of the air [°C],
p - the actual pressure of the air [MPa],
p_n - the normal pressure of the air [0.101325 MPa].
This indicates that the size of the air resistance changes proportionally with the speed of the travel and the pressure and inversely with the temperature.

3.2. Rolling Resistance

It is the second driving resistance which is always present as long as the vehicle is moving. The size can be determined using the following equation:

$$O_f = f \cdot m \cdot g \cdot \cos\alpha \qquad (3)$$

Where,
m – the weight of the vehicle [kg],
g – the acceleration due to gravity [9,81 m/s^{-2}],
α – the angle of runner plane [°],
f – the coefficient of rolling resistance [-]. It varies with the speed using the equation:

$$f_v = f \cdot \left[1 + 0{,}0065 \cdot (V - 80)\right] \qquad (4)$$

Where,
f_v - the coefficient of rolling resistance for calculated speed,
f - the basic coefficient of rolling resistance,
V – the calculated speed [km/h].

Table 3. The vehicle consumption and emissions

Section	Trnava - Bratislava	Žilina - Bratislava	Žilina - Bratislava
Speed [km/h]	110	130	160
Length [km]	50	150	150
Air resistance [N]	381	532	806
Rolling resistance [N]	170	189	217
Consumption [litre]	2.77	10.89	15.45
Price [€]	3.134	12.305	17.459
Produced CO2 [kg]	6.935	27.223	38.625

Such ease of comparison it can be shown that the increase on speed limit can caused increasing costs to consumption of 5.145 € and it will produce about 11.02 kg of CO_2 over at a speed of 130 km/h. The difference would be ever higher in the practice because the vehicle travelling speed of 160 km/h, in view to traffic situation, it had to brake repeatedly and accelerate again.

4. Connecting the Combinations of the Vehicle

Motorways in Slovakia are constructed as two-lane and under the legislation outside village is the driver required to drive in the right lane, unless it does not prevent the obstruction or traffic congestion. It means that the vehicles driving with the speed 160 km/h could drive in the right lane. To the continuous lane want include also the vehicles from the connecting strips from petrol stations, car parks or roads of lower classes and of course trucks and road trains. It needs to increase its speed in the connection traffic lane and its maximum speed is 90 km/h. According the tests carried out by the magazine Trucker 40 toned combination with the trailer Mercedes Actros 1842 needs to accelerate from speed of 60 km/h to 85 km/h the time 28.9 seconds. During this time passing combination of about 400 m, while the vehicle approaching at a speed of 160 km/h will pass 1270m. Don't limit the vehicle, the driver of the vehicle combination would have to monitor the situation behind the vehicle at a distance of 870m and it is impossible using thought mirrors.

5. Overtaking

Legislation commands slowly riding driver to give way to faster vehicles reassignment to the right lane. Vehicles able to run at a higher speed result in a range of vehicles run at a speed of 90 km/h. When vehicles want to continue in driving at a higher speed they would have to increase its speed. A vehicle with an engine power of 125 kW would increase the speed to 110 km/h took six seconds and to 130 km/h 10 seconds. It does not become an obstacle to sudden vehicle running at a speed of 160 km/h, the driver of vehicle would have to keep overview on the road at the distance of 267m, respectively 444 m. On the motorways is also moving the vehicles with less powerful engines and buses which also have the opportunity to overtake slower cars. Clearly, any such maneuver is associated with risk.

6. Braking Distance

According to valid legislation the driver may only drive at a speed that was able to stop the vehicle on the distance to which he has sight. In this area occurs a significant shift. The tires ability to transmit power varies with speed, see Fig 1, where μ_p superior adhesion of tires and μ_s is adhesion of tires at 100 % slip. Based on the achieved parameters of the adhesion of tires on asphalt, while simplyfying, at speed above 100 km/h will not fall the adhesion of tire, we can compare the braking distance of the vehicles. At a speed of 130 km/h will the braking distance of vehicle 88,61 m and from the speed 160 km/h will increase the braking distance of vehicle at 141.25 m, what is 1.594 times. If we made this comparison for loved wheels, the braking distance of vehicle from the speed 130 km/h would be 144.47 m, but from a speed of 160 km/h will be up to 300m, which is 2.077 times. Comparison of braking distance spee aks a clear language.

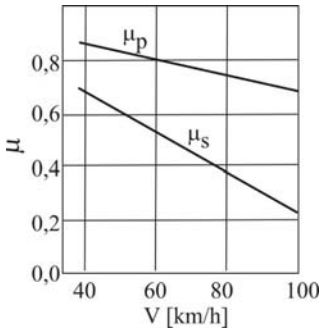

Figure 1. Change of the tire adhesion on the asphalt surface [5]

Compare the required braking distances of vehicles in the event, that the driver of bus would make a mistake and he will rank in front of oncoming vehicles. Buses are allowed to drive a speed of 100 km/h. We must also consider with the reaction of the driver 1 second. To slow down the speed of 130 km/h the vehicle needs the distance 77.08 meters, from a speed 160 km/h this distance to 138.83 meters. As to the driving speed on the highway accessing EU countries is evident from the table 4.

Table 4. Speed limits in km/h [6]

State	Build up area	Outside build up area	Motorway
Belgium	30 - 50	90 - 120	120
Bulgaria	50	90	130

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Czech	50	90	130
Denmark	50	80	130
Germany	50	100	(130)
Estonia	50	90 - 110	-
Ireland	50	80 - 110	120
Greece	50	90 - 110	130
Spain	50	90 - 110	120
French	50	80 - 110	110 – 130
Croatia	50	90 - 110	130
Italy	50	90 - 110	130
Cyprus	50	80	100
Latvia	50	90	110
Lithuania	50	70 - 90	110 – 130
Luxemburg	50	90	110 – 130
Hungary	50	90 - 110	130
Malta	50	80	-
Holland	50	80 - 100	130
Austria	50	100	130
Poland	50 - 60	90 - 120	140
Portugal	50	90 - 100	120
Romania	50	90 - 100	130
Slovenia	30 - 50	90 - 100	130
Slovakia	50	90	130
Finland	40 - 50	80 - 100	100 – 120
Sweden	50	70	110
Great Britain	32 - 48	96 - 112	112

Notes: GB, IE, CY a MT traffic drives on the left of road. It drives in others member states on the right side (Sweden from 3.9. 1967). The values in the GB are given in miles per hour. The table refers in the column "outside build-up area" speed limit on dual carriageway, which is not motorway.

Speed limits:
GE: Motorways: No general speed limit, recommended speed limit is 130 km/h (More than half of the road network has a maximum speed of 120 km/h or less).
FR: Dual carriageway 110 km/h. If the path is wet: highway 110 km/h, dual carriageway 90 km/h, in other un-build area 80 km/h.
IT: 150 km/h on certain motorway 2x3 if the operator so requests.
FI: In winter 100 km/h on motorways, 80 km/h on other roads.
PL: Build-up areas: 50 km/h from 05 hour to 23 hour, 60 km/h from 23 hour to 05 hour.

7. Conclusions

From previous results is apparent that allow the running speed 160 km/h on the roads of Slovakia is inappropriate thought. It would significantly increase the risk of serious traffic accidents at high speeds. Unsuitability to increase the risk of accidents is also evident from the fact that on the roads of Slovakia in the last two years has been arise in the number of fatalities.

Table 5. The number of fatalities per year 2013

Order	State	Number of fatalities 10 mil.person/ km
1.	Sweden	24
2.	Great Britain	28
3.	Holland	33
4.	Denmark	36
5.	Germany	37
6.	Ireland	40
7.	Finland	40
8.	France	41
9.	Slovenia	50
10.	Spain	53
11.	Italy	55
12.	EU	56
13.	Austria	61
14.	Luxemburg	66
15.	Belgium	66
16.	Estonia	72
17.	Cyprus	74
18.	Latvia	77
19.	Portugal	78
20.	Malta	79
21.	Greece	91
22.	Slovakia	92
23.	Czech	101
24.	Hungary	114
25.	Bulgaria	117
26.	Croatia	141
27.	Latvia	153
28.	Poland	158
29.	Rumania	232

Equally inappropriate is the introduction this speed also in terms of increased production of greenhouse gases. Consider this speed is only possible to fully fledged tree-lane sections where would be the last lane reserved for driving at over 130 km/h. If the Slovak driver is sufficiently prepared for increased travel speed shows the Table 5 too, in which is stated the order of states based on the number of killed people in car accidents, calculated on person/km. This indicator best reflects the intensity of use of the vehicles.

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Value Chains as the Tools for Differentiation of Offer in Services

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Abstract Customers are generally characterized by having different requirements in selection from the product offer. They are interested in the so-called differentiated offers on the market because the differentiation of services is based on providing higher added value to the customers in comparison with competitors. One of the ways of possible solution is the use of value chain which enables company to find the opportunities to differentiate its product portfolio. The value chain can be used for finding the sources of differentiation and suitable placement in a customer value chain, for identifying a way to create the value of competition as well as for ensuring of the most profitable placement in supply and distribution value chains. Contribution focuses on the possibility of using diagnostics of value chains in services and it also presents a draft sequence of the diagnostic phases applied in the evaluation of activities/processes contained in the value chains. An important part of this contribution is connected with the ideas about the completion of traditional value chain with virtual value chain. It presents the proposals to discussion which should currently integrate the virtual world of information into further value chains of service company activities.

Keywords differentiation, value chain, company activities, customer requirements

JEL M31, M00, L89

1. Introduction

Services provided by different service companies in a competitive environment (sector competition) cannot be often mutually different. Then the customers consider an offer as equal and they are not interested in a provider of the service but they follow the price. Differentiated marketing offer, delivery (dispatch) conditions, image of service provider, specific traditional or online communication are the alternatives to the price competition.

2. Solution analysis of objective issue

Kotler (1998) emphasizes that the offer of service provider should be markedly different from the offers of competition. The customers expect the service enriched with its further properties and they look for an innovation of the service. The main problem of service provider that wants to be different is that the innovations in this sector can be quickly copied and imitated. Company can differ from competition mainly by the quality of provided services in all its parameters (e.g., quality of human resources; formation of more attractive environment where providing of services takes place; higher standard of perfection in ensuring of processes connected with providing of services in comparison with competition; change of image by means of used symbols and marks which will help to differ the service offer from competition; orientation to customer requirements and so on. [1]

Payne (1996) has a similar attitude towards the objective issue like Kotler. He points out at dependence of marketing service offer towards company abilities to differ from competition by providing a higher added value to their customers. According to Payne the higher added value is expressed as the difference between the overall consumer value and overall consumer price. The overall consumer value includes the value of service, value of product, value of employees and value of image. The overall consumer price is created by self-calculated price but there is also a connection with time consumption, mental effort and amount of energy used by customers in realization of service. The customers carry out their buying decisions in services following the added value where they compare the price, value and quality which are provided to them. We can say that the customers evaluate the price, value and qualitative aspects of a product when buying a desired service. [2]

Lesáková (2008) says that the differentiation cannot be understood on a level of the whole company because the differentiation rises from the specific activities realized by the company and from the influence of these activities on customers. The differentiation grows out of a company value chain and the author understands a potential source of uniqueness in any value-creating activity. She inclines to the opinion that the differentiation can also rise from the factors situated on a way between the service company and customers. A strong source of the service company uniqueness could be distribution channels, after-sales services, information for customers, professionalism of contact employees (first line employees) and other factors. [5]

In 1992 Porter suggested the use of value chain (Figure 1) as one of the tools for achieving the higher added value. He considers the value chain as the tool for identification of the way for differentiation of the product by means of value. The activities of value chain are divided into two groups: basic activities (supply, sale, marketing and sales, services) and supporting activities (infrastructure, management of human resources, technological development and acquisition). The supporting activities are performed throughout all basic activities and they have an integrating function. Basic activities can be further divided. E.g., „marketing and sale" can be further decomposed into marketing communication, management of sales effort, own sales and so on.

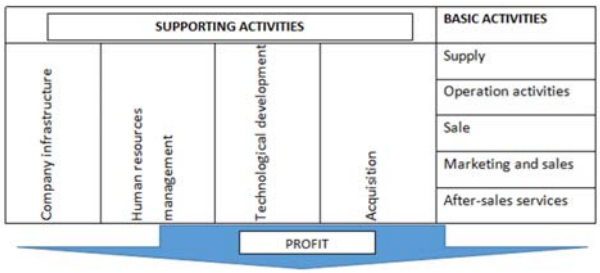

Figure 1. General concept of value chain (Source: PAYNE, A. Marketing služieb. Praha: Grada Publishing, 1996. ISBN 80-7169-276-X, 163 s.)

This general value chain can be used even for the service companies. However for the service companies it is recommended to use a specific value chain for individual service sectors. [2]

The differentiation issue is actual on a long-term basis. This fact is proved by the Porter`s works who confirms that the service company competitive advantages are created mainly by the value. In contrast to the competitors, the company can create this value for their customers and the value exceeds the expenses of the company for formation of this value. Thus the differentiation is markedly based on the attributes of difference, uniqueness and inimitableness of provided services. Uniqueness of provided service moves the company (differentiator) to a leading position among the competition. In this case the price should reflect the value of difference attributes of provided service for which the customers are willing to provide an exact specified counter-value (pay the price). Differentiator in relation to the competition creates a challenging and innovative competitive environment. Its consequence causes enhancement, variety and diversity of the market in a given segment. [3]

3. Aim of Contribution

The aim of the contribution is to present one of the possible approaches to the differentiation of marketing offer in services. This approach is based on the use of value chains as the tools of strategic marketing in services. Through diagnostic methods of value chain it is possible to identify the service company activities. These activities lead to the differentiation of offer in comparison with competition and they also lead to increase in value/benefit of service provided to the customers. The contribution refers to the possibility of applying diagnostics of objective activities. This has eventuated into the identification of such activities that support the value for customers. It includes the ability to learn, existence of mutual synergy of activities, use of effective procedures for formation of key competences, expressive demonstrations of creativity, production of inventions and subsequently innovations in service company.

4. Material and methodology of contribution

The results presented in this contribution were reached:

- on the basis of substantial excerption of theoretical approaches to given issue;
- by analysis of current state in the area of differentiation of offer in service sector;
- by formation of the value chain as the tool for structural analysis with aim to identify activities/processes leading to the differentiation and increase in value for customer and
- by synthetic methods for processing of draft sequence of diagnostic phases applied in evaluation of activities/processes contained in value chains.

5. Results of solution

The current state analysis realized on the base of secondary sources in accordance with the opinions of significant professionals has referred to the particularity of direct and indirect company activities. From this reason it also has referred to the particularity of value chain whereby the value chain diagnostics is at the same time the diagnosing process of all company activities. The ICT sector was chosen for an introduction of frame example of solved issue formation.

5.1. ICT Sector (sale and operation of computing technique)

A company from this sector can produce and directly sell the computing technique, provide a professional consulting in subjective area and provide a trading platform for internet users. Realized activities, their structure and mutual

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connection are influenced by basic company functions. In company the production factors are transformed into the goods and services whereby the combination, coordination and assurance of different activities must be ensured. Several activities must create the value so that the result of one activity will provide higher value in comparison with the value of all used production factors. This value is then realized by means of fulfilled turnover on a downstream market. The way in which all the factors are involved in a profit of a whole company is possible to identify and subsequently diagnose by means of the frame scheme in the picture 2. [4]

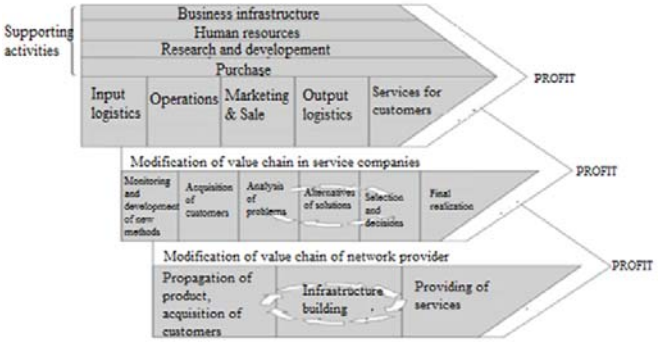

Figure 2. Modification of value chain in conditions of service companies (Source: TOMEK, G. - VÁVROVÁ, V. Střety marketingu. Uplatnění principu marketingu ve firemní praxi. Praha: C. H. Beck, 2004. 20 s.) [5]

Figure 2 refers to (in contrast to Figure. 1) different structure of value chain. This chain is created and its process is diagnosed in service company conditions of selected sector. From this diagnosed chain it is obvious that an intention of the company is to diagnose the problems of customers and their therapy (solution) within the company possibilities. A choice and a combination of sources for prevention or removal must be adapted to individual problems. These activities are accompanied with a high degree of uncertainty, integration and individuality. The formation of state diagnosis in comparison with competition and adoption of arrangements based on effectively selected therapy are not based on organizational and functional approach to division of company activities, responsibilities and time frames. Important activities that need to be improved and innovated are activities that are significantly connected with the possibilities to reduce costs and those that show a high potential of differentiation from the customer point of view. It means that diagnosing leads to: identification of places and reasons of costs (through the right therapy it is subsequently possible to define the approaches for their reduction) and •identification of value activities which lead to increase in customer benefit.

In other words, we can say that a big advantage of value chain diagnosing with aiming at customer satisfaction and support of company competitiveness is increase in the costs knowledge of company employees at all management levels and initiation of sensitivity to customer needs on the part of all company employees. [6,7]

6. Proposal of sequence of diagnostic phases applied in evaluation of activities/processes contained in value chains

Within the frame of the application of diagnostic approach to the differentiation of offer services it is important to diagnose all primary and supporting activities that are realized within the value chain. Therefore it is necessary to multistep decompose these activities/processes into partial processes of the first up to nth degree and subsequently to fulfil the sequentiality of individual diagnostic phases which should be:

- selection of the behaviour characteristics of selected object of diagnostics (process, partial process contained in the value chain);
- selection of a diagnostic method and formation of improvement model or more precisely an achievement of exceptionality (in comparison with competition) for expressing the basic characteristics of behaviour of diagnosed object (e.g., benchmarking);
- formulation of tested criteria;
- description of development and state of diagnosed object (process, partial process contained in the value chain);
- realization of diagnostic test (identification of different expressions compared to competition); application of comparison of diagnosed object with testing criterion of diagnostics (process, partial process contained in the value chain);
- diagnostic analysis (realized through some diagnostic method, e.g., through so called home quality);
- diagnostic synthesis (formulation of so called diagnosis with determination of urgency of changes, priorities and so on);
- complex evaluation of diagnostic findings and proposal of therapeutic interventions into the process/partial process contained in the value chain for achievement of uniqueness and differentiation from competition connected with increase in benefit/value for customer.

It is supposed that the result of diagnostic process, among other things, will be the evaluation in comparison with competition:

- learning abilities of diagnosed service company (learning organization),
- degree of mutual synergy of activities/processes and sub processes in value chain,
- system and level of formation of key competences,
- rate of creativity and innovative ability of company, including intensity of slowing and supporting forces in innovative processes in service company.

Exactly these aspects of objective issue have the qualifier „value-creating“ and they are related to the company as a whole.

5. Discussion

The stimulation for discussion on objective issue can currently be the area of complement of existing approaches to the formation of value chains. It deals with the so called virtual value chains because the service companies compete in two worlds: in physical world – visible, „touchable“and in virtual world of information. This virtual world provides an opportunity to penetrate into the world of e-commerce as a new centre of value formation. New informational market place is considerably different from the physical market. In buying electronic services with the use of market place in form of virtual way there are services in form of digital information which are provided through information channels. E.g., banking services sector is characterized by the fact that banks provide services to customers in their branches but also through electronic online services; in the sector of transport and transfer services e.g., airlines sell airplane tickets "in place" and also in virtual space; fast food services receive orders directly in the restaurants and more often online – via the touch screen computers.

Service companies therefore need to create the value in physical world but also in virtual world. It is necessary to bear in mind the fact that the processes for the value formation are not equal in both worlds. Understanding of differences and harmony between the processes with added value of physical world and informational world will help to see more clearly the strategic problems of service companies at the present time. A proper understanding of the two interacting processes which create the added value for the customer brings new conceptual and tactical tasks.

In the past academicians, consultants and managers already dealt with the process of value formation in physical world (contribution deals with it in introductory sections). Through the analysis and diagnostics of value chain managers were able to innovate their internal and external processes leading to improvement of efficiency and effectiveness. Formation of the virtual value chain through which a company integrates the information that are necessary for ensuring of processes in value chain provides managers with a possibility to "see" these information flows in value chain from the beginning to the end.

The impulse for discussion can be the fact whether the model of value chain works with information as supporting elements of processes creating the value chain for customers or whether this information is the source of the value itself. In the services sector we can find a lot of examples when managers often use information about inventory, production, and logistics. They also use them to monitor and control these processes but rarely use this information for creating new value for customer. As a positive example we can mention e.g., some companies doing business in postal sector. These companies allow customers to track the shipments through internet over a period of entire relocation process and this has created new added value for the customer. It has also initiated the effect of increasing customer loyalty in the highly competitive market.

The aim of our further research in the area of services differentiation is to examine how to engage the sequence of five activities (obtaining, organizing, selection, synthesis and dissemination of information) into the formation of added value for the customer in any phase of virtual value chain.

6. Conclusion

If the value chain is substantially considered as the tool of strategic marketing which identify how the activity/process can be the source of services differentiation in service company and contribute to achievement of competitive advantage then the diagnostics of this value chain can play an important role. The current perception of preventive or subsequent diagnostics has led to defining of „healthy“ and „sick“, states and processes that threaten successful existence of diagnosed subject. Diagnostic approach that is applied in service companies in processes of value formation for customer is moving to environment of competitive comparison. Compared to ordinary, in practice used procedures our suggested procedure for realization of individual diagnostic phases will „examine“ the whole value chain and through the diagnostic tools (e.g., benchmarking) the individual processes and sub processes will be evaluated in comparison with competition. Subsequent therapy will aim to obtain competitiveness, uniqueness and innovation in providing value for the customer. It will also aim to attract new customers and strengthening of the loyalty of existing customers.

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