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The aim of the *Creative and Knowledge Society* journal is to be recognized worldwide as one of the leading forums of discourse for human creativity, extending across different disciplines, whilst providing substantial contributions ranging from scientific research to innovative approaches addressing new, controversial, and potential developments at the interface between creative society and related fields. The journal's central idea is to en- able great variety of ways how to challenge, facilitate and protect potential in creative and knowledge society.

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The journal welcomes high-quality contributions concerning interdisciplinary concepts in a form of integrative literature reviews, and original submissions concerning topics encompassing creativity and knowledge transfer.

Articles are welcomed from all parts of the world. If possible, article should demonstrate theories, report empirical and analytical research, present critical discourses, apply theo- ries to case studies, and set out innovative research methodologies.

The journal publishes two issues annually; one in the spring (July) and one in the fall (December).

The journal publishes independently peer-reviewed original full-length research articles, review articles and book reviews.

All views expressed in the *Creative and Knowledge Society* journal are those of the authors only and do not necessarily represent the views of the Pan-European University, the Editorial Board, the staff, or any associates of the journal.

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The impact of construction on air pollution in the EU

Petra Romaniaková

Abstract

This paper is focused on impact of constructions to the air pollution in European Union. Construction is very important part of the economy of all countries of European Union. Constructions have a big impact to the economical growth and for the well fear of the country. The high use of energy, which got from fossil sources, is the negatives of constructions. The production of the emissions and the waste are negative effects of constructions too. The relationship between the increasing of constructions and the increasing of higher air pollution is proven. In this paper we note that in the environment policy is the European Union very active, what we can see in increasing of air pollution. This strict environmental policy is for European Union typical for more like 25 ears. The positive effects on the better environment shows, that this trend is necessary to hold for next time. The elimination of negative effects of constructions is very expensive for the poor countries. The environment, which is the base for our life is much valuable. So it is necessary to minimize the consequences of the waste, which is produced in industrial production, agriculture and in constructions too.

Keywords: *Air Pollution, Economy, Construction, Environment*

JEL Classification: *Q50, Q53, Q56*

Introduction

The construction in the European Union (EU) represents an important section within the economic development. It offers job opportunities in the employment sphere as well as development possibilities for the investors. Due to the sensitivity to changes in investors' behavior, the construction is used to gauge economic development of a country. Building achievements serve as an indicator

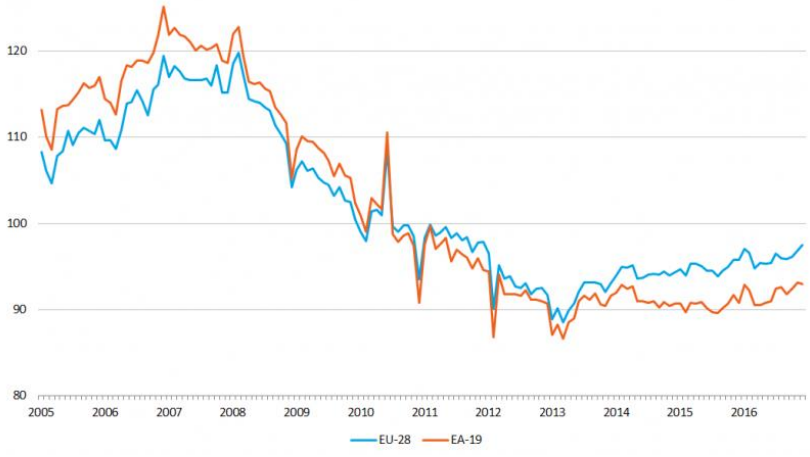
of conjunctive economic development due to its multiplicati on effect on other sectors.

However, the construction has a bearing on increased consumption of various kind of fossil energy and the production of various emissions and waste. Clean air does not harm flora, fauna or man. However, the use of technology and machinery acts as an air pollutant.

The Construction as an Economic Sector

The construction economy represents an important part of national economy. We are referring here to a system of various factors of production that is linked by relations. The relations are between individual factors as well as with the external environment. (Gádoši, 2013). Construction is specific by an individual character of production. Some characteristics are different, some similar mainly to industry. (Trávnik I. et al., 2003). It differs from other economy sectors by various specifics. These include mainly a varied length of production cycle, various terms of financial liabilities, dependence on climatic conditions, mobility of building locality, fluctuation of workers, individuality, large volume of processed material, etc. (Kopčeková, 2006). The construction sector in the European Union provides 18 million of jobs and contributes 9% to the GDP of the EU. (Construction, 2017)

According to ex-President of the Federal Institute of European Construction (FIEC) Jacques Huillard, building and infrastructure investments create economic growth and jobs. He stated that on this premise, the European construction industry is able to offer solutions for main global challenges in respect of energy efficiency in built-up areas, source effectiveness and sustainable infrastructure as well in the area of climate changes (FIEC, 2013).



Source: Eurostat, 2017, *http://ec.europa.eu/eurostat/statistics-explained/index.php/File:EU-28,_EA-19_Construction_output,_m,_sa,_2005-2016.png*

Graph 1 ***Production of Construction sector in EU-28 and EA-19 between years 2005 –2016***

The graph Nr.1 shows development of constructions in Europe. In the end of year 2006 it increases, but in the time of economic and financial crises in year 2008 it began decrease very quickly. In years 2008-2010 loose the whole index more than 30 percentage points. In years 2013-2014 we can observe a slow began of increasing in constructions production, but the production of the sector was only 80% of the maximum in precrises time (Eurostat, 2017).
On the data from Eurostat for 1st quarter 2017 we can observe, that the production in constructions in Euro zone decrease about 0,7% and in European Union about 1,1% (Eurostat, 2017).

The president of FIEC Joan- Louis Marchand told that after the minimal level of activities in constructions in the year 2013, the constructions become healthier. FIEC data shows, that the activities in constructions in European Union in 2016 increase on 2,2% and the expected increase in 2017 is about 2,2% too (FIEC, 2017).

The Environment

The environment is a concept encompassing all living and non-living things that exist on the Earth. We distinguish the concept of environment according to the following components: complete ecological units, universal natural resources and physical effects. The complete ecological units function as natural systems without massive interference by man including all vegetations, animals, microorganisms, soil, mountains, atmosphere and natural events that occur within their boundaries. Universal natural resources and physical effects that include air, water and climate, energy, radiation, electric charge and magnetism, events not generated from human activities that do not have exact boundaries. However, the natural environment is in direct contrast with built-up environment that consist of areas and components strongly influenced by people (Environment, 2016). It is possible to refer to the environment from mathematical viewpoint as a set of elements that are organized and have interactive relationship. In relation to the degree of interaction with the surrounding environment, we refer to an absolutely closed system with no connection with the surrounding environment; and open systems that have considerable large connections with their environments. Hence, we are referring to a complex multilevel system that is created by physical, chemical and biological environment. Social environment is also part of it where a man exists and realizes his needs. The environmental elements do not affect the individual in isolation but in combinations. This affects the health, work and the overall quality of individual's life (Baráthová, 2012).

Among the factors threatening the environment and changing the character of a country we include external and internal processes as well as the effect of man. In respect of dynamics of natural processes or effects we can see events of a turning effect as for example tectonic disruptions, volcanic activity, cyclones, iceberg movements, etc. In terms of the human factor we refer to negative influences on environment caused by people whether industrial, agricultural, building activities, etc. For example chemicalization, radioactivity, air pollution

and atmosphere. In relation to the atmosphere, interesting is the use of air by a man that is on average 20m3, i.e. approximately 15kg per day. It is clear that this air should be without harmful substances that are reducing its quality and thus the quality of man's health. (Baráthová, 2012). However, if we want for our world to create healthy environment for our life, it is imperative that we minimize the negative effects of waste that is generated due to industrial production, agricultural production, construction or due to technological progress.

The Effect of Construction on the Environment

Currently, there is a great expansion in the construction activity. Building occurs at nearly every corner. It is a positive occurrence from the economic point of view. In terms of environmental point, we are talking about a waste connected with this activity that has negative impact on the environment.

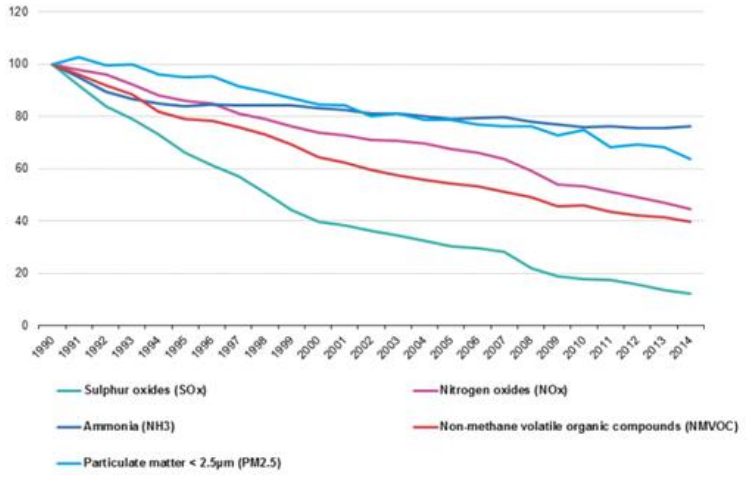
The rise of harmful emissions is induced mainly due to industrialization and increase of mechanization. The construction activity itself does not only result in excessive noise, aftershocks and vibrations but also in lots of exhaust emissions from construction machinery and building transport. It results in excess of admissible limits of exhalants that are allowed in the proximity to constructions. The pollutants are released into the air also during demolition works when using explosives. It is about a mix of aerosols. They have similar composition to the ones in the exhaust gasses and encompass a large ratio of nitrogen. Equally large amount of dust emission of up to several tons is generated during demolition works. The dust nuisance concentration reaches a distance of over a kilometer in the proximity of the demolition location. The construction's share of air pollution is 25%. It causes the pollution of the surface water and, at some places, the ground water. The pollutants are various chemical noxious agents that are washed away from the construction sites into the water; from improper cleaning of machinery; or noxious agents that seep into the water due to broken hermetically sealed coverings or containers. Another negative factor on environment is the fact that there are excessively large areas covered by construction activities and temporary construction haulage. The town's transport system gets disrupted. At the same time occurs the visual interference with the surrounding area due to material storage, dust, mud and disarray. Apart from negative issues mentioned above, the construction activity contributes to an increased risk of road incidents and accidents. It is possible to eliminate the negative effects of construction by elaborate work processes, production and assembling instructions.

In order to assess the ecological interaction and environmental effect on the environment, we need to observe the whole cycle of building. Just like the eco-system parts are mutually interlocked and dependent, so is the construction. It is dependent on industrial progress, people, natural resources as well as on the eco-system. The life-cycle of construction is of relatively long duration. However, during this time it affects its surrounding, i.e. environment, negatively. The aim should then be to create ecologically effective buildings that would have only minimal negative effect on environment during their construction and/or demolition. This depends largely on the resources used for development and

on the energy sources that are required for its execution. Large consumption of natural resources and energy produces massive amount of waste. This waste is accumulated in the eco-system and it creates large amount of emissions. The result of this negative activity in construction is the occurrence of the greenhouse effect, global warming and overall contamination. This leads to accumulation of CO2 in the atmosphere due to destabilization of the carbon cycle. It leads to the rise of average global temperature. The construction activity represents one of the main source of formation of these emissions. The level of the negative effect is different in various regions. The production of CO2 happens mainly by burning of coal and crude oil. The emissions released into the atmosphere in the form of gasses contribute to the rise of the greenhouse effect. The Nitrogen oxide in combination with water results in Hydrogen nitrate that gets into the soil in the form of acid rain. The Nitrogen emissions are also generated during transport construction by cars. Sulfur oxides are also a by-product during production of building materials, e.g. steel, copper, bricks and cement. (Zaťková, 2012).

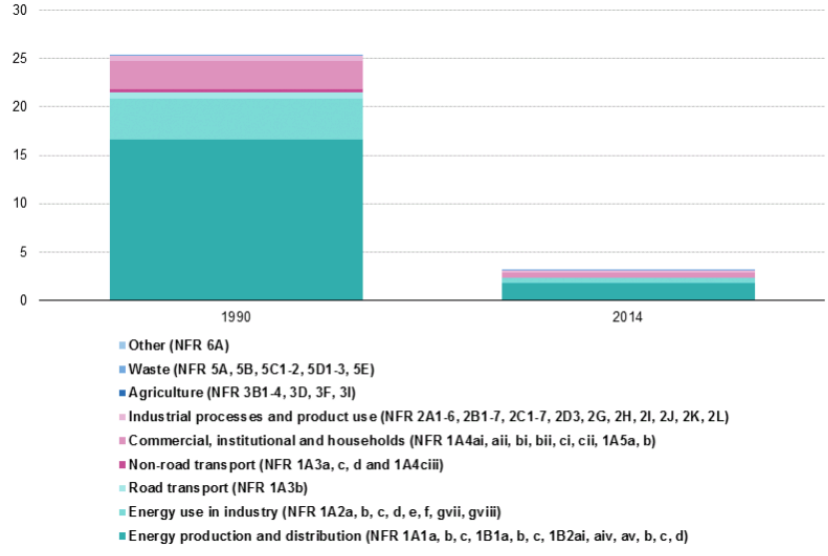
Development of Air Polluting Emissions in the Countries of EU – 28

The most current data from 2016 in the Eurostat database indicate the most important pollutants in the EU that include Sulfur oxide (Sox), Nitrogen oxide (NOx), Ammonia (NH3) and Non-methane volatile organic compounds emissions (NMVOC) (PM2,5). The pollution by these substances represents serious health risks. The eco-systems in Europe are affected by an acid deposition of excess compounds of Sulfur and Nitrogen. These substances are being released into the air by human activity mainly during fuel combustion. Due to measures in respect of environmental policies, the emissions of environmental pollutants in Europe have considerably dropped in the last 25 years. We can observe the emissions of environmental pollutants in the EU countries in illustration No 1. The illustration No 2 shows the comparison of emission of Sulfur oxide according to industry sources.



Source: Eurostat, 2016, *http://ec.europa.eu/eurostat/statistics-explained/index.php/File: Figure-1-Emissions_of_air_pollutants,_EU-28,_1990-2014,_Index_1990%3D100.png*

Graph 2 ***Emissions of air pollutants, EU-28, 1990-2014***



Source: EUROSTAT, 2016, *http://ec.europa.eu/eurostat/statistics-explained/index.php/ File:Figure-1-Emissions_of_air_pollutants,_EU-28,_1990-2014,_Index_1990%3D100.png*

Graph 3 ***Emissions of Sulfur oxides according to industrial sectors in millions of tons, EU-28, 1990 and 2014***

According to the Graph 2 the most significant decrease was recorded by the Sulfate oxides (SOx), by 90%. Non-ethane volatile organic compounds (NMVOC) decreased almost by 60%. Emission of nitrogen oxides (NOx) dropped

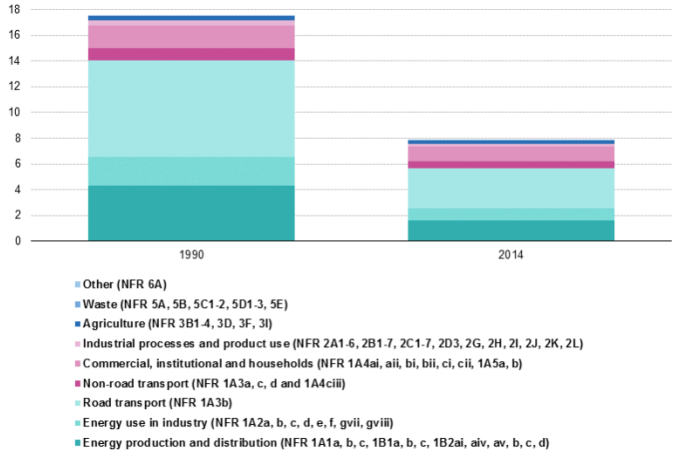
more than a half and emissions of particular matters (PM2.5) decreased approximately by 1/3. The least decrease was recorded by Ammonia (NH3), by ¼.

Graph 3 is showing the comparison of the Sulfate oxides emissions between 1990 and 2014. This substance was polluting the EU-28 the most. The decrease is significant as in 1990 it was 25.4 millions of tons, while in 2014 it was already 3.1 millions of tons.

Due the political actions the greatest emissions reduction was in the production and distribution in the energy sector (14.9 millions of tons less). The transition from high sulfur fuels to low sulfur fuels such as natural gas helped a lot to decrease the emissions as well as gas desulfurization techniques in industrial installations.

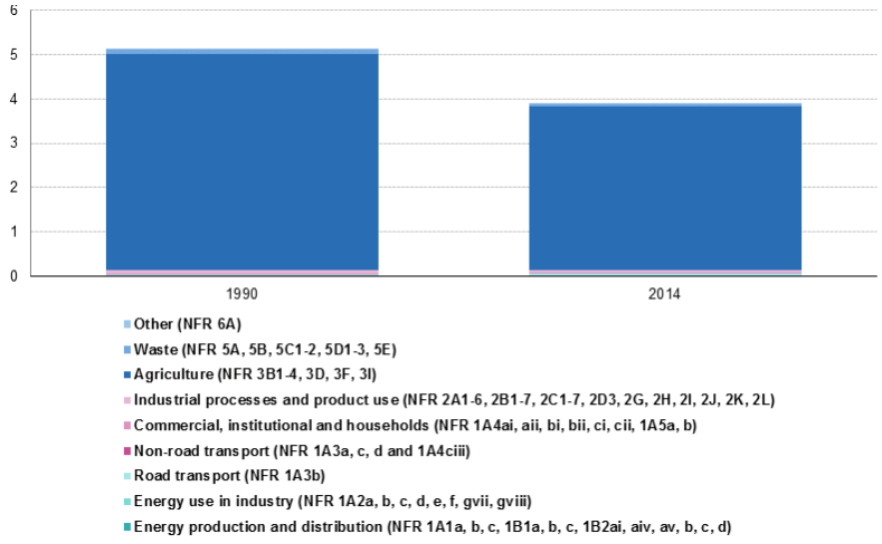
As previously mentioned emission of nitrogen oxides dropped in EU by 50 % (Graph 4) most noticeable in road transport, which is one of the greatest contributors of the air pollution. The decrease is the result of car catalytic convertors built in the cars.

The emissions dropped by 2.7 million of tons in the production and distribution of the energy sector after modernization of the technologic processes and fuel transition from solid to gaseous. Ammonia emission did not drop as significantly as other polluting substances due agricultural fertilization processes. Non-methane volatile organic compounds (NMVOC) decreased almost by 60% (Graph 5) and emissions of particular matters (PM2.5) decreased approximately by 1/3 during 25 years as represented on the Graph 6.



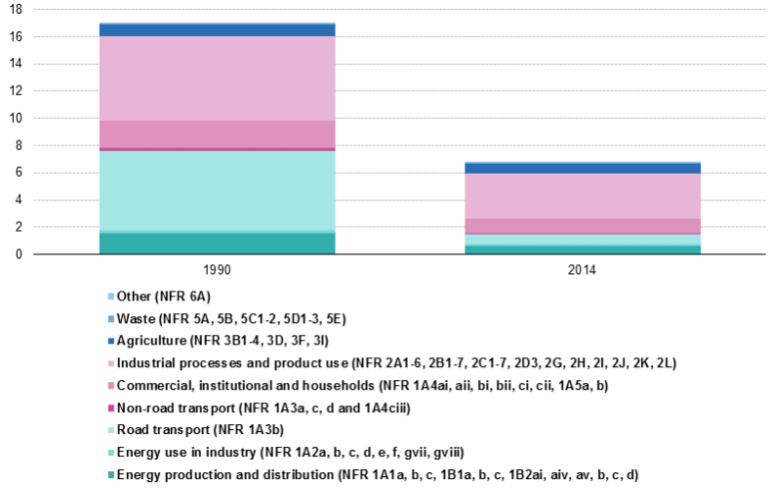
Source: EUROSTAT, 2016, *http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Figure-1-Emissions_of_air_pollutants,_EU-28,_1990-2014,_Index_1990%3D100.png*

Graph 4 ***Emission of nitrogen oxides according to industrial sectors in millions of tons, EU-28, 1990 and 2014***



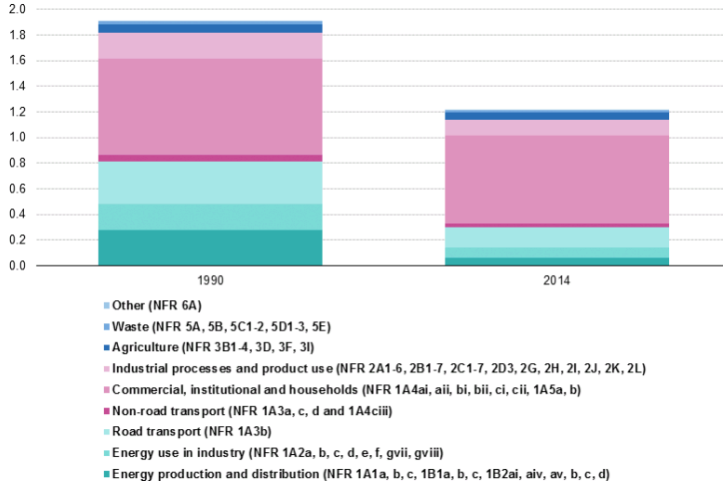
Source: EUROSTAT, 2016, *http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Figure-1-Emissions_of_air_pollutants,_EU-28,_1990-2014,_Index_1990%3D100.png*

Graph 5 ***Ammonia emissions according to industrial sectors in millions of tons, EU-28, 1990 and 2014***



Source: EUROSTAT, 2016, *http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Figure-1-Emissions_of_air_pollutants,_EU-28,_1990-2014,_Index_1990%3D100.png*

Graph 6 ***Non-methane volatile organic compounds emissions according to industrial sectors in millions of tons, EU-28, 1990 and 2014***



Source: EUROSTAT, 2016, *http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Figure-1-Emissions_of_air_pollutants,_EU-28,_1990-2014,_Index_1990%3D100.png*

Graph 7 ***Emissions of particular matters according to industrial sectors in millions of tons, EU-28, 1990 and 2014***

Emissions – Carbon Trading

Regulations exist within the European Union (EU) for the support of carbon trading in EU. Member states have reported more complete data in the evaluation that was published by the European Agency for Environment on 19 May 2017. However, there is still a room for improvement in the area of monitoring and notification. The evaluation identified areas of success in implementation of EU directives in respect of carbon trading from 2015. Among these are utilization of certain flexible possibilities aimed at reduction of red tape, integrity of plans for sample collection aimed at better determination of emissions, use of more accurate methods by emissions metering units, reduction of complaints against accredited associations that are responsible for verification of emission notifications. Areas for improvements were also identified. Specifically, these relate to improved notifications by the operators, monitoring improvements, more thorough verification processes, better notification about utilization of bio-fuels, improved notification by airplane operators, better information provision to authorities by operators about the changes to their equipment, better coordination among various authorities of member states and improvement to information by the states about sanctions for breach of regulations and directives. (Pollution, 2017)

Elimination of Negative Effects of Construction on the Environment

There are number of elimination possibilities and it depends on the concrete negative factor. It is possible to eliminate the noise by utilization of noise-reducing mechanisms (use combustion engines reduced by 10-15 dB and

electric motors by 10 dB), erection of noise reducing barriers or walls that minimize the noise. The emission of air pollutants can be eliminated by the use of electric motors instead of combustion engines that reduces the quantity and concentration of exhalants. The dust at demolitions can be prevented or reduced by thoroughly planned demolition. During constructions then by humidification, spraying of dusty materials, fencing off the construction site and by expedient removal of loose material. Construction sites should be equipped with adequate rain water diversion to prevent seepage of grease, waste oil, mortar and scud generated during cleaning of machinery and cars into the ground water. The mud emissions can be eliminated by work restrictions, choice of adequate technologies or by erection of concrete access roads. (Construction and Its Effect on Environment, 2016).

Conclusion

The atmosphere and the environment of which is the air a component should be a number one consideration of the society. That means not just by the ecologists but of every individual. The air we breathe has undoubtedly an important influence on our health. Also, the purity of the atmosphere means cleaner rainfall from which follows quality of produce they are irrigating and that we subsequently consume. There are a number of pollution causes and one of them is the construction activity mentioned in the previous chapters. The life cycle of construction buildings negatively affects the environment. Emissions generated during production of industrial material are being released into the atmosphere in the form of gasses. This consequently creates the greenhouse effect. Furthermore, the acid rain that gets into the soil. Haulage of the building material brings with itself car emissions. Therefore, the aim should be to create ecologically effective building sites that would eliminate the negative effect of construction on the environment. Although, due to the EU provisions in the area of environmental policies were the emission of air pollutants in Europe greatly reduced during the last 25 years, it is necessary to continue in this effort and work forward.

The elimination is costly for poor countries. However, the environment that forms base for our life is much more valuable. Therefore, it is inevitable to minimize the negative effects of the waste generated due to industrial production, agricultural production and construction as well as a result of technological progress.

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The Importance of Reflecting Intercultural Differences in Building PR Campaign Strategy

Zuzana Ihnátová, Eva Režnáková

Abstract

Purpose of the article: In this paper authors focus on analysing how culturally based differences in terms of Hofstede's cultural dimensions affect the process of building PR campaign strategy. Methodology: Using two case studies of the same global company from two culturally diverse environments authors compare how distinctive features of each culture is being reflected into the concept, form and language used within the PR campaigns. The first analysed campaign "Solve for Tomorrow" took place in the US environment which represents highly individualistic and masculine culture with strong emphasis on task and success, comparing to relationships. The other campaign called "The Touchable Ink" took place in Thailand which, on the contrary, is considered very collectivistic and feminine culture with strong prevalence of relationships over tasks. Scientific objective: The article highlights the importance of understanding cultural values of the target market and reflecting them by building PR strategy, and demonstrates this approach on the example of two case studies. Findings: By comparison of two case studies from the United States and Thailand we can clearly see how the low versus high scoring in the areas of Individualism and Masculinity in terms of Hofstede's cultural dimensions affects the concept of the campaign. In the United States as a highly individualist and masculine country, the campaign "Solve for Tomorrow" takes form of a contest and strongly emphasises attributes like competing and achieving goals. In Thailand, as the exact opposite of the United States in terms of Individualism and Masculinity scoring, PR campaign "The Touchable Ink" was built as an awareness campaign with strong emphasis on helping the visually impaired, focused on improving the quality of their everyday life. Conclusions: The presented paper highlights the importance of knowing and understanding the cultural environment by preparing PR campaign strategy and supports the contention that even for a global company it is still worth considering local thinking by using marketing communication tools.

Keywords: *Public Relations, PR campaign, Hofstede's Cultural Dimensions, Intercultural Differences*

JEL Classification: *M21, M31*

Introduction

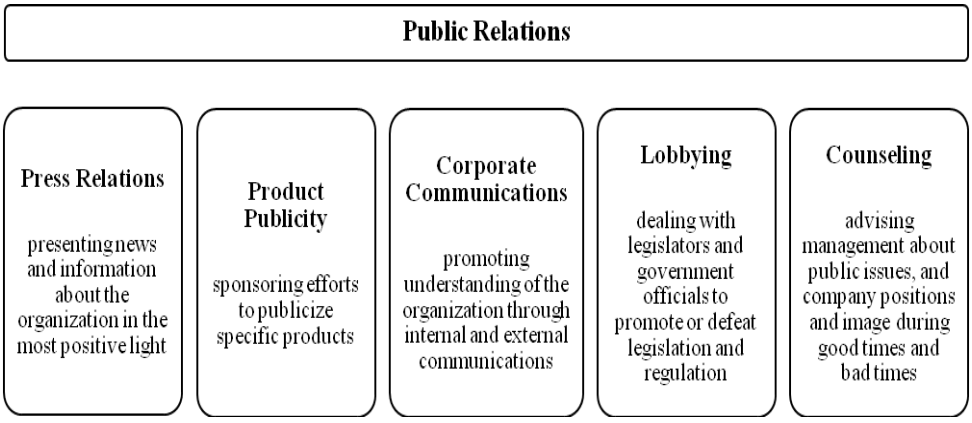
1 Literature Review

1.1 Public Relations as a Marketing Communication Tool

Public relations are relatively novel marketing communication tool and in the past, there was a lot of discussion about its position towards marketing. Nowadays is PR considered as a stable part of marketing communication tools (Smith, 2008, Grunig, J.E. and Grunig, L.A. 1998) and some marketers claim consumers are five times more likely to be influenced by this communication tool than by advertising (Kotler, Keller, 2012).

Public Relations Society of America defines public relations as a *strategic communication process that builds mutually beneficial relationships between organizations and their publics*. R.D. Smith (2013) under the term public relations understands a *management function that focuses on long-term patterns of interaction between an organization and all its various publics*. UK Chartered Institute of Public Relations perceives public relations as the *discipline which looks after reputation, with the aim of earning understanding and support and influencing opinion and behaviour. It is the planned and sustained effort to establish and maintain goodwill and mutual understanding between an organization and its publics*. Jahodová and Přikrylová (2010) define public relations as *value two-way communication of a subject with reference to different types of public to know and influence their attitudes, to gain their understanding and to build up the reputation and positive image of the subject in the eyes of the public*. Public relations are a tool to help to solve problems many public relations practitioners and marketers face, like low visibility, lack of public understanding, opposition from critics, insufficient support from funding sources, unfamiliarity of company or product, apathy among costumers, product recalls etc. (Smith, 2013).

According to Kotler and Keller (2012) public relations send out favourable news about the company and act as an internal customer and public advocate for better company policies and practices. Kotler and Keller (2012) talk about five functions of public relations: 1. press relations, 2. product publicity, 3. corporate communications, 4. lobbying and 5. counselling (Scheme 1: Functions of Public Relations).



Source: Kotler, P. and Keller, K. L. (2012). Marketing management. 14th ed. New Jersey: Pearson Education, Inc., p. 527

Scheme 1 ***Functions of Public Relations***

In terms of building PR campaign, Paria Rinrattanakorn (2012) highlights the importance of situational analysis, setting objectives of the campaign, defining public or audience of the campaign, formulation of clear and accurate messages, setting timetable and budget of the campaign, and summing up the campaign in the evaluation process. Every single PR campaign must be developed in accordance with PR strategy. *The ends concern the purposes and objectives of the organization. There is a broad strategy for the whole organization and a competitive strategy for each activity* (Thomson, 1995).

PR campaign must reflect both internal and external environment to deliver the best results. This might bring a lot of discussion about using global versus local marketing communication approach in case of entering new markets. There is no consensus among marketing practitioners about to what extent adapt global strategies to local cultural environment. Nowadays successful marketers need the actual ability to think globally while acting locally by intelligently combining parts of the standardization strategy and local idiosyncrasies (Keegan., 2002, Oliver, 2007). De Mooji (2014) points out that common needs of target markets may be generally valid, but local influences, such as religion, attitudes, and motivation, vary among different countries. From this perspective, cultural dimension appears to be crucial external factor to evaluate when entering new markets. Marketing communication is the element of marketing mix which reflects specifics of local environment at greatest extent, due to very complex and mutually influencing relationship between communication and culture. In terms of PR strategy this is reflected in building brand new campaigns for each market or adapting the global concept to the local cultural environments.

There are six activities that should be engaged when it comes to bringing PR campaign in new market (Kent and Taylor, 2007; Bardhan, Weaver, 2010):

1. Identify features of the situation:
   This activity is related to the questions such as what are the expectations of the public for communication or which norms and values will guide publics' interpretation of the message. Public relations practitioners should

clarify how a public is likely to respond to a message and where this message should come from.

2. Identify the intended audience effects: Next step after understanding the audience and situation is to reflect this knowledge into actual communication of the organization.
3. Clarify the motivational intent of the organization and publics: Identifying mutual cultural values helps the organization build relationship with the local public.
4. Examine how meaning is created: Each organization operating in a new market should be sure that their messages are meaningful and make sense within the culture. Highly recommended is to examine the archetypal or symbolic nature of language and communication.
5. Examine strategic considerations: Public relations practitioners need to make sure that their messages will be accepted and are appropriate for specific cultural environment (e.g. issues like respect for elders, religious, social features or the role of the government)

   Use communication principles and theory to understand how culture influences organizations and communication: Understanding theory of communication and the process of meaning making is essential to effective communication when it comes to bringing messages into new and culturally distinct market.

1.2 Hofstede's 6-D Model as a Tool for Evaluating Cultural Environments

Geert Hofstede, the Dutch researcher, while working for the large multinational organization IBM recognized that even though the company operated under its own set of corporate culture, the cultural differences on the individual level have also greatly influenced the work of its employees. Therefore, he started to investigate existing differences in thinking and social action among company's members. To collect the data, he used the paper-and-pencil survey among IBM employees in more than 70 countries asking also additional questions about their values. The survey was conducted for the first time in 1968 and then repeated in 1972 with the final amount of 116,000 questionnaires covering 50 countries worldwide in 3 regions around the world. In 2001 some editions to his research had been done with the final number of 74 countries and regions covered (replications and extensions). These studies have validated his earlier results by adding to his research sample commercial airline pilots and students in 23 countries, civil service managers in 14 countries, "upper market" consumers in 15 countries and "elites" in 19 countries. Based on his research, Hofstede introduced a model that identifies originally four primary dimensions that help to understand the intercultural differences around the globe: *Power Distance* (PDI), *Uncertainty Avoidance* (UAI), I*ndividualism* (IDV) and *Masculinity* (MAS). Later Hofstede added a fifth dimension to his model and called it a *Long-term Orientation* (LTO). This Dimension was introduced after the research done in Asia and is based on Confucian dynamism. Finally, based on the latest research, Hofstede added the

sixth dimension – *Indulgence* (IND). The model provides a scale from 0 to 100 for each of the sixth dimensions. Each researched country has a position somewhere between the scale, relative to other countries. These sixth dimensions have been empirically verified, are statistically independent and occur in all possible combinations. They reflect elementary problems of any society that need to be managed although the way of coping with them might strongly differ. Hofstede model had been used and cited widely since its introduction by the international scholars and practitioners (Wang, Shi 2011). We have used this model to analyse selected PR campaigns introduced by single global brand but in culturally significantly different markets.

2 Methodology

In this paper authors compare two selected public relations campaigns of the same global company Samsung taking place in two culturally significant distinct markets (United States and Thailand) and analyse how the cultural differences between these two markets affect the building of the public relations campaign strategy. The aim of the paper is not to compare the results nor evaluate success of these campaigns, since the results of using this marketing communication tool are very difficult to measure and there are no standardized metrics according to which we can claim the campaign to be successful.

For the purposes of this paper, we focus on aspects of Hofstede's cultural dimension, with special emphasis on those which are the most distinct

in comparing the United States and Thai cultural environment, e.g. Individualism and Masculinity.

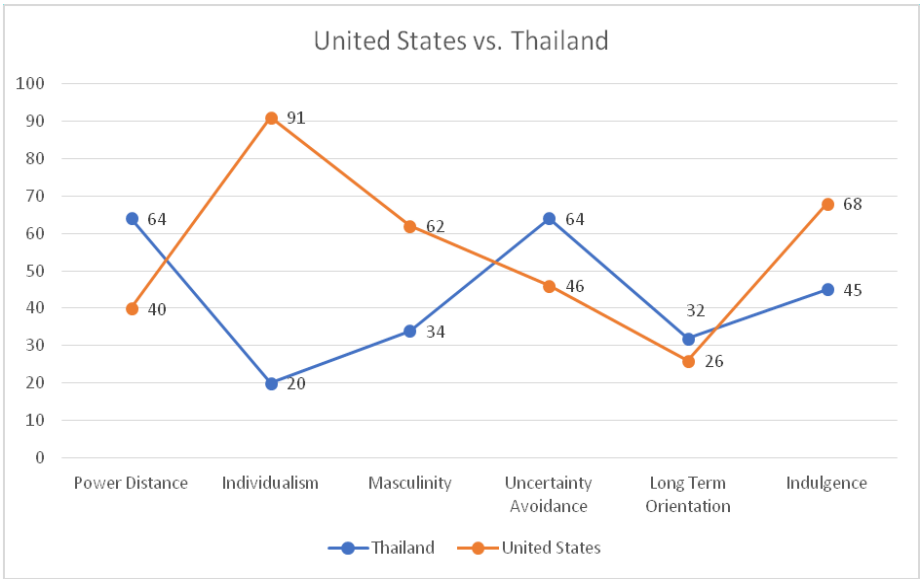
By analysing the campaigns, in terms of their goals, target groups, and even the language used in press releases, videos and other promotional materials, we investigate if cultural differences are reflected in the concept of the PR campaign strategy.

To fulfil the aim of the paper, a case study as commonly used research method in social sciences is being used. Authors conduct descriptive and exploratory analysis of selected public relations campaigns based on secondary data and in conclusion of the paper analyse if significant intercultural differences had been considered within the process of developing PR campaign strategy.

3 Results and Interpretation

3.1 Description of selected markets in terms of Hofstede's Cultural Dimensions

In purpose of better understanding of both US and Thai environment we provide a brief description in terms of Hofstede's cultural dimensions. Authors focus only on those attributes that are very typical for the observed countries and on those in which both these markets appear to be the most distinct. Complete comparison of these countries is processed in Chart 1: Comparison of the United States and Thailand in terms of Hofstede's Cultural Dimensions.



Source: processed according to ITIM International. Country comparison by Geert Hofstede < https://www.hofstede-insights.com/product/compare-countries/>

Chart 1: ***Comparison of the United States and Thailand in terms of Hofstede's Cultural Dimensions***

The United States score extremely high in two areas – Individualism and Masculinity. High masculinity with the status of most individualist country in the world is evidenced e.g. by an explicit emphasis on equal rights in all aspects of society and high expectation of being able to look after themselves and their nuclear families only. People are expected to become as good as possible and with the combination with "can-do" mentality, people tend to be extremely task and success oriented. Monetary rewards are highly effective motivator within this cultural environment. Communication style is typically rather direct and open. The United States score low in Uncertainty Avoidance what makes them very open-minded culture with high degree of acceptance of new ideas and innovative approaches.

On the contrary, Thailand with scoring only 34 in Masculinity represents a typical feminine society, even the most feminine above all Asian countries. This is reflected in low rate of assertiveness and competitiveness. Thailand scores relatively high in Uncertainty Avoidance which might be observed by lack of accepting of changes and risk and if so, change must be considered as greater good for the whole society. In contrast to the United States, Thailand is a strongly collectivistic country (scoring only 20 in Individualism). Attributions like loyalty or accepting societal rules are very typical for this kind of cultural environment. Members of the group tend to build long-time relationships and take responsibility for fellow members of the group.

3.2 Description of selected PR campaigns

Solve for Tomorrow

Solve for Tomorrow is US national contest organized by Samsung that encourages public-school teachers to submit ideas on how their students can use STEM (science, technology, engineering and math) to help solving a real-world problem in their community.

The aim of the PR campaign is to raise awareness about STEM subjects among public-school students in 6^{th}-12^{th} grade and to help close that gap and inspire the future innovators of this growing sector. The contest encourages students to combine their creativity and STEM knowledge to become the innovators of tomorrow and to apply their current knowledge to help improve their local community today.

Each national winner team gets $150,000 in Samsung technology and the Community Choice winner gets an additional $20,000 in Samsung technology for their school. All 10 national finalist teams get $50,000 in Samsung technology for their school. Solve for Tomorrow is a long-lasting project of the Company in US environment with 5-years tradition and many successful participants of the contest.

The Touchable Ink

Samsung and Thailand Association of the Blind have worked with a chemistry professor at Thammasat University to develop Touchable Ink, a project in which laser printers are able to print braille-embossed documents. This ink could be loaded into ink cartridges in home printers and this way transforming regular home printers into braille printers. Touchable Ink enables the printing industry to help socially disadvantaged people with visual impairments.

Users can replace their ink cartridge with the Touchable Ink cartridge, change the document to braille font type, print out and heat it with normal household heating devices (microwave or hair dryer). The first test on printed papers with touchable ink have been done with the visually impaired volunteers from Thailand Association of Blind. More than 90 % of respondents claimed it is readable and no different from braille embosser's one. A braille printer is extremely expensive, costs around $15,000, making each embossed A4-sized page $1.10. Use of Touchable Ink reduces the page to the price less than 3 cents, making this more affordable for users. The project, promoted as part of Samsung's approach to accelerating discoveries and possibilities, won Grand Prix awards for Design, Healthcare and Innovation at Spikes Asia 2016.

Table 1: ***Comparison of PR campaigns Solve for Tomorrow and The Touchable Ink***

	Solve for Tomorrow	**The Touchable Ink**
Brand	Samsung	Samsung
Year	2016	2016
Country	United States of America	Thailand
Agency	Hour One Agency	J. Walter Thompson, Bangkok
Distinctive features in terms of Hofstede's Cultural Dimensions	High scoring in Individualism (91) High scoring in Masculinity (62)	Low scoring in Individualism (20) Low scoring in Masculinity (34)
Goal of the campaign	To raise awareness about STEM subjects among public-school students and prepare students for their future career paths in STEM field.	Project is an answer to the needs of the visually impaired. It raises awareness about the socially disadvantaged and improves the quality of their everyday life.
Form	Contest	Awareness campaign
Target Group	Primary TG – teachers Secondary TG – students	Visually impaired

Source: processed according official promotional materials of the campaigns

3.3 Comparison of the PR campaigns in terms of Hofstede's Cultural Dimensions

Individualism/Collectivism (IND/COL)

Individualism versus collectivism represent the degree to which individuals are integrated into groups. Very individual countries (such as the USA) tend to value autonomy, freedom and personal time. They tend to proactively seek out challenge, are often motivated by extrinsic factors such as material success, enjoy challenges, and expect individual rewards for hard work. In general, task and

individual achievement is more important than building relationships. Direct communication is very typical for countries with high score in individualism. Even today 42 % Americans believe that the American Dream (that if you work hard, you'll get ahead) still holds true (Putnam, 2015).

This attitude is reflected in concept of the campaign where students at very young age are encouraged to start with building their career paths and build competitive advantage ("…students not only fostered the critical thinking skills they *need for future careers*, they also had an active role in safeguarding the people and wildlife in our community.", "While there's a growing chasm between education and *career opportunities*, there's no shortage of students who are excited to creatively address problems they see every day – it's a matter of helping them draw connections between STEAM and the real world" etc.)

In terms of analysing a selected PR campaign from the US environment we can see it e.g. by using direct speech on their official website (e.g. "from New York to Nebraska, *teachers like you are helping* students discover the difference STEAM learning can make in their lives."). Since the primary target group of the campaign are public-school teachers, content of the website is very targeted and most of the content is addressed directly to them. This makes the content more relevant, accurate and activating towards the target group. Not surprisingly for such individualistic country, the communication message is delivered to students by an individual, in this case their public-school teacher.

Another aspect of the PR campaigns which is very typical for highly individualistic environment is the possibility of reward for entering and succeeding in the contest. Not only best students but even the public-school can be rewarded.

On the other hand, Thailand is a typical country scoring very low in Individualism. This sort of country tends to develop large cohesive social networks and intrinsic rewards as motivating factors. Very typical distinctive feature comparing to collectivistic countries is a strong prevalence of relationships over tasks.

The main idea of the PR campaign in Thailand is not a material evaluation but rather helping the socially disadvantaged people. In terms of building campaign, paying attention to support group versus individual appears to be crucial. In "The touchable Ink" campaign there are a lot of statements which emphasise the support to selected community and its integration by removing barriers, e.g. "There're 285 million blind people worldwide. 90 % of them live in low-income settings. ", "As a group of people who are *part of our society*, their needs are not different from people who can see", or "They (the visually impaired) *want to live happily like people who have normal vision* ".

Table 2: ***Comparison of the language of the campaigns in terms of Individualism Dimension***

Solve for Tomorrow (High Individualism Rate)	**The Touchable Ink (Low Individualism Rate)**
"…students not only **fostered the critical thinking skills they need for future careers**, they also had an active role in safeguarding the people and wildlife in our community."	"There're **285 million blind people worldwide**. 90 % of them live in low-income settings. "
"While there's a growing chasm between education and **career opportunities**, there's no shortage of students who are excited to creatively address problems they see every day – it's a matter of helping them draw connections between STEAM and the real world. "	"As a **group of people who are part of our society**, their needs are not different from people who can see."
"from New York to Nebraska, **teachers like you are helping** students discover the difference STEAM learning can make in their lives."	"**They (the visually impaired) want to live happily like people who have normal vision**. "

Source: processed according official promotional materials of the campaigns

Masculinity/Feminity (MAS/FEM)

The very essence of the campaign is strongly affected by the nature of the country and its cultural values. In the United States as a highly masculine culture, the PR campaign takes place in a form of content where young students are empowered to use critical thinking and creative problem solving to address real-world challenges and gain skills needed for their future career. Masculine cultures tend to generally emphasise attributes like ambition, control, competition, assertiveness, and achievement. Competing is highly valued and is considered as a chance to show how good individual is. For masculine cultures is very typical to be rewarded for working hard and one's performance and get credit for their achievements.

By analysing promotional materials regarding the campaign, there are many keywords we might consider very typical for countries scoring highly in masculinity such as "achieve/achievement", "success/successful", "career path",

"contest", etc.

On the other hand, feminine cultures tend to emphasize nurture, care, sharing, quality of life, equality and relationships. Very distinctive feature of feminine cultures is the sympathy for the less successful or less lucky in society and believe they deserve a chance and should be helped. Naturally, PR campaign in Thailand as typical feminine culture emphasises the sympathy for the impaired part of the society and improving the quality of their lives. In press releases and other promotional materials to the campaign The Touchable Ink many words appealing to these attributes occur ("help", "helpful", "needs", "support").

Table 3: ***Comparison of the language of the campaigns in terms of Masculinity Dimension***

Solve for Tomorrow (High Masculinity Rate)	**The Touchable Ink (Low Masculinity Rate)**
"Samsung believes it's our responsibility to inspire passion about STEM subjects early in students' lives with the hope that they will **pursue them as college majors, and ultimately viable career paths**."	"This (project) will **lift up every aspect of the blinds' life such as daily activities**, education and living."
"(Samsung and their partners) are teaming up again to equip the next generation of kids and teens with the tools they need for a **successful future in the fields of science, technology, engineering and math** (STEM)."	"Touchable Ink emerges as an answer to the **blind's needs."**
"Students today must be prepared to join tomorrow's **workforce**, yet there is a widening educational gap when it comes to STEM."	"With this innovation, they (visually impaired) said it will help **improve their quality of living** since they can be independent and live on their own freely, no need to wait for help from others."

Source: processed according official promotional materials of the campaigns

Others Hofstede's Cultural Dimensions

Besides Individualism and Masculinity there are other dimensions that describe cultural environments and should be considered by preparing marketing communication plan, including PR campaigns. According to Hofstede we talk about Power Distance, Uncertainty Avoidance, Long Term Orientation and Indulgence. Since neither the United States nor Thailand achieve any extreme values in these areas nor are they distinct enough to observe any significant differences, we do not focus on comparing campaigns in terms of these attributes.

Conclusion

Public relations as a communication tool that is five times more likely to influence audience than advertising, is a powerful and trustful marketing vehicle (Kotler, Keller, 2012). As by any other marketing communication tool the adequate usage reflecting the cultural environment and consumer preferences is the basic condition of delivery the best possible results. In this paper authors analysed how global company Samsung sensitively approaches the process of building PR campaign strategy in culturally different markets with emphasis on the very distinctive features of each environment.

By comparing two case studies from the United States and Thailand we can clearly see how the low versus high scoring in the areas of Individualism and Masculinity in terms of Hofstede's Cultural Dimensions affect the concept of the campaign. In the United States as a highly individualistic and masculine country, the campaign *"Solve for Tomorrow"* takes form of a contest with strong emphasis on the attributes of competing, achieving a goal, and opportunity of taking first steps in the process of building successful career at very young age. On the contrary, in Thailand the PR *campaign "The Touchable Ink"* was built as an awareness campaign with strong emphasis on helping the disadvantaged part of society, focused on improving the quality of their everyday life. Nor only form of campaign but also vocabulary and language of the campaigns are highly corresponding to specific cultural environment.

Because of differences in the campaigns and respecting local cultural preferences, both campaigns might be considered as very successful in their environments. *"Solve for Tomorrow"* has nowadays 5-year long tradition in the United States with significant media coverage and many applicants from all states of the USA. On the other hand, the campaign *"The Touchable Ink"* won Grand Prix awards for Design, Healthcare and Innovation at Spikes Asia 2016.

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Advergames: Marketing, Communication and Entertainment

Vicente Martin Mastrocola

Abstract

The contemporary multiplatform environment, connecting many different digital devices (smartphones, tablets, videogames, laptops, wearable devices and others), became a privileged ambient for advertising and marketing campaigns. In this context, it is also possible to cast a message for a brand, product, company or service using a ludic language through a gaming format. Acknowledging the prominence of digital networks and entertainment in today's mediapolis (Silverstone, 2007), games can be considered an ideal tool for some specific branding and marketing campaigns. In this paper, we seek to analyze "advergames" – games developed specifically for communication and marketing purposes. Based on academic studies on communication and consumer culture, with special emphasis on digital marketing and games, our empirical research was done by the use of virtual ethnographic approach (Hine, 2000; Hine, 2005; Kozinets, 2009) and bibliographic approach. Our main objective in this article is to discuss the essential features of this category of games and the most important points, to create an effective advergame; we also aim to discuss the practices of in-game adverstising and product placement inside this ecosystem permeated by brands and entertainment. We have selected examples from different companies, publishers and studios to illustrate our discussion. We also interviewed some professionals from marketing and games area to understand and demonstrate how a game could be a marketing tool and what is not an avergame in this scenario. It is important to highlight that, in this context, video games should be considered not only a product, but a media platform for advertising.

Keywords: *Marketing, Advergame, In-game Advertising, Product Placement, Branding*

JEL Classification: *M31, M37*

Introduction

To use a proper language from the gaming universe, it is essential for the *level one* of this article defining the ideas of "advergame"," product placement in games" and "in-game advertising". It is also important to define the notion of "game design" to understand how advertising and marketing can use aspects from this area to create a way to cast a message using a game. These four concepts are the fundamental to discuss how games could be effective tools for marketing and communication campaigns.

According to Cavallini (2006), the notion of advergame – a neologism formed from the juxtaposing of the words "advertise" and "game" – could be described as a strategy for marketing that uses games, mainly electronic, to advertise brands and products. That includes a large range that goes from complex games that are developed specifically for advertising purposes to common casual games. The Internet and video game consoles are great environments to use this strategy. Mobile media (smartphones and tablets) are already being tested by companies, which chose this marketing strategy too. For instance, the Brazilian branch of the soft drink brand *Fanta* launched in 2015 a hot site with ten advergames. Developed by *Sioux Studio*, the games emphasized *Fantas*'s branding features like happiness, friendship, radical sports and music. All the features of the brand appeared in campaigns displayed on television, magazines, movie theaters and on the Internet are present in the game; therefore, we can conclude that the game is an advertising piece like any other.

Cavallini (2006) also discusses the idea of product placement in games as a strategy that inserts a company's product inside the gaming interface and context. The characters in the game *Devil May Cry* wear pants with the *Diesel* brand in evidence. In *Tom Clancy's Splinter Cell - Pandora Tomorrow*, the character uses a *Sony Ericsson p900* smartphone to solve missions, so the player virtually experiences the use of the device. In *Worms 3D*, by *SEGA Studio*, the characters drink a can of *Red Bull* energy drink in order to jump higher. In the last released UFC game, we can see the fighters wearing shorts and gloves from famous sporting brands. It is very important to highlight that this kind of strategy, as everything in marketing, needs its context aligned with the target audience. In all previous examples, the product fits in the gaming universe and dialogues with the players.

Another fundamental keyword in this context is in-game advertising. As Herrewijn and Poels (2011) define, in-game advertising refers to the use of games as a medium for the delivery of advertisements, and the authors point out that there is one player branding experience during the gameplay. In this type of

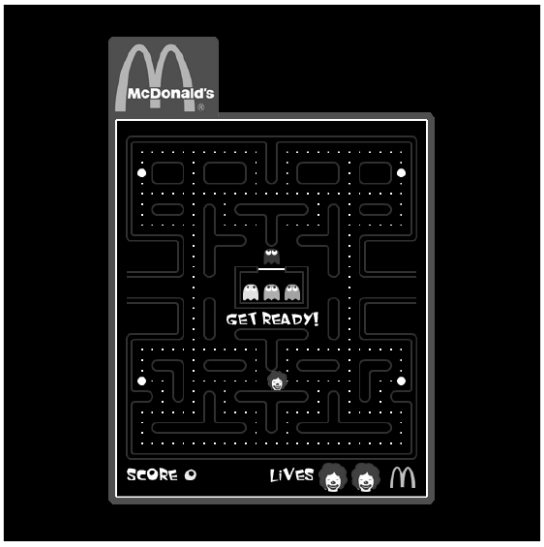
strategy, we can notice the use of banners, posters, radio spots, digital ads and billboards mixed to the game's landscape. In *Virtua Tennis 3*, as an example, it is possible to see *Bridgestone* tires and *Citizen* watches billboards all around the scenario. Both brands are present, sponsoring the real tennis matches, so it is very pertinent to be in the virtual game, creating a deeper sense of immersion to the player.

In the image below (Fig 1) it is possible to observe these diferent strategies:

Source: Google Images screenshots

Figure 1 ***(A) Fanta web advergame; (B) Red Bull product placement in the game Worms 3D; (C) Bridgestone and Citizen brands in-game advertising in Virtua Tennis 3 virtual billboards***

In the other hand, it is also important to contextualize in this introduction what can not be considered an advergame. We already explained that an advergame is an advertising piece of campaign that requires planning and an interface between the brand/product/service and the gameplay. An advergame is not a ready-made game that we can simply insert a logo or a company's feature. In the following hypothetical example below (Fig 2), we see the interface of the classic *Pac-Man* game with elements from *McDonald's* brand. To insert these elements in the gaming interface does not make this game an advergame; there is no strategic view or branding planning, we only noticed elements scatered in a videogame screen.



Source: http://www.estroll.com/2014/08/where-to-download-neave-pacman-for-free.html (McDonald's branding elements added on Photoshop)

Figure 2 ***Hypothetical Pac-Man game with McDonald's branding elements***

It is worth mentioning that advergames are not necessarily created exclusively for digital media. It is possible to find this category of games created in analogic format (board game/card game) or a hybrid format that blends analog and digital. We can exemplify this hybrid category with an advergame created by McDonald's in Brazilian territory. The brand released a tray paper with a "race to the end" game that is played using a Facebook bot. Players must answer quizzes proposed by the bot; right answers allow players to advance on the path. In addition to promoting the brand, the game captures user data for future promotional actions.

Source: DPZ&T (Brazilian advertising agency)

Figure 3 ***McDonald's promotional tray paper with board game***

All examples discussed in this introductory topic were created based on game designing process. According to Brathwaite and Schreiber (2009) game design is the process of creating the content and rules of a game, and good game design is the process of creating goals that a player feels motivated to reach and rules that a player must follow as he makes meaningful decisions in pursuit of those goals. In case of an advergame, it is possible to say that the player motivation, the rules and the fun features must be aligned with a brand or company to cast efficiently the marketing message.

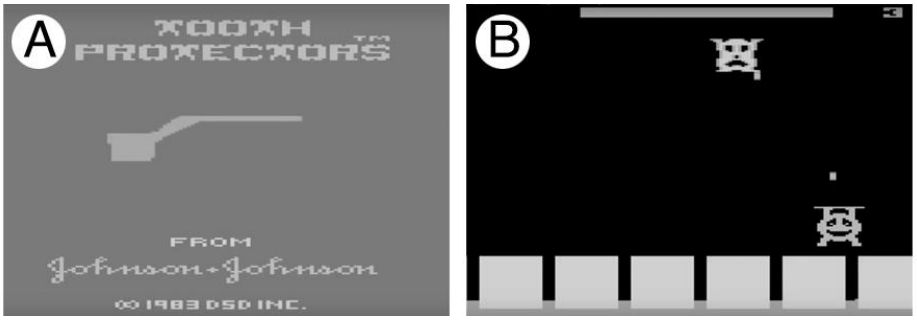
In this topic, we are discussing examples developed for consoles, personal computers and mobile media. However, the advergaming strategy is not something created in the Internet age. In the beginning of the 1980s, we already could find some very interesting cases in the Atari platform.

1 The early years of advergames

We know that in recent years the game industry had the fastest growth within the entertainment area. If we observe the entertainment industry specifically, we can see many of its players investing in games. This is quite relevant if we remember that in the first half of the 1980s game developers and publishers went through a major crisis that became later known as “the video game crash” (Kent, 2001). Now, it is considered the biggest opportunity of investment on the field of entertainment business. However, the importance of this remarkable growth is less of economic proportions than the impact of the growing consumption of this entertainment product in society. What the numbers really show us is that people are increasingly using digital games as means of entertainment.

One research from *Newzoo Institute* (2016) shows that the global games market reached the mark of $99.6 billion of dollars, being that mobile games generated 37% of this amount. A market of this magnitude can offer different kinds of games for a large number of different players in the contemporary scenario. However, this industry started its first steps by the end of the 1970s and the beginning of the 1980s. Impressively, when the video game industry was still rising in the modern entertainment scene, there were already brands/companies creating advergaming strategies for the *Atari* video game platform.

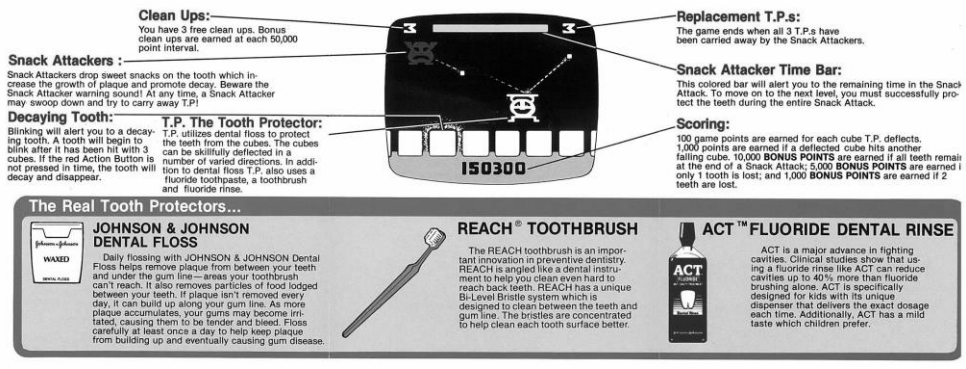
One iconic game launched in 1983 by *Johnson & Johnson* named *Tooth Protectors* (Fig 4) is one example that fits our discussion. Developed by *DSD* and *Camelot* studios, the game was an integral part of a large *Johnson & Johnson* campaign in the United States, and was not sold in game shops; the cartridges were distributed as a prize for customers who mailed in proof of purchase stamps to the company.



Source: http://1.bp.blogspot.com/-ZnfZDcrc0lg/VDMpuXZU3KI/AAAAAAAAJos/I0otH9M_Oyk/s1600/tooth1.jpg

Figure 4 ***(A) Tooth Protectors opening screen with the brand Johnson & Johnson, highlighted; (B) Tooth Protectors interface***

The game mechanics is very simple and the player must protect teeth from the attack of the cavities. You earn points by folding the harmful elements that fall from the top of the screen. Despite being very simple, *Tooth Protectors* is the precursor of many examples we see today in more sophisticated platforms. One important element to observe is the game's manual (Fig 5); it represents the interface of the game with the main rules of play and there is an area that highlights some *Johnson & Johnson* products, such as dental floss, toothbrush and fluoride dental rinse.



Source: https://www.statnews.com/wp-content/uploads/2015/12/tooth_protectors_i_3-1024x396.jpg

Figure 5 ***Tooth Protectors rules of play with products advertising.***

It is also relevant to point out that *Tooth Protectors'* game follows the basic idea of marketing. Kotler (2015) teaches us that the aim of marketing is to create value for customers and to capture value from customers in return; this author (Kotler, 2015) also emphasizes the importance of delivering satisfaction to the customers. In this case we can observe the attempt to create value and satisfaction to the individuals involved in the ludic experience through a gaming interface, always highlighting the branding features and the product line.

The company is not only sponsoring a simple game in this case (or just putting te logo in a ready-made game as we already discussed), it is an attempt to connect the brand with an emergent audience of gamers from the 1980s, demonstrating some benefits of the products in a ludic way. Bedendo (2015) reminds us that one brand does not only offer differentiation in functional benefits to its products, but also offers emotional and symbolic aspects that may be equally relevant in a marketing strategy context.

In this example, we can observe the three categories mentioned previously. *Tooth Protectors* is an advergame tailor-made for the *Johnson & Johnson* brand, with in-game advertising and product placement features in its interface.

In the Atari age other companies like McDonald's and Purina also created advergames as integrated part of their marketing campaigns. Despite the limited interface, it is possible to understand how these brands are using different platforms to cast a marketing message in the very beginning of digital media.

Today, we have more complex examples, like the game *Beercade* (a name created joining "beer" and "arcade"). The *McKinney Ten Percent*, the ad agency's incubator that encourages all employees to devote 10% of their time to focus on new applications of creativity and technology unrelated to current client business, has found a way to breathe new life into both beer tasting and arcade gaming. The agency created the first-ever beer-dispensing arcade game for *Big Boss* beer brand, that puts two players against each other in a simple fighting game. Players choose one of five characters, each one representing one kind of beer from *Big*

Boss Brewing Company. The fight begins and the winner receives a glass full of beer from the arcade machine.

Beercade, apparently, could be much more complex and funny than *Tooth Protectors*, but the basic principles of the *Johnson & Johnson* game generate an important reflection to understand the current advergames and give content to think deep about this subject.

On the next topic, we will discuss some aspects of entertainment in the contemporary scenario and what motivate some companies in creating advergames for its campaigns.

2 The magic circle idea and the playgrounds scattered throughout everyday life

From countless mobile gadgets with wireless and fast track connection to the Internet, or using more traditional modes of access, people are increasingly blurring the lines between near and far, public and private, work and leisure, online and offline. The impressive rates in social appropriation of communication and information technologies entail changes in the way we live, get together, do business and – of course – have fun.

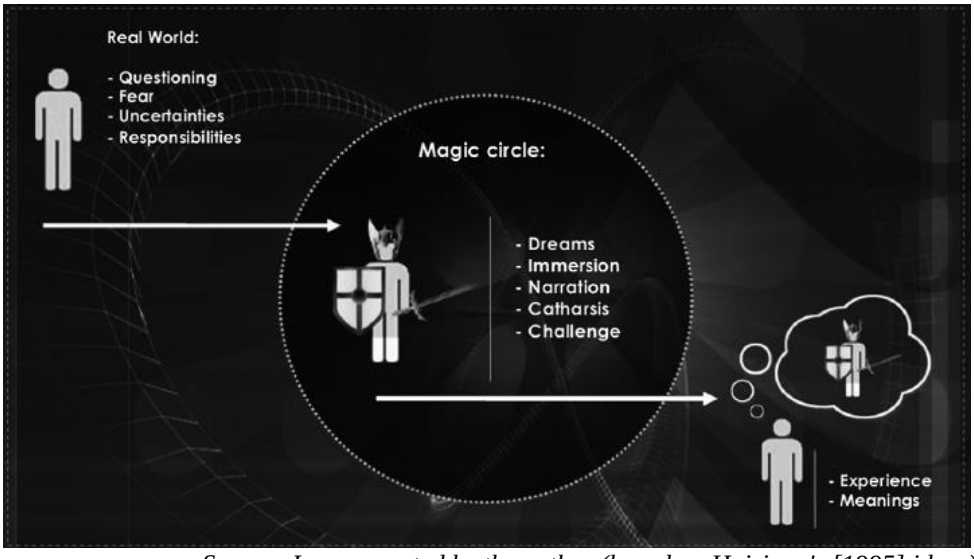
Having fun, in this scenario, is closely linked to the large number of entertainment languages that pervade our daily experience. As we discussed in the intorduction of this article, the languages of entertainment are crisscrossing boundaries in the quotidian landscape and games become media and a relevant tool of marketing for many companies. We can find games and languages of entertainment in our mobile devices, Facebook site, television shows, videogame consoles, mobile applications and lots of other platforms.

Everything indicates that, more than never, individuals are searching for ludic/entertainment/gaming experiences to disconnect for some moments from the chaotic quotidian, the pressure of working hours or the accelerated routine of big urban centers; in certain way, people are trying to reach places of catharsis, dreaming and fiction to escape from this. Based on the Huizinga's (1995) thoughts, they are searching for different "magic circles".

Johan Huizinga (1872 – 1945) was a Dutch historian and one of the founders of modern cultural history. In his book *Homo Ludens*, from 1938, he discusses the possibility that playing is the primary formative element in human culture. In this book, the author (Huizinga, 1995) presents the idea of the "magic circle". As described by Adams and Rollings (2009), Huizinga did not use the term as a generic name for the concept: his text refers to the actual playground, or a physical space for playing. Inside the magic circle, real-world events have special meanings; in the real world someone kicks a ball into a net, but in the magic circle someone scores a goal leading the crowd to celebrate this act (Adams; Rollings, 2009).

The magic circle is a place of dreams and fantasy. It's an escape from everyday problems and chores. Most importantly: everything inside the magic circle is, in some way, transformative. Each time a person leaves the magic circle, they bring meaning and experience to the real world. The arena, the card-table,

the stage, the screen, the tennis court, the court of justice, etc., are examples of the magic circle idea. It is important to mention that authors like Bogost (2016) discuss that "magic circle" is too dramatic a name for this kind of processes and embraces the term "playgrounds" as an alternative.



Source: Image created by the author (based on Huizinga's [1995] ideas)

Figure 6 ***The idea of "magic circle" proposed by Johan Huizinga (1995)***

Regardless of the categorization – whether "magic circle" or "playgrounds" – it is important to understand that the contemporary stage is full of platforms that we can access entertainment/games and there are lots of individuals attached to these ludic experiences. Following the principles of marketing discussed previously, we can suppose that companies/brands/products/services will try to connect its selves to the audiences immersed in these experiences, platforms and languages. Based on this assumption, we understand more clearly how games also become communication and marketing tools.

However, when we analyze advergames, there is a component that seems to be fundamental in this context: the narrative elements. We will discuss this subject in the next topic.

3 The importance of narrative elements in the context of advergames

The gaming field is a plural space for different genders, styles and types of products. Nowadays, we have a multifaceted environment where independent games and advergames coexist with millionaire productions from giant studios; one place in which different kind of players are experiencing extremely challenging games in consoles, smartphones or personal computers. As we already analyzed, it is an ecosystem where games could be played anytime, anywhere.

In this sense, there are abstract games that are completely based in mechanics, with no storytelling background, and games fully developed in complex narratives. In the very beginning of gaming industry, we didn't have much to tell in the limited interfaces. Pong, as example, is about bouncing a square ball using a vertical rectangle. On the other hand, Donkey Kong, for Atari console, has an interesting narrative layer where the hero must save the lady from the giant gorilla on the top of the building. Many years in advance, we can find some publishers that created games fully based on narrative components.

As we have discussed previously, it is a market full of opportunities for many types of ludic products. In the case of advergames, the narrative component is essential to cast a message about a brand, product or company. Storytelling it is one nuclear element to enrich the experience proposed in the advergame. In this sense, it is possible to use different resources such as characters, music, dialogues, plots, mysteries etc.; it is important to highlight that every single element must be conceptually linked to the product or brand advertised.

It is important to point out that the player "is at once the subject and the object of the play" (Ehrmann, 1968). We must always keep that in mind in any kind of gaming or advergaming project. The game is an inanimate thing: codes, pieces, cardboards, miniatures etc., but the experience with the game is full of life. This experience is what we need to focus in: how we will deliver a good experience to the player.

A good narrative is one possible way to deliver a meaningful experience to the player and we put brands attached with a gameplay a narrative is crucial to deliver marketing/communication ideas. Following some ideas from Dansky (2007), it is possible to say that

On the most basic level, narrative strings together the events of the game, providing a framework and what can alternately be called a justification, a reason, or an excuse for the gameplay encounters. At its best, narrative pulls the player forward through the experience, creating the desire to achieve the hero's goals and, more importantly, see what happens next. At its worst, narrative merely sets up the situation and turns the players loose to do as they see fit. It achieves these goals through three important techniques: immersion, reward and identification.

This author (Dansky, 2007) also explains that there are three fundamental pillars that we need to think about gaming narrative:

1) Immersion: in a simple way, it refers to the state of mind where a person is completely absorbed in what they are doing; immersion refers to the moment in which we are so involved with the game that time passes different and we can't notice the world outside the experience. In case of advergames, this immersion it is the moment that the player/consumer will interact with the brand/product/service/company.
2) Reward: narrative can also be a reward to the player and "the narrative events can be revealed gradually, delivered as rewards for achieving in-game goals". One advergame can contain promotional elements, physical prizes or discounts for the players.

3) Identification: something that, in the gaming context, provides justification for the actions during the experience. In the previously cited game of *Fanta*'s brand, you control the main characters from the television campaign doing actions based in the commercial's narrative like dancing, skating, singing and practing sports. There is identification between what is done in the game and what is presented in the TV commercial.

Based on these principles discussed until now, we selected four experts from the gaming field and asked each one the following question: what are three essential characteristics for an effective advergame? In the next topic, we present and discuss the answers.

4 Some thoughts from experts

Fabio Tola, Brazilian elementary school teacher and specialist in the use of games for education, says that one advergame 1) must reach the target audience; 2) convey the branding/product message effectively; 3) become viral – this last item is very important to quickly expand the marketing message to the social media environment.

For Guilherme Camargo, CEO of the Brazilian gaming studio *Sioux*, the three essential characteristics for an effective advergame are: 1) have a well-defined purpose aligned to the brand, product or service (it seems obvious but, often, an advergame is detached from the core concept of a campaign); 2) know your target audience to match the style, mechanics and other characteristics of the games; 3) be fun – it is fundamental to create something that strengthens engagement through entertainment languages

Mauro Berimbau, Brazilian high school teacher and specialist in advergames ponders that 1) in this modality of games, is elementary to send a clear marketing message; 2) to observe the historical socio-cultural aspects of the players; 3) to study the player's interpretations and responses to the system.

Laura Herrewijn, guest Professor at University of Antwerp, says that 1) it is important to be sure that your audience will have fun, to create an original game in which you integrate your brand message in a central, prominent way; 2) it's necessary to focus on the moments where the player has no attention left to perceive the brand messaging; 3) you need to make sure that the behavior you want to promote (e.g. visiting a website, buying a product) is made as easily as possible (e.g. to include a very visible link/ a coupon, etc.).

From these opinions, we can ponder a lot before an advergaming project or an analysis of an advergame. We will discuss these ideas in the final topic of our article.

Conclusion

In this paper, we discussed that games are a media platform and a very important element from the contemporary culture. More than that, we highlighted that individuals are searching for ludic experiences in different "magic circles" and "playgrounds" in the quotidian stage. In order to attract new consumers and satisfy

loyal consumers, companies are using entertainment languages on their marketing and communication strategies, where advergames is one possible tool among others. It is important to highlight that many huge brands like Coca-Cola, Fanta, Doritos and many others already are testing this marketing strategy too (Fig 7)

We also discussed that the digital games industry has shown remarkable growth, which has drawn the attention of investors and entrepreneurs. But, above all, we saw that research data shows us an increase in its consumption, becoming more and more a culturally relevant media in many societies. Upon entering deeper into the people's media habits, we can find that games are also becoming interesting for communication studies and practices in general, but especially for advertising and marketing territory.

This combination of multiplatform media technologies and entertainment languages, somehow, accelerates communication processes and allows huge trunks of information to travel long distances, by the touch of a screen, and rapidly reach broad audiences everywhere. It is well worth remembering that media is plural in its cultural forms, technological features, and – logically – in its effects (Couldry, 2010). The delicate relationship between consumers and brands/companies in a digital environment seems to require special care on both sides. It is important to highlight that marketing, entertainment and technology are no longer separate worlds.

In advergames, the myriads of meanings that constitute a brand are materialized within the dynamics and aesthetics of the game, producing experiences that are uniquely relevant to that brand. Sports games, on the other hand, may seem as an exception, because the sponsoring brands in racing cars or the ads on the edges of the soccer fields or tennis courts seem to give the player a better sense of reality, trying to make the environment less fictitious by giving the experience of the consumption of the sport. In these cases, brands can be noted as "in the game", and maybe even making the experience better somehow

Source: Google Images (keyword in search : advergame)

Figure 7 ***Brands using advergames***

By discussing advergames as a marketing tool, we hope to demonstrate how useful gaming languages could be for companies and consumers in the contemporary digital ecosystem. We believe it is of utmost importance to stay alert for fast changes in this scenario and the new possibilities that are appearing everyday in different platforms.

Our empirical data comes from specialized bibliography, interviews with experts of the gaming field by e-mail, and many hours of playing different types of advergames in sites, mobiles devices and social networks. The intersection between all this information gave us enough content to ponder on the topic addressed and create a deeper reflection about the multiple connections between marketing strategies and games.

We welcomed the opportunity to present this relevant discussion as a means of contributing to the ongoing efforts in exploring the role played by the games – especially advergames – in media, marketing, technology and entertainment context.

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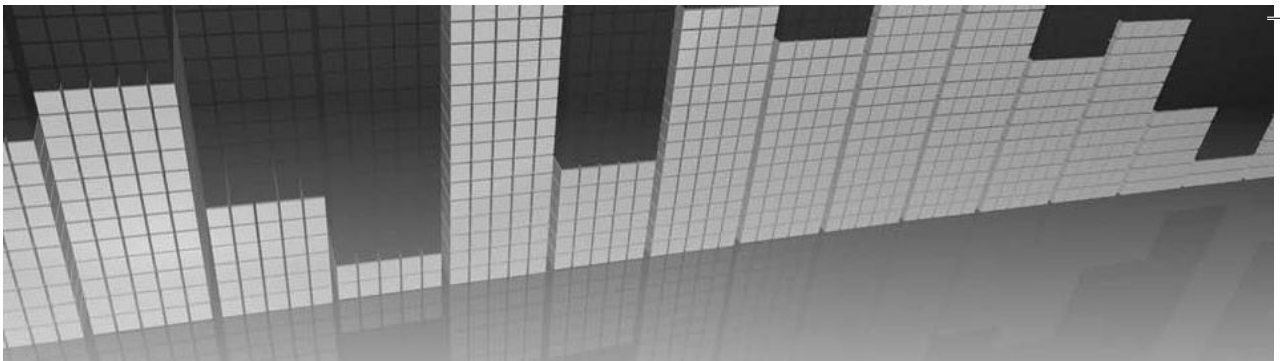


Digitally enhanced teaching by using virtual and augmented reality

Ján Lacko

Abstract

In this article we would like to present the possibilities of using of the virtual and augmented reality in the teaching process. We demonstrate the functionality of the applications, which are the part of the „InovEduc" project. We provide the various types of the applications for desktops, virtual reality headsets and mobile devices and we compare them in the teaching process.

Using the virtual reality and augented reality can lead to better information absorbtion by the users – students, beacuse these methods are still something new for them and causing so called „wow" effect, which is join with the positive or negative emotion. If the information is connected with the emotion, it could help with the memorizing it for a longer time. The aim of the project was to develope the complex material consist of methodological working sheets and the series of the interactive tools presenting the historical, technical and natural 3D models of the objects from the border region of Slovakia and Ukraine. We create for this purposes the 3D models of the exterior of the 24 unique objects and interior panoramas for complex experience and possibility of the storytelling in the teaching process. We want to have in the project representative objects which have the potential to support education mostly in the field of history, civics, traditional culture and regional education and education about different religions. In this article we also present the process of the objects selection and their digitization.

Keywords: *Education, Virtual Reality, Augmented Reality, 3D models, Information Technologies*

JEL Classification: *I20*

Introduction

In the process of the teaching, one of the most important thing is, how to increase the rememberability of information, provided by the teacher to the students. One of the most effective method is to connect the information with emotion. It depends on the type of the information, if the emotion is posotove or negative. Information can be provided to the student as the different media type like text, sound, image, video, etc. or its combinations. We can use traditional presentation techniques like reading, oral presentations, posters, which are working with mostly printed media types, or we can use digital media like web-based applications, mobile applications, virtual reality and augmented reality. In this paper we focus mostly on virtual and augmented reality applications developed as the part of the project "InovEduc - Innovative Methods in Education for Supporting Partnerships" which brings a unique fusion of interactive 3D models of historical, cultural, technical and natural monuments of Eastern Slovakia and Transcarpathian Ukraine and innovative learning approaches to improve historical and multicultural awareness in this border region. In the framework of this project is a presentation of 24 objects with the possibility of interactive viewing with applications of the most up-to-date imaging technology, inclusive of virtual and augmented reality.

1 Information technologies in teaching

The most important things in education in the education process, there are possibility of using modern information communication technologies for bringing interactive content directly to the students. Today, most of the classes in Slovakia are using classrooms equipped with PC's and some of them also with tablets. At the schools there is common to have the classrooms equipped with interactive tables, which offer to the teacher and students cooperate in very interactive way. We can use these equipments to provide the interface for very traditional input devices like mouse, keyboard or touch. Another important thing is, that these devices do not offer the possibility of stereoscopy and do not immerse the user enough. It means that user is not immersed in the virtual scene or the scene is not a part of their real space around them.

In the InovEduc project we implemented the applications also for these devices, because we respect the inquiries of the teachers. Unfortunately the most of the schools do not have enough money for buying the new equipment (e.g. for virtual reality), but in the future it will be possible.

If we want to create something like wow effect in the students, we need to find some technologies, which are not so common for them. From our research, we can see that there are two technologies available for this aim – virtual and augmented reality. For the virtual reality we need to have VR headset (in our project we are working with HTC VIVE and Oculus Rift) and also the PC which is capable to compute the frames fast enough (our PC configuration – Intel i7 –

7700k processor, 16GB RAM, nVidia GTX1080 8GB memory graphic card). We also use the touch controllers for interaction with the scenes. For augmented reality we can use the mobile devices, like smartphones or tablets with back camera, because users need to sense the space around them and mixed it with the virtual objects.

The information communication technologies are mostly used in the teaching of natural sciencies, like mathematics, chemistry, geography, physic and also in the field of languages. But there are various kind of humanities like civics, religion, traditional culture, regional education, history etc. There are not so many applications, which allow the teachers to use the ICT in the process of education. But if we want to communicate with the students by their language we need to find the appropriate ways. Most of the students are using smartphones and social networks and try to find still new ways how to use them. In many of the schools is prohibited using smartphones during education process, because the students do not follow the teacher. But on the other side, what if the students can use their own smartphones in the process of education.

In the project InovEduc we develop the series of applications sharing the same content, but bring it to the user (student) in various technological forms. We implemented standalone application for MS Windows operating system, mobile applications with augmented reality for Android and iOS and virtual reality application. In the applications we provide the informations about 24 historical, cultural, technical and natural objects (14 from Slovakia and 10 from Ukraine). These objects are in the form of 3D models (scenes), interior and exterior panoramas, images, audio and text information. Applications can be used also as the presentation tools for tourism, but the main aim was to develop the application which supports the educational process together with the working methodological sheets. These materials are for the teachers and they are the key to the using apps and modern ICT technologies in their praxis.

2 Selecting of objects for digitization and its processing

The most important things in education are data. The applications are only the tools for their presentation. The form of the data presentation is also important, but without data the applications are still only frameworks. For our educational purposes we choose 24 interesting objects, which were digitized by various digitalization techniques.

We want to have in the project representative objects which have the potential to support education mostly in the field of history, civics, traditional culture and regional education and education about different religions. The project "InovEduc" focuses on cross-border cooperation between Slovakia and Ukraine, so we choose the objects laying near the common border from both sides. In the past the most of the time both countries were part of the same state or regional structures. Thanks to this fact we are able to show a similar signitures on different kind of objects – e.g. wooden churches, or Jewish cemeteries.

The process of selecting the objects has two stages. In the first stage, there was choosen about 40 objects on different criteria – like common history

of the objects, same kind of religion denominations, same owners of the objects, or the similar kind of objects. Then the 24 final objects were selected (Voľanská, 2017) and there was selected appropriate digitalization technique (Lacko, 2010). On the Figure 1 are shown the position of the objects on the map.

Source: own image

Figure 1 ***Map of the objects – standalone application screenshot***

We try to find the object pairs (one from Slovakia and one from Ukraine). These pairs can show the students the similarities or differences of the objects. For example, the wine cellars in Veľká Tŕňa and in Serednie has the same purpose, but there is different story about their creation. Or Castle in Uzhhorod and Château in Humenné has the same owner, the Drugeths family. The final objects selected for digitization are shown in the Table 1.

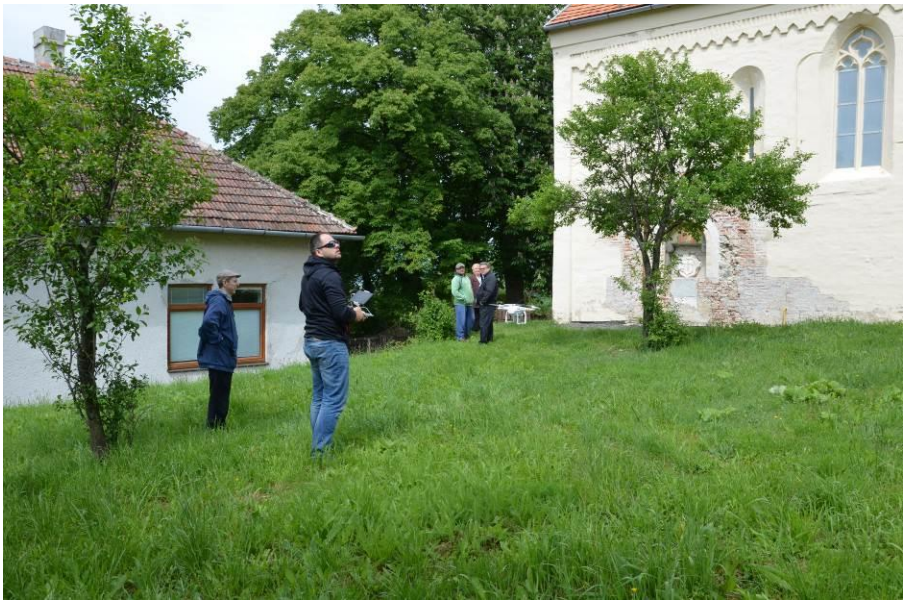
Table 1 ***Digitized objects in InovEduc project***

Objects from Slovakia	Objects from Ukraine
Jewish cemetery in Topoľa	Jewish cemetery in Uzhhorod
Wooden church in Topoľa	Church in Kostryna
Wooden church in Ruský Potok	Church in Danylovo
Zborov castle	Castle in Nevice
Wine cellars in Veľká Tŕňa	Wine cellars of Serednie
Château in Humenné	Castle in Uzhhorod
Residential house with water mill from Vyšná Jablonka	The Lemko settlement in Zarychevo
The Railway Viaduct in Hanušovce nad Topľou	Blacksmith in Forge in Lysychovo
Church in Veľká Tŕňa	The Valley of daffodils in Khust
Synagogue in Bardejov	Horjany rotunda in Uzhhorod
Church in Hrabová Roztoka	
Church in Šmigovec	
Church in Inovce	
European bison	

Source: own table

The digitalization process consists of couple of stages (Ružický, Schnidler, 2015). In the first stage we choose the appropriate reconstruction technique. For most of the object we choose manual polygonal modelling, because we want use the final 3D models in different applications (VR, mobile AR, web-based), and we can control the number of vertices and faces (triangles). It is important because not all devices have the same computing power to work with hundreds of thousand or million triangles. We also work with photogrammetry tehniques (Zborov castle), but there we need to strongly simplify the final model for smooth rendering.

Second stage was data acquisition. We use mostly the terrestrial photographs of the objects and for some objects also the video data from drone in 4K resolution showed in Figure 2. These data were processed for modeling and also for acquiring the textures, which were later projected onto the 3D models for increasing the photorealistic feeling. From texture data we also compute the normal maps. For interiors we choose the panoramas, because interiors consist of hundreds of objects and we are not able to model the whole interiors and also we do not have enough computing power for its rendering in real-time e.g. on mobile phones. The panorama images were acquired by Canon EOS 1D and tripod with panoramic head. The images were then aligned and stitched together into the spherical panorama. For some interiors we use 360° video panoramic device Samsung Gear VR. We were taken the 7 exposures of the same scene and two rotations (0° and 90°). Then images were stiched into HDR spherical panorama. We also use the panoramic images for acquiring data on the Jewish cemeteries and in the Valley of daffodils in Khust.



Source: own image

Figure 2 ***Data acquisition in Veľká Tŕňa by using drone***

In the third stage, there was created the 3D models of the objects. The stage four was the stage of creating scenes. We complete the scenes consist of 3D models of the objects and nature objects like terrain, trees, grass and the panorama of the environment of the object. Final scene were enhanced by audio (ambient and object sounds like bells, train sound…) and texts (about object and its important parts).

The final scenes (e.g. on Fig. 3) were implemented into applications. For virtual reality, standalone and web-based application were used the same scenes. For augmented reality applications on mobile devices we need to resize the scene environment and some parts of the environment were cutted, because we use only small part of the terrain right around the object.

Source: own image

Figure 3 ***3D model of Château in Humenné***

For the storytelling purposes, the presentation of the object is not enough. In this kind of the data presentation, where the teacher is a guide for the students, we want to enhance the presentation with some other information in the form of the objects, which are somehow part of the main object. For example, in the Wine cellars in Veľká Tŕňa, we add the 3D model of the doser (in Slovak "putňa") as the important part of producing of the wines in the Tokai region. For the Watermill from Vyšná Jablonka, we add the wall cut with the presentation of the separate wall construction layers and for the Jewish cemeteries we add the 3D models of the important gravestones. Each complementary object is surrounded by the text information. For teaching process this kind of added objects is important when the teacher want to use complex information about their historical, technical or other meanings.

3 Web-based applications vs. Virtual reality

Most of the schools doesn't have the VR headsets. That's the reason for using also other presentation techniques like web applications accessible via web browser. For this kind of the applications we are able to use standard devices and the schools are equiped with computers or laptops. Another important thing is that this applications can be used for demonstration for whole student group. By using smart-tables the teachers are able to show to the students the basics about the objects and they can cooperate on the tasks which are presented in the working methodological sheets, which are part of the project „InovEduc".

On the other side, the virtual reality provide deeper immersion into the virtual environment. This is done by stereoscopy, wider field of view and obtaining information about position and orientation of the headset. In our project we do not allow the users to cooperate in the virtual environment, so it is only

for the one user. This fact leads to problems when we want to use the virtual reality application for the whole group of the students. One of the solution is to use the headset for one user, who is immersed in the VR and others can see the same rendered scene from the point of view of the user in external monitor. The true is that, there is missing the "wow" effect when the user is fully immersed in the VR for the others. On the other side, we can follow the user behaviour in the virtual environment from outside. This can lead to enhance the future scenes.

When the user is immersed in the virtual reality, surrounded also by audio, the memorizing of the information is more complex, because the perception of the environment is more complex. For full immersion we should add other perception channels like haptics, taste and smell. Also, the movement in the virtual environment is limited by the headset cable lengths and the space around the user. In the InovEduc we provide the same dimensions in the virtual space as in the real space. We use the outside-in sensing of the headset position and orientation based on the external sensors position. This prevent the possible motion sickness, but also leads to the limited space for the user movements and if we want to move in the whole environment, we need to use the controllers for movements. When the user point by the controller into the terrain and use the trigger, he shifts in that position. The controllers are used also for text information, which are showed after pointing to the textual hotspots in the scene and are rendered in the same position and orientation as controller as we can see on the Figure 4.

Source: own image

Figure 4 ***Position and orientation of the text information panel based on the orientation of the controller***

Another important thing is, that in the virtual reality we are using in our project spatial UI (user interface), so we place into the scene the table with text about the object and also, we are using the icons for presentation of the additional

objects or for interaction with the scene (Fig. 5). The problem could be, that the user must to find the position of the main table. If the users are not well trained in the movement in the virtual reality environment, it is hard for them to navigate to the table, but after our testing, we can see that more than 98% of the users are able after spending 10-20 seconds in the virtual environment, to navigate without any problems.

In the next table we are comparing web application and VR application from the point of the view of the users with important facts for better memorizing of the information and the teaching process in the schools.

Table 2 ***Comparision of the web application and VR application***

	Web application	**VR application**
Content presentation for	Single user / group	Single user
Stereoscopy	No	Yes
Immersion	Weak	Strong
"Wow" effect – increase emotion for the user	Weak	Strong
Navigation problems	No	Sometimes, the training is needed
Motion sickness	No	Possible if there is no external tracking

Source: own table

Source: own image

Figure 5 ***Information table and interaction by the controller***

4 Augmented reality in schools

From our experiences, the most of the schools haven't devices for virtual reality (headsets or powerfull computers). We want to use it for teaching in our project because the high emotional factor of the virtual environment is important

in the process of long-term memorizing of the information. Another possibility of how to bring to the students emotional factor is to enhance the real space with virtual objects. So we use possibilities of the augmented reality to bring the object to life at the desks in the front of the students. Augmented reality allows us use the smartphones and tablets of the students. In the most of the schools in Slovakia, there is prohibited to use the phones during the lessons, but if we bring them applications, which are supporting the lesson, it is really good to have such devices.

In the "InovEduc" project we use the augmented reality for visualization of the objects, based on the sestimation of the position of the marker. There is important to have more then 70% of the marker visible in the first frames to estimate the proper position and then we can have about 30% of the marker visible. By the computer vision techniqes we can estimate its position and orientation in the video stream and then we estimate the global coordinate system. Our scenes are then rendered at the appropriate space position (Fig. 6). This is done for each video frame. Our system also consist of the interior and exterior panoramas. For its presentation we use the internal sensors such as magnetometer, gyroscopes and accelerometers. Then we can estimate the direction of the view and if we rotate with the smartphone (tablet), then we can see various parts of the panorama scene. The scenes are connected via hotspots and the interaction with them is done by clicking on the phone surface.

In this kind of the object presentation there is possible to cooperate in the groups, each student has its own device with own content and more students can share one marker. The scaling of the object is done by approaching of the user to the marker.

Source: own image

Figure 6 ***3D model of the Zborov castle rendered in the augmented reality***

Augmented reality becomes more and more popular in education because it is relatively cheap technique of the data visualization and the penetration of the mobile devices on the market is nearly 100% in our focus group. Augmented reality offers for our purposes that "wow" effect because there is combination of the real and virtual world, which is still for the students something new.

5 Case Study of Regional Education Teaching

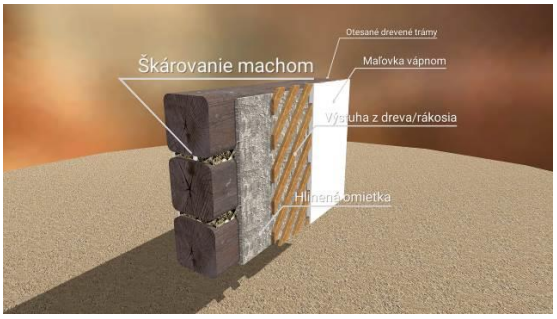
The virtual and augmented reality applications were tested on the real school environment. We can use our applications in the various themes like history, geography, language education, religion and also in mathematics, physics and informatics. But as the most important subject become Regional education. It is important because the project is focusing on the Slovak and Ukrainian border regions. We are looking for common history of these regions and to know the specifics and uniques of these regions is important for their inhabitants. We were focusing not only on the common things but also on differencies.

We can use as the example in the regional education the traditional culture. We are focusing on the traditional living of the ordinary rural people. From Slovakian side we were producing the 3D model of the Watermill (Fig. 7) originally from Vyšná Jablonka, but right now, it is part of the open-air museum in Humenné. From Ukrainian side we produce the 3D model of the Lemko settlement in Zarychevo (Fig. 9).

Source: own images

Figure 7 ***On the left – photograph of the Watermill from Vyšná Jablonka, on the right – its 3D model***

We are able to compare its outside in the 3D scene and we can focus on the main construction parts and differencies between them. Or we can find the similar characteristics. The students are able to identify the functions of the different parts of the objects. If we focus on the contruction we are not able from outside to identify the main contruction parts. We can tell something about local materials but if we want to know how, it was build, we need to have more information. For this purposes we create the 3D model of the wall cutted into parts and we provide this as the additional object to the 3D model of the Watermill. As we can see on the Figure 8, there are different layers identified with the material description.



Source: own image

Figure 8 ***Interactive 3D model of the wall cut of the Watermill from Vyšná Jablonka***

Also at the 3D object of the Lemko settlement, we can identify different parts of the object and try to identify also the material from which was the object originally built. The traditional materials were from local sources. We can see that Watermills roof is covered by the shingles and Lemko settlement is covered by straw.

Source: own images

Figure 9 ***On the left – photograph of the Lemko settlement in Zarychevo, on the right – its 3D model***

The main differencies we can see in the interior (Voľanská, 2017). The interiors are divided into three parts in the case of the Lemko settlement, but in the case of the Watermill the interior consist of the two parts. It is because there is a slightly different purposes of the object. We can compare the interior because of the panoramas. Panoramas helps us to see the photorealistic interiors (Fig. 10). We can see that the space is divided into some important parts, like table part, bed part or furnace part, which were traditionaly associated to different family members.

Source: own image

Figure 10 ***Part of the interior panorama in the Lemko settlement in Zarychevo***

For the correct teaching is important to use the working methodological sheets (Kríž, 2017). Its content was created by the professionals in the field of the traditional culture, history, teaching and informatics and also by the teachers, who were the part of the education in the "InovEduc" project.

6 Discussions

The virtual and augmented reality technologies have in the future big potential in the field of education. Bad news is that not all schools have the adequate devices. As we can see from our tests, the most of the students are interesting in these technologies. For them it is coupled with emotions from something new. Emotions are the keys for improving the number of information they are able to know after some time.

During the testing of our applications we were working with 400 young people from the age 12 to 20. We test their knowledge about chosen themes from their local history coupled with the 3D models of the object. We test them in three stages. In the first stage we want to know if they have some information about the object history before they try our applications. Then the testing were realiazed 30 minutes after them using the applications and last test was 1 month later. They were able to answer the 96% of the question correctly in the second testing stage and in the third testing stage after one moth they were able to answer correctly more than 70% of the question. As we can see if we join the emotion and the information it is written more deep in the memory against the case, when we didn't join it together.

Conclusion

The collection of the applications in the "InovEduc" project is using the potential in the field of education and could be expanded for other objects and also to another types of teaching. Digital technologies can enhance the traditional way of teaching by new techniques and technologies. As we can see from the testing in the schools, the students expect the new technologies in the education process in more intense way. The project outcomes is possible to extend also to the other areas of the interest (Štefanovič, Schindler 2016).

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Detection of unusual financial transaction

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Abstract

The unusual financial transactions including money laundering activities is very actual question of the country security and the economics security. The finding of these activities can protect the inhabitants, because it can indicate the possible terrorist and the people, who make the financial crimes. It is very hard to find concrete institution dealing with this problematic. Almost it is in USA, but in European Union it is not so often. The research articles, which are orientated to this problematic, have only descriptive character. The concrete methods how to find the unusual fanatical transactions and money laundering activities are not public presented. It not exists many literature sources, which can be used how the base of new algorithm for finding the unusual financial transactions and money laundering activities. It is the tendency to create a network of universities researching the problematic of unusual financial transactions and money laundering activities. This article serves to show institutions dealing with this problematic.

Keywords: *unusual financial transactions, moey laudering, fraud, statistical methods, centres of excellence research associated with money laudering*

JEL Classification: *A10, E02, E71*

Introduction

At present, we can see the change of the crime scene and the change in the composition of the crimes. In addition to classical forms of crime, new forms of crime committed by organized criminal groups are at the forefront. Criminal activity is committed in a planned, long-term orientation with high profit, while measures against its detection are being implemented. In the hands of organized groups, which are increasingly committing criminal activity on an international scale, huge sums of unlawfully gained income are received. The vast amount of profit thus obtained brings with it the necessary need to transform it into a legal financial system and invest it in profitable economic unions or otherwise capitalize it.

It is significant that the business and financial operations, which are profits of crime - "dirty money" put into the licit financial system are, in most cases, little visible and almost do not differ from normal operations. A wide range of products and services currently allows for putting funds into the system easier. The use of ICT in the international banking, financial and payment systems, while it facilitates the activities, but proportionally increases the risk of a global money laundering and financing activities of terrorism.

The results of science and research

In order to be able to fight effectively against the marketing proceeds of crime into the licit financial system, it is necessary to develop scientifically-based methods, which are the starting point for the creation of software that allow the systematic detection of unusual business transactions.

Contributions from the issue of money laundering can be divided into two parts: scientific and professional. Those vocational describe the implementation, or recommendations related to unusual business transactions.

Money laundering is a relatively new area in terms of research. Because of this, there is room for exploring new trends on the basis of the experience of the jurisdiction and terms of the methods of detection. The area, where you can apply the algorithms are in particular the following:

-financial operations: For the turning away of attention from the too large amounts of deposits divided into small parts (so-called smurfing); the Proceeds from the illicit trading are legalized by repeated deposits on the accounts of various “dummy” persons in different countries, and the subsequent transfers in the country of destination to finance the seemingly legal activities, such as construction companies or pharmacy, and through the process of "cleaning" dirty money; Focused organisation creates a real maze of parent and subsidiary companies and companies with mutual participation, with sites in different countries, subject to different tax regime, the purpose of which often is not the achievement of actual profits, only if indirectly, but the money laundering from criminal activity.insurance: Many jurisdictions grants the insured entity the right to withdraw from the contract of insurance, law applicable in a certain period of time since the conclusion of the contract, in principle, without penalties and without giving any reason (for the European union, see article 6 of directive

2002/65/EC). It is possible to conclude insurance contract by paying a one-time bank transfer, even from abroad, and within the prescribed period to withdraw from the contract with a claim for refund of the paid amount insurance: Since this amount formally comes from insurance, its illicit origin is easy to hide; Dirty money previously invested in the purchase of vehicles or other assets that subsequently insured against theft or damage. Followed by sham report on insurance event to obtain the compensation to which allow you to get back the amount that was invested, from an insurance company, thereby providing the appearance of legality.

-the real estate market: When laundering, purchasing property for an amount lower than its actual value; the difference will be paid in cash and immediately proceeds in the sale of this property, and created a fictitious capital gain, which legalises own revenue.

-auditing: Issuing invoices for fictitious services or services lower than the declared value allows a company to justify the amount which has on its bank accounts, which will become legal. For the purposes of payment of dirty money the bank deposits carried out through dummy companies or business activities (the so-called front companies) directly or indirectly associated with a criminal organization by the organization that have the availability of cash as a result of their activities (restaurants, cinemas, supermarkets, game rooms etc). This way is legally the income and proceeds from the crime mix and the resolution of the deposited amounts becomes nearly impossible.

-stock exchange: Stellage is the contract concluded on the stock exchange, according to which the buyer after the payment of the amount of the premium reserves the right to decide whether to sell (called put option) or buy (the so-called call option) at a pre-specified price and by a predetermined time a certain amount of security. Contract stellage is then transferred for valuable consideration. Even if at the date of maturity the transaction closed with a mild loss for the person who feathers dirty money, the amount you received as consideration for the transfer of a stellage, formally paid for by the organizer options market, and thanks to the investment it would lose any connection with the crime. Other instruments are swaps. This is a derivative financial instrument, which consists of the regular exchange of cash flows between two counterparties. The subject of this agreement may be the exchange relating to interest rates or currencies. Swap transactions the recurrent and circular nature (in the case of the exchange between a and B, then between B and the Ca, finally, between C and A) with a final zero balance may easily conceal the illegal origin of the capital.

Scientific contributions concerning the issues of money laundering and therefore also unusual business transactions have different level. The best ones are published in journals indexed in the database Web of Science. Not that they were so little, but a lot of tactical reasons not disclosed, or algorithms and procedures patents. It is undesirable to disclose to the public the procedures used in detecting unusual transactions. Rather it is about the contributions in the development of a scientific areas as such with the possibility of applications in the field of legalization of proceeds of crime.

-The contents of the page can be contributions also divided into two types. The first part consists of contributions, where the research methodology of money laundering involves, in most cases, a combination of literature and secondary data. There are very few cases of empirical research to the phenomenon of money laundering or on the controls that deal with it. Allowances use of theory as a basis for the research and supporting evidence analyses and creating conclusions. Studies are analytical, often descriptive. The second part consists of contributions, where the methodology consists of a description of the mathematical and statistical methods and algorithms that are used in the creation of tools for the identification of unusual transactions related to money laundering. Studies are analytical, precisely the nature.

A valuable source for assessing the state of top-level research in the field of unusual financial transactions, money laundering is the article Mei and Gao (Mei and Gao, 2014). On the basis of information from the database Web of Science, which includes scientific articles related to legalization of proceeds of crime and the financing of terrorism. Mei and Gao (2014) analyzed the years 1993 to 2013. Overall, it was published 891 contributions of the analysed area, which includes the databases Web of Science. For the years 2014-2015 were 193 (own finding). One can therefore conclude that the interest of the scientific community on this issue is rising possibly due to alarming the rise of money laundering and financing of terrorism.

The contribution of the Mei and Gao (2014) presents the status of development and the focus of the research of international money laundering, on the basis of the analysis of the distribution of authors, distribution organizations, highly cited journals and keywords. From the analysis of the Mei and Gao (2014) suggests that there are three main directions of research of money laundering. These are the areas:

- research on the prediction of criminal offences of money laundering;
- research of legislation against legalization of income from criminal activity;
- research of the risk of money laundering in Germany.

Leader in the number of articles with the issue of legalization of proceeds of crime (in the WoS) is the U.S. with nearly one hundred contributions. This is followed by China, England, Germany and Australia. The sixth place is Romania. Ten productive states in the research of money laundering contains the following table.

Table 1 ***The most productive states in the research of money laundering (1993-2013)***

State	The number of entries	State	The number of entries
USA	97	Romania	17
China	42	Canada	14
England	39	Holand	13
Germany	21	Italy	10
Australia	19	Ukraine	10

Source: Mei and Gao (2014)

Of the authors occupies a key position in the global AML research, and plays the most important role is (Hetzer, 1999, 2001a, 2001b, 2003, Meyer and Hetzer 1997). Other authors, such as Dongming Xu Shijia Gao, Ping Song, Pengzhou Zhang, Agus Sudjianto, Thomas Naylor, J. C. Sharman, and Jun Tang also have a far-reaching impact in the field of development of scientific knowledge in the fight against money laundering. Along the authorship usually is there in the team D.D. Lin a R. Xue; Bin Feng, Ping Song & Yang Qifeng; Shijia Gao a Dongming Xu; Agus Sudjianto, Caroline Ziemkiewicz a Alvin Lee; a Oana Andreea Pirnuta, Alina Adriana arzén, Cosmina Oana Draghici a Gabriel Florin Moisescu. However, there is a lack of interdisciplinarity between the actors of the cooperation, which can be limitujúca for the further development of international research of money laundering. Table 2 contains the twelve productive institutions in the field of research associated with the fight against legalization of income from criminal activities. They can be seen as centres of excellence of scientific investigation associated with the fight against money laundering and therefore also the identification of unusual business transactions.

Table 2 ***Centres of excellence research associated with***

Institution	Description	The number of cells WoS
Wuhan University of Technology http://english.whut.edu.cn/	a public research university in the city Edz, the capital city of the province of Hubei, China.	7
Cardiff University *www.cardiff.ac.uk/*	among the top 5 universities of the UK with an excellent base for research	5
Queensland University of Technology *https://www.qut.edu.au/*	a public research university in Australia	5

University of London *www.london.ac.uk/*		5
Florida International University *www.fiu.edu/*	a public research university in USA	4
University College Dublin *www.ucd.ie/*	a leading research university	4
University College Dublin *www.ucd.ie/*	a leading research university	4
McGill University *https://www.mcgill.ca/*	a canadian public research university based in Montreal, in the province of Quebec	4
Griffith University *https://www.griffith.edu.au/*	a public research university	4
Bank of America *https://www.bankofamerica.com/*	Bank of America is the largest commercial bank in the united states in terms of deposits, and the largest company of its kind in the world. Bank of America is the largest American company that is not part of the Dow Jones Industrial Average	3
Carnegie Mellon University *www.cmu.edu/*	research university known interdisciplinary programs	3
The University of Virginia *www.virginia.edu/*	flagship, research university	3
Southwest Jiaotong University *english.swjtu.edu.cn/*	national key university in Chengdu, sichuan province, affiliated with the ministry of education of China	2

Source: own processed according to the Mei a Gao (2014)

"Journal of Money Laundering Control" is the only periodical in the world specialised in the field of research of money laundering. Other significant, but not monothematic magazines in the field of money laundering are "magazines" Crime, Law and Social Change", part of the "Lecture Notes in Computer Science", us "American Criminal Law Review" and "International Organization". A great impact on research in the area of money laundering have magazines “the Journal of Financial Crime” and “Communications of the AC.

Table 3 ***Overview of the most commonly used keywords in the articles in connection with AML***

The frequency	Key words	The frequency	Key words
66	Money laundering	6	Fraud detection
22	terrorism	6	Terrorism financing
19	Anti – money laudering	5	security
11	crime	5	Electronic cash
11	Data minig	5	enforcement
9	politics	4	compliance
9	corruption	4	risk
8	Globalization	4	intelligence
6	shadow economy	4	networks
6	state	3	classification

Source: Mei a Gao (2014)

The following overview contains six most cited works from the field of AML OF the number of citations we can see that this is not an area with a high number of citations (in the order of hundreds of citations like in the case of key publications from the field of economic or medical sciences). The reason is primarily the need to constantly upgrade procedures for the detection of AML.

- Truman, E.M. (2014): Chasing Dirty Money: The Fight Again Money Laundering (27 citations)
- Strafer, G.R. (1989): Money Laundering: The Crime Of The 90s (23 citations)
- Irvine, M.R. (1987) Money Laundering Control Act Of 1986: Tainted Money And The Criminal Defense Lawyer (20 citations)
- Harmon, J.R. And James, D. (1988): United States Money Laundering Laws: International Implications (18 citations)
- Stessens, G. (2000): Money Laundering: A New International Law Enforcement Model (14 citations)
- Razzano, F.C. (1994) American Money Laundering Statutes: The Case For A Worldwide System Of Banking Compliance Programs (14 citations)

The use of quantitative methods in the identification of unusual business transactions.

Financial institutions represent the first vertical plane in the fight against money laundering. Therefore, it is essential to have available tools enabling the effective detection and analysis of suspicious transactions or unusual business transactions. This is in accordance with legislative requirements, shall report to the responsible entity - the financial intelligence units, which represent a second vertical plane in the fight against money laundering. For the obliged persons and,

in particular, for financial institutions, which are carried out daily by tens of millions of financial operations, there are special software tools. These can draw attention to the most unusual operations. The software automatically creates profiles of customers, including the expected behaviour and the performed transactions. Using advanced statistical analysis identifies unusual trading operations, in the financial transaction is significantly different than previously realized.

Apply software support or electronic detection of indicators of legalization of proceeds of crime is very useful. The output of such supporting software requires, however, more detailed and more challenging discovery of the substance of the operation is based on the use of mathematical and statistical methods and special algorithms for them based. The software is built on the results of scientific research.

Since the mid-eighties in the scientific contributions focused on the detection of unusual business transactions associated with money laundering or the fight against terrorism appear neural network. Half of the nineties is marked by the advent of the theory of fuzzy sets, fuzzy logics, fuzzy decision-making, but also of spatial statistics and in particular data mining. At the end of the last century, for the word receive genetic algorithms.

Software support is intended in particular for financial institutions in identifying cases of legalization of proceeds of crime is based on the use of mathematical and statistical methods. In particular, the use of the following methods: identification of outlying values, the so-called outliers, the probability distribution of the data – Benford´s law, correlation and regression, time series, spatial statistics, method of main components, cluster analysis, decision trees, naive Bayes classifier, the theory of graphs the theory of games, fuzzy logic and fuzzy sets, neural networks.

Data mining is discovering knowledge in a database. This is the specific process of obtaining new useful information. The result of modelling is the description of patterns and relationships in the data. It covers the existing techniques of the analysis of data as well as the acquisition of knowledge, of information. Discovering knowledge in database is the interdisciplinary nature. In the framework of the data mining is widely used logistic regression and decision trees. Unlike classical use of data mining, where is the criterion of the quality of the model its accuracy, in the case of the detection of fraud and money laundering is criterion of the quality the profitability, i.e. the likelihood of detection of fraud or money laundering.

The use of data mining in the identification of money laundering dealt with Hawkins et al., 1980). FAIS (Financial Crimes Enforcement Network AI Systems), which describes Senator allows a means of data mining identify activity potentially associated with the laundering of money from criminal activities (Senator, 1995) .

Prediction models for data mining suitable for the detection of insurance fraud published Hong and Wiess (Hong, Weiss, 2001). Bolton, Hand gave an overview of statistical methods in detecting fraud (Bolton, Hand, 2002). Yamanishi and others. present SmartSifter, system for identify outliers suitable

for the detection of fraud, monitoring networks, and the like. The system uses data mining (Yamanishi, Takeuchi, Williams, 2000).

Data mining for detecting telecommunication frauds used Taniguchi and others. (Taniguchi, 1998). Gao, Ye (ZENGAN, Mao, 2007) applied techniques of data maining for the identification of transactions potentially connected with the laundering of money from criminal activities. The results obtained using the data mining the authors compare with traditional investigative methods. An overview of the resource usage data miningu in the discovery of the fraud brought the Weatherford (Weatherford, 2002) and Phua and others. (Phua, 2005). Shapiro (Shapiro, 2002) gave an overview of the use of neural networks, fuzzy logic and genetic algorithms in the detection of fraud in the insurance industry. Fu, Xiong, and Peng combined data mining with distributed smart agents presented also as a simulation system (Fu, Xiong, and Peng, 2012). Ngai, et al. (Ngai, et al., 2011) gives an overview and presents a detailed classification system, methods using techniques of data mining for detection of financial fraud. This document represents the first systematic, identification, and a comprehensive review of the literature on the techniques of data mining, which were used for the detection of financial fraud. Analysed 49 journal articles published in 1997 and 2008. The authors identified four categories of financial fraud (bank fraud, insurance fraud, fraud with securities and commodities, and other fraud-related financial fraud). Identify the six classes of data mining (classification, regression, aggregating, prediction, outliers and visualization). The conclusions of the investigation clearly show that the techniques of data mining have been used very extensively for the detection of insurance fraud, although corporate fraud and credit card fraud attracted also great. In contrast, we find a distinct lack of research in fraud area with mortgage credit, money laundering and securities and commodities. The main techniques of data mining for detection of financial fraud are logistic models, neural networks, Bayesian networks and decision trees, all of which provide primary solutions to the problems associated with the detection and classification of fraudulent data.

Financial fraud affecting millions of people every year and thus financial institutions must use methods to protect themselves and their customers. Use of statistical methods to the solution of these problems is faced with many challenges. Financial scams are rarely occurring events, which led to extreme imbalances in the data. The volume and complexity of financial data requires algorithms that must be efficient.

Article Sudjianto ai. focuses on two important types of financial crimes: fraud and money laundering. Describes some of the traditional statistical methods that were used, as well i.e. as recent neural network and data mining (Sudjianto, 2010). The aim of this article is to provide an overview of the general methodologies with selected illustrative examples.

In recent years, money laundering offences is increasing through foreign exchange transactions. Studies Hong (Hong, 2005) proposes four score models of providing early warning of money laundering in foreign exchange transactions for inbound and outbound transfers of funds. It uses a model of logistic regression,

decision trees, neural network and model, which combines all three previous models. It shows that the accumulated number of transactions to be the most important indicator.

Outlier is an observation that deviates so much from other measured values, that raises the suspicion that was created using another mechanism than the other value, the Hawkins (Hawkins, 1980). Scams of different nature, including the legalization of income from criminal activities may be identified as anomalies in the data. For this reason, they can be outlier the subject of interest from the point of view of detecting unusual transactions.

Identification outliers dealt with several statistical methods (Barnet, Lewis, 1994). Detection methods outliers can be divided into two large groups. Methods based on the probability distribution and methods based on distances.

In the case of issues associated with money laundering are the appropriate methods based on distances (for example Euclidean, Manhattan distance). These methods are used also for the detection of outliers in multivariate cases (Knor, Ng, 1997; Kosinski, 1999, Knorr, Ng, Tucakov, 2000). In the literature presents three types of outliers identified on the basis of the distances.

Outliers are objects whose average distance to the k-th nearest neighborhood are the greatest. Such a definition of the use Angiulli and Pizzuti (Angiulli and Pizzuti, 2002). Ramaswamy, Rastogi, and Shim have identified as outlierov n objects whose distance to the k-th nearest neighbour are the greatest (Ramaswamy, Rastogi, and Shim, 2000). Knorr, Ng (Knorr, Ng, 1999) and Knorr, Ng, Tucakov (Knorr, Ng, Tucakov, 2000) have identified as outliers objects, for which exists less than p objects at a distance greater than d Many of the algorithms for the detection outliers that work on small files it is not possible to use for the database containing tens to hundreds of millions of data. Hung, Cheung (Hung, Cheung, 1999), Hand and Blunt (Hand and Blunt, 2001) reported the algorithm for the detection of outliers in large databases.

A combination of detection outliers with the grading techniques used by the system Sherlock designed for auditors (Bay et or, 2006). According to Zhu (Zhu, 2006) detection outliers is a key element for intelligent systems of financial supervision, which shall have the role to identify fraud and money laundering to those that appear unusual customer behaviour. The detection procedures generally fall into two categories: comparing every transaction against the history of its account and further then, the comparison against the reference set, whether the behavior is unusual. The contribution presents the approach allowing reducing the rate of false positivity.

Benford´s law says about probability the division of first and other significant numbers. Benford´s law is proof that the real data files remarkably oppose uniform probability division. Benford came to this conclusion by analysing 20229 files from all sorts of areas. From a statistical point of view it is about compliance testing (for example, using a is there such a chi square test goodness of fit of the empirical distribution of the first and more significant numbers of the surveyed accounting data with theoretical distribution according to the Benford´s law. Benford´s law is a simple and effective tool for detecting

fraud in accounting (Durtschi, Hillison, Pacini, 2004). Nigrini (Nigrini, 1999) used the Benford´s law act to detect fraud in accounting. He pointed also to the difficulty of generating data that match the Benford´s law. To verify the validity of the Benford´s law – as a technique appropriate for the audits pointed out by Nigrini and Mittermaier (Nigrini and Mittermaier ,1997) and York (York, 2000). Bernford´s law is effective not only when the accounting fraud, but also for money laundering that can be identified from accounting statements.

Individual phenomena are always found in certain relationships, one from the other depend on each other makes. An important step in examining the dependence include also the choice of the appropriate statistical characteristics that characterize those phenomena. Correlation the number of addresses the two basic tasks - correlation task, i.e. assesses the tightness of the dependence, determined by the characteristics describing the extent to which independent variables explain the variability in the dependant variable and the regression task, i.e. determines the shape of the regression function and estimated its parameters. Regression analysis provides a set of estimates from which we can infer the effect of certain variables on the studied variable. An important role plays test the statistical significance of the variables. It should, however, be cautious, because the mechanical testing of the statistical significance can obscure the real significance of the size of the investigated variable. Statistically significant relationships can be considered negligible, if the size of the effects is too small. Statistically significant relationships can be considered negligible, if the size of the effects is too small. Statistical significance may occur with many effects, which show the great inaccuracy.

This would be able to ignore the potentially significant effects of money laundering. Statistical significance by itself is neither a necessary nor a sufficient condition of the real importance of the observed variable. Logistic regression models are among the generalized linear models. They are used for the prediction of the discreet dependent variable from predictors. Logistical regression allows the identification of those variables that significantly affect the balance of the object to the group and to predict the residence. Several financial scandals in american corporations due to accounting fraud, provoked increasing interest of researchers on their early detection. Spathis built a model using logistic regression on the basis of which identified the factors associated with false data published financial statements of Greek companies (Spathis, 2002). The accuracy of correct classification exceeds 84 percent. Bell and Carcello on a sample of 77 of the fraudulent statements and 305 reports without fraud to construct a logistic regression model for the estimation of the likelihood of fraud in a financial statement (Bell and Carcello, 2000). Jay and ai. (Jay and ai. 2006) based on a set of 130 companies with revealed frauds in the years 1989-2004 and of the 83 firms without detected fraud to construct logistic models. Into models enter the annual averages, ratios, percentage changes, and dummy variables. The probability of correct classification by the model for the year in which took place the scam is 60,0 per cent, for the year before the fraud is 55,8 per cent and for a year after the fraud is 61,2 per cent. Land ai. (Land, 1990) used a regression

analysis for the clarification of the causes of crime. Regression analysis plays an important role in the macroeconomic approach to measuring the extent of money laundering, in particular when quantification on the basis of the demand for money (currency demand), the approach based on material inputs, usually for the consumption of electricity and econometric approach, when considered with the unobservable variable between the same observable causes and consequences (Walker, 1998, 1999; Schneider, 2007). On the microscale, in particular an estimate of the range of revenue from the sale of drugs, stolen goods etc. Usually the estimated range of the above activities in a few years, and the values between them are approximated.

Clusters analysis is a method of allowing in large-scale data sets found their inner structure in the form of so-called clusters. A key issue is the choice of an appropriate distance and in the case of large files even the choice of the appropriate algorithm. Cluster analysis can also be used as a means for the detection of outliers. The data that are distant from existing clusters can be considered as outliers. For aggregating data, the huge and massive databases, it is necessary to use special cluster algorithms (Williams, Huang, 1997, Yamanishi and others, 1999, Zhang, Ramakrishnan, Livny, 1996). Jiang and others (Jiang and others, 2001) presented a two-stage algorithm clustering for the detection of outliers. The proposed clustering access Yang, ai. is tested on the data of large volume that were provided by the bank (Yang, 2014). The result shows that this method can detect automatically suspicious cases of financial transactions. Clustering techniques are the best techniques for the detection of unusual operations claim (Rohit and Patel, 2015). The theory of graphs represents the discipline of applied mathematics. Part of it is the theory of networks. Important from the perspective of the analysed issues are organizational network. Special types of networks are often included in the applications of artificial intelligence and expert systems. Represent data as graphs is useful in a number of areas. Analysis of the relations uses the diverse theoretical techniques of graph theory.

Xu and Chen investigated the visual analysis of different types of criminal organizations (Xu and Chen, 2005). For the detection of fraud but also money laundering is important in data, which are in the form of graphs to find anomalies. Shetty and Adibi have been identified on the basis of the method entrópie the most important people on the basis of the e-mail addresses, in the case of the scandal Enron (Shetty and Adibi, 2005). The most important are those peaks (in the case of Enronu persons), where the omission of the chart has resulted in the biggest change of the entropy. Noble and Cook´s structural anomalies in the graph transformed to the detection of anomalous subgraph (Noble and Cook, 2003). Lin and Chalupsky have defined different metrics for quantifying the commonality of edges between the peaks (Lin and Chalupsky, 2003). It is necessary to say that the most important peaks are not necessary anomalies. The analysis of social networks (Scott, 1991) is also suitable for the analysis of relationships. The analysis of networks is also suitable for the identification of the network of people involved in money laundering.

Decision making is the process of selecting one of several variants. Situations in which it is necessary to select one of a greater number of variants, are the decision-making situation. A rational participant in this process is one which selects in some sense the best variant. Indifferent the person is to the result of the decision indifferent. This is a random mechanism that selects the variants according to a certain probability distribution. When the result of decision is dependent on the choices of the participants, such situations are referred to as conflicting. It is assumed that the outcome of the decision-making from the point of view of rational participant can be evaluated using one (scalar assessment) or multiple criteria (vector assignment). The theory of games deals with decision-making situations with a greater number of rational participants with the scalar rating. Keith uses the apparatus of the theory of games for modelling the behaviour of managers of firms with fraud and auditors (Keith, 2004). They studied the impact of four factors on the interaction between auditors and managers. The results indicate the correlation between the testing, detection of fraud and prevention of fraud in the company. Model of the audit involving the internal control is analyzed as non-cooperative game. Apparatus of the theory of games, for the detection of fraud using the Matsumara and Tucker (Matsumara and Tucker, 1992).

Fuzzy sets and fuzzy logic are a generalization of the classical two-value logic and theory of sets. Instead of a binary allocation used for probability the value of the interval. A lot of knowledge, information is in the linguistic shape. Computers, however, need accurate information. Fuzzy sets are useful for the translation of the inaccurate verbal information in the form of numeric information. The linguistic variable is a variable whose values are words or sentences of a natural or artificial language. Fuzzy sets are successfully used for the representation of the content linguistic variable. Fundamental the problem is the design function of the nationality of the fuzzy set. Is it possible on the basis of knowledge of experts and also using the neural networks. Stefano and Gisella have used fuzzy expert system for detecting insurance fraud (Stefano and Gisella, 2001). Estévez and others used a combination of fuzzy decisions and neural network for the prevention of fraud in telecommunications (Estévez and others 2006). Apparatus of fuzzy sets and fuzzy logic is applied mainly in conjunction with neural networks.

Neural network is a massive parallel processor that has the ability to remember the knowledge obtained experimentally, and these skills continue to be used. The characteristic feature of the neural network is its structure made up of individual neurons connected with synaptic links. Neural networks can be successfully used alongside solutions prediction issues and problems in the management of the processes, also for the classification of objects into classes Neural networks are able to solve problems that are using the classic number of procedures difficult solvable. Neural network fails to act according to a pre-specified algorithm. Is able to learn from the examples and the learned information to use.

The most widely used type of neural network is a multilayer percepton

(multilayer percepton – LAUNCH). Another type of neural networks used in detecting fraud as self-organising maps (I). Their selling point is that, under certain conditions, allowing you to view, which preserves the typology and it shows the characteristic features of the area of the set of data. Neural networks are used everywhere there, where it is necessary to understand the complex relationships between the different variables. Neural networks are in design non-linear and do not need to explicitly specify the shape of features depending. Can find also the interactive effects. The acquired knowledge is implicitly stored in the vector the network settings. Neural networks based on fuzzy rules allow you to increase the performance of the solutions. Neural networks tend to be linked with the expert systems to hybrid systems. The next option is to extract the knowledge from the neural network to the expert system genetic algorithms are suitable for adjusting the parameters of neural networks, difficult solvable optimization problems and machine learning with the grading systems.

Neural networks based on decision trees used in systems to detect fraud BAYES, FOIL, RIPPER and more. The project ASPeCT of the European commission, companies Vodaphone and other european telecommunications companies for detecting fraud with mobile phones also uses neural networks. The technology of neural networks also used the software package FALCON designed for the detection of credit card fraud. Bolton and Hand gave an overview of the applications of neural networks in detection of activities associated with the laundering of money from crime, credit card fraud and fraud in the field of telecommunications (Bolton and Hand, 2002). System BRUTUS allows the detection of fraud with mobile phones using neural networks. As well Ezawa and Norton used a neural network for detection on the basis of the telecommunications accounts (Ezawa and Norton, 1996). Syeda and others. (2002) used a fuzzy neural network for rapid detection of fraud with credit cards.

Stefano and Gisella (2001) have developed a fuzzy expert system for the detection of insurance fraud. Cahill et al. (2002) presented an algorithm to detect accounts with suspicious text activities on large data files. Another application of neural networks to legalization of proceeds of crime describe Chartier and Spillane (2000). Identify a suspicious transaction, to acquire information, allow for intelligent multiagentové technology (MAT). Barson and others. (1996) simulate the 6 types of users of mobile phones. His neural network correctly classified 92,5 percent of the data. Bayesian neural networks are suitable for modeling the so-called criminal profiles (criminal profiling) Baumgartner and others. (2005).

Literature brings many debates about risk, and multiple definitions. There are two streams - subjective probability and operationalism (both are derived from the same source empiricizm David Humeho). In the document on the definition of risk, Holton (2004) argues that the risk of are need two ingredients - the first one is the uncertainty of the possible outcomes of the experiment and, second, that the results have a tangible nature. Financial institutions and other obliged entities face two categories of risks – the first is regulatory risk, which is associated with the violation of the rules of the fight

against legalization of income from criminal activity and the second business risk is the risk which must be bound to the entity to face as a result of the provision of services that might (whether inadvertently or otherwise) involve or facilitate money laundering or the financing of terrorism. In addition, it is important to note that regulatory and business risks can be covered. .

A risk based approach (risk based approach) is a systematic continuous process with the aim of identification and measurement of the potential risk of money laundering to the financing of terrorism. At the same time develop and adapt strategy to mitigate these risks, especially in areas that have the highest risk. On the basis of the evaluation of the literature it can be concluded that the current policy research and work in the area of the fight against money laundering is primarily focused on the financial sector. Studies also highlight the need to have international cooperation network, capacity building, enhancement of processes in the area of supervision and so on. However, they also need an in-depth study of the major weaknesses both from a legislative and implementation point of view. It is also necessary to develop a typology and potential safety measures with the use of sophisticated mathematical and statistical methods.

The patent protection procedures

Many outstanding scientific results of the area identification of unusual transactions, money-laundering, however, are not published in scientific journals, but are patented. Their publishing would make it impossible for their patent, since the disclosure would be classified as a defect in the novelty. n some countries, there may be computer algorithms which are the basis for increasing the functionality of any computer software, patent-protected. In other countries, however, are explicitly excluded from patenting and considered impossible to patent.

Inventions relating to software may be patentable, provided that the software provides a technical contribution to the state of the art. In most countries, can be machine or source code of computer programs protected by copyright. This protection is not dependent on registration, but it is possible and in some countries even required. Protection of copyright is, in comparison with the patent protection more limited in scope, because it applies only to expressions of ideas and not the ideas themselves. Many companies can protect the machine code of computer programs by copyright, while the source code is a trade secret.

Patent law of the USA, Canada and other countries allows you to patented algorithms. The following excerpts are an example of patenting algorithms used in the discovery of unusual business operations and in AML. A preview of a few of the patents is listed in the next:

Networked system for generating suggestions for exchanging foreign currency for credit in restricted account, has suggestion module for generating suggestion information for transaction locations and transmitting information to user device

Patent Number: US2016140555-A1

Patent Assignee: EBAY INC
Inventor(s): SCIPIONI G.

Computerized method for identifying accounts stored in database of computerized account management system, involves analyzing and assigning all accounts to per-jurisdiction buckets or default bucket, and no account is left unassigned

Patent Number: US2016104166-A1
Patent Assignee: MORGAN STANLEY
Inventor(s): COLE M; CHAN P; ENG K; et al.

RMB crown word number management system, has financial organization center for transmitting data to total center through bank intranet, and self-service equipment arranged on line type teller machine to process paper currency

Patent Number: CN104657818-A
Patent Assignee: SICHUAN JUNYI DIGITAL TECHNOLOGY DEV CO
Inventor(s): GOU J; ZENG L.

System for detecting unusual activity such as moneylaundering in cash vault transactions, determines dynamic threshold indicating whether change in proportion of large denomination currency transacted by customer is unusual

Patent Number: US2015142629-A1
Patent Assignee: BANK OF AMERICA CORP
Inventor(s): SUPLEE C; HUGHES C B; ZHOU J; et al.

Apparatus for generating graphical user interface for investigating e.g. illegal financial transaction of individual in financial institution, has module for generating interface that displays link to provide correlation between parties

Patent Number: US2015142627-A1
Patent Assignee: BANK OF AMERICA CORP
Inventor(s): LEE A.

Computer-implemented method for removing personally identifiable data, using fraud detection system, involves generating reverse hashing map and which explains how to restore identifiable information of set of hashed data

Patent Number: CA2860179-A1
Patent Assignee: VERAFIN INC
Inventor(s): BURKE A; CHALKER T; KING J; et al.

Laundry treating apparatus for washing laundry at home, has first communication module to receive identity (ID) information and second communication module which communicates with management server through communication network

Patent Number: US2014085046-A1 EP2711453-A1 KR2014038738-A CN103668859-A

Patent Assignee: LG ELECTRONICS INC
Inventor(s): SHIN H; KIM H; PARK M; et al.

Method for anti-moneylaundering surveillance to detect anomalies related to financial transactions, involves using outlier-shooting algorithm to identify outliers in peer comparison statistical data by generating peer comparison alert
Patent Number: US8544727-B1
Patent Assignee: BANK OF AMERICA CORP
Inventor(s): QUINN M R; SUDJIANTO A; RICHARDS P C; et al.

Method for detecting fraudulent data, involves identifying several reported data types for suspicion of fraud, when series of all digital distributions fails to show supposed theoretical development of digital distributions
Patent Number: US2014006468-A1 US9058285-B2
Patent Assignee: KOSSOVSKY A E
Inventor(s): KOSSOVSKY A E.

Conclusion

The problematic of unusual financial operations and money laundering activity is very actual question for all countries around the world. It is important to search all the unusual financial operations and money laundering activities to protect the inhabitants and the economy. It is impossible to find concrete research, which is orientated on unusual financial operations and money laundering activity, because it will be not useful anymore. The most research papers are oriented only on problem description and how to solve it in general. This article describes the problematic from the academic site. Here are shown the universities and concrete articles, which deal with the thesis of unusual financial operations and money laundering activities. The institutions try to develop the network for searching unusual financial activities and money laundering activities to help government to avoid them. Around the world it is less institutions deal in this problematic, so the amount of the research paper is low too. It will be a high challenge for the research institutions in the future how to create the mechanism of the money laundering activities and unusual financial activities finding and how to avoid this activities.

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