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Dear Readers,

The Scientific Journal of Bielsko-Biała School of Finance and Law has been published since 1997 and is still a young but dynamically growing journal for scientists and people who want to share their scientific achievements and have their research papers published by Bielsko-Biała School of Finance and Law. It is a quarterly publication with the scoring 7, assigned by the Polish Ministry of Science and Higher Education indexed in Polish and international databases such as: CEJSH, EBSCO, CEEOL, ERIH PLUS, ICI Journals Master List. All papers published in the Journal appear in full, unabridged versions, under a Creative Commons Attribution CC-BY-NC 4.0 license.

The history of the Journal is closely connected with Bielsko-Biała School of Finance and Law (established in 1995) and with its growth and development. From the very beginning the School has been reinforcing the oldest academic traditions of Polish universities. As the basis for its actions The School adopts: "...reliability in the dissemination of knowledge combined with the inculcation of ethical values, strives to convey a universal education based on the combination of professional knowledge with general knowledge of a methodological and theoretical nature...". This mission is implemented also through the Journal where scientists are invited to publish their scientific papers.

Originally, the Scientific Journal was published only in a paper version, but since 2015, due to dynamically developing international scientific cooperation, it also has had an electronic form. The mission of the Journal is to prompt quality scientific work with local and global impacts. Its profile is focused on issues related to social sciences (including Finance, Economics, Business, Law, Internal Security) and technical sciences. The Journal publishes original scientific research, global news, letters and commentary as well as review articles. To maintain a high-quality of publication, all submissions undergo a peer-review process.

The Journal's Scientific Council includes representatives of different lines of science from a number of Polish and foreign academic centers located in e.g. Czech Republic, Germany, Italy, Iceland, Portugal, Slovakia, Spain, Sardinia and others.

Thanks to the Ministry of Science and Higher Education and the program DUN implemented by the Ministry regarding activities disseminating science, the Journal one more time has received funding for its development.

We are thankful to all of those who put their trust in Bielsko-Biała School of Finance and Law and the Scientific Journal, and present their original research work for publication. We are also grateful for cooperation and support from scientists worldwide and for their efforts in reviewing and enabling this issue.

Your support and feedback are invited and appreciated.

Prof. nzw. dr hab eng. Jacek P. Binda
Editor-in-Chief
E-business challenges in the field of payment solutions - Bitcoin a sustainable currency or gambling

Jacek Binda

1 Department of Finance and Information Technologies, Bielsko-Biała School of Finance and Law
ul. Tańskiego 5, 43-382 Bielsko-Biała - Poland

Abstract—Money is a widely accepted commodity allowing to determine the economic value of purchased goods and services and to make payments. Over the centuries, "money" has been constantly evolving. In recent times, following dynamic development of various forms of e-business, dematerialized money has emerged. However, in constantly changing conditions it is very difficult to grasp the essence of the so called e-money or cryptocurrencies. The paper tries to define Bitcoin, one of the most recognizable cryptocurrencies, and answer the question whether investing in cryptocurrencies is a serious business or a mere gambling. In search for the answers, the author reviews literature on the topic and conducts his own risk analysis based on Value at Risk measure, of selected traditional currencies and Bitcoin. The results of the analysis unambiguously show that investments in Bitcoin are burdened with definitely much higher risk. Furthermore, conclusions of the considerations clearly show that despite growing popularity of cryptocurrencies they do not fulfill the definition of both electronic money or money in general. The paper attempts to discuss selected issues related to Bitcoin cryptocurrencies from the monetary point of view but also with respect to restrictions of Bitcoin as a means of payment, investments in Bitcoin and risk assessment.

Index Terms—Cryptocurrencies, Bitcoin, Trading market, Electronic money

I. INTRODUCTION

The end of the 20th century was a period of sudden transformations. Now this period is referred to as ‘the post-industrial revolution’ or ‘information revolution’. The strategic elements of the new order are: information management (IM) and knowledge management (KM). The processes of convergence of teleinformation technologies and electronic media systems started to dominate and became significant attributes of the new economic phenomenon known as the net-based economy. The style of communication between market participants was also transformed. It was the catalyst of dynamic changes leading to technical convergence of products and their markets as well as to liberalization of the electronic market (also electronic banking services). In the new reality money has lost its material form and the newly emerged, dematerialised forms of payment are increasingly present on the markets. In the era of dynamic development of new technologies and forced changes in the functioning of markets, the importance of electronic money i.e. electronic impulses or bit strings, takes on meaning. However, interpretation problems concerning cryptocurrencies do exist due to their conceptual complexity both in the legal and economic sense.

II. THE ROLE OF ICT TECHNOLOGIES IN DEVELOPMENT OF E-BUSINESS SERVICES

Past centuries witnessed various transformation periods e.g. the Renaissance - the Enlightenment. Later periods of dynamic changes brought about advancements in science and information technologies. These changes have had a considerable impact on our civilization. Technological boom, which can be witnessed for some time now, is a resultant of development tendencies within equipment, software and means of communication. We live in a global information village, we travel on the information highway, we are the information society.

The rise of economy communicated with the net is closely related to the possibilities of ICT technologies and to the degree of their uptake what allows for effective consumption or the so called network effect. The dynamics of changes as well as strong competition between teleinformation companies for stable competitive advantage have led to the creation of a wide spectrum of services. The processes are accompanied by emergence of new segments and the loss of importance of existing ones. Electronic transactions on the world stock
markets produce the domino effect – the reactions of stock markets resulting from their respective behavior are only delayed due to different time zones. These examples show how considerable is the impact of information technologies on all layers of life, all over the globe. Technological progress is the driving force behind the development of information society, it transforms almost all aspects of people’s existence.

The pace of growth of modern technologies carries a number of challenges and dilemmas for business environment, mainly with respect to the management styles. The world of business dictates the speed to the information revolution in management because it uses state-of-the-art solutions in which knowledge is a tool of strategic importance. New telecommunication technologies, which are the catalyst for changes in e-business, play essential role with respect to:

- combining design, production, supply, sales, administration, technical services of companies which allows for creation of organizations integrated electronically,
- electronic surveillance systems leading to improvements such as cost-effectiveness or labor efficiency,
- combining networks of suppliers, materials and spare parts or companies and manufacturers, wholesalers and retailers, which generates savings with respect to storage on each phase of production, distribution and allows for prompt reaction to day-by-day changes in the demand for goods or services,
- greater flexibility within development and production of new models of goods, which is sometimes defined as the ‘economy of scale’.

Dynamic development of new technologies considerably influences the structure of the economy (emergence of new sectors of industry and services), internal structure of organizations, management style and types of ties between companies. There are tendencies towards horizontal linking of design, production and marketing in contrast to the Taylor’s system of vertical and hierarchical control. The flow of information inside and outside the company becomes more uninhibited and new channels of communication are born.

Taking the above into account, it can be said that the economy has changed more in the last decade alone than in the previous five decades. The pioneers of these changes were businesses who first spotted the opportunities in ICT technologies. In 1999 American companies invested in teleinformation technologies the amounts equal to 5% of GDP. However, the financial crisis that came later slashed the forecasts for 2009 IT investments from 4.2% GDP to about 0.9% GDP. A considerable part of investment plans was cancelled; another part was postponed (especially in Europe) due to the dollar exchange rate. Gartner Group, a British research center, published a study which argued that in the first quarter of 2009 about 42% of companies reduced their budget on maintenance and development of IT environments as compared to 2008. The recovery in IT expenditure could be observed in the period 2012-2014. However, in 2015 the figures were corrected and the total expenditure on IT projects amounted to only 3.5 billion dollars. The expenditure was 5.5% lower than in 2014, this was caused by strengthening dollar, Figure 1.

The dynamics of growth of the IT sector in the long perspective depends on the global economic situation and on the way the IT tools are used. According to the OECD experts, the increase in investment in IT will be triggered by the growth in interest in special business applications, modern and highly specialized communication systems and IT outsourcing services. The factors determining the shape of this sector are offshoring [a shift of certain business processes (production and services) to another country in order to cut costs] and outsourcing [some parts of an organisation are extracted from its structure and their functions are passed on to external entities to take care of] of selected business processes. Their share market is translated into development of local teleinformation sector. The main providers of IT offshoring services are Central-Eastern Europe countries. IT departments of companies have, thus, the choice of services rendered by local or foreign providers whenever they have to put in practice their corporate strategic development plans. The previously predominant concern about high costs of development of new IT solutions has been replaced by deep confidence that IT functions equip the services with considerable added value. ICT tools are currently widely used in business, they facilitate the way companies communicate with each other, help improve processes and build competitive market position.

The methods of financial settlements are also under dynamic transformation. This is reflected in the rise of the number of instruments available to non-cash transactions, number of payment cards, number of retailers accepting credit cards, number of cashless transactions with the use of electronic money or cryptocurrencies. Regardless of the type of non-cash payment instruments (card payments, electronic money, cryptocurrencies), the mere fact of their use in payment turnover is of significant importance for reducing the costs of cash transactions. It is estimated that this cost is between 0.9-
1.1 GDP in the European Union. For this reason, non-cash payment instruments are an important element of the dynamically developing e-business which covers all business processes carried out electronically or with significant support of ICT solutions, including non-cash transactions.

The development of cryptocurrencies is particularly dynamic, despite the lack of precise and exhaustive regulations related to the use of this means of payment. The issuance of cryptocurrencies is also complicated due to problems related to the absence of a uniform definition of this form of money and inability to clearly differentiate it from other non-cash means of payment. Hence, in the literature on the subject one can find a number of terms whose common feature is the concept of cryptography. These terms indicate that cryptocurrencies are distributed accounting systems, based on cryptography, which allow for storing information on the account holder's status in contractual units. Others state that it is a limited or virtual currency with a limited amount of circulation that uses cryptographic solutions to ensure security of transactions, beyond the control of the central authorities, and thus immune to intervention or manipulation by governments. One can also find definitions stating that a cryptocurrency is an innovative, distributed accounting system whose key element is the Blockchain. This chain is an encoded cryptographic structure operating without the participation of intermediary institutions responsible for the verification of transaction data and responsible for storing accounting entries, payments or transactions of system participants. It can also be defined as a kind of decentralized and distributed database operating on the Internet, based on a peer-to-peer (P2P) architecture and not having a centralized data storage location.

The adopted cryptocurrency concept sets out its numerous advantages (although often the advantage for some may be perceived as a disadvantage to others) such as for instance: increased resistance to cyberattacks, anonymity, independence, being out of control and supervision of domestic and international financial institutions. It should be clearly emphasized that, although the first application of Blockchain technology was related to the cryptocurrency Bitcoin, nowadays this technology is used, among others, in the Internet of Things (IoT) or in Distributed Ledger Technology. The consequence of the above is the visible increase in the capitalization of the crypto market in the world. This is favored by the dynamic development of new technologies, strong money virtualization trend, and a partial loss of social trust in the current monetary system.

Out of over 1334 cryptocurrencies that exist nowadays, Bitcoin is perhaps the most recognizable on the global market. It emerged as a manifestation of opposition to the banking system, financial institutions and governments who had been responsible for the crisis on global markets in 2007-2009. In the literature on the subject, Bitcoin is defined as e.g. a payment and investment instrument, expressed in the form of electronic records, operating in virtual space, or a decentralized, selected by the market internet currency operating on the basis of cryptography and using P2P network technologies. There is also a definition that Bitcoin is a virtual money, composed of a sequence of zeros and ones stored on computer disks. These definitions emphasize the immaterial character of cryptocurrencies and the scope of their functioning limited only to the Internet. This innovative distributed transaction system uses a peer-to-peer network communication model, and data "portfolios" located on users' computers or on external websites (in the form of specialized applications e.g. Blockchain.info and Quandl.com).

Against this background, however, arises a problem regarding the way of interpreting cryptocurrencies such as Bitcoin. It is vital to determine its role in e-business as a medium of exchange, payment and value measure, and to provide answer to the final question whether Bitcoin should really be considered money. To answer this question it is necessary to turn to the definition of traditional money which says that money is a widely accepted commodity by means of which it is possible to determine the economic value of purchased goods and services and make payments. Other definitions indicate, that it is an asset that stores purchasing power or that it is an asset with high liquidity and predictable value. Still, other authors emphasize that it is a means of linking the present with the future, or everything that is commonly accepted as a payment for goods, services and repayment of debt. From the point of view of economic theory, money is a rare commodity that is traded on financial markets. It is also a legally defined payment instrument associated with a real social product that can be both material and non-material and used to express, store and transfer values.

Contemporary money can be defined, among others through its functions and properties. The classic functions of money include: a value measure (a means of expressing value), a unit of account (register), a legal tender (a means of transferring value), a medium of exchange (rotational), a means of storing values (thesaurization). The literature also emphasizes that money is characterized by widespread acceptability, divisibility to smaller units and difficulty to falsify. The first function of money - a measure of the value of goods and services - refers to the price category, which is the value of the goods expressed in cash. Money issuers perform the function of guarantors of its stability through the pursuit of monetary policy, and the amount of currency held is equivalent to the number of "owned shares" in all goods produced in a given economy. Bitcoin as a cryptocurrency has no value, but it only has a rate against traditional currencies, which can be influenced by many factors, including decisions of politicians or state authorities (as was the case with MT Gox). Thus, the function of the value meter is not fully implemented by Bitcoin and is significantly different from traditional money. One of the functionalities, which is an important value for Bitcoin users, is the possibility of making anonymous cheap online transfers, verified instantly, by means of a global network and a peer-to-peer model. However, a limited number of Bitcoin units may lead (and leads) to an increase in the exchange rate and deflation of prices expressed in Bitcoin and may also increase its susceptibility to speculative attacks and price fluctuations, Figure 2.
Thus, the function of Bitcoin as a means of payment seems to be highly limited. Lack of features convergent with traditional money, is also shown when one wants to use Bitcoin as a means of storing value. Bitcoin in itself has no value, it only includes a speculative price of itself. Taking into account the above, it can be stated that it is not possible to assign Bitcoin the thesaurization function.

On the other hand, Bitcoin can perform the function of a medium of exchange because it is acquired for the purposes of exchange for consumer or production goods. It is also true to say that it is a rare good due to the algorithmically limited number of units in circulation up to the volume of 21 million, Figure 3.

It is also possible to assign to Bitcoin the easy transfer feature via the extensive Blockchain network and ATM devices (bitomats that enable Bitcoin cryptocurrency to be purchased), divisibility into smaller units through which transactions in the network are carried out, and acceptability among Bitcoin system users. It seems controversial however, to attribute it to the universality of acceptance as the system is used by a relatively small number of users. Moreover, goods purchased using Bitcoin can also be purchased with other currencies, Figure 4.

The daily number of Bitcoin transactions i.e. 346,283 (as at 02/12/2017 22:24:42) as well as the number of devices in the world accepting Bitcoin (1,587 items), seem to be relatively small (the number of traditional ATMs located only in Poland is 23,528 - Q2 2017 according to the nbp.pl portal). It should be noted, however, that a dynamic upward trend here can be observed, Figure 5.

Bitcoin also seems to be doubtful as a standard investment value. In case of acquisition of standard investment securities, the investor maintains certain guarantees in the event of a decrease in their price (e.g. the possibility to wait for maturity of the debt in case of bonds). Whereas, investing in Bitcoin is more of a gambling and is similar to investing in futures without a lower price limit.

Based on the above analysis, it can be argued that the Bitcoin cryptocurrency does not fulfill all the functions of traditional money and should not be considered as such. Bitcoin should also not be considered as electronic money, despite showing large similarities to this means of payment. The justification for the above thesis is to be found, among others, in the provisions of article 2 point 2 of the Directive 2009/110 / EC of the European Parliament and of the Council of 16 September 2009 on the taking up and pursuit of electronic money institutions and supervision over their activities, as well as in the provisions of article 2 (21a) of the Polish Act on Payment Services. The first document indicates that "electronic money" carries monetary value stored electronically, including magnetically, constituting the right to a claim against the issuer, which is issued in exchange for cash in order to perform payment transactions specified in article 4 point 5 of Directive 2007/64 / EC and accepted by natural or legal persons other than the issuer of electronic money. The Directive also indicates a closed catalog of entities entitled to issue electronic money: credit institutions (Article 4 point 1 of Directive 2006/48/EC), electronic money institutions, postal giro institutions (if they are entitled to issue electronic money in accordance with the domestic law), national central banks and the European Central Bank if their role does not constitute them as monetary authorities or other public bodies, Member States or their bodies, if they do not act as public bodies. The second document (the reference to the Polish market results from the author's research on cryptocurrencies on this specific market), indicates...
that it is a monetary value stored electronically, including magnetically, issued, with the obligation to buy it, for the purpose of making payment transactions, accepted by entities other than the electronic money publisher only. As regards the Polish market, issuance of electronic money requires obtaining permit from the financial supervisory authority - the Supervisory Commission.

Bitcoin in opposition to electronic money and traditional fiat currency, has no single issuer. It remains outside the direct control of central financial institutions and functions without adequate economic support. Units of this cryptocurrency are created by the system automatically, in a manner planned in advance by the system's creators, based on emission assumptions inscribed in the source code of cryptocurrencies. As a result of these activities, the number of Bitcoins in circulation is a function of the nominal value of transactions performed and the said rigid limitation of the number of units in circulation (the Bitcoin emission control mechanism assumes that their number in circulation cannot exceed 21 million units). It should be noted that standard currencies are manually controlled, which allows them to maintain their relative stability in the face of changing market situation. Bitcoin, on the other hand, being automatically controlled, seems to be less resistant to market shocks. The above allows to state that the Bitcoin cryptocurrency does not meet both the provisions of Directive 2009/110 /EC and the provisions of the Polish Act on Payment Services, defining electronic money.

III. RISK OF INVESTMENT IN BITCOIN

As indicated earlier, it seems that Bitcoin has no standard investment value. Investments in Bitcoin are often referred to as a particular type of gambling and resemble investments in futures without a lower price limit. To assess the risk of investment in Bitcoin, it is necessary to use the risk measure. The problem of measurement and monitoring of investment risk (including financial investments) is one of the greatest challenges of modern economics. The literature on the subject refers to the above issues through volatility measures (variance of rate of return, standard deviation of the rate of return, coefficient of variation of the rate of return), measures of sensitivity (beta coefficient, duration of investment) or measures of risk (semi-refund of rate of return, standard semi-error rate of return, Value at Risk).

According to Markowitz, the risk measure of the investment portfolio is the variance of the return on the investment portfolio. The imperfection of the method (as the variance of the rate of return included both surpluses over the expected value and decreases below the expected value measured in squares) was adjusted by the so-called semivariance. However, this correction led to the loss of the analytical form of the solution proposed by Markowitz. The Basel Committee on Banking Supervision in 2006, recommended the use of the so-called Value at Risk (VaR) measure. Originally, VaR was only used as an internal measure used to estimate risk in banks (as a method of assessing market risk, it was introduced through an amendment to the Basel II contract).

Here, however, arises the problem of possibility to increase the degree of risk exposure (VaR may increase) generated by the portfolio of assets, with its diversification. The VaR measure is the amount an investor may lose (value of losses) as a result of investing in the portfolio with the assumed time horizon and confidence level. It is also admissible that this is the value of losses that may be exceeded with probability $\alpha$ or a loss value, which with probability equal to $(1-\alpha)$ may not be exceeded on the following day. Summing up, the VaR method allows obtaining information on the general risk level regardless of the type of assets analyzed. The following conclusions emerge from the VaR method:

- when a given asset brings higher profits, with a lower level of VaR risk, it should have been increased,
- when a given asset brings higher profits with the same level of VaR risk, the involvement in this asset should have been increased.

Value at risk VaR can be considered in absolute terms (through the current value of capital employed in the investment) as well as in relative terms (through the expected value of capital employed in the investment). Probability allows us to predict, estimate unknown results based on known parameters, while the credibility allows us to estimate the unknown parameters based on known results.

For the needs of the present paper, the risk of investments in Bitcoin was compared on selected world exchanges (Bitfinex, GDAX, Bitstamp, BTCC, Gemini) and the risk of investing in selected "traditional" currencies - USD, AUD, CAD, EUR, HUF, CHF, GBP (exchange rate in relation to PLN in the period 01/01/2009 - 10/12/2017). The choice resulted from the 24 Hour Volume Rankings – Currency. The VaR measure was adopted in relative terms, understood as the maximum value that an investor would like to lose as a result of an investment, for a given period of time, with the assumed tolerance level, (1).

$$P(W \leq (E(W) - VaR_\alpha)) = \alpha$$

$$P(W > (E(W) - VaR_\alpha)) = 1 - \alpha$$

$$VaR_\alpha = E(W) - W_\alpha$$

$$VaR_\alpha = W_\alpha(1 + (E(r))) - W_\alpha(1 + r_\alpha)$$

$$VaR_\alpha = W_\alpha E(r) - W_\alpha E(r) - r_\alpha = -W_\alpha(r_\alpha - E(r))$$

where:

- $\alpha$ – accepted tolerance (0.05 or 0.01)
In the calculation of value-at-risk, the method of historical simulation was used, which focuses on the statistical analysis of the empirical distribution of return rates. In addition, this method allows for better mapping of market behavior. It should be noted, that distribution of returns on the analyzed exchanges did not have the characteristics of normal distributions.

An assumption regarding the normality of the distribution of rates of return was also adopted. This assumption may be encountered in many areas of finance and valuation models (e.g. the Black-Scholes option valuation model), forecasts (e.g. using the National Science Committee), risk assessment or verification of economic theories. It allows to calculate the probability of gain or loss from a given investment or Value at Risk (VaR). The adoption of the above assumption results directly from the central limit theorem, indicating that the use of a normal distribution is permissible for each continuous random variable, subject to the independence of individual variable values, the origin of observations from the same distribution and their sufficiently large number - min. 30 (the assumption was fulfilled in the conducted study).

The author analyzed the time series of Bitcoin returns on selected exchanges. As expected, the results obtained confirmed that time series are burdened with high kurtosis (leptokurtic distribution) and skewness. The results of chi-square tests also confirmed the need to reject the null hypothesis about the normality of rates of return for 0.05 and 0.01 confidence levels. Thus, it was confirmed that the rates of return from Bitcoin do not have a normal distribution. Histogram of daily Bitcoin returns on the Bitfinex stock market is shown in Figure 6.

![Figure 6. Histogram of daily returns on the Bitfinex stock market - selection based on the capitalization value on the day 15.12.2017 (1706 quotations in the period 2013-2017) (Coinmarketcap.com, 2018)](image)

The results of the Value at Risk (VaR) calculations together with their percentage change for 0.05 and 0.01 confidence levels are presented in Table 1.

<table>
<thead>
<tr>
<th>Trade</th>
<th>Volume (000,00)</th>
<th>VaR(0,05)</th>
<th>Change (%)</th>
<th>VaR(0,01)</th>
<th>Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bitfinex</td>
<td>$479,028</td>
<td>$109,332</td>
<td>-22,82%</td>
<td>$154,593</td>
<td>-32,27%</td>
</tr>
<tr>
<td>Gemini</td>
<td>$96,122,5</td>
<td>$22,003</td>
<td>-22,89%</td>
<td>$31,112</td>
<td>-32,37%</td>
</tr>
<tr>
<td>BTCC</td>
<td>$294,397</td>
<td>$62,791</td>
<td>-22,89%</td>
<td>$95,296</td>
<td>-32,37%</td>
</tr>
<tr>
<td>Bistamp</td>
<td>$117,389</td>
<td>$26,872</td>
<td>-22,89%</td>
<td>$37,996</td>
<td>-32,37%</td>
</tr>
<tr>
<td>GDAX</td>
<td>$209,344</td>
<td>$47,921</td>
<td>-22,89%</td>
<td>$67,760</td>
<td>-32,37%</td>
</tr>
</tbody>
</table>

The analysis of tabular data indicates that investments in Bitcoin are subject to high risk, which may lead to a reduction of the initial capital value by about 21% for the 0.05 confidence level and about 32% for the 0.01 confidence level (in the 10th day). In addition, there was a negligible correlation of the Bitcoin return rate in relation to the number of Bitcoins remaining in circulation, quarterly (for Bitfinex, it is 0.277771642), Figure 7.

![Figure 7. Correlation of the rate of return from Bitcoin in relation to the number of Bitcoins in circulation for the Bitfinex stock exchange (Statista, 2018)](image)

Similar analyzes were performed for selected currency pairs, performing an average of 250 observations/year - which resulted in a total of 2275 observations for each currency during the study period. It was also assumed that the average change for one day is zero, which for a portfolio of one asset may be expressed as (2).

$$VaR = W \times \sigma \times k$$ (2)

where:
- $W$ - value of the portfolio on the previous day (in the previous period),
- $\sigma$ - standard deviation of the price of the asset,
- $k$ - number of standard deviations below average (following values was assumed - for the confidence level $c=0.95$ the $k=-1.645$ and for the confidence level $c=0.01$ the $k=-2.326$).

It should be highlighted that VaR value of the portfolio...
consisting of a single asset (such a simplifying assumption was assumed) is a function of the portfolio value, asset price volatility, tolerance level and time horizon.

As in the case of exchanges, the analysis of the time series of the return rates of the currencies examined showed that the time series significantly differ from the normal distribution - they are burdened with high kurtosis (4.303 for USD - leptokurtic distribution) and skewness (0.1333 for USD). The results of chi-square tests also pointed to the necessity of rejecting the null hypothesis on the normality of rates of return for 0.05 and 0.01 confidence levels. Thus, the time series of the rates of return for the examined currencies do not have a normal distribution, Figure 8.

![Figure 8. Histogram of daily rates of return for USD (a) and EUR (b) respectively (2,275 listings in the period 2013-2017) (Coinmarketcap.com, 2018)](image)

<table>
<thead>
<tr>
<th>Trade</th>
<th>Change (%) for VaR (0.05)</th>
<th>Change (%) for VaR (0.01)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USD/PLN</td>
<td>-4.88%</td>
<td>-6.90%</td>
</tr>
<tr>
<td>AUD/PLN</td>
<td>-3.82%</td>
<td>-5.40%</td>
</tr>
<tr>
<td>CAD/PLN</td>
<td>-4.06%</td>
<td>-5.74%</td>
</tr>
<tr>
<td>EUR/PLN</td>
<td>-2.97%</td>
<td>-4.20%</td>
</tr>
<tr>
<td>100 HUF/PLN</td>
<td>-2.54%</td>
<td>-3.59%</td>
</tr>
<tr>
<td>CHF/PLN</td>
<td>-4.46%</td>
<td>-6.31%</td>
</tr>
<tr>
<td>GBP/PLN</td>
<td>-4.09%</td>
<td>-5.78%</td>
</tr>
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### IV. Discussion

The examination conducted by the author clearly indicates the complex nature of cryptocurrencies. This complexity concerns both definition and legislative issues as well as issues related to trading aspects. Despite the growing popularity of cryptocurrencies, many countries do not sanction this means of payment, paying attention to its speculative nature.

However, it is difficult to state clearly that cryptocurrencies will cease to be an element of e-business complexity solution. Similar doubts existed with respect to electronic money which now for good fits into the financial instruments of the e-economy. The considerations presented by the author seem to confirm the thesis of speculative character of cryptocurrencies. The high volatility of the cryptocurrencies value, its sensitivity to political decisions, the lack of centralized supervision, no or very limited legal regulations regarding this instrument makes this instrument a high-risk instrument.

Notwithstanding, the future of cryptocurrencies will be verified by the market itself, by the users of this form of the payment and by the investors who will or will not decide to put their money in it.

### V. Conclusions

The growing interest in cryptocurrencies results from many reasons e.g. transaction anonymity, relatively low risk of losing funds, speed of transaction execution, lack of or small commissions on transactions performed, independence from governments and banking systems. It is also the manifestation of the loss of trust in the current monetary system and financial institutions. It should be emphasized that despite the growing popularity of cryptocurrencies and the often-encountered equating them to money - especially electronic money, cryptocurrencies do not fulfil the definition of both electronic money or money in general. The future of Bitcoin is not yet decided however, it may become the money of the future on its own rights. For the moment though, due to the lack of its value in use (it is empty money) and dependence on complementary capital goods, it is relatively unlikely to obtain a money titer. In many countries, there is currently a discussion about changes in the legislative system and some financial operations with the
use of cryptocurrencies (e.g. banking law or tax law) are under way. Regardless of the pace of changes in the banking and fiscal systems related to cryptocurrencies, it should be clearly stated that non-cash payment instruments are of significant importance for reducing the costs of cash transactions and further development of e-business. The dynamic development of cryptocurrencies and their increasing popularity as a means of payment in many areas of socio-economic activity (cafes, universities, stock exchanges, etc.) shows that it cannot remain unnoticed and legally unspecified in the contemporary e-business.

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Social Networks and Personal Security

Patryk Błasik

1 WSB University
ul. Ciepłaka 1C, 41-300 Dąbrowa Górnicza - Poland

Abstract—The emergence of the Internet caused a significant simplification of interpersonal communication all over the world. True, the communication became fast, cheap and convenient and for people, who by nature are social beings, it enabled easy bonding, maintaining relationships and strengthened the feeling of belonging to one group or another. Along with development of the Internet social networking portals emerged becoming a popular means of communication and entertainment specifically dedicated to young people. The paper outlines the most important advantages and disadvantages of social networks especially with respect to security.

Index Terms—social network, personal security, the Internet, threats.

I. INTRODUCTION

What is a social network? In Poland there is no legal definition of the concept, but the term is usually defined as a website, a tool used to build social networks and social relations of specific groups, mostly based on common interests and shared private or professional life. In the literature on the subject, the concept of a social network is used interchangeably with a social networking site. The beginnings of social networks date back to the 1990s. One of the first social network sites was a portal called Classmates.com, created in 1995 in the United States, a website used to communicate with former school friends. The portal was created by Rande Conrads. But the real breakthrough occurred in 2004, with introduction of Facebook on electronic social networking market (the premiere of the Polish language version took place in 2008). Facebook, the most famous social networking site so far, was created by a Harvard University student, Mark Zuckerberg (Warzecha, 2017). Initially, the portal was used for communication between students. Currently, thanks to this service, users can publish the so-called statuses, photos, short films, react and comment on posts, make and participate in various events, create their own fanpages, run advertising campaigns, play games and much more.

Other popular social networking sites currently in operation include:

- YouTube.com (a portal enabling free posting and playback of videos),
- Instagram (photo social networking site based on photo hosting),
- Twitter (a portal that allows for micro-blogging by posting tweets),
- Photoblog (type of an online blog, diary with an option of posting comments),
- LinkedIn.com (a social networking site for establishing business contacts),
- GoldenLine (social network for people wanting to develop their professional career).

In addition to the Internet portals indicated above, there are also mobile applications for social networks which are very popular among young people. These include: Snapchat (application used for posting short videos as part of relations that disappear after a certain time), WhatsApp (messenger for sending messages, voice and video calls) or Tinder application (a dating application where you set up your own profile with a photo).

When it comes to Polish websites which can be included under the spectrum of social networking, naszaklasa.pl (today nk.pl) should be brought to the readers’ attention, the founders of this portal were Polish students of computer sciences at the University of Wrocław - Maciej Popowicz, Paweł Olchawa, Michał Bartoszkiewicz and Łukasz Adziński. The idea behind naszaklasa.pl was to find, renew and maintain contacts with mates from school. Another example of a Polish social networking site is fotoka.pl (now fotoka.com) where users can post their photos, rate photos of others, comment and freely communicate.

II. FACTS AND FIGURES RELATED TO SOCIAL NETWORKING SITES

According to statistics quoted by the Central Statistical Office, in 2017 81.9% of Polish households had access to the Internet. This percentage was higher by 1.5 pp. than in the previous year, and by 7.1 pp. when compared to 2014 (Stat.gov.pl, 2018). In December 2017, the most frequently...
visited sites by users of the Polish Internet also in terms of time spent online, were: Google Group sites, Facebook and YouTube. In the light of a report conducted by IBA Poland for 2017, Facebook remains the leader of social networking sites in Poland with the range of 82%. Fotka.com, in turn, ranks first in terms of the average number of views per user (Raport Strategiczny „Internet” 2017/2018, 2018). As can be seen from the statistics provided above, social networking sites play a huge role in the lives of Internet users as they fulfill several functions at the same time, e.g. they provide communication, information, entertainment and social life.

According to a EU-NED-ADP3 research, social networking sites are the most common form of online activity for European youth aged 14-17, 90% of the surveyed youth had at least one profile on a social networking site. This form of entertainment is more popular among girls than among boys, and people who spend on social networks at least 2 hours per day, more often overcome loneliness via the Internet than other users. At the same time, the studies described above have shown that people using social networks are more likely to intensively use the Internet and are under greater threat of abuse or addiction (Warzech, 2017).

III. THE IMPACT OF SOCIAL NETWORKS ON PERSONAL SECURITY

Social networking sites opened a new era of communication with new possibilities such as adding posts, photos or film stories etc. These activities undoubtedly allow to overcome loneliness, build a certain social status and maintain interpersonal relations. But besides all the advantages of social networking sites, one must not overlook serious drawbacks that may affect personal security of users, especially the young ones. The term ‘generation Z’ refers to people born after 2000, these young people are certainly unaware of the threats lurking on them from their favourite sites. Let’s take a closer look at portals such as Facebook, Instagram or fotka.com on which young people post entries, photos or videos and by doing so they virtually expose their entire life.

In my professional live I have conducted hundreds of preventive meetings with young people regarding online safety. I can confidently say that their approach to social networking sites matches my need to have obligatory breakfast in the morning. They cannot survive a day without the access to the Internet just as I could not function normally without breakfast. The question that I always ask young people is: Are you aware that once uploaded, the film or photo will remain on the Internet forever? 99.9% of them give me a positive answer. Yes, they are aware. So then I ask: Why did you upload them? Unfortunately, to this question I do not receive a substantive answer. So, what is the risk of uploading a personal photo or video on the Internet? When people post something on the Internet, on a social network, they can never be certain that someone, a friend or a stranger, will not save this photo or movie on their device or a carrier. Young people will probably reply ‘so what?’ In response I will quote statistics of CERT Polska (CERT Polska, 2018) which is the first computer emergency response team established in Poland. According to a CERT report on internet incidents, in 2016 alone, 1020 of these incidents concerned identity theft, including creating fictitious Facebook accounts that used images of existing people. Interestingly enough, the use of someone’s image in a way that is not defamatory without the consent of the person in the photograph, does not violate the provisions of the Polish criminal law, and the incident can be pursued only on the civil law path.

The pictures and messages posted by young people on social networking sites are frequently of intimate, explicit and very private nature, which in the literature of the subject is called sexting. According to a research carried out in 2014 by the ‘Dzieci Niczyje’ foundation, sexting is one of the threats that has started to be discussed in Poland only recently. The first study conducted among young people aged 15-19 showed that the scale of the problem is relatively large. 45% of respondents were aware that their friends and colleagues post such contents online. Only a small proportion declared that they did not know anyone who did so. Slightly over 1/3 (34%) admitted that they themselves received sexting materials, and every ninth (11%) confessed to actually sending such contents. Those who were recipients of such messages claimed that most often they were an attempt to “pick them up” (and not flirt with an existing partner, boyfriend or girlfriend). Relatively often such messages were sent to the respondents not by the people they knew but by strangers. In turn, those who declared sending sexts claimed that they were intended to their boyfriends/girlfriends (Fdn.pl, 2018). Speaking of sexting, it should not be overlooked that persons displaying, sharing, disseminating pornographic content to persons under 15 years of age (Article 200 § 3 of the Penal Code) are criminally liable. This liability applies to both adults and minors who, acting in this way even in the form of a joke, may expose themselves to liability for a criminal act or a manifestation of demoralization.

In 2015 a YouTuber operating under the name "Z dobrym slowem - Rafal Jarzabek" came up with a very interesting idea. In a short spot ‘Be careful what you post. Social media stalker with a good word’, he showed how much information can be extracted from public accounts on Facebook. Following profiles of several young women he was able to determine their current whereabouts, what they did a few hours earlier, since when they had been in Warsaw, what their boyfriend or dog was called etc. The women whom he approached directly in the street, did not believe the questions he asked, initially they responded with a smile, but over time they were overwhelmed with horror about how much a stranger knows about them. The entire experiment also had a preventive finale. The two women to whom the YouTuber spoke, blocked access to their social accounts to strangers after this meeting. I believe that footage I have just quoted should be a great warning for users of social networks.

At present, there is a feeling of mixed emotions in Poland caused by the concept of the newly introduced EU data protection regulation GDPR, which is to protect our personal data against misuse. However, we as users of social networks and holders of different profiles certainly do not protect our
own data in an appropriate way. The information about the place of work or study posted on a social network will help people with ill intentions to determine our address or address of the school, company etc. The question to be answered here is ‘why should a criminal want to know my address?’ The answer is easy, in the world there are many disturbed, psychopathic people, stalkers, bullies etc. We make it easy for them to follow us and find out information we would not like them to know. There are also jealous people, someone may like our new phone or car, which we proudly posted a few minutes earlier.

The next disadvantage of using social networking sites is the lack of anonymity and a greater risk of being exposed to various types of cyberbullying, which constitute acts prohibited by law. Another serious and perceptible problem is hate. Hate can be manifested not only by words, but also graphics (memes, gifs) or videos - in the last two cases, unfortunately, they are so much easier to remember. It is worth noting that the contents added by the haters have no substantive value, they are only directed against a given person or a group of people. Polish PWN Dictionary defines the word ‘hate’ (spółt ‘hejt’ in Poland) as an offensive or aggressive comment posted on the Internet (Sjp.pwn.pl, 2018). From legal point of view, hate can be one-time incident and it will be considered in terms of a crime of defamation (Article 212 of the Penal Code) or indignity (Article 216 of the Penal Code), multiple cases of hate where such behavior will deplete the signs of stalking, or persistent harassment will be considered pursuant to Article 190a of the Penal Code. Hate is also a dangerous phenomenon from psychological point of view. Many victims of hate cannot cope with the hatred directed towards them on the Internet, as a consequence they become depressive and even suicidal. From my own professional experience in which I frequently participate in juvenile proceedings, I can say with full responsibility for my words, that hate is a common and widespread phenomenon among young people aged 12-16. Unfortunately, the Polish legal system does not provide appropriate tools that can protect an aggrieved teenager (victim of cyberbullying) from such attacks.

Another common phenomenon is using social networking sites for dissemination of the so-called fake news. As an example of a real threat to the safety of children on the Internet, I will quote information that appeared in the media in the first quarter of 2017, the news related to the ‘Blue Whale Game’. The media reported that a dangerous game caused 130 suicides of children across Russia. The unverified information has been repeatedly disseminated by various journalists. It was the media who created the game using the ‘Chinese whispers’ method. Authors of the information related 130 suicides from 2015 and 2016 with the described game. The rules of the game assumed that it must be played in pairs or groups. In order to join, one had to find a ‘guardian’ through social media. The task of the supervisor was to assign tasks that the second person called a ‘whale’, would perform. Fifty tasks, such as self-injury or waking up in the middle of the night and watching movies that cause negative emotions, should be completed in fifty consecutive days. The last task was to commit suicide (Dyzurnet.pl, 2018). In Poland, several dozen of cases of self-injury were recorded; namely young people were cutting the whale symbol in the skin of their arms. Currently, a similar game called the ‘MOMO Challenge’ appeared on the Internet. The game also relies on performing tasks ordered by a guardian, who has a motif of a Japanese MOMO doll in the profile photo (Zachodni et al., 2018).

The very same tool of fake news can also be used for political reasons. A good example can be the presidential elections in France that took place in 2017. Cyberdefence24.pl reports: French voters were literally flooded with fake Twitter news before the presidential election whose first round was conducted on April 23, 2017. Researchers at Oxford found that much of the published fake news came from sources that could have had connections with Russia. Researchers at the University of Oxford have proved that as much as a quarter of the information on presidential elections in France that were published on Twitter was false. The analyzed fake news has been identified as deliberately false, promoting extreme views, with logical errors and opinions presented as facts (CyberDefence24.pl, 2018).

The Internet fashion for challenges described above is a very disturbing phenomenon that has an impact on the personal safety of users of social networks. Some of the challenges are fun and safe, for example those related to pretending mannequins by larger groups in a ‘Mannequin Challenge’. Challenges may arise in opposition to certain phenomena, e.g. racist behavior, as in the case of ‘We Are All Monkeys’. Another example of this type of challenge is a social action called the ‘Ice Bucket Challenge’, whose aim was to raise public awareness of amyotrophic lateral sclerosis. Unfortunately, there are also dangerous forms of challenges, such as the ‘72 hours challenge’, in which the participants are expected to escape from home and hide for 72 hours, or the ‘Tide Pod Challenge’, whose aim was to put a Tide Pod washing capsule into the mouth (Tide Pod Company decisively separated itself from this type of behavior, informing about the dangers of its implementation). Recently, the ‘Kiki challenge’ has also become popular on the Internet, in this challenge the dared person must get out of a moving vehicle and perform a dance to the song of an artist known under the pseudonym Kiki, this challenge poses a real threat to road safety. There are many compilations of accidents on youtube.com that occurred during the execution of the Kiki dance (e.g. people get hit by approaching vehicles).

IV. Conclusions

Social networking sites have become an invaluable source of information and an important tool for communication and entertainment. It can be said that the young people living in contemporary world do not imagine life without social networks, such as Facebook, Instagram, Snapchat and others. This is evidenced by the research conducted by IAB Poland in 2017 quoted in the present paper. However, it should be noted that in addition to information, communication and entertainment, social networks carry real threats that may result in exposure to the image of users, risk to their own personal
safety and their loved ones. We must start using social media wisely, we must always follow the principle of limited trust. Should we discover any inappropriate or suspicious behaviour on the Internet we should immediately report them to relevant institutions in Poland dealing with combating and preventing cybercrime, such as e.g. the Academic Computer Network (NASK).

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The Mines Rescue Service in the Polish System of Crisis Management

Tomasz Ciupa 1
1 KWK ‘Bobrek’ Coal Mine, Węglokoks Kraj, Bytom - Poland

Abstract— The paper presents the place of the mines rescue service in the structures of the crisis management system in Poland. The mines rescue service as one of several entities of the rescue system in Poland focuses on helping injured miners and other people trapped underground. The paper mentions existing legal regulations concerning the mines rescue service and other emergency services. An important piece of legislation for members of mines rescue teams, is the ordinance of the Minister of Energy of 16 March 2017 which introduces a number of revolutionary changes such as obligation to deliver qualified first aid and on-the-spot psychological support. In this way the mines rescue service has become more utilitarian and more universal and therefore may be efficiently used for operations in more general crisis situations and even better contribute to the smooth functioning of the state.

Index Terms— crisis management, the mine rescue service, the National System of Rescue and Firefighting.

I. INTRODUCTION

Despite ongoing discussions between practitioners and theoreticians in the field of security, there is no doubt that the primary legal act in the field of crisis management in Poland is the Act of 26 April 2007 on Crisis Management. The Act in its nature creates an integrated crisis management system, defining, inter alia, public administration entities as competent in these matters. The mines rescue service, which is the subject of these considerations, is not the leading unit of the National System of Rescue and Firefighting in Poland, and the general knowledge about mines rescuers is small, even among people dealing with the security issues. The research problem faced by the author of the present paper boils down to the following question: what role does the mines rescue service play in the Polish system of crisis management?

The need and frequency of rescue operations in Polish mining plants is decreasing, and the reason behind this is the declining number of mines in the country. However, the operations which have taken place in recent years demonstrated a demand for more specific and more advanced skills. It should be emphasized that the Polish mines rescue service, as well as the Polish mining industry in general, is struggling with numerous problems of financial, technical and organizational nature. Is the mine rescue service ready to meet modern security challenges? Is the work of mine rescuers only to participate in actions publicized by the media to reach miners trapped underground and to race against time clearing the rubble in order to find victims? Is the service prepared to undertake actions during more general mass-security threats e.g. a natural disaster? Can it be of assistance in case of a mass traffic accident? In order to provide answers to these questions one should have knowledge about the organisational structure of the service, about the level of training and skills of the rescuers, and about equipment at the disposal of the service. The author of the paper has conducted detailed research aimed at conceptual and terminological arrangement of the issues presented above.

II. CRISIS MANAGEMENT

The primary legal act which determines the authorities competent in matters of crisis management as well as their tasks and principles related to performance and financing of crisis management tasks, is the Act of 26 April 2007 on Crisis Management (amended, inter alia by the Act of 17 July 2009 amending the Act on Crisis Management). The Act creates an integrated crisis management system that includes: central and local government administration bodies, the armed forces of the Republic of Poland and selected private sector entities. The Act also explains the meaning of such concepts as: crisis management; crisis situation; critical infrastructure and civil planning (Katowice.uw.gov.pl, 2009).

According to the aforementioned law, crisis management is the activity of public administration bodies being an element of national security management. The activity includes: preventing crisis situations, preparing to take control in an emergency according to a detailed action plan, reacting in case
of crisis situations, removing consequences of a crisis/emergency and restoring resources and critical infrastructure. Bearing in mind the above, the following four stages of crisis management can be distinguished:

- crisis prevention phase aimed at eliminating or reducing the likelihood of crisis occurrence;
- preparation for the occurrence of a crisis situation, focusing on increasing the volume of forces and resources necessary for effective action (response) in a crisis situation;
- response phase, aimed at slowing down the development of a crisis situation, as well as reducing the damage caused during the crisis in progress;
- reconstruction phase aimed at stabilizing the situation and restitution to normality.

The aforementioned phases form the so-called crisis management cycle. It is worth noting that in the literature one can meet the fifth phase of crisis management called "learning" i.e. accumulating experiences gained during the development of an emergency situation and assimilating this knowledge, so that it can be used in the future. The presented cycle was built upon experiences of economic sciences, but it can also be successfully transposed to the field of ensuring general safety.

As regards the concept of a crisis situation, the Act of 2009 best reflects its essence and implements demands for central and local government, in particular with regard to facilitating the qualification of a given event as a crisis situation (Woiz.polsl.pl, 2009). The hitherto existing definition, contained in the Act of 2007 made the existence of this situation conditional on the threat which must have been caused jointly by the occurrence of three successive factors, namely:

- disruption or significant violation of social ties;
- serious disruption of the functioning of public institutions;
- application of necessary means to ensure or restore security to such a level that does not justify the necessity of introducing one of the emergency states referred to in article 228 paragraph 1 of the Constitution of the Republic of Poland (Woiz.polsl.pl, 2009).

However, the current approach sees a crisis situation only as the occurrence of a threat that adversely affects the level of human or environmental safety to a degree that limits the functioning of competent public administration authorities when the resources and procedures of these entities prove to be insufficient.

Civil planning plays an important role in crisis management. Civil planning should be understood as the entirety of organizational undertakings aimed at preparing public administration for crisis management, as well as planning support for the armed forces of the Republic of Poland in the event of their use and planning the use of the armed forces of the Republic of Poland to carry out tasks in the field of crisis management. Tasks in the field of civil planning include: preparation of crisis management plans, structures launched in crisis situations and resources necessary to perform tasks included in the crisis management plan.

The need to preserve the infrastructure necessary to ensure the functioning of society, in particular in the event of a crisis situation, plays a significant role in the modern world.

Following the experience of the United Kingdom, the United States, Estonia and Spain, the Act of 2009 puts special emphasis on the protection of critical infrastructure (Woiz.polsl.pl, 2009). The critical infrastructure includes the following systems: energy and fuel supply; telecommunications and IT networks; financial; food and water supply; health protection; transport and communication; rescue; ensuring the continuity of public administration; production, storage, storage and use of chemical and radioactive substances, including pipelines of dangerous substances.

III. ORGANISATION OF THE MINES RESCUE SERVICE

The mines rescue service in Poland has a long tradition, it is a constituent of the National System of Rescue and Firefighting, and it has a formal and systemic character. There are mutual relations and functions between individual mine rescue stations that operate in respective mining plants and the Central Mine Rescue Station. The forces and resources allocated to the system as needed are maintained in the ability to act. The mining rescue entities operate on the basis of the Mining Act and the State Medical Emergency Services Act, both acts have been linked together since 2017. The intended goal of the joint effort is providing smooth transition from the crisis situation to the normal state before the crisis.

The National System of Rescue and Firefighting aims to save the life and health of citizens, their property, to protect and rescue the environment during natural disasters, fires, floods etc. The system, in its assumption, brings together the units of the State Fire Service and other entities which, pursuant to the agreement, consented to participate in rescue operations. One of these services is the mines rescue which, as a part of the National System of Rescue and Firefighting, deals first and foremost with helping the miners who find themselves in a dangerous situation. The rescue operations performed by the mines rescuers include: counteracting threats, removing the effects of a catastrophe and restoring safe working conditions for miners. In addition, mines rescue teams are also involved in preventive and training activities.

The primary legal act that determines the organization of the mines rescue service in Poland is the Geological and Mining Act. The Act specifies the responsibility for the condition of the rescue service and obliges each mining plant to develop, maintain and update rescue plans. Pursuant to the Act, the mines rescue service consist of the in-house rescue units in respective mining plants and professional mines rescue service. Their tasks include: immediate assistance in the event of a threat to life or health of persons staying in a mine plant, provision of mine plant safety or general safety, counteracting all mining risks, carrying out preventive work defined in mining regulations, working towards improvement of safety for employees and minimizing hazards occurring in underground mine plants.

On the basis of the Geological and Mining Act of 16 March 2017, the Minister of Energy issued an ordinance on the mines rescue which clarified the organization of the mines rescue service in Poland. The changes covered the required age and
The basic mining rescue unit in Poland is the in-house mine plant rescue station. The in-house rescue team is an organizational unit of the mines rescue service which consists of:

- head of the mine plant rescue station;
- deputy head of the mine plant rescue station;
- mine rescuers;
- mechanics of rescue equipment.

Participation in the interventions of the rescue teams and membership in the mines rescue service is voluntary. The number of mines rescuers in a rescue team of an underground mining plant depends on the number of people staying underground within a day and is no less than: 15 mine rescuers - in the case of headcount of no more than 500 employees underground, the number increases up to 50 mine rescuers in the case of headcount of at least 501 employees and no more than 2000 employees underground. When the number of workers exceeds 2000, the minimum number of rescuers rises to 80. A rescue team as the smallest unit consists of: a patrol leader of the team and four mines rescuers, one of whom has been designated by the patrol leader as a deputy.

The entity that professionally deals with the mines rescue is the Central Mines Rescue Station in Bytom. The tasks to be performed by this entity are similar to the tasks set for the in-house stations i.e. providing assistance to the injured employees in mine plants during technical failures caused by natural hazards and carrying out preventive work. The Central Mines Rescue Station is obliged to:

- ensure constant readiness of adequately qualified and equipped rescue teams and specialist mine rescue services;
- conduct cyclic exercises in the field of mine rescue;
- organize and conduct training courses in the field of mine rescue for candidates and rescuers;
- conduct consultations defining the state of preparation of mine plants for conducting rescue operations;
- regular organization of medical examinations for mine rescuers at a specialized medical examination center;
- conduct research and review rescue equipment;
- perform specialist chemical analyzes of air samples;
- calibrate gaseous reference materials;
- initiate, coordinate and conduct research works, conduct development and implementation activities ensuring technical and organizational progress in the mining rescue system.

The organizational structure of the Central Mines Rescue Station is based on three Regional Mines Rescue Stations in Bytom-Zabrze, Jaworzno and Wodzisław. The stations are kept in constant readiness to enable immediate departure whenever necessary (CSRG, 2017). The Central Mines Rescue Station also has a multi-tasking specialist emergency service with diverse characteristics, among which the following may be distinguished:

- measurement emergency service responsible for measuring physicochemical parameters of air and fire gases and for the assessment of gas mixtures explosiveness;
- emergency service for mine air inertization, used during underground fires;
- fire brigade, for carrying out rescue work during the fight against underground fires which require the use of equipment and devices for delivering firefighting foams and isolation of excavations, rock and goaf;
- technical and mines emergency service, to carry out rescue work related to the rescue of people trapped under the infarction or cut off from active workings due to a bump or a caving;
- water emergency service, to remove the effects of discharges or uncontrolled inflow of water into headings or water with loose material and to perform works using diving techniques;
- emergency rescue lifts, for evacuation of employees or for performing other rescue work in large diameter wells or boreholes as well as emergency, inspection works in shafts and large-diameter bores with the use of mechanical devices and mountaineering techniques.

IV. THE MINES RESCUE SERVICE IN OVERGROUND OPERATIONS

At present, the Central Mines Rescue Station in Bytom is bound by an agreement of cooperation of 22 August 2013 with the Headquarters of the State Fire Service. The agreement defines the main principles of cooperation. An example of contribution of mines rescuers to the activities performed by the National System of Rescue and Firefighting can be the building disaster of 28 January 2006, during which the roof of the Katowice International Fair Centre collapsed under the pressure of snow and ice during a pigeon exhibition. Rescuers of the Regional Mines Rescue Station in Bytom and patrols of the Central Mines Rescue Station took part in the rescue operation. The experience of mines rescuers acquired during infant actions in the grounded mining excavations proved to be vital while clearing the consequences of the disaster. 105 mines rescuers managed to recover 13 people trapped under the rubble and get 29 dead persons from under the metal sheet. The mines rescue services demonstrated remarkable commitment and determination during this particular intervention (Kuszewski and Bąginski, 2006). The mines rescue service also provided assistance on 16 May 2010 during floods, when the Kłodnica River crossed the alarm condition and threatened to pour out. Despite all the effort of various emergency services, the river unfortunately broke up along the Makoszowy district. Miners from the neighboring Coal Mine in Zabrze Makoszow and the rescuers of the Central Mine Rescue Station joined the rescue operation, providing men and equipment to pump out the water needed to conduct flood-related operations.

Another example of cooperation with the use of the specialist emergency service of the Central Mine Rescue Station was an
V. THE INTERNATIONAL MINES RESCUE BODY

The deaths of six mine rescuers in February 1998 to heat stress at the Niwka-Modrejow coal mine in southern Poland led to the birth of the International Mines Rescue Body. Determined to understand and prevent the tragedy from reoccurring, Polish mining officials hosted a conference in Bytom, near the site of the catastrophe, in May 2000 to discuss mine rescue procedures and research in harsh microclimates. At the conference, participants discussed the need for additional international cooperation on mine rescue issues and developed a proposal to establish an on-going international mine rescue organization. The aim of IMRB is to promote mine rescue at the international level and to improve mining rescue knowledge and good practices by supporting global cooperation (Minerescue.org, 2018). Every two years, IMRB co-organizes the industry championship – the International Mines Rescue Competition (IMRC) of rescue units from around the world, where the skills of mine rescuers develop in the space of a simulated rescue action. The event is a perfect opportunity to exchange experiences and knowledge. The rivalry between teams takes place in conditions similar to the natural working conditions of mine rescuers and the competitors have to deal with simulations of typical threats that are likely to occur in daily work in a pit. The panel of judges sets a number of challenges in which teams from various countries have an opportunity to demonstrate their skills. In the Canadian edition of the IMRC 2016 the challenges were:
- a simulated action underground;
- a first aid challenge;
- putting out an underground fire;
- a show of alpine skills;
- a knowledge test;
- a competition for equipment mechanics.

The latest IMRC 2018 was held in Russia where the competitors had to complete an obstacle course in virtual reality. The simulation took the form of a computer game in which the rescuers wore goggles and held controllers in their hands instead of real tools. It should be noted that Polish mines rescuers are among the world leaders in the competition, and each subsequent edition of the competition brings recognition to the Polish teams.

VI. CONCLUSIONS

With over a century long tradition, the Polish mines rescue service is unquestionably one of the world’s leaders. With an impressive technical base, it is constantly evolving and this progress is aimed both at improving the work comfort for the rescuers and improving the organization of the rescue operation in the mine plant. A milestone in the development of the Polish mine rescue service was the ordinance of the Minister of Energy of 16 March 2017. The changes introduced by the ordinance concerned the extension of rescuers’ skills which now should include the ability to deliver qualified first aid and psychological support. According to the letter of the law, at least one of the mine rescuers performing their duties in a five-member-group must possess the knowledge and skills referred to in the Act on State Medical Rescue. Previously binding legal regulations did not oblige mine rescuers to have knowledge and skills in the area of qualified first aid. Therefore, the value of the mine rescue patrol participating in medical rescue operations being an entity of the National Rescue and Firefighting System responsible for maintaining, saving, restoring or improving health, was increased. Bearing in mind the above, it can be stated with full certainty that both a wide range of mine rescuers’ skills as well as specialized equipment that they can use can be used for operations in the event of mass and extraordinary events taking place outside the mine plants.

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Police Prevention Units in Poland from 1918 to Modern Times

Robert Czerniawski

1 Department of Internal Security, the Police Academy in Szczyno
st. Marszałka Józefa Piłsudskiego 111, 12-100 Szczyno - Poland

Abstract— The police forces are an indispensable element in upholding security and public order in a state, both on daily bases and in states of emergency. The evolution of the Polish police forces begins in 1918 with restoration of the country’s sovereignty after 123 years of partitions. Since that time the organisational structure, functioning and the scope of tasks performed by the Police have evolved and developed due to social, political and economical changes in order to keep up with constantly changing reality and to improve efficiency of operations performed with respect to maintaining security and public order.

Index Terms— the Police, security, preventive anti-riot units, police tasks.

I. INTRODUCTION

Poland regained its independence in 1918, however the process of reuniting all territories took some time before the final shape of the borders of the Second Polish Republic was determined. The core of the re-born state was the area of the Kingdom of Poland. The creation of a modern centralised formation responsible for upholding security and public order took a great deal of effort from politicians, social activists and civic institutions (Marszalek, 2009). As early as on 22 July 1919 a draft of the act, most probably prepared by the Ministry of Interior, was submitted to the Sejm. Despite numerous objections from the right wing and people’s party MPs, as well as from ethnic minorities, the Act on the National Police was passed on 24 July 1919 (Misiuk, 1998). The National Police was built upon the already existing Security Police which consisted of the People’s Police and the Municipal Police and was a state security organisation, whose main task was to protect security and public order, and to act as the executive organ for central and local authorities (Misiuk, 2008).

After 1919 the newly created Police forces were reorganised, extended, developed and perfected. Officers underwent a series of professional and specialist courses. For the first time women were admitted into professional training for police officers. In years that followed, regular police academies were founded. The fastest pace of development of the police education system in Poland could be observed after the May Coup d’Etat, when the first academies for officers and privates were established. The best students were sent abroad to be educated in prestigious police training centres all over the world. In 1939 the police education in Poland was on a high European level (Misiuk, 1998).

At the end of WWII the National Council of Ministers issued a resolution pursuant to which on 1 August 1944 local government guards and security corps were created on the liberated territories of Poland. The security corps was the executive organ of the government and was used for maintaining public order, coordination, support and supervision of local guards which were established in communes and municipalities (Majer, 2004).

The next stage of transformations of law enforcement agencies in Poland was the creation of the Citizens’ Militia. The guidelines which had been formulated in the PKWN Manifesto of 22 July 1944, and brought to life by a PKWN decree of 7 October 1944, established the Citizens’ Militia (MO) as a legal and public organ subjugated to the public security service (Misiuk, 2008). After 1944, the Citizens’ Militia was mainly used for political purposes such as the fight with opposition and enemies of state. Combating crime and enforcing security and public order was not in the centre of attention of this particular service, although officially, pursuant to a decree of December 1944, MO was supposed to uphold public security, protect peace, public order, life and health of citizens, common and individual property, counteract crime and conduct preparatory operations.

The structures of the Citizens’ Militia (MO) included a unit called ORMO (Voluntary Reserves of the Citizens’ Militia) which was a paramilitary voluntary people’s organisation established in 1946. ORMO was assisting the Citizens’ Militia and was organisationally subjugated to the Polish Workers’ Party (PPR) and later its successor the Polish United Workers’ Party (PZPR). Upon decision of Władysław Gomułka in 1956,
a special anti-riot task force, the so called ZOMO (Motorized Reserves of the Citizens’ Militia) was created. ZOMO functionaries were supposed to undertake preventive activities during waves of social unrest, protests and demonstrations. MO and ZOMO units took part in suppression of students protests during the Political Crisis in March 1968, they pacified workers’ strikes and protests that spread in 1970 along the Polish coastline, and in 1981 during martial law they were crucial in extinguishing a wave of mass social unrest and in detaining the leaders of the Solidarity movement.

The year 1989 was a breakthrough year. The social, economic and political revolution in Central and Eastern Europe, including Poland, brought about the necessity for reforms in uniformed agencies responsible for security and public order. The Act on the Police of 6 April 1990 dramatically changed the role and functions of law enforcement services. The highly politicized and anti-social Citizens’ Militia was dissolved and replaced by a citizen friendly formation focused on protection of security and public order. The Act on the Police of 1990 contained organisational and functional guidelines for the new Police, it also stipulated the rights and duties of police officers. The head of the new Police forces came to be known as the Commander in Chief - a public administration officer responsible for protection of citizens and public order. Local government organs were given the right to evaluate and give opinions, appoint and remove local commanders in chief, request reports, information and explanations related to the execution of service duties by police officers.

II. PREVENTION UNITS OF THE NATIONAL POLICE IN THE INTERWAR PERIOD

In the interwar period, the ruling administration used preventive anti-riot units of the Military Police for emergency situations which posed a threat to public security. The armed forces efficiently applied power play to solve social conflicts, disperse protests, rallies, manifestations and marches. In case of particularly violent riots the army was allowed to use firearms upon express request of the authorities on the condition that the commander of the relevant military unit agreed that it was fully justified. Article 23 of a decree of 2 January 1919 on military interventions in emergency situations, specified when firearms could be used. However, units of infantry and cavalry, frequently used to disperse crowds from squares and streets, usually managed to restore peace without the need to fire a single bullet. The Constitution of 17 March 1921 allowed military intervention under strict compliance with relevant acts on quelling riots or compulsory enforcement of the legal provisions. Exceptions to this rule were only permitted pursuant to the Act on the Emergency and Martial Law – article 123 of the Act.

In the Second Polish Republic if the Police forces failed to restore internal security of the state, the army often took over since it disposed of qualified soldiers and adequate equipment to resolve any social or political conflict by use of force and in no time at all. The army was used for instance in August 1921 to put an end to a strike in the Grodno Power Plant; to disperse demonstrations after election of Gabriel Narutowicz for president of Poland and during parliamentary elections to the Sejm in autumn 1923 in Kraków (Spręgел, 2011).

Following mass protests of workers caused by poor social and economic situation in November 1923 in Kraków, Tarnów and Borysław, the central authorities established special preventive units, the so called ‘school companies of the police reserves’. They were created on 5 December 1923 upon the decision of the Minister of Interior. Pursuant to the decision, the reserve companies were to enter into basic training for lower rank functionaries of the National Police, and should be in constant battle readiness. Such companies were formed in five different regions however, their training and education was far from professional. There were 60 men in each company equipped not only in standard but also in field equipment. In exceptional circumstances, upon consent of the Commander in Chief, these companies could be used in neighbouring regions in order to strengthen local police forces. Due to the Great Economic Crisis, the budget of the Ministry of Interior was considerably reduced, therefore after 1923 the development of ‘the school companies of the police reserve’ was put to a hold (Mączyński, 1997). It should be emphasized, however, that these companies were the predecessor of contemporary prevention units.

The idea of police reserve units used for prevention purposes was revived in the beginning of 1930s. The global economic crisis reached Poland and triggered some violent anti-establishment movements of the society frustrated by the worsening material situation. The government was forced to re-establish the reserve forces of the regular Police. In a resolution of 27 September 1932, the Minister of Interior of that time, Bronisław Pieracki, created a reserve of privates at the Main Headquarters of the National Police. The reserve, which was deployed and garrisoned in Żyrardów, was at the disposal of the Minister of Interior (Misiuk, 2008).

The poor economic and financial situation mentioned above, as well as high unemployment rate stirred anxiety and anger among workers and peasants (e.g. unrest began in Rzeszów, Mińsk Mazowiecki and many other towns, strikes of miners broke out in the regions of Dąbrowa Basin and Upper Silesia Basin, textile workers went on strike in Warsaw). To restore peace and extinguish strikes, regular officers of the National Police joined forces with the newly established reserve units.

Yet the wave of frustration among Polish workers intensified even further after 1935. As a response, the government formed more units of the Police reserve (Mączyński, 1997). President Ignacy Mościcki by a decree of 17 April 1936 amending the Act on the National Police, created the Preparatory Service of the National Police. The Preparatory Service was a police-military formation of preventive, anti-riot character (Misiuk, 2008) under command of the Minister of Interior. Members of the service were employed on contractual basis and were directed to special task forces. In the following month, the Minister of Interior, S. Składkowski, issued a resolution on conditions and functioning of the Preparatory Service which was to be garrisoned, uniformed, fed and paid regular wages (although much lower than regular officers) (Misiuk, 2008). The
Preparatory Service was supposed to be in permanent combat readiness and in constant training to meet the requirements of the variety of tasks its functionaries were to perform. In spite of this, the functionaries were not full-time employees of the National Police forces. They worked on the basis of a contract which they signed upon entering the service. The contract obliged them to perform all service duties related to upholding security, peace and public order, especially when the forces of regular Police were inadequate to restore public order and quench resistance. In 1939 there were 13 reserve companies and 5 cavalry squadrons which were particularly effective in dispersing riots and demonstrations, especially during massive strikes, 1st May demonstrations, pacifications of villages during peasants’ strikes and during major events. The Preparatory Units were equipped in means of transport which guaranteed instant mobility whenever required. In the September Campaign of 1939, for the reasons unknown, these very-well organised police units were not incorporated in the system of resistance and did not undertake any combat operations.

III. PREVENTION UNITS OF THE CITIZENS’ MILITIA (MO) IN THE COMMUNIST ERA

After WWII the security issues of the Polish People’s Republic (PRL) landed in the hands of the communist authorities. The PKWN decree of 7 October 1944 brought to life the Citizens’ Militia (MO), a formation which was supposed to uphold security and public order in the communist Poland. For a couple of years MO had not disposed of any special anti-riot preventive units. The first strike and wave of dissatisfaction among workers from the Cegielski Metal Works in Poznań were suppressed on 28 June 1956 by combined effort of the Army and the Citizens’ Militia, but the events showed that MO was not able to successfully handle mass protests (e.g. protests in Bydgoszcz and Szczecin in November 1956). In order to restore peace in emergency situations, the Council of Ministers of the Polish People’s Republic issued a decree on 4 December 1956 which was the basis for creation of Motorized Reserves of the Citizens’ Militia (ZOMO). The guidelines related to the service in ZOMO were introduced by an order of the MO Chief Commander general Dobiesz, issued on 17 July 1957. Pursuant to the order, ZOMO was a garrisoned paramilitary formation (Socha, Letkiewicz and Gula, 2010).

The first duty tasks entrusted to ZOMO were: safeguarding national elections to the Sejm (January 1957), and then violent quenching of people’s demonstration in the village of Lutoryż near Rzeszów (March 1957). In July 1957, ZOMO suppressed a strike of tram drivers in Łódź and in October a demonstration of employees of a weekly newspaper in Warsaw. Gradually ZOMO functionaries were engaged in more and more numerous interventions. They were present wherever there was an outburst of dissatisfaction with the communist regime of the Polish People’s Republic. They were in constant readiness, always in battle order. Originally the formation had been equipped with tranchees, batons and military helmets, later the equipment included also water cannons and tear gas launchers, as of the beginning of the 1960s.

The Political Crisis of March 1968 was triggered by university students in Warsaw who became angered by the censor’s ban on the play ‘Dziady’ by Adam Mickiewicz in the National Theatre. The students took to the streets and the wave of demonstrations spread to Gdański, Kraków, Radom, Łódź and Poznań, but MO brutally quenched the riots. Around that time ZOMO once again had their equipment updated and modernised. The functionaries were uniformed in new ‘moro’ gears, they received protective shields and newer water cannons which were built upon the chassis of a popular heavy goods vehicle STAR. In 1983, ZOMO functionaries were clad in shin pads, better helmets, shock proof vests and disposed of five barrel tear gas grenade launchers, troop carriers equipped in battering rams or guarding fences, rubber bullet putters, metal gas grenades and even firearms. ZOMO became the best equipped and trained formation specializing in anti-riot interventions in the whole communist Europe. The recruits to the service had to be below 30 years of age, minimum 1.70 cm tall with clean criminal record, basic military training and at least primary school education. The main area of activity of ZOMO functionaries was dispersing and suppressing social protests, strikes, waves of political unrest, manifestations of the opposition etc. These tasks were performed with a great deal of brutality and inexorability. When required ZOMO functionaries may also have taken part in rescue activities during catastrophies or natural disasters, they searched for missing persons, escaped criminals and protected mass events.

The Chief Commander, upon request from district commanders adjusted the headcount, organization and dislocation of units across the country (Socha, Letkiewicz and Gula, 2010). The number of functionaries initially at the level of 6,600, rose to 30,000 at the end of 1980s. The biggest ZOMO unit was deployed in Gołędzinów (the Warsaw district), but each major city in Poland also had one. During the martial law 1981-1983, units of MO and ZOMO were critical in pacification of strikes and protests.

There was yet another branch of the Citizens’ Militia that must not be overlooked. The Voluntary Reserves of the Citizens’ Militia (ORMO) were created following a resolution of the Council of Ministers on 21 February 1946. It was a paramilitary voluntary and social organisation supporting the MO (Majer, 2004). Originally the tasks to be performed by ORMO were limited to providing security during important social, cultural, sport or political events. However, in March 1968 the ruling communist party PZPR used ORMO to suppress students demonstrations. From that time ORMO directly reported to the District Security Commission and indirectly to PZPR. The MO Chief Commander in an instruction of 1 March 1946 described in detail specific tasks, organization, conditions for admission to the service, rules of the services as well as rights and duties (Majer, 2004). There were special task ORMO units deployed in each Polish district as well as the so called Road Traffic Brigades which were organised in factories. The ORMO units collaborated closely with ZOMO which was an inherent constituent of the communist apparatus of repression. ORMO co-protected mass events such as international football matches, festivals,
manifestations and took part in the so-called civic patrols hand in hand with the Citizens’ Militia. ORMO was a uniformed formation without military ranks but each functionary carried a badge with distinctions of the performed function. ORMO uniforms were similar to field uniforms of infantry, the functionaries wore navy blue berets and when on an assignment they wore special helmets and carried batons and gas. As a rule ORMO functionaries did not carry firearms and they did not receive any wages for their service. The Road Traffic Brigades, in turn, supervised the flow of traffic but without the right to impose fines. During the Polish martial law the Brigades also engaged in political and propaganda activities. Pursuant to the decision of the MO Chief Commander of 3 February 1982, the Brigades were transformed into specialist units called the Political and Defense Units and with termination of the martial law they were dissolved by the Sejm in 1989.

With the end of communist era in Poland ZOMO units were dissolved on 7 September 1989 by a resolution of the Minister of the Interior who called it a negative and much hated symbol of the communist regime. They were substituted by the Prevention units of the Citizens’ Militia, which in 1990 pursuant to the Act of 6 April 1990, were transformed into the Police Prevention Units.

IV. POLICE PREVENTION UNITS IN MODERN TIMES

After the political transformation of 1989, the Citizens’ Militia was transformed into the Police and the Prevention Units of the Citizens’ Militia were transformed into the Police Prevention Unit and Independent Police Prevention Units. Nowadays the main focus of the police activity in Poland is closely related to the notions of public security and public order. Police duties related to security include elimination of threats that may be posed by the ruling administration or other public organs and protection of life and health of citizens. Public order is connected with the necessity to eliminate any manifestations of unwanted acts that go against what is viewed as appropriate in public space (Czapska, and Wójcikiewicz, 1999). The main form of police activity is prevention, within preventive activities a certain amount of repressive action is permissible e.g. during the process of restoring peace and order in case of demonstrations or riots provoked by hooligans at football stadiums. The anti-riot functionaries have at their disposal batons, tear gas and rubber bullets. Anti-terrorist units are entitled to use force and means of physical coercion including firearms (Jałoszyński and Zalewski, 2009). When riots do occur the units must safeguard the area of unrest not to allow the perpetrators to escape. Anti-riot police units report directly to Chief Commanders of the Police on voivodeship level.

The anti-riot preventive forces have a company structure which allows rapid reaction with considerable amount of strength. Detailed tasks and competences of anti-riot units include:
- upholding security and public order during legal gatherings and mass events;
- restoring public order in cases of collective violation of law;
- upholding security and public order during visits of heads of foreign states;
- upholding public order during emergencies, catastrophies and natural disasters provided for in the Constitution;
- supporting regular Police units in patrol and intervention activities;
- chasing dangerous criminals.

While on service duty, the anti-riot officers carry standard police equipment. In case of special tasks they are additionally equipped with protective helmets, shields, shock proof vests, nightsticks, shin pads, protective gloves, tear gas launchers, pepper gas launchers, tear grenades and flare pistols. They also use water cannons, automatic and manual tear grenade launchers as well as modern acoustic appliances.

Since 1989, the National Police has been a service friendly to the citizen. In a democratic state it is important to provide expected level of security to the citizens and protect the fair standards of living.

V. CONCLUSIONS

Provision of security and public order is a vital but also a very difficult task. Prevention and anti-riot units of police forces constitute an important element of the law enforcement system. The present shape of prevention in the Polish Police Forces is an outcome of many decades of evolution which occurred alongside political, social and economic changes. With time organisational structures, rules of conduct, functioning and even headcount has been adjusted to meet current needs and assure efficiency of performed tasks and duties. The deployment of preventive forces has always reflected the administrative division of the country and responded to distribution of possible threats to assure speedy and efficient intervention whenever necessary.

Contemporary anti-riot prevention units are well-trained and well-equipped to be at the service of citizens. It should be noticed, however, that threats change and evolve with time, therefore comprehensive theoretical and practical training of police officers is critical to keep up with the changing reality. Insufficient knowledge or lack of necessary skills may lead to lowering of standards in the service which may in turn increase the level of threat to the internal security and public order. Taking into account the nature of contemporary threats, it is estimated that the role of special task anti-riot units in providing security and public order will continue to grow along volatile nature of current security environment. The formation should constantly adapt itself to the changing reality in order to maintain efficiency of operations, adjust its educational programmes and modernize equipment. Another important aspect is maintaining close cooperation with other agencies performing tasks related to security and public order.

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IT Tools Used to Reduce the VAT Loophole—JPK_VAT, STIR, Split Payment Mechanism

Beata Hoza¹, Adam Żabka²

¹ Department of Finance and Information Technologies, Bielsko-Biała School of Finance and Law, Poland
² Department of Finance and Information Technologies, Bielsko-Biała School of Finance and Law, Poland

Abstract — Tax leakage is a challenge for fiscal organs in many countries which make use of the Value Added Tax (VAT) in their tax system. It is a widespread phenomenon also in Poland. In order to reduce the so called tax loopholes or gaps it is necessary to implement changes in the legal system which will allow to conduct data analysis through information technologies using control algorithms. When it comes to Poland, such analyses can be conducted thanks to the following tools: VAT Standard Audit File for Tax (SAF-T) – in Poland referred to as JPK_VAT file, STIR - the teleinformation system of KIR – the key entity of the Polish payment infrastructure, and the VAT split payment mechanism. The aim of the paper is to present the estimated value of the VAT loophole in Poland and other EU member states in the period 2015–2016, and to point to steps which aim at reducing the size of the gap through application of IT tools.

Key words — Value Added Tax, tax on goods and services, VAT loophole, JPK_VAT file, the split payment mechanism

I. INTRODUCTION

Although the tax on goods and services, being a Polish variant of the Value Added Tax (VAT), is the basic source of state budget revenues, its fiscal efficiency is being considerably hindered. In the view of the Polish state organs ‘widely understood fiscal crime especially with respect to the Value Added Tax and Excise Tax, generates massive losses for the state budget and undermines economic security of the country’ (MSW, 2015). The tax on goods and services (VAT) is a consumption tax placed on a product or service whenever value is added at each stage of the supply chain, from production to the point of sale. Such construction of the tax on one hand accelerates its collection, but on the other hand may become an invitation to abuse. Taxes perform fiscal role (Owsiak, 2005), (Rusikowski and Kosikowski, 2006), (Wójtowicz, 2002), (Kulicki and Sokół, 1996), (Famulska, 2007), therefore they should be an effective source of revenues for public authorities, which means that the state should reach for such an object of taxation (of things, occurrences) which would provide sufficient resources for the performance of central and local administration tasks (Ciupek, Famulska and Walasik, 2006). However, the extent of abuse as regards the tax on goods and services generates considerable losses in budget revenues, violates the fair taxation principle (Głuchowski and Patyki, 2011) and disturbs market competitiveness. New legal regulations are hoped to enforce certain limitations to the extent of malpractices, and some existing legal solutions which make these malpractices possible are going to be liquidated. Thanks to the new legislation it will be possible to implement such legal instruments which will encourage taxpayers to conduct business activity in a way which is compatible with the law.

II. VALUE ADDED TAX LOOPHOLES

The Polish legal system has not yet defined the term ‘tax loophole’ or ‘tax gap’ which was coined by the OECD and developed for the purposes of reporting, conducting research and comparative analyses. The ‘loophole’ is defined as the difference between the amount of tax due and the amount which was actually paid into the state budget (PWC, 2013, p.3).

Unwillingness to fulfill tax obligations is a common phenomenon known since the beginning of taxation. Taxpayers treat their tax obligation as a certain limitation of their rights and freedoms so they search for ways to avoid or just to reduce this burden. The dilemmas so characteristic for the whole history of taxation are still valid in modern times, however now, with even more tax avoidance opportunities, tax fraud is easier to commit than ever before. This situation is caused by globalization processes accompanied by a tendency to break down any existing barriers in order to guarantee free movement of people and capital.

The leakage of the tax on goods and services is a universal problem of fiscal organs of many countries where the Value Added Tax is in use. Therefore, it may be assumed that the loophole in the revenues not only is a sign of weakness of fiscal organs but also, to a certain extent, the consequence of the very
construction of the tax, which is vulnerable to malpractice and unable to defend itself.

According to the statistics published by the European Commission, the EU member states lost 150 billion EURO of VAT revenues in 2016 alone. The VAT loop ranged from 35.9% of unpaid VAT in Romania, to 0.85 % in Luxemburg (in Poland 24.5 %). When expressed in absolute amounts, the biggest loophole was observed in Italy (35.1 billion EURO), whereas in Poland in 2015 the loophole was estimated at the level of 9.8 billion EURO (CASE, 2018) (Chart 1).

**CHART 1. ESTIMATES OF VAT LOOHOLES IN EU-27 IN 2015 AND 2016 (AS % OF POTENTIAL REVENUES)**

![Chart 1](image)


Tax loophole is just an estimated value arrived at through various statistical data, including estimates coming from the grey economy, thus its value must be interpreted with caution. A much closer attention must be paid to the changes in time. Data gathered in Chart 2 show an alarming trend upwards of the VAT loophole in Poland. With the exception of the period 2005–2008 the gap remained above the level of 15%. It proves insufficient efficiency of the Polish fiscal system and the need to implement new solutions which would reduce the scope of tax fraud (NIK, 2016).

One solution that may be effective in reducing the scope of grey economy is appropriate legislation which will allow to use such information technologies which facilitate flow of information and conduct data analyses based on control algorithms.

When it comes to Poland, the following IT tools are currently being implemented:

- Standard Audit File for Tax (in Poland called JPK_VAT file) - under gradual implementation process (mandatory),
- STIR teleinformation system,
- VAT split payment mechanism (voluntary).

**CHART 2. ESTIMATES OF VAT LOOHOLE IN POLAND IN THE PERIOD 2000-2016**

![Chart 2](image)


III. JPK_VAT FILE – POLISH VERSION OF STANDARD AUDIT FILE FOR TAX

Standard Audit File for Tax is a database made of the IT system of an entrepreneur. The database stores information on business operations for a given period in a format and layout which makes the processing of data fast and easy. The data is transferred by means of a template prepared by the Ministry of Finance (in the XML form used as a standard in electronic communication). Standard Audit File for Tax (SAF-T) had been developed in OECD in 2005 and was used for the first time in 2008 in Portugal where it brought the desired effects. The concept was soon adopted in other countries such as: Germany, Great Britain, Denmark, Holland, Sweden and Slovenia.

The Polish version of Standard Audit File for Tax (JPK_VAT file) consists of 7 structures: accounting books (JPK_KR), bank statements (JPK_WB), warehouses (JPK_MAG), records of VAT purchase and sales (JPK_VAT), VAT invoices (JPK_FA), revenue and expense ledger (JPK_PKPIR) and revenue account (JPK_EWP). The term JPK refers to all data which compulsorily or on demand must be handed over to the Inland Revenue Office. One category of data which must be sent to the Inland Revenue Office in JPK format is all VAT related data - JPK_VAT. With respect to monthly preparation of JPK_VAT, it is obligatory for large enterprises starting 1 July 2016, for small and medium sized enterprises starting 1 January 2017, and for micro enterprises starting 1 January 2018 (Table 1).

JPK_VAT file contains the register of VAT sales and purchase ordered in a logical structure. For instance, VAT sales register includes the following information (for each transaction): date of sales, date of issuance, number of the document, name of the buyer, address of the buyer, net amount and the amounts of the tax due broken into particular tax rates.

The structure of VAT purchase register is based on a similar
principle. At the same time, the JPK_VAT file features all data needed for preparation of a tax return and summary information, and constitutes the basis for verification of accuracy of tax deductions and confirmation that the invoices were issued by an empowered entity (an active VAT taxpayer).

### TABLE 1. STAGES OF JPK_VAT FILE IMPLEMENTATION

<table>
<thead>
<tr>
<th>JPｋ STRUCTURE</th>
<th>LARGE ENTERPRISIES</th>
<th>MEDIUM SIZED ENTERPRISES</th>
<th>SMALL ENTERPRISES</th>
<th>MICRO ENTERPRISES</th>
</tr>
</thead>
<tbody>
<tr>
<td>JPｋ_VAT</td>
<td>1 JULY 2016</td>
<td>1 JANUARY 2017</td>
<td>1 JANUARY 2017</td>
<td>1 JANUARY 2018</td>
</tr>
</tbody>
</table>

Source: own work based on article 6 point 2 of the Act of 13 May 2016 amending the Tax Ordinance

The success of the Standard JPK file depends on its universality. The number of entities who were obliged to submit JPK_VAT but failed to do so is consistently decreasing – from 5,4% in January 2018 to 2,9% in June 2018 (Chart 3).

### CHART 3. NUMBER OF ENTITIES FAILING TO SUBMIT JPK_VAT FILE

(01-06/2018)

In the first half of 2018 the system identified and called into question 155,443 invoices, issued by 55,780 entities not registered as taxpayers of VAT. The amount of VAT due on these invoices amounted to over 260 million PLN (Mf.gov.pl, 2018).

The most frequent inconsistencies detected in the JPK_VAT files refer to:
- divergences in the submitted JPK_VAT files and the tax returns filed for the same period,
- divergences with respect to transactions shown in the JPK_VAT files,
- cases of including in JPK_VAT files VAT invoices purchased by entities without the status of an active VAT taxpayer (Finanse.mf.gov.pl, 2018).

JPK_VAT system has automated audit activities. Thanks to the system the National Revenue Administration can react quickly to any inconsistencies and attempt at tax fraud. Special algorithms used during the analysis of JPK_VAT files immediately single out fictitious transactions made by dummy corporations.

IV. STIR – A TELEINFORMATION SYSTEM OF KIR (THE KEY ENTITY OF THE POLISH PAYMENT SYSTEM INFRASTRUCTURE)

STIR is a fiscal administration tool introduced to the legal system by the Act of 24 November 2017. The tool aims at preventing the organized crime groups from using the financial sector for fiscal fraud especially in the so called carousel fraud. ‘Carousel’ refers to such money transfers on bank accounts which are intended, in the final moment, at obtaining undue VAT reimbursement. Based on the data accumulated in the STIR software, the computer system analyses the risk of fiscal fraud occurrence. Pursuant to the above mentioned Act, the head of the National Revenue Administration gets access to information on:
- accounts of eligible counterparties (i.e. other than accounts of natural persons used for private purposes) – as of 13 March 2018,
- all transactions of eligible counterparties made through commercial bank accounts or accounts of the Cooperative Savings and Credit Unions (SKOK) – as of 1 July 2018.

The STIR Act also stipulates who can become an eligible counterparty:
- natural person being an entrepreneur;
- natural person being self-employed;
- legal person;
- non-corporate entities having legal capacity.

STIR is intended to maintain tight supervision over bank operations made by business entities. All entities are under surveillance irrespective of the fact whether non-compliance procedures have been initiated for them or not. The system, which conducts risk analysis, is based on software algorithms - the data is sent and analyzed automatically by the IT system in order to detect the risk of fiscal fraud. Should a threat be detected, the head of the National Revenue Administration (KAS) is entitled to suspend the account of the identified eligible counterparty. If the estimated value of the tax obligation exceeds 10.000 EURO, the suspension on the account may be prolonged to the period of three months. The STIR Act is not binding for accounts of natural persons which are used for private settlements. Thanks to the analysis provided by the STIR software, it is possible to establish which business entities are fictitious and exist only for the purposes of VAT carousels. The demands of the head of KAS concerning the suspension of accounts of eligible counterparties are also processed and sent electronically which assures speedy and appropriate reaction.

In the period between March 2018 and end of September 2018 (Mf.gov.pl, 2018) the system analyzed more than 5 billion bank transactions and singled out more than 26,000 high risk taxpayers: 12 bank accounts belonging to 8 entities were suspended, the accumulated resources on these bank accounts amounted to 3 million PLN.

It should be observed, that the legislation concerning the STIR system gives fiscal organs discretionary powers which results from unspecified and inconsistent criteria, generally referred to as ‘risk algorithm’. Such provision makes it possible for each business entity to become a subject of scrutiny of relevant financial and fiscal institutions. It must be emphasized,
however, that the risk analysis is based on transactional data which helps to tighten the fiscal system in Poland and creates a good environment for efficient battle with the carousel crime.

V. VAT SPLIT PAYMENT

The VAT split payment mechanism aims at tightening of the fiscal system and increasing the security of the business turnover (La Grutta, 2015). The tool has been introduced in Poland on voluntary basis, as an extension to the Polish VAT law, starting 1 July 2018. Split payment mechanism is not commonly used in the European Union countries. In fact it is only operational in three countries: in Italy, where split payment is used in settling transactions with public entities; in the Czech Republic, where it is voluntary and taxpayers may use it for protection against the joint and several liability principle; and in Romania, where split payment constitutes a kind of sanctions connected with overdue VAT payments into the state budget.

The VAT split payment mechanism completely changes the way in which the tax on goods and services is collected. The clients of the entity will perform two electronic payments: one payment amounting to the value of the acquired goods/received services (i.e. the net amount without VAT) into the usual bank account and one payment amounting to the VAT into a specially created VAT account which is under constant supervision exercised by a fiscal organ.

The split payment operation may be performed automatically by a special settlement system which divides the payment and transfers it into two separate accounts; or manually by the taxpayers who make two separate transfers into two separate accounts. Taxpayers should open the VAT bank account with a commercial bank. Alternatively, they may open a VAT account with the state treasury, in which case the account is managed by the central bank. It should be emphasized that the VAT split payment may be used only for transactions between two taxpayers, the B2B (business-to-business) model. The mechanism cannot be applied in B2C (business-to-consumer) environment.

The split payment mechanism is a preventive tool which can eliminate or at least considerably reduce the risk of imposing on a taxpayer the liability for VAT which should have been settled in earlier stages of the business turnover. In July and August 2018, the split payment mechanism was used by more than 120,000 Polish businesses in 2.4 million transactions worth 40 billion PLN. This means that more than 7% of all entitled entities used this solution in transactions which constituted 1.5% of all transactions made in this period between VAT payers. As regards the value of transactions, the value of split payments amounted to 5% of the total value of transactions in this period (Gazeta Prawna, 2018) (Chart 4).

Poland belongs to the small group of countries which have implemented the VAT split payment mechanism. The split payment variant introduced in Poland is friendly for the taxpayer and rather easy to execute: the amount which arrives at the seller is already reduced by 23%.

The application of the VAT split payment mechanism will impact businesses with varying degrees. Problems with liquidity may occur in case of entities who perform activities taxable at 8% VAT rate and purchase goods and services taxed at 23% VAT rate. The most affected will be the agri-food industry or the construction industry. It should be highlighted, however, that the decision concerning making the payment in the split payment formula is made by the buyer not the seller. According to the Ministry of Finance, the VAT split payment mechanism is one of the final stages of tightening the tax system.

VI. CONCLUSIONS

The teleinformation tools described above are indispensable elements in the process of tightening the tax system. To be effective however, they require a comprehensive approach so that all individual constituents could complement one another and work in harmony. Definitely, the most effective will be the tools imposed mandatorily.

The advantage of the JPK_VAT file is that it allows for efficient analysis of a large volume of data. The key asset of the
System is the speed of elimination of errors which helps to reduce the number of necessary tax audits in companies and shortens the time of these audits. Selecting entities for audit is based on risk analysis, and as the result actual audits can be performed only in companies where the risk of irregularities is really high. Network approach to tax and bank related information about business activity of entities used in the STIR system has shown considerable potential but is still in need of further development. Fusion of the STIR data with data from JPK_VAT file will offer vast possibilities of trade transactions analysis and payment analysis. In the presented package of IT tools aimed to reduce the VAT loophole, the least effective is probably the split payment mechanism as it is used on voluntary basis.

Only a mandatory system embracing most sectors but especially: fuel trading, steel and scrap material trading, electronics and construction services, would bring considerable results and would contribute to the reduction in the VAT loophole.

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Security versus Threat – Interrelations

Wioletta Koper - Staszowska¹

¹ National Forest Holding "State Forests", the Regional Directorate in Katowice - Poland

Abstract— The issue of interrelations between security and threat has a history as long as the history of mankind. Human beings since the beginning of times have always had needs of higher and lower importance, these needs sometimes collide with the needs and interests of others, thus creating a threat. Originally, the meaning of the term ‘security’ was limited only to the armed protection of territories against the enemies from neighboring countries. With time other layers of threat were recognized and determined. Nowadays, protection against external aggression is just one of many threats which must be dealt with to provide security to a state, other threats are related to economic, ecological, social or cultural aspects.

Index Terms— security and safety, threat, fear, anxiety.

I. INTRODUCTION

The notion of security is under scrutiny of many scientific disciplines, it has rich literature and is considered from various angles. The interest in security related issues has increased in recent years due to the changes occurring in contemporary societies and impacting the living conditions of their individual members. Security is analyzed and researched in many dimensions, it may be perceived as decent persistence, survival and development in the perspective of ambivalent human inclinations and personalities (Świniarski, 1997). Contemporary understanding of security embraces all aspects of human life, therefore one may speak of military, political, social, economic and natural security (Ostojski, 2007). It should be emphasized that in the 21st century permanent expansion of the meaning of the term ‘security’ can be observed, but unfortunately up till now there is no universally accepted interpretation of its meaning. The presence of many different definitions generates considerable difficulties for identification of the field of security. What makes things even more complicated is the fact that security is both a state and a process, it is not a constant value of unchangeable designations.

VII. DEFINITIONS OF SECURITY

The term ‘security’ comes from Latin and means sine - without, cura - care, attention, anxiety; securitas – assurance, freedom from worries, anxieties and threats. In the Polish language the word security (“bezpieczeństwo”) denotes a state of peace and confidence that nothing may threaten the fundamental rights of people (Szymczak, 1995), a state in which life, health, personal dignity and immunity are sufficiently protected. Absence of threats is a critical but not the only aspect of the sense of security. The very awareness that security can be provided is also important. Perception of security based on intuition refers to the sphere of consciousness of a given entity – a human being, a social group, a nation or a group of nations. For example J. Kunikowski defines security as a notion reflecting the state of being free from threats (Kunikowski, 2005), N. Sillami views the sense of security as nothing more than complacency caused by confidence that there is nothing to be afraid of (Sillami, 1994); whereas A.S. Reber and E.S. Reber see it as a feeling of freedom from fear and anxiety (Reber and Reber, 2005). A similar viewpoint is shared by B. Malinowski who, while discussing emotional states, remarked that the essence of security is the freedom from fear (Malinowski, 2001). T. Parsons observed that lack of security is the determinant of fear (Parsons, 2009). Psychologists and sociologists alike see security as freedom from fear and uncertainty. Moreover, from the social perspective, security plays a critical role in the process of satisfaction of human needs, existential needs in particular. Security guarantees existence, survival, stability, identity and independence as well as protection of standards and the quality of life. Loss of security immediately generates anxiety and the feeling of threat (Zięba, 1989). A more extensive and complex definition of security was formulated by P. Sienkiewicz who claims that it is not only the absence of threats but also a whole system of institutional and non-institutional guarantees for liquidation or minimalization of threats. For P. Sienkiewicz security is an asset closely related to the feeling of stability, sustainability of the favorable state of affairs and confidence (Sienkiewicz, 2018).

II. OBJECTIVE AND SUBJECTIVE SENSE OF SECURITY

Security may be considered in an objective and subjective
sense. Objectively, security, or lack of security as the case may be, is related to the existence of actual conditions that may trigger threats, whereas security seen subjectively reflects the sense of security felt by individuals or groups of individuals. The subjective assessment so as to the absence of threats is based on internal beliefs and emotions of an individual, while objective evaluation is based on statistical data, facts and professional analyses. In subjective view, threat is a state of mind of an individual who judges a given phenomenon as unfavorable or dangerous. Objectively, threat is a state of uneasiness and anxiety about a situation in which the risk (likelihood) of emergence of a dangerous situation really exists (Wolanin, 2005). According to A. Ostrokoński security may be considered subjectively as a certain state of the environment in which citizens do not sense the threat, and objectively, in which protection is guaranteed by public institutions, by the state in particular (Ostrokoński, 2004). Subjective feeling of security of individuals is related to the stability of the system they live in, i.e. family, local community, region and country (Ostojski, 2007). In subjective view, one may speak of an interaction between what is imagined about potential threat and the actual conditions occurring in the immediate environment. In this way the sense of security is a state of a given moment which may develop into another state (creating a higher or lower risk of threat) as a consequence of changes which take place in the environment where people live. A threat as a physical or social phenomenon generates a state of uncertainty and fear, therefore it undermines the feeling of security. As sense of security is related to all aspects of human life and activity, thus it creates a multifold vector of mental comfort of people who feel safe. Similarly, any threat posed to this feeling of security embraces a whole spectrum of phenomena which deprive people of this comfort in various aspects of life and activity, or in different configurations of the first and the latter (Wiśniewski and Zalewski, 2006).

III. TYPES OF SECURITY

According to J. Szmyd security on the one hand is a social, civilizational, cultural, political, economic and ecological value, and on the other hand, an existential, moral and spiritual asset (Szmyd, 2000). Simultaneously, it is a fundamental value which is desired not as a value in itself but because of other values it is supposed to safeguard. The Polish Dictionary of National Security Terms (Balcerekowicz et al., 2002) defines security as a state which guarantees the feeling of assurance that the security is maintained, will be maintained and chances are that it will be even better maintained in the future.

The literature on the topic uses several typologies of security. The basic typology is the subject criterion, according to which the security is divided into national security and international security. The oldest security formula is the national security (a term which is often used interchangeably with state security). National security has its origins in the most basic existential needs of various local communities forming a state. These needs can only be satisfied by the apparatus of the state. When applying the spatial criterion, other types of security emerge: local security; sub-regional security; regional security; supra-regional security and global (worldwide) security. If time criterion is used, one arrives at the state of security and the process of security (Balcerekowicz et al., 2002). Security as a state refers to certainty, serenity and absence of threats, fear and aggression. D. Frei differentiated three states of security:

- state of absence of security, perceived as an actual threat appropriately assessed;
- state of security, when the level of threat is perceived as low, and the threat is accurately assessed;
- obsession, a minor threat perceived as a very serious one;

D. Frei also points to the so called false security i.e. a serious threat but considerably underestimated. Security as a process, in turn, refers to the state of security and its organization which are subject to dynamic changes. In other words, security as a process is a continuous activity of individuals, local communities, states and international organizations.

IV. THREAT- A THEORETICAL ASPECT

A threat refers to the sphere of consciousness of a given entity, to a given state of mind caused by perception of a phenomenon as unfavorable or dangerous. S. Korycki notices a certain duality in the understanding of the term threat, which on the one hand is a purely subjective feeling resulting from the assessment of the occurring phenomena, on the other hand, it is an objective factor generating the state of uncertainty and anxiety (Korycki, 1994). E. Kołodziński wrote that the way in which individuals perceive threats, and the level of their sense of security is just a reflection of an actual or potential threat in their respective consciousnesses. This reflection may of course be inconsistent with the actual state of affairs as it is a sum of feelings and assessments formulated by individuals in various states of minds. Therefore, in assessment of the level of security one must take into account the reality in which the threats arise. The knowledge and awareness of participants of social life must be accounted for as well as their perception of the threats and the current level of the feeling of security (Kołodziński, 2011). Subjective views of individuals must not come unnoticed by the state organs who are responsible for upholding security in cases of emergency and who are supposed to eliminate or reduce harmful effects of the emergencies. State organs must also provide psychological support to the society, and take steps based on proper assessment of the situation to counteract outbursts of panic (Kołodziński, 2011). Thus, a threat on the one hand is a certain mental state of the consciousness brought about by subjective perception of reality as unfavourable or dangerous, on the other hand, a threat consists of objective factors which trigger feelings of fear and uncertainty (Korycki, 1994).

V. THREAT VERSUS THE NEED OF SECURITY

At this point, it is worth looking at the so called safety need as described by Abraham Maslow. Maslow’s hierarchy of needs is a motivational theory in psychology comprising a five-tier
model of human needs, often depicted as hierarchical levels within a pyramid. Needs lower down in the hierarchy must be satisfied before individuals can attend to needs higher up. From the bottom of the hierarchy upwards, the needs are: physiological, safety, love and belonging, esteem and self-actualization. As it can be seen, the safety need is located right above the most basic, physiological needs tier. Maslow’s hierarchy of needs is frequently used to clarify the relationship of an individual with the environment.

The psychological concept of the hierarchy of human needs in which the need of safety and security are seen as extremely important, is also reflected in sociological thought. B. Malinowski, for instance, referred to the hierarchy of needs while developing his theory of culture. While discussing emotional states, he observed that security means freedom from fear (Malinowski, 2001). T. Parsons, in turn, argued that the lack of security is a determinant of fear (Parsons, 2009). For psychologists and sociologists alike, security as freedom from fear, anxiety, uncertainty plays a very important role in satisfaction of human needs. With respect to the issues related to the security of groups and broader social systems, it is necessary to mention key terms related to this issue: social surveillance, trust, public order, social integration, disintegration, disorganization and the phenomenon of anomie.

The lack of security translates into the so called ‘sense of threat’ which may be influenced by (…) dynamics and scope of political, social and economic changes such as for example: political and economic crisis, struggle for power, departure of the ruling authorities from deep moral values, absence of reasonable long-term social policy based on universal values and justice, equal opportunities and solidarity (Holyst, 1997). The feeling of threat impacts the satisfaction of the security need, the more intense the feeling of threat, the more difficult it becomes to satisfy this need and vice versa. The sense of threat intensifies if the emerging dangers are unfoundedly and excessively treated as personal by the affected individual.

A threat may also be considered in a narrower and a broader sense. With respect to the first, a threat is born (…) when a person starts to experience fear of losing highly treasured values such as the most important one i.e. life (Holyst, 1997). Here the threat is understood as a situation an individual is aware of (Holyst, 1997). In a broader sense, (…) threats may also embrace situations of which individuals are not aware (Holyst, 1997). According to the Polish Language Dictionary, ‘threat’ is a situation or a state of danger threatening an individual, it may also be a person who creates such a situation (Sjp.pwn.pl, 2018). The Concise Polish Language Dictionary defines the verb ‘to threaten’ as to scare and frighten, to become a menace and danger for someone (Skorupka, Auderska and Łempicka, 1989). ‘Danger’ on the other hand is a menacing state, a situation which spells certain doom (Skorupka, Auderska and Łempicka, 1989). The users of language usually accompany the noun ‘threat’ by an adjective or adjectives which specify the object of the threat and a specific area concerning the threat.

VI. TYPES OF THREATS

With the development of civilization new threats emerge and enter more and more areas of social life. A threat may be understood as an intersection of events within one country or on the international arena, which generates a danger for undisturbed being of citizens and peaceful development of the state. Depending on the kind of entity whose vital interests may be endangered, one may speak of national and international threats. The state related threats (national threats) may come in two categories: internal threats and external threats. So a threat to national security may result from internal and (or) external conditioning and have military and (or) non-military nature. Each conditioning may occur independently (separately) or in any configuration, in this way contributing to a conflicting situation within a state or in its immediate environment. The penetration of causes and interrelations of threat conditions may be so far-reaching that unambiguous qualification and identification of the threat becomes virtually impossible. Therefore, threats should be considered on various levels and from various angles, in order to determine all possible cause-effect relationships (Dworecki, 1996).

In literature on the subject the following kinds of threats to the security of the state may be encountered: military, political, economic, social and ecological (Górka-Winter and Dębski, 2003). In general sense, threats may also be divided into: natural disasters or technical failures. Natural disasters are major adverse events resulting from natural processes of the Earth (Sosada, Żurawiński and Niczyporuk, 2011). Whereas technical disasters are caused by human factor and they may be both intentional (e.g. terrorist attacks) and unintentional (e.g. railway accidents, car crashes, building collapses). The scope and consequences of the above mentioned disasters depend on the number of people who find themselves in their immediate vicinity.

Taking into account the organization of security on the level of an individual member of the society, the following threats may be identified (Leszczyński, 2011):

- educational threats – generally limited access to education for some social groups, or additional difficulties on a particular level of education,
- threats to public health – epidemic outbreaks, diseases of civilization (obesity, cardiovascular diseases), lack of appropriate health care, limited access to doctors, health care facilities and rehabilitation, disability,
- health related social pathologies i.e. alcohol, narcotic, nicotine, psychoactive drugs addictions with all health and social consequences, this group also includes prostitution,
- cultural backwardness,
- demographic threats – low generational replacement rate, ageing of population,
- threats to the family – divorce, aggression, domestic violence, single parent families, orphanhood.

With respect to collective threats to social security, their nature comes down to (Leszczyński, 2011):

- absence of social trust, closure of social groups, prejudice and xenophobia, all of which considerably hinder social integration,
VII. CONCLUSIONS

Security has become one of the most popular notions of everyday life. The subject matter related to this issue is raised by mass media who frequently report on events related to personal security, social security, public security, energy security, information or military security of the state. We want the space around us to be safe and secure, we do not want to fear unpredictable behavior of other people or unexpected impact of the forces of nature. From the world around us we expect peace, confidence, predictability and transparency, these are, however, difficult to achieve, as the surface of our planet shrinks alongside growing population, and the forces of nature cannot be tamed despite all advances in technology. We are exposed to dangerous situations on daily bases and we must be aware that more often than not we will be forced to face various threats either individually or collectively. How we cope should dangerous situations materialize, will depend on our attitude and the level of social organization.

Overall, threat and security are two opposite terms which are closely related to each other. These terms are omnipresent in the lives of contemporary people. While security specifies a certain state, threat is associated with a phenomenon the undermines this state (Prońko, 2001). Security has a positive meaning, it is associated with peace, stability and absence of threats. Threat, on the other end, means anxiety, uncertainty and fear of the future. The development of civilization and globalization may generate and multiply threats. Despite the fact that the term threat is intuitively understood, experts have not yet managed to formulate an unambiguous definition.

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Emergency Hotline as a Communication Tool in Times of Crisis

Gabriela Socha

1District Headquarters of the Polish Police Forces in Katowice
ul. Lompy 19, 44-100 Katowice - Poland

Abstract—For a couple of decades telephone crisis services called hotlines or helplines have been an important instrument in the process of providing help and assistance to people in distress. The idea of providing psychological help and support over the telephone was born of sincere kindness and sympathy of human heart but with time it evolved towards a standardized scientific discipline based on rules and procedures. The paper outlines the history of telephone crisis services and points to their most important functions in contemporary, globalized world.

Index Terms—crisis, crisis situation, telephone crisis service, hotline, helpline, trust, intervention.

I. INTRODUCTION

Communication is a transfer of data or exchange of information between entities. It is based on individual interpretation of the message and it constitutes a conscious and intentional act. According to Denis McQuail there is a number of levels of social communication: intragroup, intergroup, communication within institutions and organizations, mass communication as well as intrapersonal and interpersonal communication. The intragroup impact takes place within small groups, whereas intergroup communication relates to large groups in which not all the members know or come in direct contact with one another e.g. local communities and associations. In case of organizational communication the roles of senders and receivers are clearly determined, defined and formalized. But the widest process of all is mass communication which is transmitted via mass media: radio, press, television, the Internet. Here many parties participate in exchange of information, as the information reaches nearly every corner of the world. Intrapersonal communication in turn, consists of all kinds of biological reactions to stimuli from within the organism (Gawroński, 2018).

For the purposes of this particular paper interpersonal communication is of key importance. Special attention should be brought to a definition formulated by John Stewart, which assumes that interpersonal communication is such a type, quality or kind of contact which occurs when people speak or listen in order to maximize what is personal (Stewart, 2009). The author emphasizes that the term ‘interpersonal’ with respect to communication, goes beyond the communication itself. It means more than just face to face communication as it refers to the type or quality of interpersonal contact, appropriate for many instances of communication, also to a telephone conversation, which, due to obvious reasons, is never carried out face to face.

What is very important is the fact that most people perceive communication as action, which obviously is a very simplified view. This model of communication assumes the existence of the speaker and listeners, always one ‘teacher’ and one or more groups of ‘students’. Transfer of information is in one direction only (if feedback loop is omitted). Interpersonal communication is understood as such contact between human beings which is based on reciprocity. Therefore communication must be treated as interaction, as a process of reciprocal influence. Such approach to communication, to informing, and at the same time expecting feedback, is vital in the context of using emergency line as a tool of communication in crisis situations.

The terms ‘crisis’ and ‘crisis situation’ have become increasingly popular lately, even fashionable. One may wonder about reasons for such a career of these terms because crisis has always been present in human life. Maybe it is because people only recently have learned to verbalize, define and openly speak about their problems. Crisis and crisis situation, despite their frequent occurrence, are unique and unrepeatable just as unique and unrepeatable individual human beings are. Taking into account the complexity of processes accompanying crisis and inscrutability of human nature, there is no universal recipe so as to crisis resolution. The paper focuses only on emotional crisis which is something virtually imminent for each human being. It is very typical that one day life beats a person down on the ground, and the other day makes them wake up stronger, richer in new experiences and ready for new challenges. Mental crisis
is a feeling of powerlessness and unpredictability of the future, usually generated by strong mental disturbance, personal loss or closure of a certain phase in life. The characteristic feature of crisis is a strong emotional strain and overwhelming absence of the will to live. Another important aspect of crisis is time. A crisis never goes on forever, it never lasts a long time. It is often assumed that the average duration of crisis is from six to eight weeks after which the process of healing begins provided that the person affected received help. Sometimes external help from not related people is necessary as not everyone is surrounded by loving family, caring and observant friends or understanding superiors and co-workers. These groups of people i.e. family, friends, colleagues are the first instance where assistance should be sought in a crisis situation. Sometimes it is even not necessary to say a word, hints of unusual behavior will instantly be noticed by those who care. But there is a group of people who go through life alone, nobody cares for them, if they do not start crying for help they will sink in loneliness and overwhelming chaos, they may even take others down with them.

II. MEDIA AND TELEPHONE AS MEANS OF COMMUNICATION

Telephone is a useful tool which may help to address certain problems of contemporary people. It was invented by Alexander Graham Bell in 1876. At the turn of the centuries the invention was perfected to enable communication between people wherever they are and whenever they want. At this point it should be emphasized that communication becomes medial when it is carried out by means of electromagnetic waves carrying signals whose sending and receiving exceeds the capacity of biological apparatus of human perception or when it is materialized on a carrier. The first type involves transmission media, the second recording media. When the two types merge they become what is known as communications media, understood as the entirety of means of communication. Older media such as press, radio, television are generally referred to as mass media, and the relatively new media such as smart phone or PC are called telematic media (Goban-Klas, 2008).

III. THE BEGINNINGS OF EMERGENCY HOTLINES

The founder of the idea of a telephone crisis service was a minister of the Baptist Church Harry Marsh Warren, who in 1906 in the United States opened the first suicide prevention organization ‘Save-a-Life League’. It all began during his stay in New York when a young woman in despair contacted him for help. As he was in a hurry he refused to see her, the woman left alone with her problem took tranquilizers and overdosed. Shortly before she died she told rev. Warren, who was called to her death bed: “I think maybe if I had talked to someone like you, I wouldn’t have done it.” Marsh Warren overwhelmed by her death and his failure to deliver help decided to encourage suicidal people to make telephone contact with him. Local press helped to propagate this idea and the venture took off culminating in opening a clinic for suicidal persons called ‘Save-a-Life League’, the clinic provided not only psychological but also material help.

Further development of telephone crisis services can be attributed to a British Anglican priest Chad Varah, who in 1953 in London founded an organization for those contemplating suicide. The organization was called the ‘Samaritans’. Varah began to understand the problems facing the suicidal when he was taking a funeral as an assistant curate in 1935, his first church service, for a fourteen-year-old girl who had taken her own life because she had begun to menstruate and feared that she had a sexually transmitted disease. Varah was devastated by the girl’s death and a series of suicides that followed. He vowed at that time to encourage sex education, and to help people who were contemplating suicide and had nowhere to turn. On the church door he put a notice: ‘Before you commit suicide, call us’. The idea was picked up by the Daily Mirror newspaper, who coined the phrase ‘crisis hotline’ which started to be commonly used for any kind of help provided by telephone to people who are helpless, lost, suicidal.

In Poland the first emergency helpline was opened in Gdańsk in 1967. The service, initiated and developed by professor Tadeusz Kielanowski and Grazyna Świątecka, was based on the ‘Samaritans’ principles, and started to be known as Gdańsk Crisis Hotline ‘Anonymous Friend’. The facility was of clearly social character. The attendants on call worked on voluntary bases and they represented different walks of life. The service was a subsection of the Polish Red Cross and the assistants worked from the Red Cross district headquarters. In 1967 professor Adam Bukowczyk from Mental Disease Clinic of Wrocław Medical University set up a more professional hotline with doctors and psychologists available to provide advice and assistance. A year later more hotlines emerged in Bydgoszcz and Toruń, next in Warsaw, Lublin and Kraków. In 1970 in Warsaw the first telephone counselling service for children and young people was opened. Two years later, in 1972, Katowice and Olszyn also had their ‘Anonymous Friend’ emergency lines. Soon afterwards the Polish Catholic Church opened their hotline services in Poznań, Zielona Góra and Szczecin. In 1983 in Warsaw the first IFOTES (International Federation of Telephone Emergency Services) associated emergency hotline for alcohol addicts was created, and in 1999 the first in Poland Internet emergency service ‘Anonymous Friend’.

To increase the quality of services offered by telephone emergency lines, the Polish Council Coordinating Telephone Emergency Services was appointed in Kraków. Moreover, many emergency hotlines joined the International Federation of Telephone Emergency Service (IFOTES). With time the Polish Coordinating Council was transformed into Coordinating Committee with the headquarters in Sopot. In 1990 the Polish Association of Telephone Counselling was appointed with the headquarters in Sopot, the Association brings together assistants working for emergency services all over Poland.

The Polish Association of Telephone Counselling (PTPT) provides support in the following areas:

- prevention, protection and promotion of health and social assistance;
helping lonely persons, addicted persons and their families;
• counteracting pathologies and social exclusion;
• supporting people in social and mental crisis;
• protection of human rights and freedoms;
• propagating of voluntary work.

Currently PTPT has about 400 members, the Association is responsible for organizing annual conferences for hotline assistants, they also publish a bulletin of informational and training character under the title "Telefon Zaufania Nasza Gazeta", which is sent to major libraries in Poland. Many Polish emergency hotline services are associated with PTPT and their activity is based on the so called "International IFOTES standards". The most basic and at the same time the most important IFOTES standards include:

• providing access to the telephone hotline to people in distress and crisis;
• listening but restraining from criticism and judgment, kindness;
• absolute discretion concerning what was said during the counselling sessions;
• providing full anonymity of the caller;
• strict avoidance of any religious, political and ideological pressure.

The list below features selected emergency lines functioning in Poland:

• 800 12 01 48 - toll free hotline ‘Stop the Violence’;
• 22 619 91 49 – anti-terrorist hotline;
• 116 111 – emergency line for children and young people;
• 800 12 12 12 – the Children’s Emergency Line of the Polish Children’s Ombudsman – a service devoted to all the children who need help;
• 801 12 00 02 – the Blue Line for victims of domestic violence or for those who possess information about persons experiencing domestic violence in their homes;
• 801 19 99 90 – the Polish Emergency Line offering support for drug addicts;
• 22 692 82 26 – 24-hour-emergency-line of the National AIDS Centre;
• 801 24 70 70 – 24-hour-support-line of the Centre for Missing People ITAKA;
• 116 000 – 24-hour-toll-free-number offering assistance when children are missing;
• 801 109 801 – emergency line of the National Centre of Competences.

IV. JUST DIAL THE NUMBER

The first step initiating the healing process or the problem solving process is picking up the phone and dialing the hotline number. This very act is a passage from a thought and reflection to concrete steps leading towards solving the problem, it liberates the subconsciousness with which every human being was brought to life. The survival instinct is the most powerful strength of the universe. "It is commonly understood that those who want to talk about their suicidal thoughts and seek help do not really want to die, but still they represent a high risk of suicide” (Kubacka-Jasiecka, 2010). Experts agree that dialing an emergency line number is a ‘cry for help’, being suicidal is a symptom of emotional crisis, a temporary disturbance of mental stability and not an actual attempt at self-destruction. It should be remembered, that those who turn to the emergency line in their dark moments must feel alienated in the world they live in, they are lonely people who are unable to seek support and counselling in their immediate environment. Not always in their conversation with the counsellor they articulate their problem but they will send various signals which should be detected by a careful ear of the counsellor. Most ‘customers’ of helplines are absolutely helpless, they may have been affected by morality crisis, the treadmill of everyday life or they may have got lost direction in the rat race. Every so often they are tormented by the feeling of guilt for not being able to provide their families with appropriate living standards, they experience the so called ‘loser syndrome’ which is usually enhanced and reinforced by frustrated families who keep raising their expectations. Some callers seek assistance as a result of a life tragedy which tore their world apart, some are worried by the absence of role models in contemporary world or lack of respect for legal norms. Some people call because they feel rejected, alienated from their immediate environment due to their abnormal behavior or just because of their being different. Typical groups of callers are: alcohol and drug addicts, their families, homosexuals, sick people or people whose appearance derogates from what is considered as standard and they are unable to come to terms with their otherness and the fact that certain human reactions will accompany them till the end of their lives. Another group of callers are young people with adolescence problems who cannot find support from their parents, they think they do not fit in with their peers and they lose the will to live. Young people constantly look for ideals but their system of values is frequently re-evaluated and each failure or even unhappy love is elevated to the level of personal tragedy. It happens every so often that the fear of confessing the truth e.g. about unwanted pregnancy or repeating a year at school, is paralyzing and may lead to suicidal thoughts. In recent years the so called online crisis chats have become very popular with young people due to complete anonymity offered by the Internet, however this form of communication unlike the telephone contact is completely impersonal and very shallow.

V. MAIN FUNCTIONS OF EMERGENCY HOTLINES

There are three fundamental functions of a crisis helpline: offering support, providing objective information and knowledge, and intervention. With respect to the first function, the caller should be allowed to speak, to ventilate emotions (whatever the problem concerns, difficult external situation or just mere dark thoughts and fantasies) in a friendly, safe and anonymous atmosphere. The fundamental principle of a hotline is that it must offer the possibility to speak to each and every caller, 24 hours a day in absolute anonymity and discretion. The essence of hotline help is based on an assumption that the caller is experiencing a deficit of ‘emotional capacity’, i.e. he or she is unable to accommodate and bear the overwhelming emotions. Therefore, the assistant must concentrate on active,
supportive listening. The pre-condition and requirement for a
good counsellor is not only the ability to establish and maintain
contact, but also the ability to endure and withstand all the
difficult emotions of the caller. The counsellor must be able to
mobilize all the resources and self-assurance within the caller
that can help him/her to overcome the crisis. It is important to
break the deadlock and help the caller assume a problem solving
attitude. The counsellor should suggest seeing another
specialist: a doctor, a lawyer, a therapist, a counsellor, a parent
etc., who will be able to provide more professional help than
the telephone assistant.

The second function of each crisis hotline is providing
information and knowledge so as to possible ways of
overcoming the difficulties. Those who decide to turn to a
helpline most probably have a deficit of both information and
knowledge concerning ways out of their misery. It is the task of
the telephone assistant to inform the caller about different forms
of professional help, the procedures that must be undertaken
e.g., the counsellors must dispose of appropriate amount of
relevant knowledge and an extensive database available at
hand. But still, the most important asset of a good counsellor is
the gift of establishing and maintaining contact. If the caller is
a child it is important to inform this child precisely how to get
to the place where help can be received and to whom they
should report.

When it comes to intervention, the counsellor must initiate
crisis proceedings with respect to the caller who has found
himself/herself in a difficult situation e.g. as the result of
violence, accident, suicide attempt, development of mental
sickness etc. During intervention phase it is necessary to
cooperate with various facilities (e.g. emergency room,
hospital, the police, shelter, emergency care unit etc.) or with
intervention team who for example will go to collect an
abandoned child from the street and place it under professional
care. The assistant is responsible for initiating the process of
helping the caller who has limited possibilities (external and
internal) for self-help and then for monitoring the case until it
has been taken over by relevant institutions. The aid provided
by helpline operators is critical because it initiates crisis
intervention proceedings. The pre-requisite for providing high
level of services is well-trained personnel knowing what
procedures to apply and when (Jaroszewska, 2001).

Well conducted telephone intervention should fulfill the
following conditions:

• the assistant must be fully engaged in the conversation;
• the assistant must keep reassuring the caller;
• the assistant should refrain from making judgements,
  should encourage the caller to express his/her feelings and
  emotions openly;
• the assistant should offer the feeling of security,
  companionship but without taking the responsibility away
  from the caller;
• the assistant must listen in order to extract the most
  important problems and issues from the caller;
• the assistant should provide addresses of people and
  institutions which may help the caller;
• the assistant should offer the caller his/her credentials and
  offer readiness to cooperate;
• during a conversation with a suicidal caller the assistant is
  obliged to determine the whereabouts of the caller, make
  sure that the caller is safe and direct him/her to a crisis
  intervention center;
• the assistant must motivate the caller to seek direct contact
  with those who may help as this is so much more effective
  in terms of security of the person in distress (Kubacka-
  Jasiecka, 2010).

A big advantage of emergency helplines is the fact that the
lines are open non-stop and the counsellor can offer time and
attentive ear at any time of night and day. It is not easy for the
telephone assistants as they do not see the face of the caller and
therefore are unable to notice many important signals resulting,
for instance, from body language. They need to listen
attentively because the help and support they are going to offer
may be of critical importance for overcoming the crisis of the
caller. Assistants do not rely entirely on their intelligence and
life experience, which in themselves are very important factors.
During training sessions they learn to recognize attitudes and
thoughts, mainly of suicidal character, symptoms of mental
illnesses, but most of all, they learn to listen attentively and
speak with friendliness and care typical for a true and caring
friend. In practice however, acquiring all these skills turns out
to be quite difficult. The main challenges seem to be related to
the competences of assistants, the choice of appropriate
strategies and intervention procedures but also to the intentions
of individual callers. There is always a certain amount of risk
involved. But on the whole, any doubts related to the existence
and efficiency of telephone help services are quickly
outweighed by benefits this type of help brings.

VI. THE MEANING OF TRUST

Telephone interventions as a tool of psycho-sociological
support in emotional crisis, play a very important role in crisis
management. But without winning trust of the caller it is not
possible to bring any help. Trust is a complex process whose
essence is difficult to define. Trust is a specific bond that needs
to be established between the caller and the assistant who is at
the other end of the line. The bond must be based on the
assumption and belief, that by sharing their secrets and
weaknesses the caller will not be harmed in any way. The caller
must be convinced that by sharing the burden, they will feel
better, that by talking the problems over with the assistant they
can ease their pain and calm down the troubled mind. Only in
an environment based on trust and understanding, the
counsellor may offer comfort, hope and assurance that the caller
is capable of overcoming the crisis. The essence of trust is
contained in an assumption that the person on the other side of
the line is eager to help and has competences to offer
professional help and counselling. For the very same reasons
people seek help from doctors when they are ill.
VII. CONCLUSIONS

Even when we do not have enough strength to open our eyes and come out of bed in the morning after a sleepless night, when the world around us lost all his color and seems strange and indifferent, we should still remember that life is worth living. It is difficult to say before the crisis strikes whether we are able to go through it alone or whether we will have to rely on others for help. We do not even know how we will react when we will be offered help. We are not machines but complicated and fragile beings. One day the world may seem beautiful and the future bright, and the next day we are overcome with terrible thoughts and we are just shadows of our usual selves. Fighting a crisis is not easy, if it were the humanity would not have experienced many horrible tragedies. Norway would not have to weep and mourn almost a hundred innocent victims whose lives had ended before they even begun. Everyone may be in need to call an emergency line one day. If not with an own problem maybe with a problem of somebody else. We should keep our eyes open, we must not be blind and indifferent to others! The work of all crisis hotline assistants is very important, it is a therapy in itself for those who are in despair which helps to alleviate or even close a difficult time in life.

REFERENCES


Identification of a crime perpetrator based on trace evidence

Dariusz Szydłowski¹

¹ Department of Law and Social Science, Bielsko-Biała School of Finance and Law
ul. Tańskiego 5, 43-382 Bielsko-Biała

Abstract—The application of advanced methods of trace identification at a crime scene has made a substantial contribution to the identification of offenders. An accurate identification as well as preservation of forensic traces at a crime scene are key determinants of the methods’ usage. The application of appropriate forensic traces identification and preservation techniques has been presented in the paper, including selected case studies.

Index Terms— forensic identification, forensic traces, trace evidence.

I. INTRODUCTION

Nowadays trace evidence analysis constitutes an integral component of forensic techniques. Since the beginning of mankind use of traces has been a significant element designed to identify and impact on a safety of a given environment. In the 20th century along with dynamic scientific and technological development, traces analyses have deeply influenced the effectiveness of identification of offenders and allowed to conduct comparative tests. Trace evidence may be found at every place of incident. From a rational point of view, a perpetrator must get to the crime scene, stay there and return. Offenders always leaves traces of their actions.

A consistent search and an adequate preservation of forensic evidence are the most important aspects in forensics. Any mistake or negligence on the part of a forensic technician threatens the continuation of a method of proceeding. Both in urban and rural areas, crime may be counted among the most important social problems. A proper forensic work of technicians depends on the appropriate use of their findings. However, the results of that hard and responsible work are used only to a small extent, although they are of great importance in solving a criminal case. At present, the collected traces of footwear soles secured at places of incidents are stored at the Voivodeship Trace Evidence Register which greatly facilitates preparatory proceedings.

II. FORENSIC IDENTIFICATION

Since the beginning of mankind identification of persons and objects has proved particularly difficult, but now it is the main focus of forensics (Kulicki, Stepka and Kwiatkowska-Wójcikiewicz, 2009). Forensic identification primarily refers to a variety of findings related to the course of events, ending with the investigation of acquired traces (Moszczyński, 2016). It includes scientific methods of conduct in determining the perpetrator who left a mark. Forensic identification is an important element resulting from a criminal proceeding, and it is a part of each stage of proceedings, from recognition, detection, proof to prevention (Kędzierska, 2007). The use of the adjective forensic together with the word identification reveals its distinctiveness in relation to other methods of identification. This is due to ‘a small amount of evidence, its unlimited generality, uniqueness of identification situations’ (Kędzierska, 2007). Identification embraces two very important meanings: the first is a research process, often developmental therefore considered dynamic. The process is also regarded as recognition, comparing, and identification. The second stage is the result of the research process, which is assumed to be static because it is a result, and above all, the end of the research process. The identification is a result of the research process.

The definition of identification may be divided into narrow and broad. The narrow definition of identification determines only the origin of the trace, whereas the broad definition covers everything that is outside the research process, inter alia: a type of incident, circumstances of the incident, detection of a perpetrator (Kędzierska, 2007). It may be claimed that forensic identification is ‘the determination of the identity of a person, an animal or an object by comparing them with someone or something, or by recognition’ (Kędzierska, 2007).

The basis of identification are material identification features. Each feature that an object possesses enables a certain
type of identification, and it is also a forensic feature. In a research where the amount of evidence proves to be insufficient, only available features are taken into account. The term identification demonstrates only the usefulness of a feature, not its essence. Identification feature concerns both living beings and activities carried out by them, as well as things. When it comes to humans one may distinguish, inter alia: smell, fingerprints, hair colour, and the colour of hair in case of animals. Objects may be identified inter alia: by texture, loss, scratches, joining elements and size. Identification features are always connected with an object. Various situations may occur during an incident, for example a whole vehicle is considered to be a trace, therefore all its features may be used for the identification process. In a case when a part of an object is approved to be a mark, features of a given element are used for research. However if an object's features are transferred to a carrier, then the transfer becomes a trace with a limited number of features.

Important elements of identification process include: the number of features - the more features, the greater probability of determining the positive or negative result, quality, distinctness, durability, reliability of connection with an element, interchangeability of features, distinctive features, features indicating the specificity of an object. Identification features in forensics may be classified as follows:

<table>
<thead>
<tr>
<th>Classification</th>
<th>Explanation (what it concerns)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Unit</td>
<td>Re shape of e.g. ear, lips, a colour of e.g. skin</td>
</tr>
<tr>
<td>Group</td>
<td>Re e.g. type of weapon, typewriter type</td>
</tr>
<tr>
<td>2. Qualitative</td>
<td>Re type of trace</td>
</tr>
<tr>
<td>Quantitative</td>
<td>Re trace dimension</td>
</tr>
<tr>
<td>3. Simple</td>
<td>Re trace length of footwear sole</td>
</tr>
<tr>
<td>Complex</td>
<td>Re shape size of footwear features</td>
</tr>
<tr>
<td>4. Internal</td>
<td>Re density</td>
</tr>
<tr>
<td>External</td>
<td>Re external features e.g. cavities</td>
</tr>
<tr>
<td>5. General</td>
<td>Re a whole object creating a trace</td>
</tr>
<tr>
<td>Detailed</td>
<td>Re specific area of an object</td>
</tr>
<tr>
<td>6. Group</td>
<td>Feature characterizing a group</td>
</tr>
<tr>
<td>Individual</td>
<td>Applies to a unit</td>
</tr>
<tr>
<td>Specific</td>
<td>Specific for a given object</td>
</tr>
<tr>
<td>Diagnostic</td>
<td>Characteristic for a given type, make recognition easier</td>
</tr>
</tbody>
</table>

Source: Own description based on (Kędzierska, 2007)

The division into individual identification and group identification is the most popular typology, in such case names of types have been borrowed from features names 'according to the number of identified objects' (Kędzierska, 2007). The features of human beings are both individual and collective, they are primarily genetically conditioned. Moreover, a person's characteristic traits are acquired throughout life. This happens due to biological processes such as: aging, diseases and their treatment, also through work and favourite entertainment. Objects first acquire characteristics during production stage, then during use, renovation, and modification. All aspects are interrelated because what is destroyed requires repair which alters the current features. Forensics strives for individual identification. However, it all depends on many factors such as: the level of knowledge, the degree of development of a given field, the quality and quantity of the material that is tested, and circumstances. The most important determinant in forensics is the trace and its types. Therefore, it is possible to single out individual information about the origin of the object. This information must have scientific justification.

Forensic identification is a process which must meet the conditions resulting from three important elements such as: the subject, the method and the number of identification stages (Kędzierska, 2007). The first mentioned criterion refers to the subject, it includes a procedural body, a victim, a witness, an expert as well as the perpetrator. They all are a part of forensic identification. The method as a basis for identification may distinguish several types, inter alia: chemical, biological, economic or forensic. The method criterion is not complex as methods employed during identification. Forensics as a science has its own, original research methods.

Next criterion is the number of stages, therefore one may distinguish indirect and direct traces. During each conducted identification a trace becomes the starting point. However, the law enforcement authority does not deal with the trace itself but with the information who the trail belongs to. Identification is supposed to determine the identity of the person who has left the mark. Regarding the number of stages one may distinguish two types of identification: indirect and direct. Direct, one-step identification allows for the recognition of the owner based on the mark itself e.g. fingerprint, dentition traces, also handwriting. Indirect identification called a multi-stage, consists of at least two phases. It gradually endeavours to identify the perpetrator's identity. The examples of indirect traces are inter alia: traces of a tool revealed during the inspection of a place the crime scene, groups of people with an access to the tool. The number of stages and their type depends on the way of disclosure and the trace preservation. Trace identification and apprehending the perpetrator are the last stages in the identification process. The result of the research process may be obtained through the following elements: the object of identification, the number of identified objects and conclusions.

As far as the object of identification is concerned, a person, body, animals, a thing, a place as well as activities are taken into account. Disclosure and preservation of the trace will lead to one of the above elements. The example of such disclosure is a track of speech registered on a tape or other carrier enabling a person's identification. The number of identified objects leaving a trail is the next element (Kędzierska, 2007). T. Hanausk differentiated between two types of identification: a group identification which occurs when the object of identification mentioned earlier possesses identical features as objects classified to that group before, and individual identification that demonstrates the fact that an object presenting the same features decides about how it will be named and why it will be marked in such a way. The above division detects two terms: identical and same. The identical features refer only to one object, whereas same ones are similar in several objects (Hanausk, 1994). Often a group identification
becomes a stage leading to an individual identification. Both identification types mentioned by Hanausek are mainly the result of interpersonal relations of traces investigations.

The number of features in a trace is a more important criterion as far as individual and group identification division is concerned. It refers to a process of individualisation where application of new research methods allows for a gradual shift of a group identification towards the individual one. The process constitutes an essential component of investigation work during an operation of suspects elimination. Objects of interest include traces such as hair, saliva, blood, semen, and also some traces in the field of physicochemical tests e.g. fibre. Individual identification only enables determination if a given person came into contact with a specific object, or was present at the place of the incident, however it does not confirm the fact that the person was really the perpetrator (Kędzierska, 2007).

The last criterion refers to conclusions indicating positive and negative identification (Kędzierska, 2007). Identification as a research process is referred to as identification survey. One may distinguish two types of identification surveys: identification tests and comparative study. In both identification surveys, assignment of features present in the tested material is crucial. The material is selected in pairs. The difference between surveys depends only on the type of the problem under investigation (Kędzierska, 2007).

The purpose of identification surveys is 'to determine the identity of the object creating the trace by recognizing it' (Kędzierska, 2007). Identification test must answer the question regarding the identity of the object that had left the mark. The examples of objects are inter alia: fragments of plants, strange material stains, unknown liquids. During a given object investigation further detailed questions appear (Kędzierska, 2007).

The following types of material may be differentiated: the evidence – include all traces preserved at the scene of an incident regardless of whether they will be qualified to individual or group identification (Kulicki, 1994). The evidence not only includes forensic traces but also everything that could be related to the event, while material not classified as trace, is eliminated in further stages of testing (Kędzierska, 2007), comparative material – encloses intentionally obtained traces, in order to identify the perpetrator, for example material collected in appropriate databases (fingerprints), and also in forensic collections (footwear bottoms, broken locks equipment, weapon) (Kulicki, 1994). Comparative material is the result of evidence material. One may distinguish between two forms of material: an object, or a comparative trace. Comparative material is obtained for testing in a form of biological swab e.g. of shoes. As far as control material is concerned, it refers to the whole object or to its part, and also a sample from the collected substrate, on which the trace was made. During trace preservation at the scene of the incident, frequently a part of substrate is taken as a carrier. Receiving such material is intended to eliminate the evidence from the ground and determining its effect on change as well as destruction of the trace identification features. Standard reference material relates to the object with permanent, objective and scientifically determined features, which constitute a comparative unit during identification tests. Standard reference material is easily accessible as it is not required to possess special permissions to receive it (Kędzierska, 2007).

Comparative studies intend 'to determine an object's identity from which the trail comes by comparison' (Kędzierska, 2007). Each testing both comparative and identifying is completed by obtaining the result which is also an opinion on a given issue. The opinion may be categorical, that is positive and negative, as well as alternative, that is a probability (Kędzierska, 2007).

III. FORENSIC TRACE

The definition of a forensic trace has been evolving over years along with the development of forensics. The first definition referred to objects which could have been regarded as a forensic trace. In the following stage of the trace definition development there was a word change i.e. the removal of trace calculations and its substitution with the term of changes. The third stage included adding information about incidents written in human consciousness. One may conclude that the change in knowledge possessed by a human was also perceived as a forensic trace.

The term forensic trace is constantly changing, along with human consciousness (Kędzierska, 2011). The most popular definition belongs to Jan Sehn: 'a trace in the forensic sense includes any changes in objective reality, which as observable marks after the events being the subject of proceedings, constitute the basis for reproducing the course of these events in accordance with reality' (Kędzierska, 2011). However, a different definition may also be employed. This definition was proposed by authors of a popular forensic textbook written under the editorship of J. Widaicki. The authors claim that 'traces are certain, special, noticeable remnants of events' (Widaicki, 1984). Another definition of forensic trace is provided by T. Hanausek, according to whom forensic trace is 'all identifiable in a specific part of reality consequences of these changes, which group either create an event, or is closely linked with this event (e.g. traces of escape, traces of concealing the booty etc.)' (Hanausek, 1975). B. Holyst claims that, 'each change of appearance (e.g. shape, colour), or place of an object and deformation of the substrate as well as residual substance, objects etc. which raise suspicion to be related to an investigated event, may be named as a trace in forensics' (Holyst, 2010).

Many divisions of traces may be distinguished in the literature. G. Kędzierska demonstrates the most extensive classification of traces. The basic division is separation of substance and memory traces – the terms have been accepted conventionally. The mentioned classification may be regarded as the example of a general trace division. Based on stages of criminal activity, traces also may be separated into: traces arising with the intent to commit a prohibited act, traces created during preparation, traces created during the crime, and the ones created just after the crime in the process of obliterating the marks.
Another division is based on a trace carrier and it refers to traces found on objects, human bodies (of a victim, a witness, a perpetrator), and on the body of animals. Due to the size of material traces, they may be divided into macro and micro traces. In the literature there is also a distinction according to an individual that had left the trace, whether he was a perpetrator, a victim, a witness, or other person. It is quite clear that based on a trace one may obtain information about a prohibited act itself as well as persons involved in such an event. Due to the process, a trace is created, a projection, stains, and other trails may be distinguished.

While attempting to precisely classify traces, it may be noticed that there are many divisions, and some of traces cannot be disconnected. Often, one trace contains double information (Kędzierska, 2011).

According to S. Kozdrowski traces may be distributed because of their outer form into surface prints – formed on a hard surface, and those in turn on layered prints – created by applying a trace on a substrate with the help of substance on the object e.g. mud, flour, oil (Kozdrowski, 2012) and exfoliated prints – formed when a surface is covered with a substance, part of which is found on the object, e.g. crossing in footwear through freshly painted pedestrian crossing, leaving a mark in a form of surface prints with paint used for painting a pedestrian crossing, and finally corrugated prints – created on a soft surface e.g. an imprint of bare foot in mud.

Next division includes layered and exfoliated prints. Additionally, stains may be differentiated – remains of substances of irregular shape, differing in colour of the ground, often stains have their own specific smell. Objects and their parts – all will be found at the place of incident, for example a knife, a crowbar, and also fragments of a padlock. Smells – a trace is an effect of evaporation of a given substance. Changes in the geometry of objects – include all of objects' distortion, e.g. bent trellis in a window. Negative positioning – refers to all differences in objects' location before the event, possibly a lack of the objects. Thermal traces (factual) – due to temperature differences they stay in the air, and such traces may be revealed using a thermal imaging camera. Memory traces – remain in human memory, and are disclosed during interrogations (Kozdrowski, 2012).

Traces distinction may also occur according to the size of a trace: macro and micro traces – ‘poorly visible or invisible to the naked eye particles of matter or features of physical activity, related to the event’, and macro traces – include easily seen objects, or prints e.g. footprints (Bąkiewicz, 1996). T. Hanausek divided traces according to the name of the laboratory where traces are tested: dactyloscopic traces – inter alia fingerprints, mechanoscopic traces – inter alia traces of tools, traces of use of firearms – among others cartridge shells, missiles, trace evidence – inter alia footprints, traces of vehicles, chemical traces– inter alia stains, marks on documents and equipment designed to create them – inter alia typewriters, copiers, computers, thermal traces – temperature changes, phonoscopic traces – sound traces, osmological traces – odour traces, micro trace – traces that may be disclosed only and exclusively using appropriate methods employed by forensic laboratories, inter alia DNA, hair, biological traces – inter alia blood traces, secretions and excreta. Gradually, some areas have begun to penetrate therefore the division was considered as incorrect (Kozdrowski, 2012).

Depending on the stage of a process, forensic traces may be used as evidence as well as a subject of interest in detection activities. Situations appear when a given function does not occur at a given stage of the process, then other function plays an important role in the process. According to H. Kolecki one may distinguish the following functions of forensic traces:

- identification function based on testing of forensic traces. The tests ultimately aim to determine the perpetrator of a crime, by establishing the person, animal, objects, from which the trace comes from (Kędzierska, 2011);
- evidential function a basic function in the evidence proceedings during a criminal case. A trace in the sense of evidence proves something, speaks for something, and indicates something, it also has an adequate justification. However, if a trace could go to the court as a factual evidence in the case, it must be reliable. In connection with the principle of free assessment of evidence, the court has the right to question the evidence and consider it unreliable. Therefore evidence should be adequately preserved in two aspects: procedural and forensic. As far as proceedings are concerned, the evidence should be included in the inspection protocol with attached file, made photograph, as well as forensic sketch with a place and its position on the scene of the incident. Whereas in forensic sense, the evidence should be secured in a physical way to avoid destruction, damage, deformation or theft (Kozdrowski, 2012);
- registration function refers to the Police database in terms of forensic evidence that after years still presents evidential value. The evidence located in forensic databases come from proceedings in which the perpetrator was not immediately detected, however, it is still possible. Commonly, a registration function is regarded as a thesis to save from oblivion (Kozdrowski, 2012);
- associating and reactivating function consists of the following elements: combining something into one whole and applying it to the resumption of the activity. From a practical point of view it is about the association of traces from crimes with the traces in the databases. Consequently, it is possible to reopen proceedings that have been cancelled some time ago;
- organisational function deals with the organisation of work on a trace. Along with the disclosure of the trace, the operation begins concerning the preparation and undertaking of activities both procedural and forensic e.g.: determination of forces and means needed to capture a person, hearing witnesses and blocking the area;
- reconstructive function intends to reconstruct the course of events so that it would be the most compatible with the reality. It is worth remembering that the reconstruction should be only one, such as the material truth is only one. It may happen that certain data will be missing, which results in deficiencies in the reconstruction, often
impossible to complete. During the reconstruction of the course of events one must take into account the place of the event, the type, time and the way in which the act was accomplished. In a nutshell, the reconstruction phase refers to the recovery of the events based on forensic evidence disclosed in a given place;

- designating function is supposed to select the perpetrator of the crime based on a trace by specifying e.g.: gender, age, personality, action motive, force, as well as the background of the perpetrator;
- version function refers to the manner in which the case will be presented. A version may be detailed or general, an event or personal. The version function is partially connected with the reconstructive version, because from several versions, only one may be true, being at the same time a reconstruction of a given event. Versions include time before the incident, during preparation and at the time of the offence. However, traces are the most important, without them it would not be possible to create various versions of events;
- verification version is designed to check and confirm the authenticity of the event. According to the type of a trace available to the Police, verification version is supposed to control the fact if information obtained is reliable and may be taken into account in a case. The function is directly connected with the designating, version and reconstructive function (Kędzierska, 2011);
- informational function relates to skilful reading of coded information. It is mainly employed at the place of the event and it refers to actions of the person examining the traces at the crime scene, one's ability to observe and think as well as one's professional experience (Kozdrowski, 2012);
- preventive function is of preventive and precautionary importance. The task of forensic prevention is to make it difficult to commit a crime, using physical protection. While the task of preventive forensics is to make it impossible to commit the intended crime. The difference between the terms of preventive and precautionary actions is minute, and in practice, it is hard to define whether a given action is prophylaxis or prevention. Both of these phenomena complement and permeate each other. (Kędzierska, 2011).

IV. TRASEOLOGY

Traces of shod, attire or bare feet are the most typical traces of all forensic examinations of criminal activity of a perpetrator inspection. Traces of footwear should be located in every place of inspection, which results from logical thinking: the perpetrator must get to the place of his action, stay in it and evacuate from it. Every perpetrator leaves traces of movement and action. The most important thing is to consistently look for and secure traces, engaging in the activities the advances of technology and intuition (Rodowicz, 2000). As a result of the impact of both the human and the object on the substrate, the tracings of a given object appear on the substrate. If the substrate is hard, it may happen that there will be marks on the object indicating contact with the specific substrate (Widla, 2016).

“Traseology - a field of forensic technique, dealing with the study of traces arising as a result of the movement of people, animals or means of transport intended for the movement of people, animals or things” (Łachacz, 2001). In traseology one can distinguish three types of traces: traces of human feet, traces left by animals, traces of vehicles (Miś, 2007).

The durability of the trace may be primarily affected by the weather conditions, as well as the presence of unauthorized persons, animals and vehicles at the scene. These elements may affect the removal of traces left. However, it should be remembered that such removal of traces can be both accidental and intentional (Jagiello, 2011). The oldest criminal trace is the footprint of the bare foot (Kasprzak, Młodziejowski and Kasprzak, 2015).

In traseological studies, the concept of individualization of features was introduced by L. Rodowicz. The concept distinguishes group features - for example, the shape and structure of the soles, pattern, size, etc., individualizing features incorporating performance parameters - rips in the sole - location, grade and range, and production features - the material from which the sole was made, from which mould, finishing - glued, honed, cut. The author also indicates individual characteristics in the form of classical functional features - tears, scratches, cuts and non-classical features - additional elements in the substrate, e.g. small stones, tacks, repairs, sticky substances, as well as production features - pattern layout relative to the bottom edge cut from the artificial material used for producing soles, air bubbles.

T. Szynawa, a court expert in the field of traseology of the KWP Forensic Laboratory in Katowice, dealt with research on the production features of a sole of a shoe. He distinguished three types of features, i.e. group features - permanent defects of form, type of pattern, construction of form; individualizing features – defects: acquired form, dirtiness of the form, loss of smoothness and pitting of corrosive forms; individual features - released air bubbles, a system of non-released air bubbles, short-run castings, deadheads. Group traseological features, e.g. in the form of footwear soles, are created during the production process, while individualizing and individual features are acquired during the use. On this basis, it can be concluded that both individual and individualizing characteristics can be interpreted as the effect of destruction and imperfection of group features. Traseology in its research is based on individual identification features. A feature of individualization can be defined by any feature that, to some extent, relates individually to the source of the trace (Moszczyński, 2011).

The mechanism of footprints is based on contact between a bare foot, a shod one or attired one with soil, snow or other hard surface. In soft ground one can pay attention to traces recessed otherwise known as imprints, while on the hard substrate the so-called surface traces appeared otherwise known as prints. The division of surface marks is as follows: accumulated-positive and delaminated - negative three-dimensional. On a substrate such as asphalt, parquet or floor, surface marks are created. These include the part directly in contact with the
surface. The results of applying the substance to the substrate are layered prints, whereas the delaminated ones are created as a result of taking substances out of the substrate (Miś, 2007).

The author distinguishes barefoot elements in both prints and footprints. These are the toes, the front part, the bridge part, the heel, the inner edge and the outer edge. Taking into account the shoe foot, one can pay attention to such elements as zip, heel, toe tip, back edge, inner and outer edge of sole, part of the bottom, front heel of the heel, inner edge and external edge of the heel (Kędzierski, 2011).

An important element in traseology, apart from traces, is also the gait path (gait image) of the so-called ichnogram - an area in which footprints were left with a set of characteristics for a given person. The elements of the ichnogram include walking lines, walking direction and foot angle, foot length, foot width, step angle, step length and step width (Miś, 2007). The traces left by animals include paws, hooves, cloven feet (Miś, 2007). These traces are secured very rarely and are not often used (Jagiello, 2011).

During the inspection of the crime scene, one often encounters traces from various means of transport. These are mainly tire tread mappings, while tracks of the vehicles on tracks or runners are rare. Due to the construction of the vehicle, one can distinguish traces of two-wheeled vehicles, traces of four-wheeled vehicles, traces of three-track vehicles, tracks of four-track vehicles, horse-drawn vehicles, sleighs, skis, tracks. On the road and on the hard shoulder there are vehicle traces such as: skid marks, slip marks, wheel blocking traces, driving tracks, traces of parking, traces of swerving, traces of gouging, traces of stop, traces of dragging, traces of rims (Miś, 2007).

In most cases traseological traces are revealed by the optical method; however, there are situations in which the trace is poorly visible or invisible; in such cases devices using the electrostatic properties of MES are used (Miś, 2007). The initial stage of protecting traseological traces is photographing, which is the basic method of securing traces of shoes seen with the naked eye. The photograph is taken from a height directly above the track, so that the picture includes the entire track along with the angle scale. In the light falling diagonally, small details will be better visible. In the case of embedded marks, the best solution is to take several shots casting light from different perspectives (Moszczyński, 2011). In order to protect the embedded trace, a gypsum or silicone cast is made (Miś, 2007). The material most often used for this is a dental stone and casting mass - used on a daily basis in dentistry. We can also use wax, silicone mass or stearin in some cases. Before starting the process of casting, remove all traces of contamination such as: pebbles, lumps, leaves, etc. Then, if the trace is on a loose substrate such as sand, it should be sprayed with hairspray or acetylcellulose solution. On the snow a spray wax will be used as the equivalent of the varnish, and after a while the casting will form. Special care should be taken when making casts (Moszczyński, 2011). In the case of revealing surface marks deposited on the substrate, it is important to protect the trace along with the ground, e.g. the shoe imprinted on a piece of paper (Miś, 2007). At that time, no other forms of securing are undertaken (Moszczyński, 2011).

In the case of a trace found on the floor, it is protected with gelatine dactyloscopic film (Miś, 2007). However, on non-absorbent substrates, as in the case of fingerprints, traces are revealed using fingerprint powders. Then such a trace is transferred to the previously mentioned dactyloscopic film, adapted in size to the protected trace.

There are also traces of dust, which can also be transferred to the film. In the case of invisible dust traces, electrostatic film is used, which allows revealing traces among others on concrete substrates and carpets. This method is based on the arrangement of a vinyl film on the substrate on which the aluminium foil is spread - which serves as an electrode loaded with the use of a special device. Electrostatic field created thanks to this method electrifies and attracts shoe pollen to the film (Moszczyński, 2011). Each time photos of traces are taken along with the scale, in addition, each trace should be accurately described in the inspection report (type of trace, track number, location, dimensions, pattern of the sole and method of revealing and protecting the trace), and the protected trace should be provided with a certificate (Miś, 2007).

Via traseological traces left by different types of tires, one can determine exactly what kind of tire it is, what is the tread pattern and what is the degree of wear of the tire, which company produced the tire and what type of car they are used for. Tire marks occur mainly in cases of visual inspection of the place of a traffic accident and are most often the signs of braking, blocking, skidding, swerving, rim (if the tire is cracked) - all these features allow to determine the direction of travel and the speed at which the car was travelling at, as well as what manoeuvres were made while driving or whether the braking system had some drawbacks. Thanks to this information, it is possible to perform a reconstruction of a road accident. Traces of tires are secured in the same way as footwear traces, while traces of animals are extremely rarely secured (Moszczyński, 2011).

Traseological expertise is an expertise that requires a lot of work, where subjectivity and the expert's intuition play an important part (Wójcikiewicz, 2009). High level of subjectivism is associated with the evolution of individualizing features and changes in detailed characteristics when the time between securing the evidence trace and comparative footwear is too long (Moszczyński, 2011). In this case, however, it would be possible to consider the psychological opinion with the help of another expert, which would aim at eliminating subjectivism, possibly through meta-opinion. Analysis of the value of traseological research turns out to be quite high after all (Wójcikiewicz, 2009).

V. SELECTED CASUISTIC CASES

In the 1990s, a hand-made tracing base was created in the Forensic Technique Complex of the Municipal Police Headquarters in Bielsko-Biała. It consisted in drawing up forensic sketches by technicians, depicting patterns of shoe protectors that had previously been secured at the scene. The sketches were stored in binders, which the policemen used to
compare footwear traces at other occurrences. It made it possible to single out in what crimes the perpetrator, whose shoe served as an example probably took part.

In the first decade of the 21st century, however, another traseological base was created. This time, its function consisted of photographic documentation by a forensic technician serving the crime scene of the incident. It contained a photo of a trace left by the sole of the footwear and the appropriate case number for which it was secured. Other crimes attributed to the perpetrator after his detention were also typed on the basis of such data. Negative photography, produced on the spot, in the Municipal Police Headquarters in Bielsko-Biała, was used to take photographs of this type of traces. The photographs were collected so that they could be used for comparative analysis.

The breakthrough, however, turned out to be the introduction of digital cameras for technicians serving event venues. They were used to take photos of the pattern of the sole of the footwear, secured on the forensic film. Then they were located in a special folder that contained a collection of traseological traces. It allowed to create a base that enabled grouping and typing events, and comparing photos over the years. This made it possible to name the perpetrator whose pattern of the sole of the footwear was already in the base. It was a huge step forward for the Forensic Technique Team, because on its basis a lot of positive results were obtained, among others due to photos of footwear soles of detainees.

This method found practical application in tipping the mugger, among others at the hairdresser’s, banks and many commercial establishments. One of the most interesting cases was the detection of the perpetrator of many burglaries that took place in 2002-2005 in the area subordinate to the Police Headquarters in Bielsko-Biała. The incidents occurred on average at intervals of two days, sometimes from day to day. The perpetrator burgled into the flats, using his method of burglarizing, forcing the balcony doors or windows. The perpetrator tried to work in gloves, however, during one of such events, fingerprints were secured, which were identified by the fingerprint expertise. In addition, on the burglary site, three traces were secured, which served as a comparative material. Thanks to this, the Police selected an accused who later admitted to the alleged deed. The collected evidence was also compared with the old, unresolved burglary cases. After inspection of the files and traces, traces coincident with the pattern chosen as a comparative material were found (about 180 of them were selected). An expert in the field of traseology was appointed to examine these matters. Having investigated each trace, he determined that the evidence footwear tracks and comparative evidence that was secured were deposited with the same footwear. He showed individual characteristics and on this basis the detainee was accused of committing about 160 burglaries and was sentenced to multiple prison sentences.

Another issue worth mentioning is the detection of a criminal group operating in Bielsko county. As in the case of the previously described story, it concerns burglaries. This time, however, they were made in detached houses. The group’s members operated in various configurations, often checking beforehand the operation of services in the area. It consisted in breaking in the chosen district and observing when the reaction would take place. It helped them to prepare for further burglaries in this area. The perpetrators used various shoes, which meant that the traces of the different bottoms of the footwear were secured on the crime scene. Each of them went to the Municipal Traseological Registers, in which about 200 burglaries into detached houses were selected. The perpetrators admitted to committing these crimes and were convicted.

The described cases are only a small percentage of positively solved events based on a traseological database. Every time when working on this type of crimes, an expert in the field of traseology is appointed, who gives an opinion on traces, evidence and comparative material. An important element that has an impact on the detection process is therefore the collection of traces of the soles of footwear secured at the crime scene in the Municipal, County and Provincial Traseological Registers. The use of traseological databases to compare the protected traces and then the typing of footwear patterns will significantly contribute to the detection of the perpetrators of crimes. At the current stage traseological databases are not frequently used, which translates into the number of preparatory proceedings detected on the basis of traseological traces. Analysis of the secured evidence in the proceedings will help in identifying the offenders and perpetrators. The creation of a centralized traseological database should be considered here, which will certainly increase the detection.

VI. CONCLUSIONS

The proper use of the collected forensic evidence improves the security in an area. This is related not only to the increasing effectiveness of the identification of traseological traces, which affects the effective detection of ‘perpetrators’, as well as the social awareness itself. The perpetrators are guided by the fear of inevitable identification of traces and linking them to the crime scene. The enlarged database of traseological traces used in the Voivodeship Trace Evidence Register and then in the Municipal and County Registers of Traseology will also have a significant impact.

Every technological change will be connected with a growing number of databases of traces, and most importantly with the speed of their processing, which is important in detecting the perpetrator of the crime. It is worth adding that throughout the history research on traces has been and is an indispensable field in revealing and identifying perpetrators. Tracing research will play a significant role in improving the safety of residents. Correct identification of the perpetrator of the crime on the basis of traseological traces in the area subordinated to the Municipal Police Headquarters in Bielsko-Biała contributes significantly to identification and then convicting perpetrators of crimes. A high rate of categorical opinions indicates that the appointment of an expert in the field of traseology brings unquestionable benefits in detecting offenders, which also affects the conviction of judges about the guilt of the suspect.
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Basic Issues of Management in the Field of Public Security

Wojciech Franciszek Wiśniewski¹

¹PhD student in Management, Warsaw School of Economics

Abstract — The issue of management in the area of public security is a subject under intensive research due to its importance for managing the security of the state. In a high standard manner, this problem was addressed in Poland in an organized way in the beginning of the 20th century. The management of public security is exercised by the authorities and public administration. The authorities set up the legal basis and introduce organizational solutions. Public administration is responsible for the full and effective organization of management in this type of safety. In the present paper, the Author presents basic management problems in the area of public security using several theoretical methods.

Key words — management, organization, society, security, public security

I. INTRODUCTION

The issues of public security management are not sufficiently researched. Hence the question: What is public security and how it should be managed? The key issue to be addressed before attempting to define the concept of management is to determine what an organization is. The Polish Language Dictionary presents three definitions (Sjp.pwn.pl, 2018):

• a group of people or countries having a fixed structure and acting together to achieve common goals;
• way of organizing something;
• organizing something.

From the point of view of the presented considerations, the second of the above will be applied in the further part of the work.

Management is also determined in multiple ways. Most often it is perceived as an art of implementing something through other people (Stoner, 1996). Management is understood as a process of planning, organizing, leading (initiating, stimulating, motivating) and controlling the activities of members of the organization and using all of its other resources to achieve the set goals (Stoner, 2018)(Stoner, 1996). In this context, planning should be perceived as a plan or logic usually based on the current procedure, not on premonition (Stoner, 1996). In contrast, organizing should be understood as coordinating human and material resources available to the organization (Stoner, 1996). Leadership is the way in which decision makers guide and influence their subordinates, leading them to perform the necessary tasks (Stoner, 1996). And finally, control, understood as the actions of decision makers (detecting obstacles and its remedies), ensuring that the organization aims at achieving the assumed goals (Stoner, 1996).

Since the first sentences of this paper highlight the connection between management and process, the question what is a process should be asked? The answer comes from L. Krzyżanowski, who believes that a process is a sequence (band, chain) of changes that take place in directly overlapping moments, intentionally distinguished as a whole (Krzyżanowski, 1994). At the same time, he emphasizes that 'processes and events occur only in the real world; however, their entitativity is always dependent, because they must necessarily coexist with objects inside which, among which or around which they are made’ (Kitler, 2007).

In the process of management, which is a social process, ‘there are also states of things (changes) that are outside the sphere of human influence’ (Kitler, 2007), which may lead to the conclusion that the process of managing safety ‘also includes changes independent of the influence of one or many entities’ (Kitler, 2007). Taking into account the above circumstances, one can conclude that the process of safety management includes ‘a sequence of a specific type of changes, dependent or independent of the components of the safety management system occurring within this system or resulting from the relations connecting it with its surroundings’ (Kitler, 2007).

In the era of dynamically occurring social changes, ‘contemporary reality is becoming more and more complicated. Living conditions require many choices in life that allow people to open up opportunities for themselves and at the same time ensure the safety of other people. As the civilization develops, among others, through the development of technology, society has tried to reduce the risk in working processes, but still, it cannot be completely eliminated. Knowledge allows a person
to adopt rational solutions in crisis situations (...) with an acceptable level of risk’ (Wiśniewski, Koziol, and Falecki, 2017). Knowledge from various fields and disciplines, knowledge that can and should be used to effectively manage security, public security including. Hence the emerging needs addressed to science, education and didactics.

How to deal with the problems outlined above? The answer is simple: apply uncomplicated research methods. Therefore, during the preparation of this work, theoretical research methods were used, i.e. the analysis and synthesis. The method of analysis was used in literature studies of the subject, thanks to which, the basic problems that define the subject-matter scope of this work have been identified. This method also made it possible to determine the conditions of the process of managing public security. The method of synthesis was used to formulate conclusions referring to the issues of managing public security.

II. PUBLIC SECURITY

What is public security? The answer to this question seems quite straightforward on the surface. In reality this is a complex notion whose explanation should begin from the basics of security and only then move towards definition of public security. To explain the meaning of security is as difficult as to explain the essence of management mentioned earlier. Both terms are defined in many different ways and from various angles.

The origins of the word ‘security’, found in many languages (also in Polish), reflect the primal presence of threat over the feeling of safety and protection. In Polish language ‘bezpieczeństwo’ means ‘without custody’ in the sense of being deprived of sufficient protection (Zięba, 1997). The English word ‘security’ having its source in Latin ‘sine cura’, literally means exactly the same as in Polish” (Zięba, 1997). The term ‘security’ embraces the following:
• Lack of threat, peace, certainty;
• Major need of an individual human being and of entire social groups (Zięba, 1989);
• Continuous social process within which active entities try to adapt mechanisms that assure the feeling of security (Kukulka, 1982).

It is more than necessary to recall here the famous pyramid of human needs developed by Abraham Harold Maslow (Maslow and Murphy, 1954). From the bottom of the hierarchy upwards, the needs are: physiological, safety, love and belonging, esteem and self-actualization. Needs lower down in the hierarchy must be satisfied before individuals can attend to needs higher up. As it can be observed the need of security is right above the most basic physiological needs.

One of the identification criteria of security and security management is ‘process’ which is a common identification element of all considerations presented so far. Thus, ‘security’ is perceived as ‘a continuous activity of individuals, local communities, states and international organizations in creating the desired level of security’ (Jakubczak and Flis, 2006). In general social sense ‘security satisfies the following needs: existence, survival, certainty, stability, unity, identity, independence, protection of living standards. Security being the major need of individuals and groups of human beings, is at the same time the basic need of states and international systems. Lack of security triggers anxiety and feeling of threat’ (Zięba, 1989).

The complexity of interpretations of the term ‘security’ leads to the situation in which multiplicity of different types of security coexists in various typologies (Jakubczak, 2006). Generally speaking, it can be assumed that a common feature of all typologies is seeing security in three fundamental dimensions: subjective, objective and processual (Wawrzusiszyn, 2012) (also known as prospective or functional). Special attention should be paid to the subjective approach in which ‘security refers to the participants of social life whose number is constantly rising (individuals, social groups, nations, countries, non-state participants of international relations and international community’). In subjective scope there is a departure from the state-centred perception of security resulting from the necessity to expand the catalogue of protected values (...). In the objective scope, security refers to various layers and extension of:
• the catalogue of protected values,
• the scope of resources ad methods of the security policy,
• the spatial vision of security of nations’ (Wawrzusiszyn, 2012).

It is time to define the notion of ‘society’. K. Loranty observes that ‘in literature the term society does not make a clear theoretical sense. This term is very often used to cover all forms of social life which are juxtaposed with the category of an individual’ (Loranty, 2003). Therefore, K. Loranty proposes to treat ‘society’ as a certain entirety consisting of three basic constituents (Turowski, 2000):
• objective conditions for life and survival;
• social structure;
• culture created by this social group.

Society is also a certain demographic aggregate. Biological reproductive functions are supported by socialization processes, social control processes and various institutions regulating reproduction. Even such personal and intimate activities as reproduction are not for the exclusive use of an individual, although individuals may think so. Demographic transformations are a direct reflection of social changes. In light of the theory of demographic passage, in human demographic patterns two opposing tendencies may be observed: biological survival and maintaining the balance with respect to the environment. In accordance with this theory, each society under modernization process experiences demographic passage i.e. radical, lasting and irreversible decrease in the mortality and fall in the birth rate (Loranty, 2003).

For the sake of transparency of deliberations presented here, it is necessary to adopt a precise conceptual apparatus. Therefore it should be observed that public security is of polysemantic nature and is closely related to public order, balance and laying the foundations for the existence of the society (Fehler, 2010). A. Trzpil argues that this issue may be perceived from a wider and narrower perspective. In the wider
perspective it is necessary to conduct analysis on social groups and mutual relations between them within the scope of international communities; in the narrower perspective, the emphasis should be on social structure, conflicts, integration and disintegration processes that impact social order and relations between individuals (Trzpił, 2006). Public security understood in this way 'is directly related to the main objectives of social policy which are:

- removing disparities in living and working conditions through satisfaction of needs of different age groups;
- offering equal opportunities with respect to enjoying citizens' rights;
- removing social inequalities;
- safeguarding against life risks' (Auleytnar and Głębicka, 2000).

For the needs of the present paper it was assumed that public security 'is a state of security which guarantees not only continuing existence and survival of the nation but also its development. This state of security is the outcome of the activities of the State (as it was established to provide security to the people) manifesting, most of all, in a specific social policy implemented by the administration. The state of security is also impacted by spontaneous social processes being outside the administration mandate or processes unintentionally generated by the activities of the State authority. The said processes are either the consequence of the very nature of social life or the consequence of failing to embrace this nature in the creation of social transformations in a State' (Auleytnar and Głębicka, 2000)

III. DETERMINANTS OF MANAGEMENT IN THE FIELD OF PUBLIC SECURITY

Even superficial analysis of the issue of security management allows to formulate a thesis that change is the basis of management. The holistic approach allows for security management in the area of public security 'as a separate unity to be seen in a wider perspective i.e. in the aspect of co-existing among other equal or superior beings. Thus, the typology of determinants may embrace internal and external conditioning (factors) and mutual relations between these two. Internal factors (...) include material, energetic, social and cultural conditioning, whereas, internal consist of the same factors which constitute the environment of the system and impact the system directly and indirectly' (Kitler, 2007).

The internal scope of management in the field of public security includes also:

- government and public administration organs;
- people of different views and opinions;
- entrepreneurs;
- social and political organizations;
- non-governmental organizations (Kitler, 2007).

As far as the role of government and public administration organs is concerned, it is necessary to emphasize their mission with respect to the society (Tyburska and Nepelski, 2008). The mission can be seen in two layers of security; the first is about protection of 'national values and vital interests against potential threats' (Jakubczak and Flis, 2006), the other refers to the creation of (...) 'conditions for unrestrained development, and standing up to challenges facing the nation such as volatility, unpredictability and progress of civilization' (Jakubczak and Flis, 2006).

Speaking of public authorities, it is important to mention the State as a political organization. One of the basic motives behind the drive of individuals and communities to form a State was the desire to satisfy the need of security. The role of the State, somehow by its nature, is to serve individuals and whole social groups. Therefore, the social, economic and political space should be organized in such a way to create conditions of safe and comfortable existence for all entities that constitute the State. Generally speaking, everything the State does for the sake of the society should aim for the good of the society, providing conditions for life, survival and development. The State, while conducting international, internal, economic or educational policy has in mind the well-being of people it represents” (Loranty, 2003). Such activity of the State ‘is perceived and felt by individuals and social groups, this activity acquires a subjective meaning and is evaluated from the perspective of interests of individuals, groups or the entire nation (…). In this sense, each activity of the State creates situations which contribute to the feeling of security, assurance and optimism, or alternatively, threat, uncertainty, frustration and dispirit. Such subjective judgements impact the reaction of the society to the activities undertaken by the State’ (Loranty, 2003).

Public administration undoubtedly impacts managing in the field of public security. Administration is a very wide and diversified notion with respect to its various functions and areas of activity. The most frequently encountered division of administrative function differentiates between interfering function, service function and infrastructure function. Another division of functions of administration in public security was proposed by H. Izdebski and M. Kulesza who differentiate between: the maintenance of public order function, the rationing function, the service to the citizens function and performing ownerships rights and management rights (Izdebski and Kulesza, 1999).

Maintenance of public order consists of performance of tasks aimed at protecting public order and collective security, whereas the rationing function regulates the number of issued permits. For many years these were the main functions of state authorities which were upheld by means of appropriate instruments: orders, interdicts and permissions to conduct activity, but also with help of law enforcement agencies. Orders ad interdicts are issued by the public authority to make the members of the community respect the law. It is the first step towards imposing lawful behaviour upon citizens. If the law is not obeyed and broken, the citizens may be punished.

It should be emphasized that the decision about what is appropriate in a particular situation belongs to a relevant organ of administration. Permits for conducting activity related to protection of public order and collective security are issued by relevant organs of public administration after fulfilling legally required conditions. If an applicant fulfills all conditions required by law, the organ is then obliged to issue the permit.
Public administration organ may also make use of the institution called the administrative discretion. 'The essence of construction of administrative discretion is flexibility, intentionally provided for in the act, to shape the content of legal effects by a public administration organ. The legislator judges that in certain situations, (...), the administrative organ may take the role of the legislator and independently adjudicate on the content of a legal effect and through this adjudication assure provision of the public weal to an optimum degree (statutorily individualized value)' (Cieślak, Lipowicz and Niewiadomski, 2013).

Multiplicity of institutions responsible for public security functioning within administration calls for such organization of the institutions which would guarantee efficient performance of entrusted tasks. There must be a certain kind of a coordinating instrument, which will serve as a mechanism of responsibility for the efficiency of performed tasks.

In the contexts of deliberations made so far, it is important to emphasize that the social conditioning of security is of subjective nature. ‘Regarding the complexity of social problems, there are such factors as: private interests, public interests, as well as national and international interests; legal norms; social conflicts; multiplicity of social positions and roles; uneven standards of living; formal and informal social impact; national distinctness of societies; quantitative and qualitative diversity; mutual obligations – ties that connect across boundaries and others. Special attention must be paid here to the issue of challenges and threats accompanying human activity or resulting from the forces of nature’ (Tyburska and Nepelski, 2008).

For the considerations put forward in the paper it is important to highlight that internal conditioning of management in public security also embraces the law factor. Law ‘formally sanctions the functioning of a State and almost all entities within its borders (national law), it regulates the functioning of states and international entities within international relations (international law)’ (Tyburska and Nepelski, 2008). It comes without saying that the importance of law for each state is huge, ‘thanks to the norms formulated by relevant organs the rules of procedure in provision of public security are determined (…), the law also governs the ruling class, economic market, social organizations and individual citizens. The intrinsic relationship between the State and its legal system plays a vital role in the organization of activities undertaken by the State activities and by entities functioning within the territory of the State. The efficiency of the functional construction of the State and its organizational constituents depends on the nature and scope of the law (…), one of such constituents is the society’ (Tyburska and Nepelski, 2008)

IV. CONCLUSIONS

Any theoretical considerations made with respect to management in the field of public security ‘only make sense when they are referred to a specific concept of a human being and the society. For some time now, experts have been unanimous so as to the fact that an individual living outside the society will not be capable of developing a personality as a social and moral being. A human being isolated from the society does not exist. The society, in turn, is worth as much as it facilitates personal development of an individual. This mutual determination makes the characterization of a human being extremely difficult, the same is true about the group of human beings i.e. the society. It is impossible to describe society without taking into account the essence and nature of an individual human being’ (Loranty, 2003).

Management in public security seems to be one of the most important sectors of management when it comes down to security of the State. Public security directly depends on a number of factors, most of all, on the efficiency of authority organs and public administration. This efficiency relies on appropriate legislation in force and is supported by scientific and educational activity. So, it should be emphasized once more that internal conditioning plays a vital role in the management of public security. The analysis of literature on the topic shows that in the nearest future the situation will remain unchanged.

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Tax odyssey – tax avoidance which ends with penalty?

Krzysztof Raul Woźniak¹,
¹Department of Financial Law, the University of Gdańsk

Abstract—The doctrine states that tax avoidance is a legal action, albeit not tolerated by the state. The legality of tax avoidance is of private law character, under the Tax Law tax avoidance results in deprivation of the illegal tax benefit. Self-assessment which is non-compliant with the factual proceeding of the taxed actions, is penalized by the Penal Fiscal Law as tax fraud. The objective of this paper is to indicate the limits beyond which legal actions, procedurally compliant with the Tax Law, become criminal. The doubts raised by the taxpayer through acting contrarily to the objective and the spirit of the Tax Law may bring not only financial consequences but also criminal penalty.

Index Terms—tax avoidance clause, penal fiscal law

I. INTRODUCTION

The normative tax avoidance clause was inserted in Section IIIa of the Act of 29 August 1997 – Tax Ordinance – hereinafter referred to as T.O. – amended on 13 May 2016. In accordance with the wording of the provision in Article 119a Section 1 and 2 T.O. (material content of the clause) – an action taken primarily in order to earn tax benefits, contrary to the subject and the objective of provision of the tax law in given circumstances, shall not result in tax benefit if the performance was fake (tax avoidance). In the above situation, the tax effects of the action taken are determined on the basis of such a state of affairs which could potentially exist if the relevant action was taken. In literature it is stated that ‘the new provisions in Section IIIa of Tax Ordinance include (...) the term of tax avoidance; they refer to (...) legal but adverse actions of the tax payers’ (Kujawski, 2016). However, it seems that this legality is only of private law character, concerning the forms of business turnover which result in tax avoidance, not tax avoidance per se whose result is the abovementioned tax benefit. Illegal tax benefit, resulting from a fake performance, in circumstances contrary to the subject and the spirit of the provision, remains financial gain obtained at the expense of a public entity, which is definitely prohibited and also penalised as broadly defined tax fraud. It is unnecessary to be Cicero to claim that tax avoidance may result only from important legal actions and real, not apparent, declarations of will (Kujawski, 2016); at the same time it is ‘incomplete truth’, because the actual tax status is basically created by important and legal actions under civil law. ‘Tax avoidance in its essence is compliant with the letter of particular tax provisions; it derives the tax effects from their disposition’ (Kujawski, 2016), therefore particularly favourable conditions for the occurrence of this phenomenon are caused by the unthinking use of the linguistic interpretation, at least by the deciding body, because the tax payer avoiding tax undoubtedly considered the wording of the provisions to obtain the beneficial result in terms of taxes. The statement of the Constitutional Tribunal that ‘the interpretation of the constitutional obligation of taxation determined in the act cannot lead to the conclusion that within the obligation there lies a legal principle that the taxpayer is forced to pay the maximum tax determined in the act’ is legitimate, albeit regardless of how the taxpayer runs their business, they should pay the tax in the amount corresponding to the general assumptions of the tax structure, including the granted tax exemptions. Citing B. Brzeziński – the taxation should be ‘adequate’ (Brzeziński, 2002).

II. FACTUAL BASIS

There is an opinion that in case of discovery of tax avoidance, the tax effects are assigned to the action which did not exist, but – according to the tax office – must have taken place. Article 217 of the Polish Constitution states that taxation, public levies, determination of subjects and objects of taxation, and tax rates shall be applied under the act. One can make an allegation against the strategy applied by the head of the National Revenue Administration, which involves ‘substituting’ the action taken by the taxpayer with an ‘adequate action’ for which there are determined tax effects, which infringes the prohibition of analog and is disadvantageous to the taxpayer. However, with this approach the tax and legal factual status is determined by the disclosure of the real substance of a ‘fake action’ and in this regard it corresponds to the material truth. Tax provisions are
applicable to the determined factual state as an "adequate action"., and not to the declared state. In other words - according to the factual character of the actions taken by the taxpayer, not the presented "facade" which was justified mainly by gaining the planned tax benefit. The basis of any resolutions in the tax proceedings must be the factual arrangements which correspond with the reality, thus they are real (Hanusz, 2018). Such arrangements provide a possibility of creating an image that will reflect the objective reality which the body is interested in (Iserzon and Starościai, 1970). The factual basis of the resolution, which would be the reflection of the factual state, may be this way compared to the tax and legal factual status included in the tax law (Hanusz, 2018).

The tax effects of tax evasion are not determined for formal and legal fiction (Filipczyk, 2018) (for the state of affairs that never took place), because it concerns the real substance of events that provide the subject of taxation, and not the formal and legal characteristics (including the name) of the action under taxation; it rather concerns the reality than the form of the action taken. Some authors commenting the issue of tax avoidance claim that in case when the body issues a decision, it does not reproduce the proceeding pattern of the general and abstract norm, but – using the norm of competence – it creates (constructs) this proceeding pattern (Bartosiewicz, 2018). However, in the author’s opinion the function of the head of the National Revenue Administration consists in accessing the reality, not constructing the proceedings patterns, because the tax law does not create any orders or – it only determines the consequences of the actions taken (Brzeziński, 2004) (this is also the function of the Polish anti-abuse clause).

III. PENAL AND FISCAL LIABILITY

The only legal act which can specify the consequences of committing fiscal deeds and taking the responsibility for those deeds is the Penal Fiscal Code. The characteristic of penal fiscal deeds is the fact that their level of social harm must be higher than negligible. The amount of 100,000 zlotys, which constitutes a distinction between tax-indifferential deeds and tax avoidance, is a particular regulation of the legislator, which definitely determines the level of social harm reflected in the threshold amount, exceeding of which triggers the reaction of the state. Penal and fiscal liability is based on an individual guilt which is connected with the necessity to charge the offender due to the criminal offence. In general, the regulation of Article 4 Section 1 of the Penal Fiscal Code indicates that specified deeds, prohibited in the code can be committed only deliberately. Article 4 Section 2 of the Penal Fiscal Code includes the characteristics of the deliberate subject party which features the intention to commit a prohibited act in two basic forms of deliberate intent: a direct intent, when the offender wants to commit a prohibited act, and a conditional intent, when the offender has no straight intention, but assumes a possibility of committing a prohibited act and accepts this possibility. Both forms of deliberate intent are based on the awareness of the possibility of committing a prohibited act, whereas the conditional intent is always accompanied by some direct intent, even the one which is criminal-law-irrelevant; it never occurs independently.

The deliberate intent and its form must be proved, at least on the basis of indirect evidence, obtained by logical reasoning based on the whole evidence. The circumstance excluding the guilt or derogating it, is e.g. the offender’s mistake. The offender is wrong when they perceive the reality or its significant element in an inadequate way (Konarska-Wrzosek, 2018). In terms of responsibility for the effects of tax avoidance, two errors are significant: the error with respect to statutory definition and the error with respect to law. The first mistake concerns the circumstances of the prohibited act. Inadequate conception of the offender prevents charging and prosecuting – the act must be of conscious and deliberate character, so that the offender can be accused of reprehensible and deliberate action. The second of the abovementioned mistakes was determined as unawareness of punishability of the act committed by the offender (the offender did not know that their acting was lawlessness penalised as fiscal offence). The lack of offender’s awareness of punishability of the taken action results in inability to recognise the act as one fulfilling the hallmarks defined in the Penal Fiscal Code, and also threatening the offender with prosecution. The unawareness of punishability of the act (justified) occurs when the offender cannot be accused of negligence in defining the binding law. The taxpayer is obliged to follow the amendments to the law, particularly when it comes to their area of business activity, profession or a certain function – these circumstances oblige the taxpayer to get familiar with the applicable law (Bojarski, Giezek and Sienkiewicz, 2004). One may not speak of non-culpable unawareness of the current state of the legal system if the established facts prove that the offenders not only did not try to get familiar with the applicable law, although it was possible for them to obtain relevant information from representatives of appropriate institutions, but they consciously gave up this opportunity, and this function is carried out particularly by the protective tax ruling institution. An unjustified mistake in realisation of hallmarks of an offence by the Penal Fiscal Code does not overrule the guilt and the offender’s act shall constitute a fiscal offence. When judging the degree of the offender’s guilt, the court must take into consideration both culpability in terms of the offender’s capability to wrongful act, recognising the unlawfulness of the act, the motivational situation and also the offender’s attitude towards the committed act in terms of intent and its type, the way of acting, motives, awareness of the obligation to take reasonable precaution when needed.

The legislator introduced a possibility to safeguard the party or parties of the transaction against the application of the general clause by obtaining the abovementioned protective opinion which can be issued by the head of the National Revenue Administration. A negative protective opinion should result in the decision that the offender was aware that their behaviour constitutes tax avoidance and the tax effects of this behaviour are unacceptable for the state. Therefore, the state is obliged to restore the 'expected' state of affairs, applying legal instruments if necessary.
IV. SELF-CALCULATION OF TAX

In Poland it is permissible to calculate income tax by the taxpayer alone. The legislator has transferred the obligations of correct settlement to the taxpayer. The tax authority must therefore find any irregularity in the declared amount of tax liability. In tax law, the determination of the actual state is to serve the purpose of applying the substantive rules of tax law. The consequence of the issue, where the body applies the norm, is that it should determine the facts. ‘A taxpayer self-calculating the tax, must first submit a declaration containing a statement of actual expenditure and revenue received. Secondly, the taxpayer must independently assess which of these expenses may be properly classified as deductible. On the one hand, the taxpayer is required to be reliable about facts that are legally significant from the point of view of a potential tax liability (...). The tax declaration in this respect is a statement of knowledge. However, on the other hand, the legislator requires the taxpayer, who make their own calculations, to be able to qualify the facts (expenses) in juridically correct manners. (...) The problem, therefore, is not the lack of truthfulness of the facts provided in the tax declaration, but the irregularity of their qualifications from the viewpoint of the assessment necessary for the correct taxation. Both elements of the taxpayer’s obligation (as to the facts and correctness of their legal qualification) make up the concept of a correct (reliable) tax assessment’.

Pursuant to Article 21 § 3 (the Act on the Income Tax), it is for the tax authority to prove that the taxpayer has not complied with the (correct) obligation of self-calculation. The tax authority is responsible for proving the legitimacy of its allegation and, consequently, for rebuttal of the presumption that the tax return is correct. Tax proceedings are characterized by the principle of inquisitiveness, which means that the determination of the fact is to decide whether the substantive law standard can be applied at all. In the Polish regulations of tax proceedings, there is no legal norm which requires the assumption that objective truth corresponds to the actual state of affairs established by the tax authority, and the taxpayer has the right to rebut this presumption with a counter-claimant. What is more, there is a presumption of the veracity of the taxpayer’s tax return, and thus the tax authority can only rebut this presumption by gathering the evidence (Marianiński, 2018). Since it is the tax authority that applies the substantive tax law norm, it is also the authority that should determine the actual state, as it derives legal effects from established facts in the form of the possibility to determine a different amount of liability other than specified in the tax return - Article 21 § 2 and 3 (the Act on the Income Tax).

V. TAX FRAUD

‘Tax fraud’ is committed by anyone who, contrary to the tax act, is guilty of negligently fulfilling their duty to provide data in a way that allows proper tax calculation. The legislator, ordering the taxpayers to pay their own tax liabilities and reserving only control functions for the tax authorities, has to effectively secure the correctness and reliability of the tax law enforcement process. Violation of the Penal Code contained in Article 56 and 76 of the Penal Fiscal Code clearly indicates both the person to whom the prohibition is addressed, the features of the prohibited act as well as the type of penalty threatening the commission of such an act (Warylewski, 2003). Since all these elements are included in the criminal provision, one deals with so-called complete penal order. The unreliability of the declaration or statement (its untruth) is the result of the fact that the taxpayer provided data inconsistent with reality, e.g. showing costs related to the taxpayer's business activity as acquisition costs, even though the tax law does not include these costs as acquisition.

Intentionally unreliable classification of deductible expenses is necessary to commit ‘tax fraud’. The concept of truth used in Article 56 and 76 of the Penal Fiscal Code refers not to the data disclosed by the taxpayer or the payer in the tax return but to their legal and tax qualification. The references to tax laws, that describe imposed and prohibited acts (relevant for tax purposes), and thus allow to determine what is true information, makes it possible decode the signs of ‘tax fraud’ in a manner that does not follow a standard which can be considered as acceptable.

The concept of fraud in penal fiscal law has a sovereign shape in relation to the concept functioning in the common criminal law which is the result of axiological, systemic and functional differences in the rules of penal fiscal law. The fraud is considered in addition to the act penalized in Article 56 of the Penal Fiscal Code (for clarification, it can be defined as a fraud in a tax return), also penalized acts in Article 76, 76a, 87, 92 of the Penal Tax Code. According to Article 56 of the Penal Fiscal Code, the offense is committed by a taxpayer, who by submitting a declaration or statement to the tax authority, other authorized body or payer, attests untruths or conceals the truth or fails to comply with the obligation to notify about the change in data covered by them, thereby exposing the tax to depletion. Due to the weight of the deed and the value of the tax advantage, the perpetrators of the tax evasion fulfill the characteristics of basic or privileged tax fraud in a tax declaration. This remark also applies to fraud under Article 76 of the Penal Fiscal Code - tax refund fraud, which consists in providing data that is inconsistent with the actual state or concealing the actual state of affairs and misleading the competent authority, exposing it to undue refund of public law debt. Both actions are punishable by a fine of up to 720 daily rates or imprisonment, or a combination of both. The privileged type (§ 2 of both provisions) takes place when the value of the public law liability threatened with depletion or depletion does not exceed two hundred times the minimum wage in force on the day the deed was committed. The penalty imposed in these cases is a fine. Undoubtedly, tax avoidance in the event of determining the reasons for issuing a decision or stating the occurrence of such a statement, is a direct evidence of concealing the truth, i.e. the actual economic content, constituting the taxable legal state of the taxpayer's activities.

Within the meaning of Article 119e of the Labour Code, the tax benefit derived from tax avoidance is non-occurrence of tax
liability, postponement or reduction in the time when the tax liability arises, or the occurrence or overstatement of the tax loss. It is also the occurrence of an overpayment or the right to tax refund, or an increase in the amount of overpayment or tax refund. If one takes a closer look at the elements of the offenses - fraud in the tax declaration and fraud in the tax refund, the features of both are analogous to those contained in Article 119e of the definition of a tax advantage derived from tax avoidance activities. In practice, penalized tort in Article 56 of the Penal Fiscal Code, is usually committed by filing declarations or statement containing content that is inconsistent with reality and have an impact on tax loss, e.g. undervaluation, overcharging of tax deductible costs, making false tax deductions, hiding sources of income, etc. (Wilk, 2014). A characteristic feature of the party to the typified behaviour described in Article 56 of the Penal Fiscal Code is to mislead the tax authority by illegally presenting or concealing circumstances affecting the amount of tax. The taxpayer who submits the declaration, attests untruths or conceals the truth, thus exposes the tax to depletion. Thus, an entity committing a tax fraud behaves correctly from the formal side - it participates in tax proceedings. The consequence of the entity’s material behaviour, however, is at least the risk of tax depletion (Zgoliński, 2018). Although the subject of enforcement activity is a declaration or a statement made by the taxpayer to the tax authority, this act of the taxpayer seems to negate the criminalization of tax avoidance only on the surface, because the declaration discloses the state consistent with the economic operations carried out. In fact, it is a falsification of the reality at a different level and in case of reclassification by the head of the National Revenue Administration of the activities in avoiding taxation, the purpose of the dishonest taxpayer's action and the result of its operation falls within the scope of the fraud.

The sanctioned standard included in Article 56 § 1 of the Penal Tax Code covers not only acts consisting in exposure to depletion of tax liability, but also in the conclusion of a minori ad maius, causing such depletion. The perpetrator’s action in typified behaviour in the provision of Article 56 of the Penal Tax Code made by the taxpayer is the reflection of the principles of self-calculation and the self-assessment adopted in the tax law. The attestation of untruth should be understood as the information provided by the taxpayer that is inconsistent with the actual state, including tax consequences based on events that actually occurred, but could not be based on that (Zgoliński, 2018). The Constitutional Tribunal concluded that the truth within the meaning of Article 56 of the Penal Tax Code is a normative concept, although not every tax unreliability will constitute a deliberate tax fraud. It is important that the taxpayer's intention is to effectively inform the authority about the content of the documents and on this basis to obtain certain tax consequences.

In Article 56 of the Penal Tax Code, which regulates tax fraud, the taxpayer submits a declaration or statement in which their attest untruth, conceal the truth or fail to notify about the change of data, therefore variable marks from Article 286 of the Penal Tax Code appear. There is no regulation of property, because the taxpayer simply does not pay the tax or pays it in a reduced amount. Regulation of property - reimbursement of overpayment by the State Treasury - may occur only in case of an offense under Article 76 of the Penal Tax Code. For the existence of offenses under Article 56 and Article 76 of the Penal Fiscal Code, an effect in the form of an undue tax benefit is not required – it is sufficient to expose a public law entity to the said effect. The public entity's exposure to the occurrence of the said effect is sufficient. The reason for the possibility of unjustified refund is incorrect assessment of the taxpayer's rights by the competent authority. It always results from an incomplete or incorrect assessment of the actual state of affairs which in turn is the reason for making the wrong decision. In case of fraud under provision of Article 76 of the Penal Fiscal Code, the enforcement activities of the offender consist exclusively in misleading and therefore on action. This mistake must relate to facts connected with the creation of the taxpayer's right to demand reimbursement of the surplus of this tax or the statement of overpayment of tax. The inclusion in the tax return of data which is inconsistent with the actual state or concealing the relevant material circumstances in that tax declaration, is sufficient for fulfilment of specific elements of executive actions (Kardas, Labuda and Razowski, 2018). The perpetrator must be aware of the total absence of legal and factual basis for their claims. The sole intention of the perpetrator was to get material gains at the expense of the State Treasury (Konarska-Wrzosek, Oczkowski and Skorupka, 2013) (a different view on this matter can be found in Wilk and Zagrodnik, 2007).

VI. QUID EST VERITAS? (JOHN, 18:38)

Penalized acts mentioned in the Criminal Code are of a blanket nature and refer to appropriate legal regulations defined in other specific legal acts, in particular in the so-called tax laws. Some doubts may arise in a situation in which the head of the National Revenue Administration determines the subject of taxation in tax proceedings aimed at determining whether tax avoidance took place. Attesting untruths, which is falsifying the real nature of undertaken tax-related behaviours, can include providing ‘false data’ affecting the size of tax liabilities and exposing the State Treasury to the depletion of tax revenues.

Rights and obligations of a taxpayer, related to a payment of due tax, and tax proceedings have been regulated in acts of a statutory rank. One of them is the Act on Personal Income Tax. The phrase ‘to attest untruths’ is semantically close to phrases: ‘to testify untruth’ (Article 233 § 1 of Criminal Code) or ‘to certify untruth’ (Article 271 § 1 of C. C.). The provisions of the Criminal Code, quoted above, do not rise doubts to interpretations of the discussed area. Article 56 § 2 of C.C. penalizes tax payers’ unreliable performance in mandatory tax proceedings. This provision refers only to attesting untruth which means giving false data in terms of their compatibility with reality. The term ‘attesting untruth’ includes non-compliance in the scope of such a piece of information about data affecting tax dimensions, which results from the legal qualification of these data by tax law.
VII. CONCLUSIONS

Tax law provisions are developed in a universal way because tax avoidance is aimed at bringing an unauthorized tax benefits to running business professionals who can hire specialized services (accountants, specialists in tax law). The general anti-avoidance clause, introduced into the Polish tax system, is a departure from formal equality in taxation in favour of equal opportunities in the economic game. In the Polish legal system, the principle of independence of fiscal penal liability from liabilities for financial obligations applies. Financial obligations refer to a person achieving taxable income, running a business or showing other types of activity with which specific tribute obligations are necessary. The fact that a perpetrator has been punished for their unlawful act related to self-fulfilment or improper performances of certain obligations resulting from the broadly understood financial law, does not exempt them from the obligation to pay their public law liabilities if they failed to pay them (Article 15 § 1 C.C.). The adoption of this principle is logical and necessary as it provides real protection of budget revenues through the obligation to compensate the injured public bodies. The principle also makes tax offences not profitable and not worth committing (Konarska-Wrzosek, 2018).

In the Polish legal system, sanctions for a tax offence such as e.g. tax avoidance, require proof of guilt and the guilt must be intentional. The guilt is determined in the course of the application of the Criminal Code provisions by a court that should take into account circumstances of a particular offence and the fact whether the taxpayer was aware of committing the offence. One should disagree with the statement that before issuing a decision based on the anti-tax clause (when the act potentially leading to tax avoidance took place), the taxpayer did not have knowledge (or awareness) of the full set of features that would lead to a tax offense. It would be an act of excessive ‘kindness’ to recognize that the taxpayer received a tax advantage equal to or exceeding 100,000 zlotys in an unconscious way or quite by chance.

Tax avoidance, or the ‘optimization’ of taxation is made in order to achieve a tax advantage with the awareness that it is performed at the expense of a public law entity. The taxpayers walk on slippery grounds and on the edge of risk because an authorised fiscal body may always question the correctness of their self-calculations of tax. The taxpayers who intentionally make their tax Odyssey more attractive must be aware at the end of their journey there may be consequences. If they are not as cunning as Odysseus, they must face the music.

REFERENCES


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