VOLUME 1, 2013

SCIENCE
EDUCATION
INNOVATION

ASSOCIATION SCIENTIFIC AND APPLIED RESEARCH

VOLUME 1, 2013 *ISSN 1314-9784*

SCIENCE EDUCATION INNOVATION

ASSOCIATION SCIENTIFIC AND APPLIED RESEARCH

International Journal

The journal publishes scientific information and articles which present new and unpublished results from research in the spheres of the mathematical, physical, chemical, natural, humanitarian, social, medical, Earth, forest and agricultural sciences.

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The papers in this Volume of the Journal Scientific and Applied Research are supported by the Project BG051Po00l-3.3.06-0003 “Building and steady developing of PhD students, post-PhD and young scientists in the areas of the natural, technical and mathematical sciences” (2012-2014)

ISSN 1314-9784
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CONTENTS

Sustainable development

Technical Sciences

National Security

Surveying

JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution ISSN 1314-9784

PERSPECTIVES OF INCREASING AMOUNTS OF WATER USING FIELD INVESTMENT

Mykhaylo Khvesyk, Vasyl' Golyan, Yuliya Khvesyk

Annotation: *The article deals with the problem of increasing the volume of investment in water sector under the conditions of institutional transformation deepening. The basic trends of incoming of capital investment to return water treating and to rehabilitation of surface and groundwater are analysed. The expediency of implementing some forms of public-private partnerships as an important precondition to attract private investment in water use is grounded. Clusters of water management and concessions are considered as priority forms of partnerships between the owners of waterworks facilities and temporary users, which contribute to increase of investment potential of return water treating and rehabilitation of surface and groundwater.*

Key words: *Sustainable development*

There are many fields in the structure of Ukrainian economic sector, which are characterized by the high water-retaining capacity. Involvement of large volumes of water resources into economic turnover is accompanied by significant amounts of waste water drainage. Taking into consideration the fact that the majority of enterprises were not able to implement water recycling systems, increasing of water resources used in various segments of the national economy requires increasing of return water treating. The main sources of return water treating funding are the state and local budgets, funds of enterprises, institutions and organizations.

Taking into account the permanent budget deficit, the main burden of financing projects of modernization return water purification systems concerns directly water users – industry and the enterprises of water supply and sanitation.

During the period from 1996 to 2012 in the dynamics of capital investments in return water treating at current prices except of certain periods there was an upward trend. In particular, in 2000 compared with 1996, the amount of capital investments in return water treating increased by 52 million UAH and reached 317 million UAH. In 2004 compared to 2000, taking into consideration, that it was a period of economic growth in the country, investments in water treatment increased more than twice and reached 760

million UAH. In 2005 and 2006 compared with 2004, there has been some reduction in the investments in return water treating, in the first case it was 25 million UAH and in the second – 91 million UAH.

In 2007 and 2008 compared to 2006 the trend of capital investments increasing was renewed. In 2007, compared with the aforementioned base, they raised by 141 million UAH, then in 2008 – by 256 million UAH. The decline in production that picked up steam in 2009-2010 as a result of the global financial crisis also affected the dynamics of finance capital investments in return water treating.

In particular, in 2011 compared to 2009 the capital investments in return water treating at actual price decreased by 159 million UAH that significantly reduced the amount of technical upgrading, renovation and modernization works of water management and protection of infrastructure. In 2012 we can observe increasing of capital investment value compared to 2011 and 2010 years, accordingly – by 124 million UAH and by 115 million UAH.

Despite the fact that during the period from 1996 to 2012 there was an increase of the total volume of capital investments in return water treating at actual price, the real increase didn't take place, affirmed by the dynamics of this index over the same period, but at comparable prices. Moreover, in 2012 in comparison with 1996, there was a significant reduction of capital investment in constant prices (by 142 million UAH) compared to 2008 (by 59 million UAH).

One of the reasons for the decline in real investment resources aimed at modernizing the return water treating industry was financial situation deteriorating at enterprises – water users, entities in water supply and sanitation, as well as the weakness of used state incentives that would encourage economic units mentioned above to implement total water cleaning, and to introduce recycled water systems that would have significantly reduced the amount of drainage. Reducing the level of investment is largely due to the lack of traditional sources of international investment practices to ensure the implementation of infrastructure projects, including water supply and sanitation.

There is no stable trend of increasing the volume of capital investments in the protection and rehabilitation of soil, groundwater and surface water. Despite the fact that in 2008 compared to 2006, this figure increased by 532 million UAH, in subsequent periods, we could observe an intense reduction. Thus, in 2010 compared to 2008 it reduced by 467 million UAH, and compared with 2009 - by 81 million UAH. This is due to the fact that in 2008, significant amounts of capital investment were aimed at elimination the effects of high waters and floods in the western regions of Ukraine, and also due to reduction in budget capacity to fund environmental projects, including those that relate directly to the groundwater and surface water protection. In 2011 compared with 2010 the volume of capital investments in the protection and rehabilitation of soil, groundwater and surface water at actual price increased by 319 million

UAH. Unfortunately, in 2012 compared to 2011 this indicator decreased by 98 million UAH.

With the major trends in the dynamics of capital investments in protection and rehabilitation the soil, groundwater and surface water at actual prices correlates the dynamics of this indicator in comparable prices. But in 2012 compared to 2006, a real volume of capital investments in the rehabilitation of soil groundwater and surface water decreased by 22 million UAH and in comparison with 2008 – by 254 million UAH.

From the above mentioned we can conclude that in the period from 2006 to 2012 in the dynamics of capital investments in the protection and rehabilitation of soil, groundwater and surface water at actual and constant prices there was no significant improvements since environmental goals, especially at the regional level, are financed on leftovers. Modernization projects' limited funding of industry protection of soil, surface and groundwater leads to further exhaustion and pollution that reduces the resource base of drinking water and biological resources increasing.

About weakening of investments in projects of reconstruction and modernization of the infrastructure of return water treating also affirms a reduction in the period from 1996 to 2012 the share of capital investment in return water treating in total capital investment for environmental protection. If in 1996 the share of capital investment in return water treating in total environmental investments amounted up to 50.9%, in 2008 – 24.8%, in 2012 it dropped to 12.8%. Downward trend in the dynamics of the share of capital investment in the total environmental investments suggests that the national economic and environmental policy, water protection activities are not the main priority.

During the period from 2006 to 2012 it was no clear trend concerning the share of capital investments in the protection and rehabilitation of soil, groundwater and surface water in the total environmental investments. Between 2006 and 2008 we observed an increase in this index (from 11.6% to 21.1%), starting from 2008, this figure had been constantly decreasing and in 2012 reached the level of 8.2%. This trend is the evidence of limited financial capacity of both central and regional authorities to finance protection projects of soil, groundwater and surface water natural water sources. If in the coming years the situation won't change radically, we are to expect a rapid deterioration of natural water bodies, as well as the surface layer of soil.

Improving of investments in return water treating and rehabilitation of surface and groundwater depends on the introduction of modern forms of public-private partnership (PPP) that can store state and municipal ownership of water management and water protection infrastructure and thus attract private venture capital to their modernization. These forms are the clusters and water management concession. The first form provide voluntary joining in inappropriate association of state and local governments, water management

enterprises, agricultural business entities, financial institutions and educational institutions to implement water management and water conservation projects, the second form consist in temporary transfer to the foreign operator water management services of water management facilities on the basis of maturity and payment.

An important component of regional water management cluster is the selection of the cluster members, primarily – private partners. This selection should be based on the selection criteria of its implementation considering possible alternatives and evaluating the production potential of the cluster potential participants (private partner). When deciding on entering the cluster private partner, it should be defined: the public partner and property objects in common use with the private partner, the amount and form of financial participation by the public partner; deadline for applications private partners to participate in the contest, the main criteria for determining the winner.

Conclusion of an agreement with the private partner is carried out by the body which according to Art. 13 Law of Ukraine «On Public-Private Partnership» decided to establish a water management cluster, with the winner of the contest.

Efficient operation of the regional water management cluster is possible by identifying the real sources of its budget. Taking into consideration that water management cluster is created on the basis of natural water bodies and artificial water bodies, water facilities, in some cases, also on the basis of cross-border watercourses, revenue budget items should be diversified and adapted to the existing tax, budget and water legislation [2].

In areas, where a cluster of water management is formed, it is necessary to direct in it a fee for special use of water bodies of local importance. This will encourage cluster members to identify the actual removal of the base fee and raise the level cap of water resources. Taking into account that water management cluster will serve water bodies of national importance, 10% of fee for their use are to be directed in its budget.

In a case of realization strategic importance for the formation of regional or local water management or water protection project, it is necessary to direct the corresponding amount of local funds for environmental protection on the basis of the relevant decision of the representative body.

The budget of regional cluster should also secure 50% of admission to the rent for the use of closed artificial ponds that will allow timely actions to finance their treatment, consolidation and increase the potential of biological resources. Completely water management budget for the cluster must be fixed fee for violations of environmental laws in connection with causing loss of natural water bodies. This link requires particularly rigorous work attitude, because for most businesses, water users are characterized by a low level of ecological culture of water use and compliance with technological standards of water consumption.

The effectiveness of fiscal revenue for regional water management cluster depends on how effectively the executive committee will form the participants of hazing association as one of the items of income has its own means of businesses participating in the cluster. Effective functioning of the cluster will enable attraction of investment resources of international organizations, as well as grants, donations and sponsorship. Terms of deductions of cluster members to the consolidated budget and attracting external investment resources must be secured in an agreement on the budget of the cluster. Control over spending of the budget of the regional cluster will be assigned to the supervisory board.

Twenty-two years of independence have shown that neither the state nor the municipalities are not able to fully fund projects of modernization of water management infrastructure, especially water and sewer networks. Therefore, it is necessary to create a modern institutional framework for implementing the system of water management relations concession schemes that can keep the ownership of the state and territorial units for water supply and sanitation, but it ensures the supply of investment resources in the modernization of them from temporary users of these facilities [1].

But the risks are very large. This may be an increasing the tariffs for water supply, or possibility of losing local government control over the temporary owners of waterworks facilities, it is inappropriate refinancing profits from the use of water management facility in the state or municipal property. In such circumstances it is necessary to make significant changes to the Water Code of Ukraine and other normative legal acts in order to the concession regime institutionalization of water and water management facilities served as an effective source of growth in financial revenue to local budgets and does not affect the ability to receive appropriate by price parameters of water management services by a majority of the population and the availability of drinking water to residents of correspondent territorial entities.

International experience shows that even in the most developed capitalistic countries in the system of water supply and sanitation public sector of provision water management services is dominant. Precede the spread of concession schemes should the implementation of a number of pilot projects, which will be evaluated by technical, organizational and commercial adequacy of this form of economic relations in the real needs of the population.

CONCLUSIONS

Improving of purification of wastewaters and rehabilitation processes of surface and groundwater depends on the implementation of certain forms of public-private partnerships which will promote increasing the investment resources in this field of water management. Most suitable for spreading in the areas of water supply and drainage water management are clusters and concessions.

Creating clusters of water management will enable water management to

build a powerful block of commercialization of certain types of water supply and water use, identifying additional objects of water-resource taxation arrangements and finding investment for modernization of infrastructure drinking and industrial water supply.

Legalization of concession usage of water supply and sanitation will promote preserving of given waterworks facilities in state and communal ownership through the transfer them to private operators in the use that will attract private investment for modernization and reconstruction of water supply and sanitation.

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution ISSN 1314-9784

REVIEW ON MONOGRAPH

"INNOVATION-INVESTMENT AND TECHNOLOGICAL SECURITY OF THE REGIONAL ECONOMIES TRANSFORMATION"

Current attainments of Ukraine in the fields of international economic competitiveness and efficiency of the national innovation system are not sufficient to ensure sustainable development, national security maintenance and approach to European standards of living for Ukrainian citizens in the near future. Efficiency, quality and structure of the national innovation system's most creative part (R&D, education, invention) do not fully match potential requirements of intensive development. On the other hand, structurally and technologically, backward domestic economic, as well as the business system, introduced in Ukraine under the influence of externally imposed neoliberal reforms, remain extremely unacceptable to modern scientific achievements and technological innovations. Any consistent modernization on the firm scientific and technological basis does not occur in the economy. As a result Ukraine quickly loses its position in the world ranking, and respectively involvement in the international division of labour, its ability to cope with socio-economic problems.

The Ukraine national interests require immediate and effective measures to modernize and increase its scientific and technological potential, ensuring effective use in order to overcome the crisis in the economic and social development. The task of modernization involves, above all, elaborating effective social and economic models, enabling innovational self-renewing and ensuring quality growth in terms of the acceptable level of safety. At the moment, Ukraine is rather far from this goal, since its energy-intensive economy with large zones of shadow operations remains inefficient, focused on raw materials export and output on the initial stages of production.

Newest R&D, corresponding technological processes and undertaking efforts serve not only as the mechanism for solving urgent social and economic problems of society, they always carry the risk. Each of the major scientific and technological achievements carries no less sizable threat. The authors of peer-reviewed monograph[*] focused their attention on clarifying conditions, ways and

[*] Innovation-investment and technological security of the regional economies transformation : [monograph] / [M. Khvesyk, A. Stepanenko, A. Obikhod, O. Lyashenko, N. Datsiy, A. Sunduk,

mechanisms enabling to overcome shortcomings of the national systems of innovation and investment, as well as human security technologies used in the transformation of regional economies. They identify problems of insufficiently effective adoption of national scientific and technological capacity, causing massive usage of foreign scientific and technological developments rather than similar domestic achievements.

Analytical studies have revealed catastrophic performance deterioration of assets, particularly of high-risk, municipal infrastructure settlements and sewage companies, etc., and this contributes to excessive levels of anthropogenic impact on the territory of Ukraine and man-made causes of congestion of capacities. Relying upon the database of innovation and investment flows and technology upgrades, the authors managed to find out that at the present stage of social and economic development of Ukraine the above mention problems can not be solved without related systematic approach to development of fundamental and applied aspects of innovation, investment and technological security as well as conditions of formation of the threats and challenges and basic parameters of the regional economies transformation with regard to innovative changes.

Taking into consideration Ukraine's participation in the world of globalization, the studies of the global technology development and the role of our state in the process of its formation are especially valuable. The authors emphasize that the core basis of leading and “breakthrough” strategies for introducing scientific and technological innovation and innovative type of economic development must necessarily be based on technological modernization (to the 7th technological level), which will maintain the same high safety level of production.

With transformation of the world economy further internationalization and worsening environmental problems are noted in natural and industrial spheres. The paradigm of sustainable development, announced at the International Conference in Rio de Janeiro, neither radically changed situation in the environment for better, nor eliminated global environmental threats that later gave rise criticized policies of industrialized countries. Conservation of such an economic model, its continuous playback, threatens to leave Ukraine forever not even in the "second", but the "third" roles in the global division of labour. Outdated structure of Ukrainian production forces leads to significant economic losses and enables innovative development.

The monograph reveals the essence of the concept of "security" as a fundamental systemic paradigm of sustainable development and existence of society. Safety is regarded as distinctive feature of social systems that shows some particular degree of their protection (up to and including human

I. Illjashenko; Scientific edition of academician NAANU M. Khvesyka. – K.: «Naukova Dumka», 2013. – 486 p. – (The Project " Naukova Kniga")

civilization). The book emphasizes that specific content of security defines the purpose, method and conditions for the existence of a social system, which safe and sustainable development can be regarded as a particular form of its existence.

The reviewed study reveals the actual process of evolution and risk factors of scientific, technological and innovational development, which determine the field of risks and threats, as well as measures to neutralize them. Evaluation of threats and systemic challenges in innovative-innovation development of Ukraine and its regions includes studies of modernization and institutionalization of the system's basic blocks – production of new knowledge, its commercialization and practical application. The authors of the monograph argue that the modernization of the system understood as "maintenance safety" should be run as successive improvement of safety oriented innovative-innovation development. This presumes that research efforts should be run by such blocks as: potential threats identification for the whole spectrum of possible applications of the new knowledge – as for production of new knowledge; assessment threats formatting options in certain specific technologies and products, combined with the use of new knowledge – in the area of commercialization; analysis of threats, which are determined by the magnitude and direction of the implementation of relevant technologies and product innovation – in the field of practical application of new knowledge. The key direction of the research lays in studies of distinctive features in Ukrainian economic development, transformation processes imposed by two types of interrelated global trends - globalization and informatization.

Thus, transformation of the national economy is hampered by its simultaneous transformation into a post-industrial, as well as a set of global risks and hazards aggravated purely domestic, including poor compliance of socio-economic needs and real socio-economic potential, production and investment required for expanded reproduction. The same situation between prices focused on international standards, and domestic production costs, financial needs of enterprises and their revenues, external debt and volume of export etc.

The authors draw attention to the fact, that Ukraine has also certain competitive advantages in the global economic system, and under favorable conditions it can actively participate in global economic processes through unique natural resources, manufacturing, human, scientific and technological potential. The authors consider the prospects of the state in joining economic blocs as an important factor that allows to ensure own development on the basis of unification of forces and coordination of activities. However, the effectiveness of international economic cooperation largely depends on well-timed identification of the place and role of Ukraine, its specific economic complexes in the global technological revolution. In this respect issues relating to the development strategy of regions of Ukraine in the growing process of globalization obtain particular relevance.

To make modernization of the country successful it is necessary to provide comprehensive security conditions for its development. This involves deep renewing the national security system, significantly raise its capability to recognize new internal and external challenges and effectively respond to them. The modern state should quickly find answers to environmental and technological risks, threats to the financial, economic and social security, together with other countries actively participate in creation of secure international environment in regional and global dimensions. Reformation of the security sector, which should be considered in the format of quantity, quality and price, is an important part of comprehensive modernization of Ukraine. In the socio-political and socio-economic development of the country its security sector performs a vital function because it produces such basic public good as security, using for this its human, material and financial resources. The logical completion of the monograph is presented in the authors' developments as for “breakthrough” strategies of socio-economic and technological development of Ukraine, taking into account the achievements of the international community in solving such tasks. Wide international experience in implementing new technological modes convinces that here we deal with the global-scale process and the source of threats and challenges to the national safety, which almost double risks for the Ukraine economy, where since obtaining independence manufacturing sector continues to operate on the outdated technological basis, while new, innovative potential practically was not created. The authors stress on urgency of changes in the government policy regarding development of science and technology, aiming, particularly, to overcome the existing imbalance between priority position of financial and intermediary sector over measures intended to support science, technology and innovation.

The peer-reviewed monograph is a pioneering study in the field of innovation and investment support of the regional economies safety technological transformation. Introduction of scientific principles of wide implementation of leading and “breakthrough” strategies for scientific, technological and innovative development, highlighted in the book, will help to improve critical technologies, accelerate development of high-level technological structures and create an innovative economy in Ukraine.

REVIEWER: ***Prof. DSc. Zhivko Zekov***

JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution ISSN 1314-9784

SUSTAINABLE DEVELOPMENT - EDUCATION, SCIENTIFIC RESEARCHES AND INNOVATIONS

Zhivko Zhekov

Abstract: *In this paper the actuality of the scientific researches and innovations especially in terms of economic crisis and globalizing dynamic international competition is considered. The emphasis on the modernization of the scientific base is placed. This base in serious challenge to the increasing necessity of scientific service and offering of practical oriented technological solutions is transformed. The basic factors describe the state of scientific base in which serious methodological, conceptual and practical challenges are occurred. The research infrastructure in center of knowledge as an intermediary between the scientific researches, the education and the innovations is placed.*

Key words: *Sustainable development, education, scientific researches, innovations.*

Introduction

Today the scientific researches and innovations are especially actual to work together in order to solve key challenges for a Sustainable development [1]. Bulgaria has to defend her interests of the Bulgarian academic community and business and to place the emphasis on the fundamental priorities for actual building of scientific research space [5].

The successfully business model achieving and Sustainable economic growth through education quality improving is realized. This is achieved in exchange for the dry theory with pragmatically approach. It is necessity the knowledge into an innovation and into a tool for decisions taking to be changed [3, 4].

In the terms of economic crisis and globalizing dynamic international competition very actual takes place the scientist's dedication and the active research activities. Exactly for this reason it is necessity the creation of supportive environment for developing of scientific researches and the transforming the scientific results into economic advantages [2].

The science progress on the state of the existing scientific base and on the access to scientific appliances is dependent that must be enough advanced so as to allow scientists to accomplish scientific activity and world class research work. The efficient using of scientific equipment requires it to be part of an institutional framework that allows scientists to take full advantage of it.

There exist clear trends showing the creation, searching and scientific equipment performance. The one hand technological progress drives the building of larger infrastructures increases the quality of the performed research activity and the access to the achieved results. On the other hand the scientific progress inculcates higher work standards. There is a increasing investment process in the scientific base accompanied with the decreasing and sharing of the operating costs for a work with scientific equipment as a result of technological innovations implementation and using a distributed access from any point in the world. The intensity of the investments for science are being increased and because of the expanding needs of the modern scientific equipment this plays an important role in all technological areas.

In this way the scientific base in a serious challenge for the national scientific policy is being transformed. It increases the need of scientific service and offering of practical oriented technological solutions with the purpose of addressing of the increasing in complexity and severity problems of the modern society at those conditions on increased requirements for efficiency and expedience.

The purposes of the national programs can't be achieved if the participating research teams aren't sufficiently good equipped. The worst infrastructure is an obstacle for returning the full value of the investments in the scientific researches.

The success during the research space building to a great extent on the purposes execution of the research infrastructure is dependent. Usually when it is talking about research infrastructures the attention on large scale projects is focused. These projects are pointed to conduction of fundamental scientific researches. The scientific equipment from low and medium level is less significant as well as its sharing in the framework of interinstitutional and international scientific networks. A similar understanding only through concerted action can be achieved.

To a great extent the scientific equipment market is international. Nevertheless there exist national features and specifics regarding the research teams and the scientific areas that impose solutions conceptualization for the developing and using the scientific equipment. This includes a creation of complete database, applying benchmark analyzes, and imposing good practices in order to be used completely the research infrastructure with that the scientific community has. In the most cases the problem isn't so in the purchase of scientific equipment as the access to it. With other words there is a problem so-called "encapsulation", which is an obstacle for achieving synergistic effect of the investments.

The state research of the scientific base meets range serious methodological, conceptual and practical challenges. There is applied approach in which the advantages of the case analysis and investigation among the scientific community are combined. This research in the context of the common

European and national developing policies of the scientific research infrastructure is made. The results of implementing of such approach with comparative analysis of the used financial schemes and tools in the practice as well as with specific models for management and monitoring may be supplemented.

Some factors which are in the field of analysis vision may include:

- Value of the available scientific equipment of a researcher in subject areas.
- Partition of the equipment of top world levels and average for the science fields technical indicators.
- Structure of the investment sources in new scientific equipment and financial resources to support its operational.
- Partition of the research teams and institutes engaged in important scientific research areas that can not be fully operational due to lack of modern scientific equipment.
- Scientific areas with most critical need to provide scientific base.
- Categories of equipments that is most wanted by the scientific community in the relevant area.

Making decisions for providing modern scientific base and access to it should focus not so much on the purchase of scientific equipment complies with the short-term needs of individual research teams. This process must take into account the complex needs of the strategic development of critical research areas at this in the context of the common European policy on scientific, technological and innovation development and modern European map of scientific research infrastructures.

The question "Are innovations the only one alternative and opportunity for achieving growth?" is particularly important for the growing number of economies, especially in times of crisis and post-crisis period. In all its strategic framework documents European Union identifies the science and innovations as a priority for the European economy not only to overcome the delay compared to major competitors such as the United States of America, Japan, South Korea, etc., but also as a unique source of competitive advantages based on the knowledge.

Despite the progress made over the last decade in terms of public costs for scientific research activity as a percentage of gross domestic product, including funding from the European Union, Europe is still lagging in relation to the world leaders in areas such as "Open and attractive research systems" and "interaction and entrepreneurship". The research infrastructure is critical of scientific findings achieving, technological development and knowledge transfer and as such it is cornerstone of the European agenda in the area of scientific researches and innovations. The research infrastructure in the center of the “knowledge triangle” as an intermediary between researches, the education and innovations is placed.

In the European Union a significant potential in terms of the research units, science and technology parks is made that serve as centers of knowledge creation and for their transformation into innovation results (radically new and/or improved processes, products and services). Nevertheless and especially in the times of crisis the European research community a number of challenges is faced.

Conclusions.

As a conclusion it should be noted that modern scientific base as a factor is determined that will provide commitment to the three key areas, needed to build a dynamic economical model of sustainable development and employment - education, scientific researches and innovations and will provide strategic and effective development of the science and innovations and increasing the competitive power of the scientific products.

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution

ISSN 1314-9784

CONVERTING THE LEARNING PROCESS IN EDUCATIONAL RESEARCH WORK OF THE STUDENTS

Stiliyan Stoyanov, Petar Boyanov

Abstract: *A great deal of this paper is oriented toward the students' tuition. Strongly accentuated is the evolution of the educational process and primarily its new approach, including both education and research. This new approach develops the creativity and increases the quality of educational process in the universities.*

It is not necessary for the teachers to teach only specific knowledge to the students. A wider and broader approach to the science is needed. The students need more specific and scientific information and mainly a lot of general information. With the help of that information the tutors must invoke interest in the students toward creative and research work. It is necessary to bring up a new methods and approaches when working with the students, and systematically to renew the contents of the school subjects. The knowledge, which students acquire must help them in the preparation for a life as a highly - qualified specialists, able to use in their future work not only the knowledge learnt in school, but also to be able to deal with newly received information.

Methods for self-dependent educational and research work of the trainees are being investigated in this paper. It is necessary for the trainees to be involved in self-dependent solutions of educational and research tasks. Considering the self-dependent educational and research work, the education must be done within the time of the tuition and in the same time of the tuition. Classes of such kind aimed higher level of assimilation and application of professional knowledge and develops elf-dependency, activity, a quest for new solutions, solid knowledge and consciousness.

People achieve success whenever in the process of tuition the trainees are required to be creative in their educational and research work. This process issues impulses for self-dependent work over scientific problems. That's the basic stimulus of the educational research work, which finds its base in the education process and influences it, and in this way form the development of the personality.

The Students' participation in scientific researches heightens the quality of the educational process, as it is its main ingredient.

Key words: *Educational research work.*

Introduction

The educational research work provides a mastering of new scientific knowledge, subserve the development of the creative thinking and under the conditions of the higher educational institutions contributes to the systematically increasing the quality of educative educational process. There will not go to the

function of researches for developing of theoretical knowledge in the science, and the realization in the educative educational process will be considered. Although the concept has not been developed it is very well know, the educative process directly depends on the educational research work of the teachers to the corresponding specialties. This means, all areas of the research work directly influence on educative educational process whether they relate to a solving of educational research work.

The educational research work for increasing the quality of educational process.

It is of crucial importance that how the educational research activity should influence on the increasing the quality of educative educational process.

It is first necessary to raise the students' attitude to the science. It is necessary the modern student to be obsessed neither for the chosen specialty and the connected with that profession, nor for scientific and methodological part of the given specialty, for scientific consistent way of thinking. From this viewpoint is expedient the familiarizing all teachers and through them the students with educational research department plans, with the methods solving of educational research tasks, with the occurred problems during their solving, with the achieved results and their meaning to further development of the science and technology, that will constitute a significant portion of the educative educational process.

The modern higher educational institutions must provide the students neither the necessary knowledge on the specialty, nor to make in them systematically habit and skills on ever increasing scope of special, scientific and interdisciplinary information, to refract trough the prism of the acquired knowledge in order to engender in them interest in the creative and research work. Undoubtedly it is necessary continuous the educative educational process to be refined, new methods and forms of work with the trainees to be included, purposefully the content of teaching material to be updated. The knowledge that the students acquire during their education must help them to learn how to create and creative to apply the achieved knowledge after graduation. This means that they must use all novelties in their work and with routine to master the new incoming information. It is necessary the students active to fight for new knowledge and must suggest them interest to further increasing of the knowledge and education.

This means, that the quality and preparation requirements of the trainees continuous will be increased. Therefore it is necessary to take notice of multilateral development of educational research work with the students and thereby interdisciplinary information and literature must be presented [1, 2] and these are most effective forms for education and preparation. Here should be emphasized that not everyone student a scientific worker must become.

When the students' participation in the educational research and scientific developments from year to year is being increased and is being creep into the educative educational process then it is necessary a possibility for selection in solving significant tasks for the modern science development and the needs for the practice to be created, the specialty boundaries to be overcomed and such teams to the scientific research laboratories to be built in order to solve complex scientific problems [3]. This way of research work is extremely perspective.

The present level of scientific work has success the research activity that over the principles of complexity and cooperation is made and has a particular importance in the massive students' preparation. From a scientific and practical viewpoint the tasks must be useful and interesting. With an enthusiasm the students to their applying in the practice must be involved in order to give the students a contribution to the science will the solving the specific tasks. These, who formally in the solving of responsible tasks are participated, receive a negative base for their future activity after education graduating.

On one side the students' participation in the scientific researches increases the scientific potential of the department and on other side it should be noted that the head task is in the quality increasing of educative educational process because namely this activity is his organic ingredient. Their including in the educative educational process as an indivisible ingredient is neither simply, nor easy.

The scientific work and researches connected with high qualified education contribute ever greater meaning and find condition that more favorable influence over the manifestation and recreation of this type of principles. Therefore before men responsible for education processes stands the task to form education process so that the trainees to dispose with basic scientific and special knowledge as well as with practical knowledge. The students must be ready and able to apply the contributed knowledge during the education time in the practice as well as to have a feeling for responsibility.

Independent educational research work of the trainees.

It is necessary the ambitions of the teachers and scientific workers for the building of the educational process in such way to be maintained that the discovery spirit and the ambition of the trainees for researches to be released and thereby this will develop the abilities and willingness for the introduction the scientific development in the life. Our society hasn't a need from pseudo-specialists and from specialists with scientific profile that will be able to realize quickly in their life. Hence the significant meaning for the theoretic methods bases of a specific specialty and practical studies is determined. This refers to the raising problems, ambitious and stimulated studies, group lessons, seminars and exercises.

Still in an education process it is necessary actual tasks to be made. It is recommended the best trainees of professional viewpoint to be selected and their

ambition and discovery searching for aim to be maintained. It is necessary to the students independently solving of the educational research tasks to be assigned. This must not dependent on the education flowing in the free lessons time.

The education in the direction of independently educational research work above all during the education time and in the himself education process must be performed. Such lessons have the aim at assimilation of higher quality degree and application of professional knowledge of the trainees. They develop independently, activity, searching of new decisions, and willingness for taking a risk as well as solid knowledge, consciousness and patience.

It is necessary from everyone student to accomplish an independently educational research work. The Success are achieved at that time when in the education process from the students a creative educational research work is required and from this process proceeds impulses for independently work over the scientific problems and their application in the practice. This is the underlying stimulus of educational research activity that finds her base in the educational process and in this way the personality growth is formed.

The cooperation between the teacher and students influences more strongly on the achievement level and a style of education and learning is being built. Ever better is the understanding that each lecture, exercise and each care for the educational research work of the trainees for the education level are crucial. The professional and political developments of each student are also crucial for independently conscious, responsible and creative work. It is necessary the teacher during the education process with private example, scientific achievements and pedagogical mastership to arouse the students' curiosity to the science, to push them into the solving of research problems, to reveal their motives, to guide them, to be strict with them and to maintain them. More complete understanding of the education responsibility and the higher education level supposes an ambition to the students for higher achievements, active and consciously respect to the education.

It is important not to being conservative in the preparation of the future specialists and teachers with university education, not to hold on the old well-trodden paths and to be able to cut the new and progressive. In this form (as a form for a preparation of high qualified staffs) really as a contribution to the pedagogic process and to the preparation of young specialists must be considered.

In recent years there a progress in the enthusiasm of the students to independently research work in the case of volume, participation and the level of the achieved results is being felt. But not everywhere the students for such type of interesting, useful and intensive education form are enthusiastic. An expedient is the work in establishing of more favorable materially technical conditions that allow the students independently to perform educational research tasks namely scientific research and educational research laboratories towards each department with a profiling technical purpose.

Conclusion

The existing experience gives grounds to being optimists: the well laid bases show that partial but successful the selected purposes are accomplished. Above all the achievement of ever better results will lay the building and fitting up with modern precisely equipment that provides a high accuracy and quality of the conducted experiments in the scientific and educational research laboratories.

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution

ISSN 1314-9784

ANALYSIS OF LOGISTICS MANAGEMENT SYSTEMS SECURITY

Rumen Kodjeykov, Emiliq Encheva

Abstract: *The structure of the logistics management system security as one of the basic concepts defined criteria for evaluating a process or phenomenon. Management in terms of socio-economic development of society is seen as a process, in terms of social status as a phenomenon . On the parameters of any system of this kind are: methodologies and technologies the life of society and instrumental resources to the process . The methodology for the design of control system is associated with certain design standards established methodologies for design, concrete design technologies and software tools used for design. Conceptual model of the control system is the development and installation of major evaluation factors of a process to be carried out on the basis of the idea of an infinite and dynamic changes adopted and codified indicators and criteria.*

Key words: *Logistics systems, computer modeling, computer simulation, automated warehousing system.*

The structure of the logistics management system security as one of the basic concepts defined the struction for evaluating a process or phenomenon. Management in terms of socio-economic development of society is seen as a process, in terms of social status as a phenomenon . On the parameters of any system of this kind are: methodologies and technologies the life of society and instrumental resources to the process . The methodology for the design of control system is associated with certain design standards established methodologies for design, concrete design technologies and software tools used for design. Conceptual model of the control system is the development and installation of major evaluation factors of a process to be carried out on the basis of the idea of an infinite and dynamic changes adopted and codified indicators. This basic approach is coordinated with the model of infinite dynamics of eight priority principles:

- Total institutional and individual binding targets for society;
- Close approach to the structures of organized crime and a more precise definition of their activities to teach preventive authorities in this regard;
- Planning the execution of all activities "right first time " adoption of standards for evaluating the leve of security and the power of th institutions and the level of performance ;

- Introduction of the process of improving the organization and management to all levels and forms ;

- Measurement of security and creating a single evaluation system of socio-economic indicators and the role of society;

- Requirements for continuous improvement of preventive measures related to trafficking in persons and smuggling of goods;

- Validate the results of the legislative, executive and judiciary.

Therefore, on this basis, assuming that the purpose of the study is to analyze system security management based on three main criteria: organized crime , human trafficking , structure of smuggling of goods and trafficking in drugs.

These three criteria are adopted as the basis of assessment in ensuring the safety of citizens in the country.

Organized crime is being targeted impact , which is aimed at the target function of behavior. Therefore, this criterion systems analysis and management are complex and dynamic and have behavior and attitudes directly related to the performance of security. Key elements to operate such systems must have the following elements : a body of government - creates and implements managerial impact, subject to government - controlled process, activity , organization, structure , business , etc., in a functional aspect to there is a synergy of three things - input, process and output; straight connection - through her subordination is realized and the impact on the system; feedback - it is used to control the operation of each stage of the system, ambient (surrounding) environment - everything considered factors influencing the subject and object management . Accept standard approach security system has three types of control:

- Psychological control - regulation, guidance , mentoring, rape : the object is a person or persons whose character is automatic ie accepts commands and performs primary instinctive actions.

- Social control - and the subject and object are social elements and conduct their relationships.

- Financial management - control cash flow by criminal organizations engaged in service or business.

The main types of governance structures in organizations of national security are:

Linear structure of government - all government activities are performed by one person. Main advantages are precise division of rights and responsibilities; reliable communications ; suitable for solving routine tasks simple and clear links between levels of management , to execute decisions quickly , the head is fully and completely responsible for their work. Disadvantages: congestion contractors and have difficulty in performing specific tasks; threat of competition or entry into the work perimeter of structures at a higher level , the leader is not able and can not solve all problems, difficult adaptability to new

tasks and responsibilities , in the absence of the head , missing opportunities for development and the absence of opportunities for coordination.

Functional structure - a functional leader - someone who manages all units , but only in the context of its function. There is division of labor management . Advantages: enhances the competence of management due to better intellectual level of leadership, a better allocation of financial flows ; opportunities for specialization and qualification in a given direction , cover all functions of socio- economic life. Disadvantages: Damage to the unity of razporeditelstvo , lack of clearly differentiated responsibility and have more freedom , complex relationships and better coordinated interaction.

Linear - functional structure - a structure that combines elements from the previous ones by established functional units are serviced line managers . Benefits : increases the quality of decisions because they take only one leader , and is prepared by leading circle of the organization facilitating the work of line managers , a large part of the activity is covered by specializing in a particular field organizers . Cons: slows down the process of decision making , there is a risk of excessive growth of government departments .

As a prevention system has three sites of security : the individual, the society and the state. Personal security is achieved through the provision of legal and moral norms and institutional capacity building , permitting the development of capabilities and meet the needs of everyone. Public safety is the development of institutions , norms and social consciousness to the realization of the rights and freedoms of all population groups. State security is an effective mechanism for managing and coordinating social groups and political parties , as well as actions institutes for their protection. In the structures of these institutions , the state has produced are not woven departmental and national interests.

Characteristics of the control system is based on a standard approach for the overall function of the criminal law and is performed primarily by law enforcement institutions - the Ministry of Interior and the judiciary . The criminal justice system seen as a major step to prevent and reduce crime . Prevention activities aimed at reducing the initial commit crimes in order to curb the possibility of other (Fig. 1) .

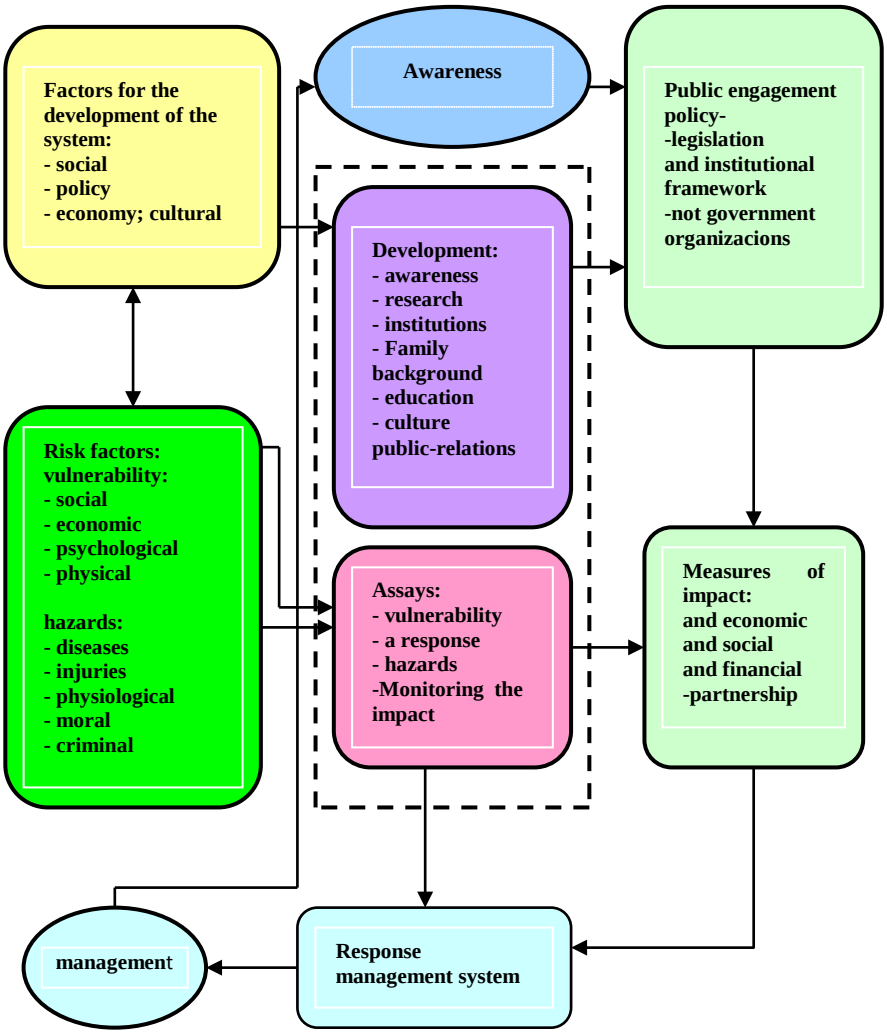

Fig. 1.

Analysis in Figure 1 allows us to accept the hypothesis that police in all states have a duty to protect the law by interfering occurring or imminent crimes, and by responding to the already committed criminal acts . In the right security system preventing crime means less convicted , less costs of detecting them and the entire criminal procedure to the benefit of society. Prevention is not only regulated by law , but is always present among the priorities of the Ministry. Partnership as a tool is an arrangement between the institutions whose primary purpose is to overcome the disadvantages of division of labor in dealing with a number of social and other problems where the activities of these institutions intersect. In partnership powers to influence individual problem redistribute or create new relationships . Development activities for security management in Bulgaria is subject to various aspects of this activity, and at the European level , in line with the European strategy for the prevention of crime. The model of decentralization in the field of security is applied in some European countries - notably Germany and gives very good results in the implementation of preventive measures . Task and the role of academia in planning and evaluating the success of the policy is to analyze and reveal the reasons for the emergence

of various forms of crime, and to evaluate successful projects to propose models and validate .

From existing surveys and meetings statistical material is that Bulgaria is a country of departure , but through which human trafficking , drugs and smuggling of goods. According to the European Centre for Crime Prevention 80-90 % of traffic in Europe for sexual exploitation . More recent estimates of the prevention and control of crime, the number of victims of trafficking in Bulgaria annually between 3000 and 4000 people. Few are more reliable traffic data, including the number of cases of victims identified by the police or seek help from an NGO in Bulgaria or abroad. These data were used in this review traffic in Bulgaria. According to the Regional Centre for Combating Trafficking of the Stability Pact in Belgrade (RC) victims - Bulgarian and foreign nationals who have received care in Bulgaria between 2000 and 2003, at least 423 . Of these, 352 were Bulgarian and 71 - foreign nationals. Bulgarian citizens are predominantly women and girls who have voluntarily returned to Bulgaria with assistance programs and support, as well as women and girls identified as victims by the police during its shares in the country in which they were residing. The data given by RC represent minimum and are similar to those collected and published in 2005 by the International Organization for Migration (IOM), which are the most comprehensive to date in cases of trafficking in Bulgaria . According to the IOM number of victims - Bulgarian citizens identified and assisted in Bulgaria between January 2000 and 31 December 2004 was 620 , and for foreign nationals identified for the same period in Bulgaria is 86 .

Management operations in response to the reduction in crime is a set of fundamental decisions and actions of a different nature , which shall be limited to : monitoring of risk factors for the development of the process, analysis and early warning of the risk groups , defining management objectives in the situation; development planning documents for the use of national assets and to interact with international institutions, preparation of solutions , organizing and managing the operations and control management results in the course of prevention , preparation and implementation of a strategy (program) for recovery after The event , analyzing crime process and the effectiveness of measures taken by the institutions and bodies , the national planning system for management operations in response to the action of restricting criminal organizations take steps to improve the living status of the victims . Developed country in the legislation is not sufficiently affords solve these problems. Factors that determine them are great but could only be solved with clear and precise coordination between all the structures that are part of the National System for the organization and management of security such as socio- economic phenomenon .

Communication and information technologies provide management operations as well as the timely , reliable , secure and comprehensive management of information sources , streams and users and the degree of

freedom to access and use the information. These two correlations are opposite , so their unity is a matter of judgment and qualitative implementation of the Head of the ongoing operation in response to criminal acts. Communication and information system is built based on the networks of telecommunications operators and professional networks of the Ministry of Interior, the central and local executive authorities and other state agencies and commissions , executive agencies and other public institutions which function to carry the executive. Its main task is to exchange information between control centers within NSUPP .

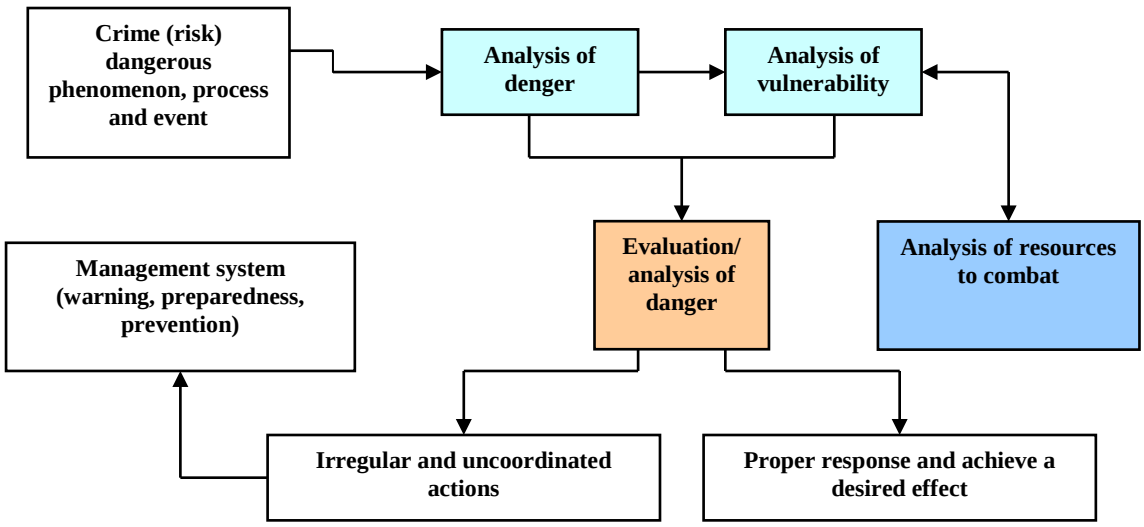

Fig. 2. Methodological framework for the functioning of the system

Management tools for operations in response to security management . Major features in defining the operations are complexity, unique character , effect on many elements of the environment , developing at great speed , not high predictability and a high degree of risk. Management is based on the following approaches : an integrated , process- oriented and centralized. Elements of management in operations in response to crime include : providing timely and accurate information about the nature and scope of the situation on the status of available resources; consolidation of information , coordinating the actions of the structures at the national level, the coordination of the above national trafficking in human beings with cross border issues , providing communication between state structures and NGOs. The stages are : monitoring, hazard identification ; manage and control the crime situation; final action (Fig. 2) .

Analysis of Figure 2 shows that the priorities are first, maintaining life, health and safety of individuals , and then to minimize adverse effects . The key factors are grouped into areas resources, infrastructure , time, information superiority . Perspectives to work in accordance with the organization and processes . Aspects that should be reported are operational analysis , structuring . The basic data used in the calculations are associated with standard resources ,

organizational structures , plans , network schedules , milestones and texts. Through computer simulations based on strategic analysis and operational level can be obtained good preliminary results for the preparation of system elements . A design which is performed is pre - related to the preventive measures in real time when used in a practical situation, the binding in a dialog , and / or other arrangements . Objects of planning are time, resources and capacities. Essential element of planning is balancing capacity .

Approach adopted, the violent exploitation is a crime , then the problem remains voluntary action in order to obtain benefits, and funds can be allocated by type of crime. The essence of the contemporary threats to human security defines preventive measures and preparation for a rational response in situations that are a priority for the government authorities , natural and legal persons. Effectiveness of prevention is determined by the quality of the risk assessment , definition of critical facilities and activities , focus and consistency in the implementation of the measures. Responsibilities are both public institutions and officials - for life, health and security of individual groups of citizens. Specificity of response capabilities in such situations defined areas of life, and their organizations , which is necessary to build such capabilities. Criteria for determining their responsibilities to protect the lives and health of many citizens and non- occurrence and development of events involving risks to normal existence . Analysis of the attacks in recent years against such sites showed stable tendency to strive for the various criminal activities in terms of education and entertainment . The basis of the response to the occurrence of such situations would be to take charge of threat actions that classify the factors and means of crime prevention.

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution ISSN 1314-9784

PHOTOELECTRIC TRANSDUCER BASED ON THE USE OF MOUAROV'S EFFECT

Anton Antonov, Dimitar Chervenkov

Anotation: *This paper describes suggested method and realization of piston photoelectric transducer based on the use of Mouarov's effect, combining functions of the executive mechanism and sensor for linear shifting. As result the accuracy of readings of linear shifting is enhanced parallel with decrease of transducer's dimensions which makes it suitable for use in space aircrafts.*

Key words*: piston photoelectric transducer, Mouarov's effect.*

Nearly all automated and robotized systems necessitate the measurement of linear shifting trough executive mechanisms with small constructional dimensions with enhanced positioning accuracy. To satisfy this necessity, a number of such mechanisms have been designed and are operating in practice [1 – 5].

The aim of the development here described was the design of an executive mechanism and linear-shiftings sensor with reduced dimensions and high positioning accuracy, suitable for exploitation in space aircrafts, too.

A piston photoelectric transducer based on the use of Mouarov's effect is proposed, combining the functions of an executive mechanism and a linear-shiftings sensor [6].

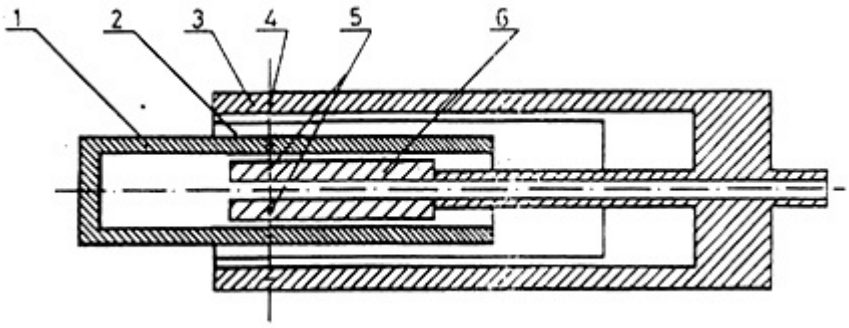

Fig.1. Photoelectric transducer

The piston photoelectric transducer based on the use of Mouarov's effect consists of three cylinders 1, 2 and 3 (Fig. 1). On cylinders 1 and 2, by a photolithographic method, concentric hatches are marked, satisfying conditions:

$$\omega_1 = \omega;\ \omega_2 = \omega + \Delta\omega \text{ and } \varphi_1 = \varphi_2 = \frac{\pi}{2}, \quad (1)$$

where $\omega_1 = \omega$ is the distance between two adjacent hatches of cylinder 1; $\omega_2 = \omega + \Delta\omega$ – the distance between two adjacent hatches of cylinder 2;

$\varphi_1 = \varphi_2 = \frac{\pi}{2}$ – the angle at which hatches of the 1st and 2nd cylinder are drown with respect to the x-axis.

On cylinder 3, light-diodes 4_i are fixed which form optic-electronic couples with photo-diodes 5_i.

Substituting conditions (1) in the equation of Mouarov's combination stripes, we obtain:

$$W = \frac{\omega_1\omega_2}{\sqrt{\omega_1^2 + \omega_2^2 - 2\omega_1\omega_2\cos(\varphi_1 - \varphi_2)}}, \quad (2)$$

and

$$W = \frac{\omega_1\omega_2}{\omega_2 - \omega_1} = \frac{\omega(\omega + \Delta\omega)}{\Delta\omega}, \quad (3)$$

where W is the distance between two adjacent combination stripes.

From here, about x-axis:

$$x = \frac{p\omega_1\omega_2 + c_1\omega_2 - c_2\omega_1}{\sqrt{\omega_1^2 + \omega_2^2 - 2\omega_1\omega_2\,cos(\varphi_1 - \varphi_2)}} = \frac{p\omega_1\omega_2 + c_1\omega_2 - c_2\omega_1}{\omega_2 - \omega_1} = \frac{p\omega(\omega + \Delta\omega) + c_1(\omega + \Delta\omega) - c_2\omega}{\Delta\omega}, \quad (4)$$

where c_1, c_2 are the distances at which the first hatches of the two scales on the x-axis are located; p is the successive number of the combination stripe.

From expression (4), it follows that, in this case, the combination Mouarov stripes are parallel to the y-axis (Fig. 2).

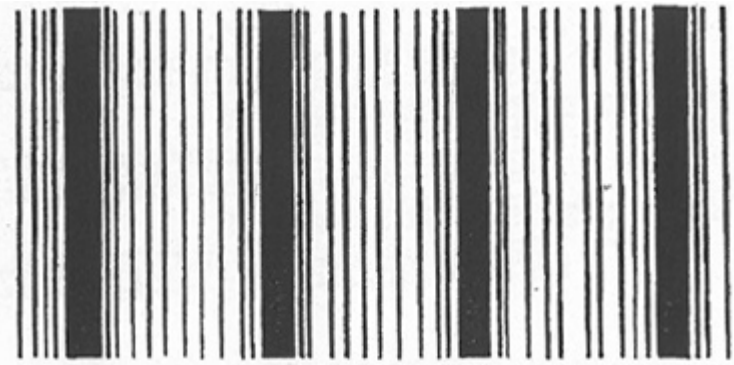

Fig.2. Mouarov's effect

The piston photoelectric transducer based on the use of Mouarov's effect operates in following manner. On change of pressure in front of piston 6, cylinder 1 moves forward or backward depending on the direction of change of the pressure. Here, a linear relationship between pressure and mechanical shifting is assumed. On movement of cylinder 1 in either direction, the light flow from light diodes 4 is modulated by the Mouarov's combination stripes. On formation and amplification of the electric signals from photo-diodes 5, two logical levels are obtained – a logic "0" and a logic "1".

The low electric potential of the logic "0" results from the low level of the light flow, and the electric potential of the logic "1" – from its high level. The transition from "0" to "1" and vice versa corresponds to the shifting of Mouarov's combination stripe.

With a view to reducing external noise, the light- and photo-diodes operate in the infrared section of the spectrum optic range. The laboratory experiments show however, that this is not enough, so additional noise-proof coding of the light-flow had to be made.

As a result of the unification of the sensor and the executive mechanism, operational parameters of the transducer are reduced, and the use of Mouarov's effect increases the accuracy of the linear shifting registration.

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution ISSN 1314-9784

METHOD FOR DETERMINATION OF ANGLE COORDINATES

Anton Antonov, Dimitar Chervenkov

Abstract: *The purpose of this paper is development of equipment for determination of angle coordinates and formation of azimuth marks trough photoelectric angle-code transducer.*

The purpose is achieved with use of coding mask with three reading heads and use of Mouarov's effect. Determination of position on the azimuth is achieved in the middle of the package of abovementioned signals.

Proposed multi-purpose equipment provides north-orientation of indicative equipment to the radiolocation station antenna which is a predisposition for electronic handling of gathered information.

Key words: *photoelectric angle-code transducer; determination of angle coordinates.*

This paper concerns determination and registration of angle coordinates with the use of photoelectric angle-code transducers. The coordinate system used in radiolocation is characterized by following parameters: R- inclined distance, β – azimuth and ξ- angle at place[1, 5].

In existing radiolocation systems the azimuth position of aerial targets is determined by azimuth-grid of indicator for circular observation[2] .

There exist systems for determination of angle-coordinates, using angle-code transducer (with slits which number depends on necessary accuracy of azimuth measuring)[3,4,6,7].

The purpose of present paper is development of equipment for determination of the angle coordinate (azimuth β) and formation of azimuth marks trough photoelectric angle-code transducer.

The purpose is achieved with use of code mask with three reading heads and use of Mouarov's effect.

Determination of position regarding the azimuth is achieved in the middle of the package of abovementioned signals. The algorithms for computation of the azimuth are as follows:

$$\beta_0 = \frac{\beta_s + \beta_e}{2}, \quad (1)$$

where: β_0- azimuth at the middle of the package equal to the target azimuth;

β_s- azimuth at the starting position of the package;

β_e- azimuth at the end of the package.

Taking into account the impulses that determine the azimuth at the start and at the end of the package and at the width of the package the result is:

$$\beta_0 = \beta_e = \frac{\Delta\beta . N'}{2}, \quad (2)$$

$$\beta_0 = \beta_s = \frac{\Delta\beta . N'}{2}, \quad (3)$$

where: N'- number of positions corresponding to the width of the package;

$\Delta\beta$ - interval of discretization by the angle of the impulses of the package.

A sample device could be explained with the help of the attached figures, where:

Fig. 1 – scheme of position of reading heads on the code mask and the mask itself;

Fig. 2 – scheme of measuring of angle-coordinate, as well as formation of azimuth-grid. There are moving code mask and stationary code mask with three reading heads, placed on 120° with use of Mouarov's effect, containing 5 tracks, applied by photolithography technique on glass base (fig. 1).

Above second, third and fourth track of moving mask are placed reading heads – A; B; C.

The first track of the moving mask has only one transparent gradation, corresponding to 0° or direction North. On the fifth track of the moving and stationary mask are applied hatches by radial central raster with different angular step, providing for fulfillment of following conditions:

$$\begin{aligned} \varphi &= h . \omega_1; \\ \varphi &= k . \omega_2. \end{aligned} \quad (4)$$

where: ω_1, ω_2- angular steps on the first and second scale;

h, k – parameters accepting integer values.

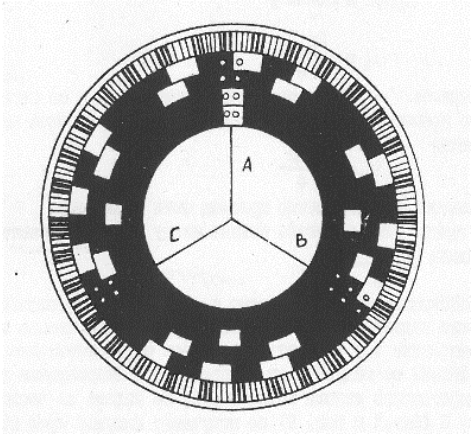

Fig.1. Scheme of the reading heads position on the coding mask

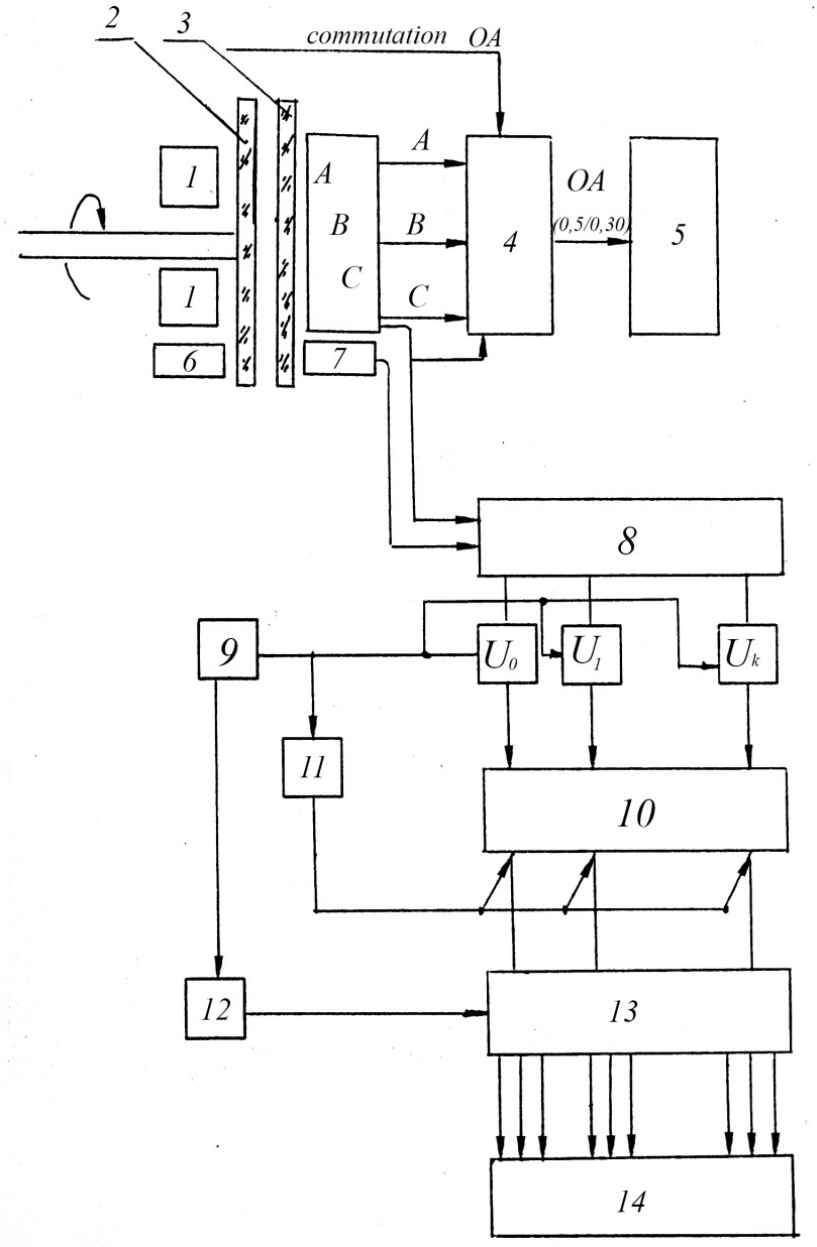

Fig.2. Algorithm of measurement of angular coordinates

The equation of Mouarov's picture has the following form:

$$\varphi = p\frac{\omega_1\omega_2}{\omega_2-\omega_1}, \quad (5)$$

i.e. Mouarov's picture consists of a family of radial bands.

When $\omega_1 = \frac{2\pi}{N}$; $\omega_2 = \frac{2\pi}{N-4}$,

where: N- number of non-transparent hatches on the first raster;

than the equation of resulting Mouarov's picture has the following form:

$$\varphi = p\frac{2\pi}{4},$$

where: p – parameter accepting integer values.

Therefore angular step between combined poles is equal to $\frac{\pi}{2}$.

The device acts as follows: When moving code mask rotates synchronically with radio-location antenna in proportion 1:1, the light flow from light-diodes of block 1 (fig. 2) is modulated by transparent and non-transparent gradation of coupled code masks 2 and 3. On the exit of the reading heads A; B; C (fig. 1 and fig.2) on every 5° are received impulses that are subjected to formation and commutation in block 4 and than passed to block 5 as azimuth marks.

Light flow at light-diode 6 is modulated by Mouarov's picture, resulting from coupling of the masks 2 and 3; on the exit of the photomultiplier 7 are generated counting impulses that enter counter 8.

Scheme 9 generates impulse that resolves key schemes $I_0, I_1, I_2 \ldots I_n$, when on the input entered a signal for the start and the end of the package of the discovered by radio-location system target. Simultaneously the readings of the counter corresponding to the angle positions at the start and the end of the package are entered to the adder 10 where they are summed and the resulting sum is divided by two.

Division is accomplished by shifting of the sum with one decimal place in the direction of the lower ranks. This is provided as the impulse at the end of the package through the delay line 11 is passed to the shifting bus of the adder.

The signal commuter 12 is governed by scheme 9 and commutes multi position commuter 13 that passes information to the memory device 14 for subsequent processing of information.

In conclusion we have to acknowledge that suggested equipment is very functional, provide easy north-orientation of indicator equipment to the antenna of the radio-location system, is predisposed to easy maintenance and allows electronic processing of gathered information.

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution

ISSN 1314-9784

EXPERIMENTAL ANALYSIS OF TERMINAL PERFORMANCE OF BIMETALL AND BRASS FULL METAL JACKETED BULLETS

Borislav Genov **Georgi Genov**

Abstract: *The influence of the type of the jacket of the full metal jacketed bullet on terminal performance was investigated. The character of penetration ability of brass- and bimetal-jacketed bullets was analyzed. Experimentally is confirming the different character of two calibers bullet deformation for full metal brass and bimetal-jacketed bullet.*

Key words*: terminal performance, penetration, deformation, brass-jacketed, bimetal-jacketed, full metal jacket ammunitions, ballistic materials*

1. Introduction

Full metal jacketed (FMJ) bullets are fundamental type small arms ammunitions, used widely as for military purposes, as for enforcement agencies purposes and for civil use.

Former Warsaw Pact manufacturers used different approach in FMJ bullets compared to the other west manufacturers. Due to economic reasons, manufacturers preferred to use steel cladded with copper in jacket[1] instead of brass [1, 2].

Unless economic and technological aspects of manufacturing, the jacket type in the FMJ bullets influences on the performance on the ammunition [1].

Material characteristics of jacket are very important for indentation of the bullet in the barrel grooves [2]. These reflect as on the interior ballistic performance as on the wearing of the weapon parts (mainly barrel).

Jacket in the FMJ bullets helps integrity in the bullet during indentation in the barrel grooves while guarantees reduced barrel wear [2].

With introducing the bimetal bullets in the beginning was paying less attention on the terminal performance.

[1] These bullets are popular as “bimetal bullets”

The terminal performance of the bimetal bullets was studied mainly because of the wound ballistics problems (high possibility for bullet fragmentation) [3, 4] and increased ricochet risk [6].

Nevertheless of different terminal performance, older Warsaw Pact standards Mil standards, and current NATO standards rarely give limitations for jacket type of FMJ bullets.

Because of this, many manufacturers, mainly from Scandinavian countries, former Warsaw Pact nations, Germany and other countries uses steel in the jacket.

Such limitations give NIJ Standards [7, 8] and other standards related with ballistic protection, where FMJ bullets are used as test bullets for different ballistic protection classes.

Due to different mechanical properties of jacket materials, we expect different terminal performance for bimetal and brass jacketed bullets with equal masses and fired with the same velocities.

Given the lack of reliable information and lack of mathematical formulation of the problem, we going to perform experimental investigation dedicated on different terminal ballistics of bimetal and brass jacketed bullets, especially on different penetration ability.

Because of wide use, we had chosen 9x19 mm FMJ and 7,62x25 mm FMJ bullets with different jackets – bimetal (copper gladded steel) and brass.

2. Comparison of mechanical properties of bimetal and brass jacketed bullets

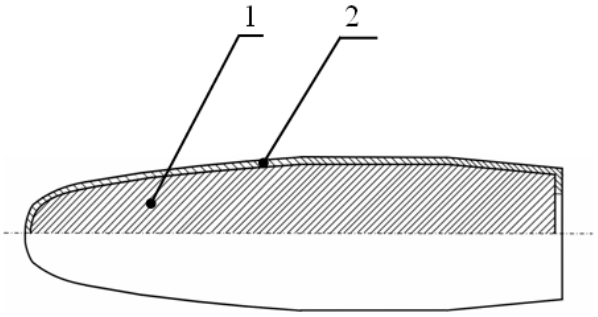

Fig. 1. Shematic view of FMJ bullets:
1-core and 2-jacket

In Table 1 is specified chemical composition and in Table 2 major parameters affected on penetration ability are consolidated.

Table 1

Element	Percentage, %	
	Bimetal jacket	Brass jacket
Fe	99,217	0,050
C	0,190	-
Si	0,012	-
Mn	0,300	-
Cr	0,050	-
S	0,017	-
P	0,014	-
Cu	0,100	84,590
Ni	0,100	-
Zn	0,000	15,300
Pb		0,060

Table 2

Mechanical properties	Value	
	Bimetal jacket	Brass jacket
Tensile strength, MPa	3200	365
Elongation,%	40	8
Vickers hardness, HV	175	87
Density ρ, g/mm3	8,00	8,75

Steel (11kp or other with similar properties) for jacket bullets is one with good flow properties (after annealing).

Ceteris paribus (chemical contents, mechanical properties, grain sizes etc.), the better flow properties has the steel that has a metal lattice structure composed by ferrite (7÷9 balls) and grained perlite (1÷5 balls) [1, 2].

These steels have normal hardness. And after tests we had obtained results for Vickers hardness after different technological operation as specified in Table 3.

Table 3

Vickers hardness (HV) after typical technological operations for producing steel jacket				
№	Compression	Annealing	2nd elongation	Final
1	180	103	182	175 (183)
2	182	102	178	183 (187)
3	183	107	195	183 (186)
4	188	100	187	178 (187)
5	185	105	190	175 (183)
6	183	102	186	179 (185)
Ave.	183,5	103,2	184,7	178,8 (185,2)

The brass jackets have average hardness conversed to Vickers hardness 87,7 HV.

Greater hardness and tensile strength of bimetal jackets (see Table 2), is a prerequisite to forecast greater penetration ability for bullets with bimetal jacket in the same other parameters affected on the ballistics (ballistic coefficient, mass, etc.) [1, 6].

3. Experimental investigation on penetration ability of bullets with different jacket – bimetal and Brass

We had used panels composed of soft ballistic layers for the experimental investigation because of the reasons as follow:

1) Soft ballistic materials doesn't cause erosion of the jacket;

2) This helps to reach "street velocities" of the bullets;

3) Adding and removing of ballistic layer allow "to tune" ballistic resistance by an effective manner.

To avoid unnecessary adjustment of propelling charge of 7,62x25 mm and 9x19 mm ammunitions, we had used different panels for different calibers.

These had allowed us to accomplish low cost and reliable testing procedure to obtain V_{50} criteria (velocity at that we had 50% probability for perforation) [7, 8].

The experimental results are consolidated in tables from 4a to 4b.

Table 4a

9x19 mm FMJ (brass) bullet			
№	Velocity	Perforation	Stopped
1.	377	x	
2.	378		x
3.	382	x	
4.	374		x
5.	382		x
6.	381	x	
Perforated 3 Stopped 3 Calculated average velocity 379,0 m/s			

Table 4b

9x19 mm FMJ (brass) bullet			
№	Velocity	Perforation	Stopped
1.	358	x	
2.	360		x
3.	349	x	
4.	349		x
5.	348		x
6.	357	x	
Perforated 3 Stopped 3 Calculated average velocity 353,5 m/s			

Table 4c

7,62x25 mm FMJ (brass) bullet			
№	Velocity	Perforation	Stopped
1.	397	x	
2.	388		x
3.	400	x	
4.	399	x	
5.	389		x
6.	396		x
Perforate 3 Stopped 3 Calculated average velocity 394,8 m/s			

Table 4d

7,62x25 mm FMJ (bimetal) bullet			
№	Velocity	Perforation	Stopped
1.	366		x
2.	361		x
3.	368	x	
4.	369	x	
5.	360		x
6.	357	x	
Perforated 3 Stopped 3 Calculated average velocity 363,5 m/s			

4. Analysis of results

The results were prepared with STATISTICA 8.

There are following conclusions based on the obtained results:

1. We have a substantial difference in the nature of penetration for different jacketed types of bullets (fig. 2).

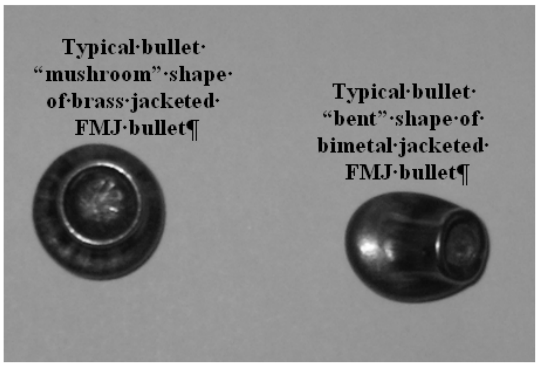

Fig.2. Typical bullet of stopped bullets with different jackets

The brass-jacketed bullets have specific mushroom shape and a larger bullet impact cross-sectional area compared to a bimetal jacketed bullets.

2. Penetration ability is better for bimetal jacketed bullets (Fig. 3 and Fig. 4).

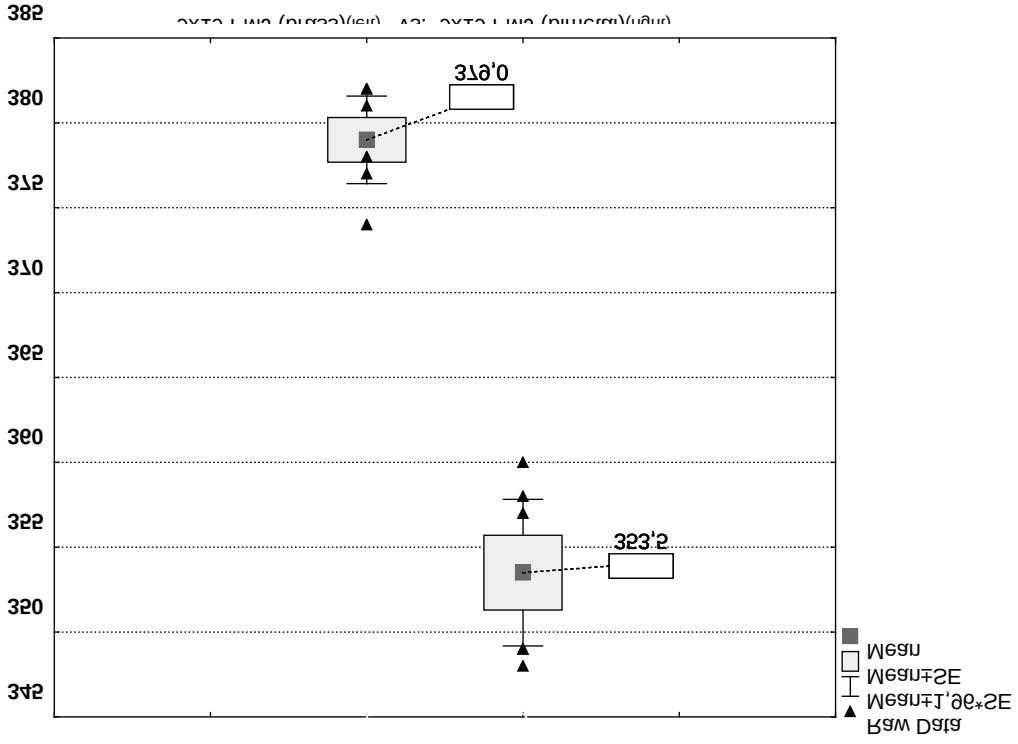

Fig. 3. V50 velocities for brass and bimetal jacketed 9x19 mm FMJ

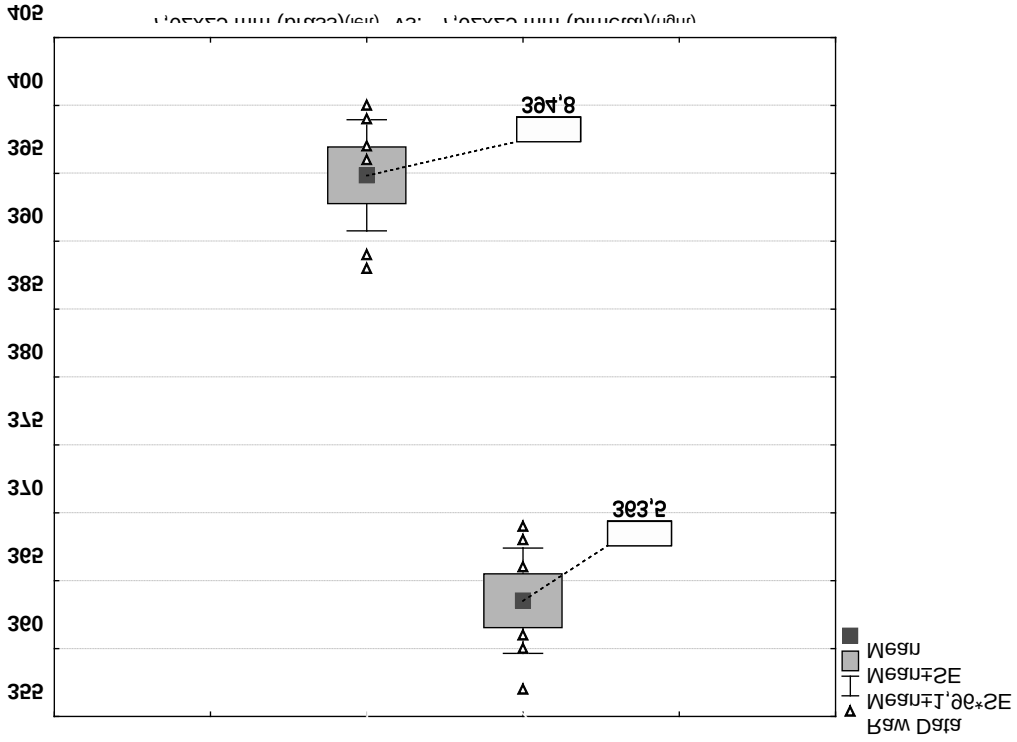

Fig. 4. V50 velocities for brass and bimetal jacketed 7,62x25 mm FMJ

We have about 7% lower V50 criteria for bimetal-jacketed 9x19 mm FMJ rather than brass-jacketed 9x19 mm FMJ (Table 4a and Table 4b).

We have about 9% lower V50 criteria for bimetal-jacketed 7,62x25 mm FMJ rather than brass-jacketed 7,62x25 mm FMJ (Table 4a and Table 4b).

This fact is explained with greater hardness of bimetal jacketed bullets 160÷190 HV versus ≈88 HV (Table 3) at relatively equal other parameters affected on terminal ballistics – projectiles weight, ballistic coefficients, etc.

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution ISSN 1314-9784

COMBINED TRANSPOTATION AND LOGISTICS ADVANTAGES FOF BULGARIA WITHIN THE EU

Andrey Bogdanov

Abstract: *The paper deals with the opportunities of the modern combined transportation and their advantages for the infrastructure. Bulgaria and the European transportation corridors are analyzed*

Key wards*: logistic, transportation corridors, modern combined transportation*

Transport system work is based primarily on the fact that each type of transport has specific characteristics which defines the field of its efficient use. In identifying areas of different transport application, the affecting factors are: type of freight, cargo flows power, distance of transport, necessary investments for the organization of transportation activity in certain directions.

As for the cost of cargos, delivery deadline, maintaining the integrity of the cargo, the most rational and profitable use of each shipment would be the compliance with the field of the efficient use of different modes of carriage.

Combined transport is an efficient integration of different types of transportation i.e. individual transport operators, infrastructure companies in the context of the transport logistics chain. Combined transport is also known as an intermodal and multimodal transportation.

Combined freight transport occupies about 15% of the total transport segment for Europe [2, 3].

The effectiveness of combined shipments involving railway or road transport is determined by its comparing to the other conventional ways of transporting the goods in the full cycle of transportation operations. The assessment of options and the selection of optimal version is made on the basis of certain criteria such as:

- timeliness of delivery;
- reliability (safety);
- flexibility;
- expenses - operating and external.

Overall freight transport services are characterized as a market with an excess supply in terms of quantity (capacity) and insufficient adequate demand

in terms of quality. The distribution of the transport market in message types is illustrated in figure 1 [3].

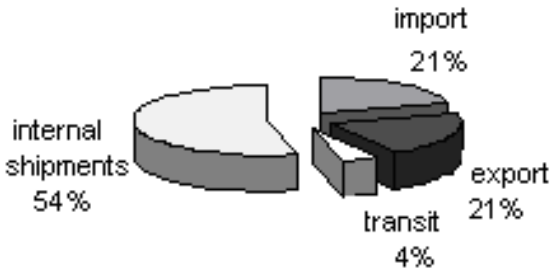

Fig. 1 Structure of shipments

Combined transport should be considered in general as a service, performed by various means of transportation, organized as a logistics network consisting of an operator for a combined transport, featuring railway.

Combined shipments are means of cargo transportation, covering several systems, which differ in infrastructure, facilities and equipment, stuff and technology for work in the following varieties [1]:

- containers transport system;
- a system with interchangeable bodies;
- a system with vertical loading of vehicles;
- horizontal loading of vehicles;
- “Rollende Landstrase” system;
- a “Road Railer” system

The system with interchangeable bodies is the most common in Europe. The vertical load semi trailers system comes after that “Rollende Landstrase” system "Road Movie" and the horizontal load vehicle systems are not so common.

“Rollende Landstrase” system makes possible the movement of transit transport vehicles without disconnecting the tractor and trailer. Loading of vehicles is carried out quickly, during movement, at front without the necessity for a ramp and machinery [2].

The system is suitable for our railway network realized in two ways:

- ordinary platform wagons;
- specialized low platform wagons “Niederfluwagen” type.

The choice of a flexible option for "Ro-La" shipment with specialized wagons leased or rented depends on the financial and strategic objective of the carrier or operator.

Combined transport operators can be a company which has signed a contract for combined transportation and it is a party to the contract, or it is on behalf of the shipper, or on behalf of the shipper or carrier involved in combined transportation, responsible for the execution of the contract. Operators should be determined by a competition with clear criteria. Concession is also possible.

From a strategical point of view it is correct to have an operator which is a combined company with Bulgarian and Turkish company's participation.

For the realization of combined transport "Ro-La" Bulgaria - Romania - Hungary, the operator must sign contracts with rights; obligations and responsibilities which are clearly stated: The other party of the contract should be Bulgarian railway authorities and shipping companies etc. [2].

Basically, combined transport is an efficient integration of different ways of transportation – it is an integration of operators and infrastructure companies in the context of the transport logistics chain. Combined transport is also known as an intermodal or multimodal transport.

Combined transport provides a considerable reduction of the transportation expenses due to the integration of varieties of activities in a single operator. The main benefit for the customers is the chance for a better preservation and protection of goods during the process of transportation. The main reason is its compactness (pallet, container, demountable body, etc.) without the need for transshipment and other manipulations. All these cause the delivery time reduction of goods to their recipients.

At the time of the signing of the European Union Treaty (EU), the legislation for putting into effect the single market in transport services is generally accepted. EU carriers can take all the benefits of the internal market and to operate in the most effective way based on competition conditions as well as on harmonized safety requirements, technical specifications, professional standards, common insurance rules, etc [3].

Most of the goods, especially those which are exported and imported are transported on a long distance. In all those cases, because of economic reasons a combined transport scheme is necessary. Depending on the types of transport and the number of transshipment points, the degree of transportation process complexity is different. In our country there is a great difference in the volumes of loading and unloading in categories modes. In parts loading is twice much which means that there is a high load flow from ports to railways. In combined areas the level of unloading is higher which means that freight flow is railway to road transportation.

Priority development of combined transport is determined primarily by the possibility for the best combination and use of different ways of transport in carrying freight. Of all types of transportation EU put much importance to the development of land transport systems - both road and railway both within individual countries and between them. They combine efficiently the advantages of railway for carrying bulk cargoes at long distance with advantages of roads for carrying cargoes at short range and the possibility for cargo delivery to and from the warehouse to the customer. The search for new opportunities to solve transportation problems successfully demands the development of combined transport. These problems are traffic jams road accidents, environmental pollution, high expenses for fuel etc.

The combination of railway and road transportation provides significant economic advantages, such as:

- shipping of containers or truck trailer by railway (the so called "unaccompanied combined transport");
- unaccompanied combined transport contributes to lower operating costs and allows savings of toll tax on vehicles, etc.;
- the implementation of combined operations on regular services at a guaranteed rate of service has a number of benefits for customers – such as reduction of transportation expenses by introduction of rebates, tax incentives for the use of combined technologies, canceling weekend bans on the movement of vehicles involved in combined transport;
- there is no need for entry permission for certain countries. The organization and transportation process is improved due to the smooth passage of trains at border crossings etc.

Different automated and computerized systems are developed for transfer of cargoes from one unit to another vehicle. It will result in further development and increase of the effectiveness of combined transportation. Such an example is the design of French Railways "Comutor" for quick loading of containers and trailers; the project "Kombifintor" for horizontal overload, developed by Mercedes-Benz and etc. Along with this, the cargo units are upgraded by using high weight containers for bulk transportation.

The EU countries prioritize the development of combined transport of containers, trailers, semi-trailers, changeable bodies, etc. for unaccompanied shipments. These services currently occupy about 75-80% of combined transport. "Ro-La" shipments are developing very fast nowadays.

As an EU member Bulgaria should adhere to the policy in the field of combined transport. This means – limitation of road transport use for cargo shipment and use of railway transport. The main guidelines in this respect connected with the development of containers transportation, railway seaferry transportation and combined Ro-Ro transportation by sea and river. The favorable geographical position of our country, the existing transport corridors, the well developed equipments, the transportation policy are factors which stimulate the transit of significant amount of goods.

Five of ten transport corridors to Eastern Europe, go through the territory of Bulgaria. All influenced the development of railway and combined transport.

The following strategic corridors for Bulgaria [3]:

- Corridor 8 Durres - Tirana - Skopje - Sofia - Plovdiv - Burgas-Varna.
- Corridor 4 Dresden - Prague - Bratislava - Guen - Budapest - Arad, Craiova - Sofia - Plovdiv - Istanbul or Dresden - Prague - Bratislava-Guen - Budapest - Arad - Craiova - Sofia - Thessaloniki - Athens. This corridor is a priority for Bulgaria and compete in the Corridor number 9.
- Corridor 7 Rhine - North Carolina - River it determines the development river transport as well as development of railway and combined transport.

An important condition for the expansion of the European Network for the Balkans and the Middle East is providing transit through Switzerland, Austria, Hungary, Serbia and Romania. From Austria and start moving in Bulgaria transit block - trains to Turkey and Greece.

The development of transport corridors integrates the development of transport infrastructure. Bulgaria's geographic location makes it a major crossroads of three continents and a major transit country of the Balkans.

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution ISSN 1314-9784

ANALYSIS OF THE INDUSTRIAL LOGISTICS FEATURES

Andrey Bogdanov

Abstract: The paper analyzes the industrial logistics using the systematic approach. It offers ways for optimization of the logistic chain in the industrial logistic.

Key wards: industrial logistic, systematic approach

Industrial logistics deals with the material and related information flows. Material flows go through three phases - supply, production and distribution [1]. A lot of operations are part of their implementation. Logistics does not include operations such as raw materials transportation ready product materials which are part of the production process.

Material flows are products in different forms (raw, unfinished and finished). They are in motion and different activities are connected with them – some are related to their physical replacement and distribution in space. Where products are not moved, they become stock in a different form. (raw materials, materials in production, ready – made goods) [2]. They go through the stages of supply, manufacturing and distribution, become objects of different logistics operation (transportation, storage, packaging, assembly, etc.). All of them refer to a certain period of time.

Information flows are a combination of continuous exchangeable messages in different forms (speech, paper, electronic and others). Information flows could be part of a certain management system as well as a connection between the system and the external environment, designed to perform different management function. Their main characteristics are direction, frequency, volume, bitrate, etc. [1].

The purpose of industrial logistics include two main targets.

The first one is to provide a high level of customer service. In the context of logistics, it means to provide conditions for delivery in terms of time, place, reliability, accuracy, and appropriate quantity of a batch, a condition which include quality and packaging, meeting the customer requirements.

The second purpose is to reduce total logistics costs which are done in connection with the implementation of all activities under the flow of material

and information. According to the definition, this target is expressed in the phrase ".. efficient movement and storage of products ...".

The term "effective" means a better realization of the objective, t.e. the target should be achieved with fewer resources and reduced expenses. It is closer to the term "profitableness". The term "effective" is associated with the degree of realization of the target. In order to clarify the meaning of these concepts Peter Drucker's work is quoted [11]. It is said that effectiveness is what should be done (from the point of view) and efficiently is what should be done, in the best possible way.

The defined objective of the industrial logistics can be clarified by the well known rule in the literature of "7 R" which stands for right correct [8]. This means that for its implementation it is necessary to ensure the right product, in the right quantity, at the right place, in the right condition, at the right time, to the appropriate customer, with the appropriate cost.

There is a close and strong relationship between these two targets of the industrial logistics. The higher service level, connected with the supply conditions requires higher expenses. That's why the realization of the logistics goal must be connected to the optimization of the ratio between the level of service and the level of total logistics costs. It means to pursue the objective of achieving a higher customer service, which is at the same time at an affordable price. In other words, the objective of industrial logistics is to satisfy customers requirements in terms of quality of service, conditions of supply of lower costs [1]

The industrial logistics of a company includes three phases of material flow. (fig. 1). The starting point is the source of material which could be eihter raw or processed to a certain degree. The material is used for the production of a certain product - activity of the company. The material flow continues through the phases of supply, production and distribution, finally reaching its destination - the customers of the market. In each of these three phases the logistics operations are identical from managerial point of view. Because of continuous turn they occur repeatedly. These operations are transportation, formation maintenance of inventories, packaging, storage activities.

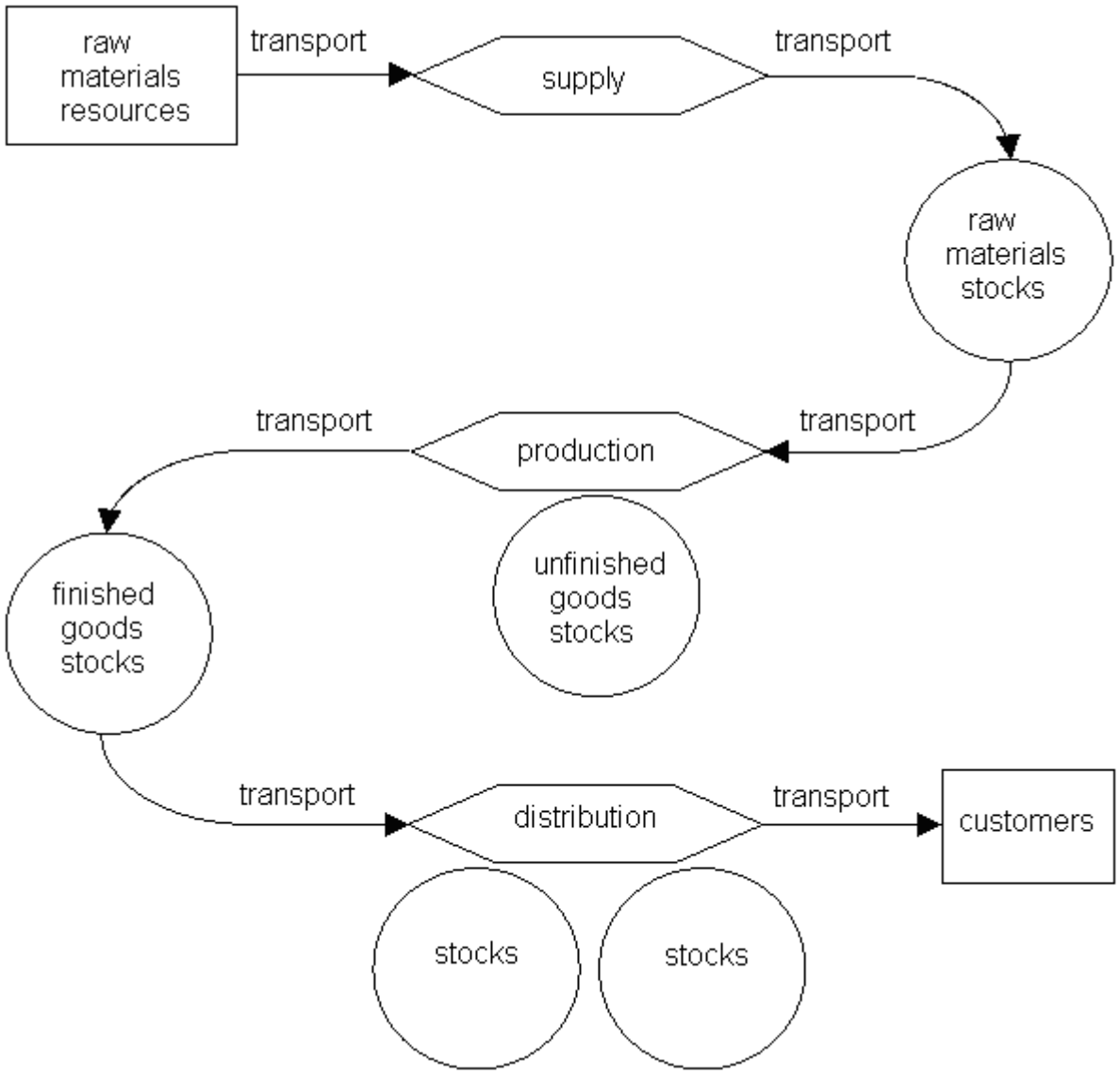

Fig. 1. Scope of business logistics

Figure 1 shows that stocks are formed at four locations - the entrance to the processing company (raw materials) at different parts of production (unfinished goods), at the end – this is the output of the processing (finished goods) and finally the participants in the distribution (goods inventory with the dealers) [10]. The operations of products moving both in the manufacturing company end outside exist in all phases. This confirms the importance of activities management, connected with transportation and stocks maintenance for implementation of logistics.

Specialized bibliography refers to industrial logistics in two ways. On one hand - as a functional area of business management. As such, it covers the management of processes in pursuit of material and information flows in the supply of production (without immediate manufacturing operations) and the distribution. Industrial logistics has always been an integral part of the activities

of the separate business unit. At the current stage of the world economy development this aspect is to some extent conventional, and the applied management approach - traditional. It is characterized by an independent, separate control of different activities in the material flows in supply, production and distribution.

On the other hand, industrial logistics is referred as a management concept. It is connected to the concept for an integrated management of activities in pursuit of material and information flows in the field of production and distribution, both within individual companies, and groups of firms (cartels, chains, etc.). This is the so called logistics concept. It is based on the systematic approach which takes into consideration all elements of the management system as interconnected and interacting in the realization of a common goal. The main feature of the system approach is the achievement of functioning optimization not only of the individual elements, but of the management system as a whole. The application of this approach in logistics makes it possible to achieve a better coordination between the participants responsible for separate logistic operations and functions, and a better rationalization of their decisions result optimizations in terms of the defined goal.

Systematic approach application is determined by the strong interconnection end interaction between activities that are generally identical and repeated in the phases of supply, production and distribution. This is the main feature of the formation of logistic systems in different spheres of the world business (corporate, regional, global) [2, 5].

The systematic approach is a result of ongoing dynamic processes in common economic, organizational and market conditions. Its task is the interrelated functions management which provide supplies materials for the production and the goods distribution to the customers. All these processes are in compliance with the requirement of separate firms and chain of firms. The objective is to achieve synchronization of functions management in the conditions of high demand and completion based on the optimization of the ratio between the performance quality and the total expenses.

Material resources, semi-manufactured and ready made goods pass through many intermediate points of the logistics network starting with the supply to the final distribution. The points are:

- suppliers;
- producers;
-wholesalers;
- forwarders agents;
-warehousing and freight distribution centers;
- logistics organizations;
- retail sector units;
- transportation organizations

The whole idea of the logistics chain unites the perceptions of its participants and is aimed at the coordination of material flows in the whole network. This type of coordination is known as a logistic chain management. Optimization of the whole supply chain, aims at [3,7]:

- orientation towards enhance-ment the profit of the customer;
- increased customer's satis-faction by deliveries tailored to their needs;
- reduction of stocks in the supply chain which leads to storage expenses reduction;
- increased goods flows and simplify the management;
- higher efficiency of inter-company production management;
- quicker adaptation to market changes;
- shortening the execution cycle at compatible time;
- avoiding lack, of stock situations related.

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution ISSN 1314-9784

ANALYSIS OF THE RELATIONSHIP BETWEEN LOGISTICS AND STANDARTIZATION

Andrey Bogdanov

Abstract: *The paper examines the relationship between standardization and logistics, through the application of the most - widely used methods for transporting goods by means of different transportation. It also deal with the issues of securing cargo, grippers for loading - unloading work and storage systems as parts of the logistic system.*

Key wards: *Logistic, standardization, transporting goods, cargo, pallet, container, warehouse*

Modern society is so widely connected with standardization that without any special analysis it is difficult to determine its benefits for the economy, trade and public life. For nonspecialists all results of the standardization activities are generally considered to be logical and reasonable. Nonspecialists do not take into consideration all difficulties and the huge amount of efforts for achieving the standardization results [1].

Standardisation is a scientific, technical and socio concept that includes a complex system for creating and publishing rules, requirements, indicators, materials, units of measurement and many other features, concepts and terms for all events - products, processes and services which are basic for the economy and society nowadays. According to the European requirements two characteristics could be set in the system:

- mandatory; they are technically regulated, they are defined by legislation;
- voluntary; they are defined by standards.

The concept of standardization changed with the development of science and the requirements of international trade. In 1991 Guide 2 ISO / IEC was published in English, French and Russian – this is a way of establishing a common terminology for different countries. In 1993 [1, 11] the European standardization bodies SEN / CLA adopted with minor amendments this Guide to European standard EN 45020 [2] “General terms and definitions in standardization and related activities”. This standard was introduced in Bulgaria in 01.06.1994 years. In 1998 the standard was updated by SEN / SLK and in 2001 was introduced in Bulgaria as identical - BDS EN 45020 "Standardization and related activities. Glossary of common terms".

According to the definition of the term - standardization is an activity for creating regulations for actual or suspected problems.

According to the Council of Logistics Management, logistics includes the integrated planning, control, realization, and monitoring of all internal and network-wide material, part, and product flow, including the necessary information flow, industrial and trading companies along the complete value-added chain (and product life cycle) for the purpose of conforming to customer requirements [10].

One definition of business logistics speaks of "having the right item in the right quantity at the right time at the right place for the right price in the right condition to the right customer" [18]. Business logistics incorporates all industry sectors and aims to manage the fruition of project life cycles, supply chains, and resultant efficiencies.

Inbounding logistics is one of the primary processes of logistics, concentrating on purchasing and arranging the inbound movement of materials, parts, and/or finished inventory from suppliers to manufacturing or assembly plants, warehouses, or retail stores.

Outbound logistics is the process related to the storage and movement of the final product and the related information flows from the end of the production line to the end user [6, 8, 23].

In the developed countries, the status of the standards are defined as voluntary, but there is a very well-developed mechanism for their mandatory application in justified cases discussed below. It is of great importance for the integration of our country in the European Union (EU) to adopt the principles and system of technical regulation and voluntary standards that are set by the governing bodies of the EU and the United European standards institutions SEN / SLK

There are many approaches of the European mechanism to determine the so-called "hidden status of obligation" of the European standard. This occurs in the following cases [4]:

A) the standard is mandatory due to the "market" mechanism;

B) the implementation of the standard is a criterion for a high quality product, and hence for its competitiveness;

C) standards reference in contracts between two parties;

D) reference in administrative decisions, such as when the employer shall issue instructions for the manufacturing process;

E) performance of obligations arising from membership in organizations, and the obligations are defined in the standards, etc.

The hidden mandatory standards are of great interest. The main reason for their occurrence is the market mechanism with its "exchange" and "decreasing" functions. Every big manufacturer is obliged to comply with the hidden mandatory standards since the manufacturer is a participant and a section of the

mechanism. If the manufacturer does not produce goods that satisfy the standardized requirements, other producers will not be able to sell their production because their goods will not be compatible with them. There should be a connection and coordination between the market players.

Gradually, it turns to be an integration of the mathematical models with their practical application.

During the wars the logistics is a science dealing with transportation, securing and dislocation of staff and equipment at minimum cost. After World War II it is developed as logistics. Simultaneously, the logistics expands its range as an integrated science for managing the processes of supply [18] and transportation of materials, goods, people and equipment at minimum cost [23]. Only in the early eighties of the last century logistics becomes an integrated science dealing with management of material and physical side processes. These processes are connected with the transformation of raw resources to the state of by-products and goods at betting on the economic criterion of minimum of costs. Logistics includes many processes – starting with the primary extraction of raw materials, their processing, enrichment and transportation; continuing with the reproduction of new products, their distribution and finishing with marketing and recycling them into secondary raw materials, entering a new cycle of reproduction. The criterion for the way of interaction of the reproduction process elements is economical and aims at minimization of costs. Gradually, logistics, along with marketing and management, occupies an important place in entrepreneurship and particularly in the field of corporate management. It becomes an element of the management. Nowadays in the sphere of modern company management logistics has its leading function with a definite structure and content. Logistics is an inevitable element of the whole management process thus a new approach to the production process is created. It requires the formation of management and operational structure in each modern company. Logistics deals with the creation and management of logistics chains, processes systems. Logistics is an objective continuation of the technology. It approaches the production technology from the management point of view. Information documents flows are of great importance in the whole process, including operational and calculations accounting [8, 9].

These processes are the foundation of logistic flows, with their three levels of positioning - technology info - documentation and operational logistic management. The numbers of providers who integrate more logistics activities increase nowadays. The level of supplier development in this respect is measured by the number of logistic services they offer. Structured in this way, the logistics sector is a combination of 2 PL, 3PL, 4PL providers, and some sources mention even 5 PL providers. So, for the most commonly used type of organizations 3 PL (Third Party Logistics Provider) they offer several services in one package or a whole set of services for the management and implementation of logistics activities such as supply management [4, 10],

distribution management etc. LLP (Lead Logistics Provider) is an interesting variant of the 3 PL (Third Party Logistics Provider). These are organizations which offer a single point of contact with customers, coordinating the activities of several 3 PL 2 and PL. They provide complete customer solutions for shared use and reuse. Thus an optimal order of a certain situation is achieved [8].

The application of logistics in the economy is determined by the changes of the world market. The world market is referred to as a customers' market not a sellers' market. This is the latest philosophy which is the basis for customer – oriented market models. The new models changed the way of production and supply.

There are many definitions of logistics. Some of these are [9, 23]:

- logistics is a process of planning machines and tools equipment, monitoring the monetary flow effectiveness, raw material storage supply, the very product and the relevant information dealing with the raw material resources up to the point of consumption so that the customer requirements are met. (Definition of logistics by the Board of logistics in the US [4]).

- Logistics is all analysis, planning and management of materials, equipment, instruments, information and personnel flow from the materials resources to the consumption point so that the customers' requirements are met.

Nowadays the problems of supply, warehousing, raw material flows, the production marketing and shipment could be solved by the integrated approach. Engineering logistics uses this approach. The engineering logistics offers the most favorable conditions to reduce production cost and increase productivity with the least possible investments.

The optimal price of a supply is directly dependent on the characteristics of freight. Changing the parameters of the load is one way to achieve that price. There are alternative requirements for the size of the load unit. Producer and consumer prefer over packs, saving additional funds for its processing. Reversely, Transport Company and Storage Company with an intermediate function prefer to work with consolidated cargo [18]. Consolidation is grouping of several goods following certain rules and with the help of some equipment in one shipping unit. Grouping is done in packages, pallets and containers are the most typical example of the application of standards in modern logistics.

The most common packet load is constructed in the form of the pallet. This is a very solid platform which keeps the goods, which are attached at the bottom by horn – like lifting device. Usually they are made of wood, metal and plastics. The plastics are more expensive, that's why they are rarely used. This increases their price. Their additional cost is justified. For example, the regulations often prohibit the use of wooden pallets for processing food.

The main technical features are: nominal size, dimensions, size of the pallet key elements, weight (tare) and nominal load. All projections (hitch, locks, etc.) of the pallets should do not go beyond the specified dimensions.

For many years the developed nations have been trying to construct a standard pallet or a series of standard pallets. The various standards in the different countries turn out to be constraints. The maximum width of the available vehicles is a huge restriction. There is a tendency that it is about 2.5 meters. Since it is preferable for the pallets to be arranged in a double width, sometimes between the walls of the vehicle, the requirement for them are less than 1200 mm.

There are different kinds of standardization - international – ISO; regional - UIC and national standards for main parameters of the pallets. The main purpose of these standards is unification exchange and eventually facilitation. According to their nominal capacity, expressed in *kN* (or gross mass in *t*), there are two types of standards:

- dynamic - with fork manipulation;
- static – stacking in four rows in height without shelves.

According to ISO the flat pallets are standardized in *mm*. Their capacity is given in parentheses – with both dynamic a static nominal capacity [13].

The International Railways Union of standardize a single wooden pallet - *800x1200mm,* also called European pool pallet. There are well defined restrictions of the pallet size, the quality of the wooden material, the way of assembling the material, its marking, its approval and other requirements.

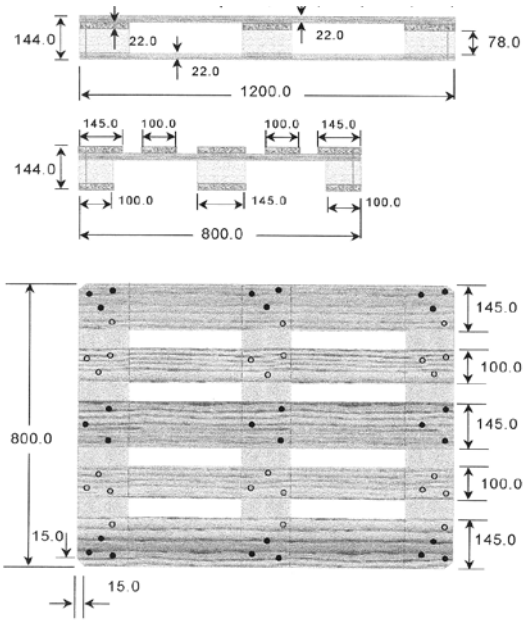

Fig. 1. Pallets size

ISO International Standards Organization introduced new standards of cargo conveyors in the postwar period created. These standards imposed another restriction. The containers should not be larger than the maximum size allowed in the countries where they are transported both by road and railway. As a result, their size is set at *2.4 meters* now. Because of the walls thickness the *1200 mm*

pallets could not be put at double with. In accordance with this new, *1100 mm* square pallets were constructed [14].

Before the approval of ISO 3676-83 the size of the main flat pallet was *800 x 1200*. This type of pallet is widespread called a European pallet exchanged in 19 European countries members of the European Pallet Pool (EPP) [13].

Following the standardization, most of the European industry switched over to use Euro-pallets with trucks, forklifts and high-rack warehouses optimized for their size [13, 17]. National associations developed framework agreements for pallet exchange in that freight would be delivered on Euro-pallets and be given the same number of Euro-pallets in return ("pallet for pallet"). The Euro-pallets are controlled by the association and the association takes care of repairing or removing old pallets from the pool. With the ongoing European integration, the European Pallet Pool allowed for pallet exchange even in cross-border dealings.

With the success of the Euro-pallets, a number of replicas entered the market that used low-quality wood which splintered easily and were prone to mould. So the European railways, which own the trademarks for EUR/EPAL, created a separate standardization body. The European Pallet Association was founded in 1991, [13] and the EUR and EPAL logo may only use by licensees of that organization.

Globalization has made for a decline of the EUR/EPAL system since the EUR-pallets do not fit well into ISO containers. It is still the most widespread pallet type in the world, with an estimate of 350 to 500 million EUR-pallets being in circulation [13]. One of the advantages is that the *800 mm* width fits through normal doors (the most common DIN door type is *850 mm* by *2000 mm*).

The main reason for the adoption of *1000x1200mm* sizes pallet was to improve its compliance with the containers parameters. For further improvements a new size pallet *1200 x 1200 (10/40)* will be introduced, mainly for water transportation, but it can also be used on road or railway in open – *1200x1600 (32/80)* and *1200x1800 (32/80)* size wagons. The clearance of the reusable folks pallets min *96mm*, and min *50 mm* for the non – reusable ones. Regardless of the standards and recommendations, of the well – defined fastening devices and agreements, many countries and companies use other size pallets dimensions, including the so called half pallets the size of which is *600x800 mm*.

Flat pallets are used for packed and unpacked pieces of goods mostly of regular geometric shape. Flat pallets have not only the general features but they also have some specific features, typical for them.

Two – platform pallets consist of two platforms – a load platform (area *F1*) and support platform (area *F2*) connected by dividing elements blocks The structure of *F1* and *F2* is the same as structure of one platform pallet. When: *F1 = F2* the structure of each platforms is good for loading.

Two- platform pallets are designed to be lifted by the deckboards. In a warehouse the deckboard side faces the corridor. For optimal cubage in a warehouse, the deckboard dimension should be the shorter. This also helps the deckboards be more rigid.

Four-way pallets, or pallets for heavy loads, or general-purpose systems that might have heavy loads are best lifted by their more rigid stringers. A warehouse has the stringer side facing the corridor. For optimal cubage in a warehouse, the stringer dimension should be the shorter.

Pallet users want pallets to easily pass through buildings, stack and fit in racks, forklifts, pallet jacks and automated warehouses. To avoid shipping air, pallets should also pack tightly inside intermodal containers and vans.

No universally accepted standards for pallet dimensions exist. Companies and organizations utilize hundreds of different pallet sizes around the globe.[17] While no single dimensional standard governs pallet production, a few different sizes are widely used.

The EUR-pallet—also Euro-pallet or EPAL-pallet—is the standard European pallet as specified by the European Pallet Association (EPAL). Pallets conforming to the standardization are eligible for the European Pallet Pool (EPP) - the EPAL pallet system allows for an exchange as "pallet for pallet".

The EUR/EPAL-pallet is *1200×800×144 mm*; it is a four-way pallet made of wood that is nailed with 78 special nails in a prescribed pattern. Only EPAL-licensed makers may produce EUR/EPAL-pallets.

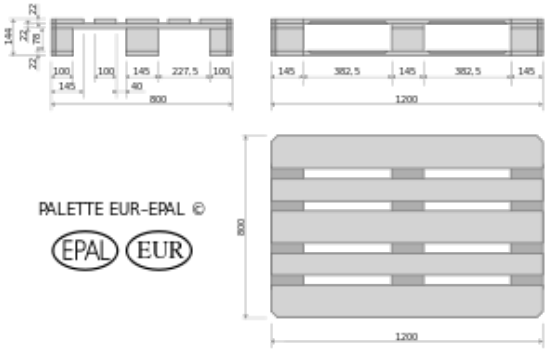

Fig. 2 Euro Pallet

Wooden pallets are the more common (90% of the world's pallet park) – they are made of boards, sometimes they are combination of boards and plywood or pressed wood-fiber boards. Nowadays the amount of pressed wood-fiber disposable pallets increases.

In addition to the other standards it publishes, the European Committee for Standardization, also known as the Comité Européen de Normalisation (CEN), produces standards for pallets. While the standards are voluntary in nature, many companies and organizations involved in transportation have adopted

them. The major standard for pallets produced by CEN is ICS: 55.180.20 General purpose pallets [14]

Due to the International Plant Protection Convention (abbreviated IPPC), most pallets shipped across national borders must be made of materials that are incapable of being a carrier of invasive species of insects and plant diseases. The standards for these pallets are specified in ISPM 15.

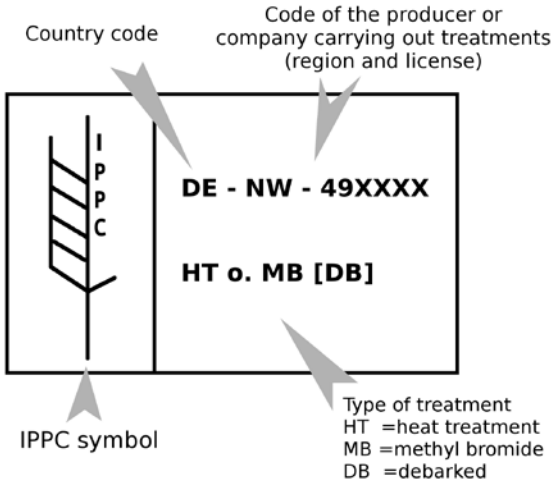

Fig. 3. IPPC marks on a pallet from Germany (DE).

International Standards For Phytosanitary Measures No. 15 (ISPM 15) is an International Phytosanitary Measure developed by the International Plant Protection Convention (IPPC) that directly addresses the need to treat wood materials of a thickness greater than 6mm, used to ship products between countries. Its main purpose is to prevent the international transport and spread of disease and insects that could negatively affect plants or ecosystems. ISPM 15 affects all wood packaging material (pallets, crates, dunnages, etc.) requiring that they be debarked and then heat treated or fumigated with methyl bromide and stamped or branded, [17] with a mark of compliance. This mark of compliance is colloquially known as the "wheat stamp".

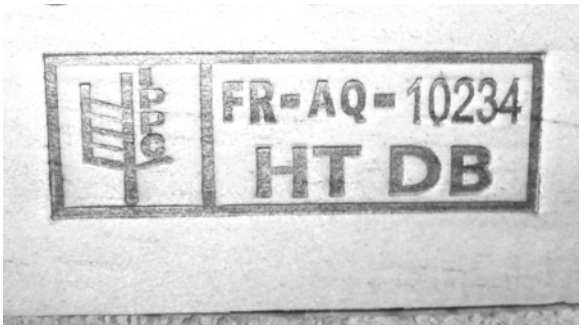

Fig. 4. A IPPC seal on a wine shipping crate

Products exempt from the ISPM 15 are made from alternative material, like paper, plastic or wood panel products (i.e. OSB, hardboard, and plywood).

The pallets structure should provide:

- reliability and convenience;
- good conditions for the loads in case and stand pallets when they are replaced with lifting equipments;
- possibility for reliably loading and unloading using forklift. Case pallets should be transported by specialized devices in the lifting machines.
- transportation by all kinds of land, water vehicles and containers, arranged in one or more horizontal rows one above the other;
- safety in loading and unloading;
- assembly, disassembly, folding and unfolding should be done carefully so that interchangeability is possible;
- case pallets with a lid should have locks and sealing devices;
- the blocks of the flat wooden pallets should be solid wood. They could be also made of two parts of wood particles bended by waterproof adhesives. The fibers of the wood blocks should be placed along the pallet.
- there should not be cores in blocks and beams;
- boards and beams of wood pallets and design details for metal pallets shall be whole. Splices are not allowed.
- case pallets with thick walls and bottom should be provide with holes for draining the water;
- metal pallets and metal elements of other pallets should be provided with protecting coat;
- pallets details and protecting coats, made of synthetic materials should withstand temperature of 60° to minus 30° Celsius, without any damage.

Besides the above mentioned requirements, there are requirements for deviations in planes parallelism of the upper and bottom sides, length difference of upper and bottom sides of flat pallets differences in diagonals lengths of planes formed in case pallet; perpendicular deviations in vertical plane, etc.

The size of the pallet should depend on the size and member of transported or stored goods. It should depend on the way of transportation. Big pallets decrease the number of the processed loads. The size of the vehicles and containers as well as the manual loading and unloading put a limitation of the size. That’s why most of the pallets are produced in the range of *800 to 1200 mm* no width or depth.

Another requirement is that pallets should be as wide as machine processing them. For example, if goods should be arranged in blocks or movable racks, some space is a *1200 mm* forklift handle only pallets, wide about *800 mm* [13].

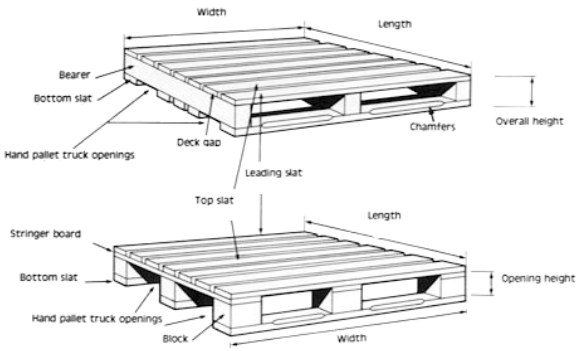

Fig. 5 Pallets parts

It is recommended that standard pallets are arranged where possible. These pallets are available. It is profitable to send them to the consumers, where they could be resold instead of sending them back. On the other hand consumers should be careful with the pallets. Sometimes standard pallets are not good and suitable for the produce special household pallets which might be smaller or wider higher or stronger that the standard ones. Sometimes these pallets are more flexible for some specific needs.

Another important issue is the proper determination of the stacking height in the stores or distribution centers. If the goods are arranged in compliance with the height of pallet, the total amounts of the stored and processed pallets decrease. In this case the weight of the pallet often increases, which means that the process equipment should be bigger. The stability of the load decreased. Sometimes the lower boxes are crashed.

And more importantly, if the boxes are handed by a person who is not on the processing equipment the working height is limited. When it is necessary to take into boxes from the second level either the operator should be lifted or the height of the pallet and the load should be restricted to a maximum of *1200 mm* [14, 17].

In any well organized logistics center there should stacking facility for each section of the warehouse. The number of boxes in every pallet should be calculated in advance so that each customers order is executed automatically by computer.

Thinking twice about the load stability when the shelves are being operated and the pallets are being arranged. If the equipment is used for narrow paths, the square shape of the pallet and the amount of stored goods are important factors for determining the minimum width of the path. It must be remembered that some boxes shrink laterally in cold conditions or when other boxes or stacked on them, which makes the final size of the load longer than initially estimated

To maximize the benefits of using palletizing is necessary to ensure continuity of the loading chain – starting with production to finishing with consumption. For this purpose, the "Convention European Pallet Pool" is established. The following countries are its member Austria, Germany, France,

Belgium, Italy, Switzerland, Luxembourg, Holland, Denmark, Sweden, Norway, Slovakia, Finland, Hungary, Serbia, Bulgaria and Poland.

These countries can make shipments flat euro - pallet and *800x1200 mm* metal case pallet.

The Euro-pallet goes back to the wooden pallets used in railway transport. In 1961 the European railways commissioned the standardization of a common pallet type under the auspices of the UIC. The actual inventor is unknown, but there are historic records of the effect - using the Euro-pallet it was possible to load railroad cars in just 10% of the time of earlier loading processes [13]. In 1968 the association also specified a standard lattice box along with a standard lattice box pallet.

Following the standardization most of the European industry switched over to use Euro-pallets with trucks, forklifts and high-rack warehouses optimized for their size [13, 14]. National associations developed framework agreements for pallet exchange in that freight would be delivered on Euro-pallets and be given the same number of Euro-pallets in return ("pallet for pallet"). The Euro-pallets are controlled by the association and the association takes care of repairing or removing old pallets from the pool. With the ongoing European integration, the European Pallet Pool allowed for pallet exchange even in cross-border dealings.

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Derivatives of the EUR-pallet have been developed for specific uses. The EUR-pallet - also EUR-1-pallet - was followed by the EUR-2-pallet and EUR-3-pallet, which are both *1200x1000 mm*, which is close to the standard American pallet type of *40 by 48 inches* (*1016 mm ×1219 mm*). For use in retail stores, the EUR-6-pallet is half the size of the EUR-pallet, *600x800 mm* [14] ISO standards have also been published for these Euro-pallet types.

To accommodate EUR-pallets, there are derivative intermodal containers that are about *2 inches* (*5sm*) wider - these are commonly known as “pallet-wide” containers [17]. These containers feature an internal width of *2440 mm* for easy loading of two *1200 mm* long pallets side by side - many sea shipping providers in Europe allow these, as overhangs on standard containers are sufficient to fit them in the usual interlock spaces. Especially the *45ft* pallet-

wide high-cube shortsea container has gained wide acceptance, as these containers can replace the *13,6 m* swap bodies that are common for truck transport in Europe. The EU has started standardization for pallet-wide containerization in the EILU (European Intermodal Loading Unit) initiative [17].

The main principles of common use of pallets and pallets in the European Pallet Pool are the following:

The exchange of pallets in different countries is done at designated border railway stations. The exchanged pallets become property of the receiving railway administration. Only pallets in good conditions can be exchanged. Accountability for accepted and delivered pallets is done by pallet border-control services based on the information written in red tag, glued to the consignment note. A faulty pallet is any pallet which has a broken or missing boards, block or marking.

Almost all railway administrations [17] – members of the European Pallet Pool formed their own domestic national pools. The pools follow European regulations but also increase the range of the lifting equipment.

The other widely used logistic element is the container. It is also a subject to standardization.

Containers are standardized transportation equipment (ISO 668, ISO 1491) used to transport different goods by road, railway and water transportation (mostly marine). Transportation containers are processed by specially manufactured for purpose cranes. They are stored in special containers terminals. Then they are transported by sea with specialized container ships.

According to the International Organization for Standardization (ISO) definition, the container is a transportation device, having the following characteristics [15]:

- it keeps its quality for a long period of time; it is strong enough and that's why it is used many times;
- it is specially designed for transportation of goods by means of different kinds of transport without any reloading;
-it is equipped with devices which facilitate its services especially when loading from one vehicle to another;
- the construction of the container makes the process of loading and unloading easier;
- its useful volume of at least *1 cubic meter*

Fittings or locks are very important element of the containers were. There are eight of them. They are located at each corner of the container and thus they help the processing equipment hold the container. With ton containers these elements are standardized BDS 12138-74.

Containers are:

- small weight containers – with capacity of *1 to 3 cubic meters* and length of less then *6 m*;

- medium weight containers - with capacity of more than *3 cubic meters* and length of less then *6 m*;

- heavy weight containers - with capacity of more than *3 cubic meters* and length of more then *6 m*.

According to their functions the containers are [16]:

- covered containers - for unit loads;
- open containers – with convertible covers;
- folding containers – for bulk loads;
- containers for liquids,
- refrigerating containers;
- ventilating containers;
- heating containers;
- the soft (flexible) containers with the ability to fold when unfilled are universal and special. The universal containers are for general purpose.

According to the material they are made of, the containers are:

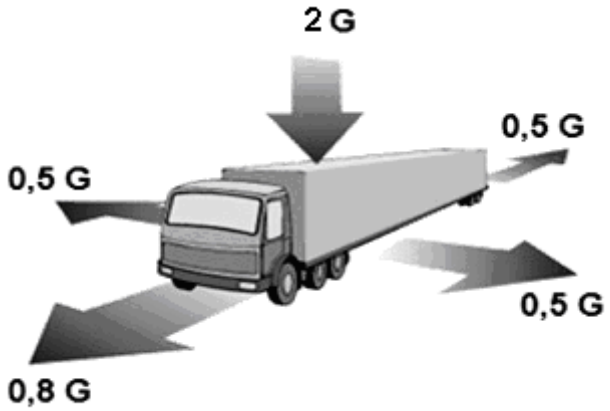


Fig. 6. Scheme of load distribution in road transports

- wooden;
- metal;
- of combined material.

Basic parameters are: maximum gross weight, own weight, overall and inside dimensions and useful volume.

1A container is also called *40-foot*,

1B – 30 foot and *1C - 20 foot*.

Size *2438 x 2438 = 8 x 8 feet*.

The construction of the container should correspond to the specific properties and transportation characteristics of the goods which the container is

used for. It must comply with the requirements of the International Convention for the Containers Safety. It is mandatory for construction loading to avoid deflections and torsions which might lead to poor functions and permanent deformation of the containers elements. The main loads in containers are:

- the containers transportation on roads. The load is affected by the acting forces of inertia, acceleration, braking, and vibration. In this case the load weight is doubled which increase the loading *(2g)*. The magnitude of the centrifugal force depends on the mass of the load, the speed of the vehicle, turning radius and height of the gravity center from the road surface [20].

Furthermore, it should be taken into consideration the coefficient of friction between the bottom of the container and the load. Vibration frequency to *30 Hz* can reduce the friction coefficient to *1/3*, which can cause displacement of the load in the container, pressure increase over the lower load line and rupture of the package [20].

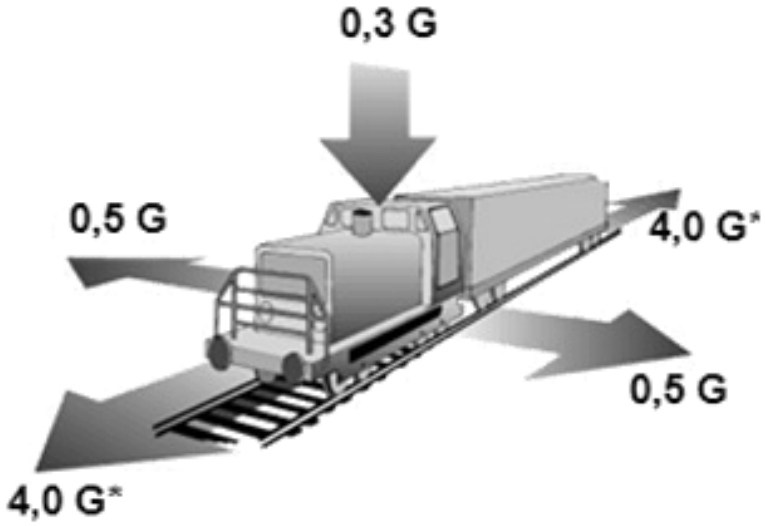
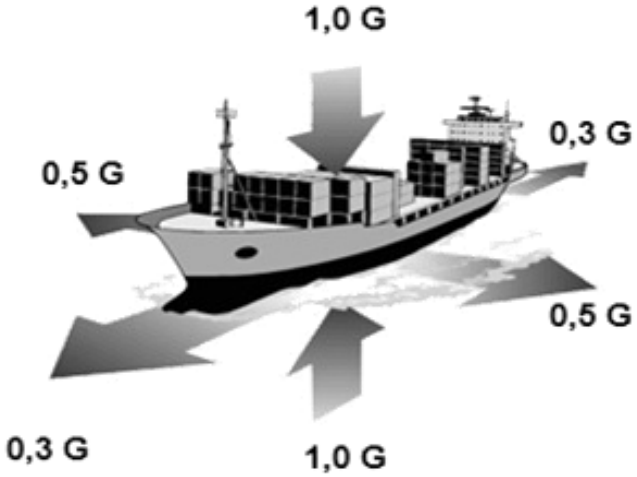


Fig. 7. Scheme of load distribution in railway transports

- railway transportation causes short term load pressure up to *4g*. Turning efforts amounts to *0,5 g* The average vibration frequency is *16Hz*. For example, the bottom of the containers are designed to overload *2g* in the absence of shocks, the formation of the Chamber transporting containers is permitted only when the railway platforms are equipped with longitudinal shock absorbers.

- the containers transportation by water causes extreme loadings when there is board, keel vertical waves blows. Board swing causes static and dynamic efforts in container and cargo. The magnitude of the static effort depends on the load mass and the inclination angle of the container.



Fif. 8. Scheme of load distribution in water transports

The magnitude of the dynamic efforts depends on the distance between the container and the lateral plane of the vessel at waterline. The greatest efforts occur to the containers on top lines of the deck. The inside containers efforts depend on the amplitude and period of wave swings. The use of the damper reduces the amplitude by 10 times.

The biggest damage to the containers and their cargo during stacking the deck are caused by the wave's blows.

Vibrations mainly reflect in the containers situated mainly in the stern. They arise from the operation of the propeller screws. Studies prove that the frequencies of the five layers propeller are *10 Hz*, but they can also reach *50, 70, 80, 150, 250 and 300 Hz* [20].

- in air transportation, the highest pressure during taking off and landing and passing through the turbulent atmospheric layers. But in all these cases the stresses is smaller compared to the stress during the process of loading and unloading at the airport.

Shock pressure occurs during the load transfer from transportation to another one. It should be taken into consideration that the pressure during loading and unloading could reach *40g* for *2 ms* and *36g* over *1,5 ms*. That's why it is mandatory to place special fixing devices to limit overpressure [21].

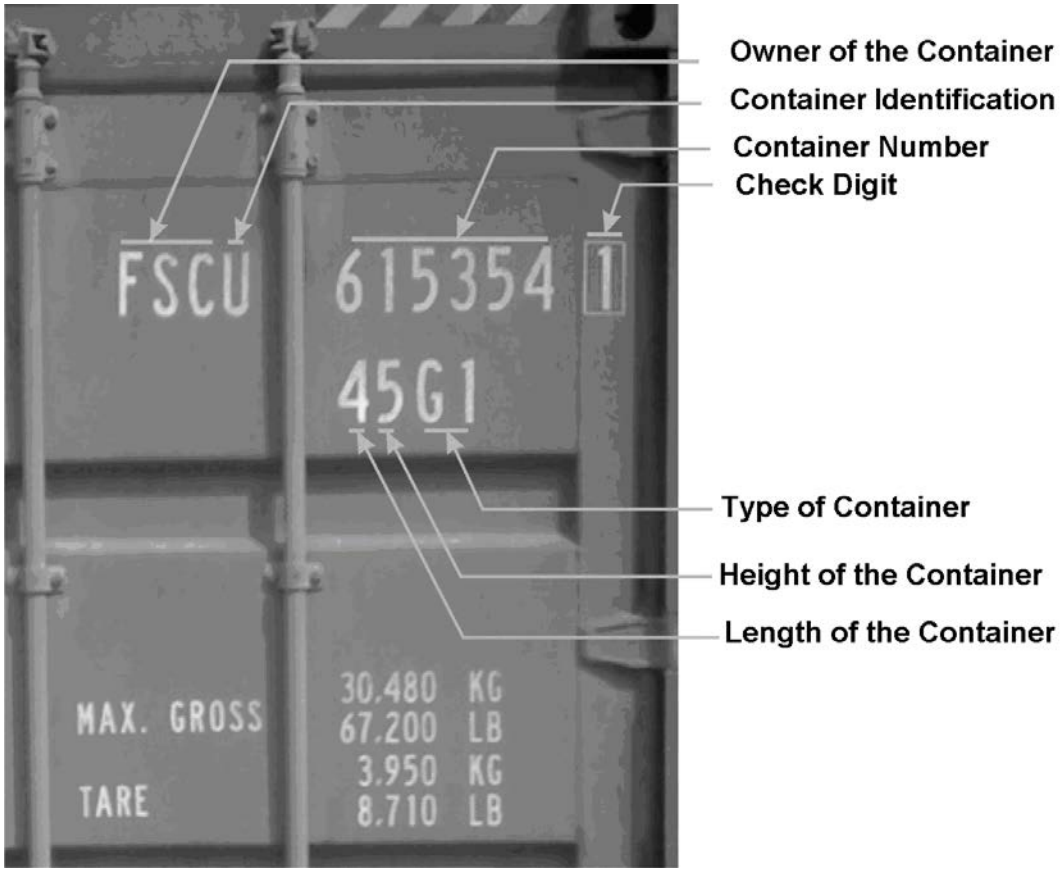


Fig 9 Marking of containers

Door seals (if any) must be strong, elastic, and resistant for the range of -*40° C* to *+70° C*. They should also resist sea - water and petrol [16].

The floor of the container is sized to withstand forklift car with its load.

The main marking of the containers consist of three groups of signature:

Group 1: This signature consists of owner's code, containers number of the container and check digit;

Group 2: The signature consists of the country code, where the container is registered, container code size and container type;

Group 3: It consists of the maximum gross mass in kilograms and lbs (*1lb = 0,45359 kg*) and tare in kilograms and lbs.

The code of the container's owner is marked in 4 letters of the Latin alphabet [8]. For our containers owned by BDZ code is BDZU). The serial number of the container has 6 digits and the final o digit number is the control number. The country code consists of 3 letters of the Latin letter. The code of Bulgaria is BGX. The code size and container type consists of 4 Arabic digits. The first two describe the container's size, and the last two describe the container's type. Containers carrying freight with customs stamps and seals have special tags in Russian and English. There is an inscription of the country which issues the type of container and its plant number [6].

In accordance with the Convention for containers safety each serial container has a safety tag with the following inscription in English.

1.country, giving the permission; number, date and year of permission.

2.date of production – mouth year.

3.an identification number, given by the plants which produce the containers.

4.maximum gross mass.

5.stiffing mass.

6.pressure under raking (traverse stability).

7.front size brighten.

8.lateral size brighten.

9.date of first and following checks.

The interval between the container's production date of and the first check date should be not more than five years. The next checks period should not be longer than two years.

The formation of the container shipping unit is usually done at the beginning of the transportation – processing chain. The proper type of container should be selected just before the formation of the container unit. The selection is based on loads type, quantity, and transportation characteristics. When choosing a container the following information should be taken into consideration:

- permissible gross weight of the container not be exceeded;

- the load must be placed accurately over the whole floor area so that permissible maximum floor load is not exceeded (for big ton containers it is $19{,}105 N/m^2$) [6, 21].

- height of the whole load must be at the same level. There must not be deviation of length of gravity center bigger than 0.1 from the container's geometric center. Height of loads' gravity center must be in the same plane with the geometric center or must be lower. If, exceptionally, the loads gravity center is higher than of the container's then the container must be market on both sides. It is very important for transportation and for loading and unloading procedures;

- heavy loads must be placed under the light ones;

- It is not recommendable to leave empty spaces around the load in the container. Sliding especially in the direction of the door must be secured just in case of occurrence;

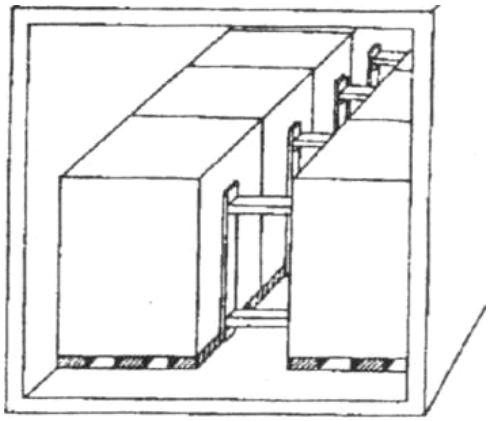
- before closing the door, cargo must be secured so that they don't press the doors. Eventual falling down must be prevented;

- different incompatible goods must not be loaded in one container;

- when cargo are not wrapped and containers are with loose material it is mandatory to take into consideration the static pressure on the walls of container. Loads must be precisely selected and weight.

Cargo securing in the container is usually done manually. Securing must provide cargo stability so that cargo can not move under the action of dynamic

forces. Securing must not damage the cargo and container structure. Reinforcement is done by means of wooden pallet to the door clearance (fig 10) supported by rods placed transversely to the container, wooden logs, beams and frames to prevent transverse displacement of cargos by means of straps arcs and brackets mounted on the container walls by means of anchor bolts to a specially designed floor, by plates placed horizontally or vertically between different layers of cargos, by means of air bag.



Fif. 10 Fixture of cargo

Heavy loads with comparati-vely high gravity center in the upper part must be equipped with a frame, which is similar to the frame positioned on the floor. Tying or fastening to the attaching rake is not enough because the attachment rake can not take the point loads.

A particular attention must be paid to avoid point loading over the side walls by the supporting wooden logs. When the load is not against the whole door, supporting wall must be reinforced at the door post.

If the dimensions of the load allow formation of a single longitudinal line, so that there is a room between cargo end side walls bigger than the permitted size for handing the cargo, the cargo must be placed symmetrically to the longitudinal axis of the container.

The space to the right and to the left must be fixed with suitable loose material. If in the container, when viewed from the front side, the load is arranged in two or more adjacent rows, both end stiff must be placed as close to the side walls as possible. The other rows of cargo must be arranged as close as possible. If there is space between rows, cargo must be secured by filling materials and supporting containers.

When filling with sacks, they should be arranged in cross – connection since the sacks could slide.

Long loads – such as planks, beams profiles pipes, sheets with large surface can easily slide in longitudinal direction. If goods are relatively short they are arranged in the container in two or more rows, one behind the other. If

the abutting ends must be protected from mutual injury, vertical parting walls are placed between them.

During cargo transportation exterior forces affect them. They disrupt their position of rest. That's why cargos must be secured in accordance with international norms for proper cargo security EN 12195.

Security straps are the best way to prevent any slipping, tipping or falling during transportation. A special fastening mechanism guarantees cargo's attachment to the floor. The enhancement is determined by the kind of transportation since loading with transportation is different (Fig. 6,7,8)

Load capacity of the reinforcing straps is *250 kg* to *20000kg* [8]. Their length and width is generally uniform for the main types of cargo.

When we have a variety of packaging they must be separated from each other, means of slats, cardboard, bags, and other way of separation.

Placing sacks [21] and cardboard next to wooden boxes and wooden separators should be avoided because of risk of rupture. If the textile and paper bags must be arranged on boxes, it is necessary to provide an intermediate layer made of cardboard or other material in order to prevent fraying of the bags.

Goods with strong odors must not be loaded with goods which absorb odors, because they could lose their consumer value.

It is recommendable to avoid transportation of dry and liquid cargo in one and the same container. Dry goods must be stored on wooden beams. This will reduce the risk of leakage. Liquid cargos must be placed under the dry ones.

Special attention must be paid to the choice of containers parameters because the usable volume and mass depend on them. Prospective planning of shipments considers the type of the containers which are most widely used in the certain country. In the U.S., the most common container size is *12192 x 2438 x 2438 mm*. In Europe, the most used container size is *6058 x 2438 x 2438 mm* [20].

One of the most important factors in determining the economic efficiency of container transportation [8] is the ratio of the mass of the load mass (*M*) to the distance of transportation (*L*)

$$K_1 = \frac{M_T}{L} \tag{1}$$

For example, a container whose length is *6058 mm,* traveling from Paris to Frankfurt, carries more cargos than a container whose length is *12192mm,* caring cargos from Paris to New Orleans.

The ratio of cargo to useful volume of container (*V*) is of great importance for the choice of container parameters. The bigger the container's volume is its lower average load.

(2) $$K_2 = \frac{M_T}{V}$$

For example, for a container whose length is *6058mm* the ratio of the mass volume to cargo mass is *18,65:30 = 0.60*, for a container whose length is *12192mm* we have a ratio *26,50:63 = 0,42*. A container whose length is *12192mm* is less effective transportation of cargos with small density than container length is *6058mm*. In order to have a perfect correspondence of volume to load capacity of the container, its mass should be not less than *400* and not more than $600\frac{kg}{m^3}$.

The choice of container's type and parameters depends on some restrictions connected with the transportation vehicles handling equipment and loading ramps.

Certain calculations are necessary to make the container's use effective.

A very important criterion for containers is the duration of use and services expenses. World statistics show that the main damages occur with railway and road transportation of containers during loading and unloading processes. That's why containers are damaged more than at short transportation distance than at long distance. This must be consider when calculate the transportation price. In marine and ocean transportation container's corrosion is the main damage. Suitable material must be selected for the purposes of water transportation. To achieve a low cost container low-carbon steel with galvanized coat is used. The coat increases the container's cost *5%* but makes possible effective service and re-coating in third and sixth year of nine-year use.

Fiberglass and plastic coated panels are widely used. The strength of these panels is very big so it is not necessary to use additional cross beams and columns on the walls and tops. These types of containers are widely used in the U.S. (*over 20%*) [21]. Despite of their higher initial cost, the total cost for the entire period is lower.

Use of steel reduces the mass of the used material and increases the strength of the container. This is partially offset against higher cost. It also reduces container's mass and preserves the same volume. This increases its load capacity. Containers fittings are made of the same steel.

The handling equipments are another object of standardization.

Fastening devices (cargo handling devices) are elements of lifting and transportation system (as well as logistic system).They realize the connection between the load and the hoisting machine. The following issues depend on their constructive solution:

-storage of goods;

-safety and security of hoisting and transportation operations;

- possibility for equipment and machinery unification;

-mechanization and automa-tion of handling processes;

- increased productivity and lower cost of product;
- exclusion of the subjective factor.

Flexibility of the fastening device is [4]:

$$\delta = \frac{m_j}{M} \quad (3)$$

where m_j is the set of work pieces of cargo handling devices defined by its basic parameters (scope, type of coverage surfaces permissible clamping force);

M - the amount of all cargos, planned to be processing by hoisting machine (system).

When transported cargos are grouped in bigger units such as pallets, boxes, cases, etc., flexibility is increased by reducing the number of handling devices.

From the above mentioned information it is obvious that flexibility sets the price of each machine or equipment. The dependence (discrete or continuous) between the flexibility of any device, expressed by its structural and operational parameters, and the price is a necessary condition for finding the optimal solution. This relationship generally exists in every company. The modular structure of the device is constructed on its base.

Generally a lifting machine can process a variety of goods under the main constraint for maximum weight and maximum dimensions. Its working body (flexible or rigid) is mainly determined by the functions for which it is intended and by the intensity of the work. Its parameters are identical to the parameters of the main machine and do not affect considerably flexibility.

The last element subject of standardization and part of logistics is the warehouse.

Warehouses are places where materials and goods are stored [12]. Depending on the market demand, many operations such as loading distribution, packaging, marking, commercial conversion consolidated cargo forming are completed. Warehouses could be considered as a distribution channel for goods and materials. They could also be considered as an "insurance" against various difficulties in distribution channels and disruption of material flows in already established distribution chain.

Warehouses [5, 8, 23, 24] accumulate material resources, which are necessary for dampering the volume fluctuations of demand and supply. They are also very important for synchronizing system from the producers to the customers or material flows in technological production systems.

Modern big warehouse is a complex technical facility which consists of multiple interconnected elements. It has a fixed structure and performs a number of functions in the transformation of material flows, also in the accumulation, processing and distribution of goods among consumers. Moreover, because of

the variety of parameters, technological and volume-planning solutions, equipment design and characteristics of the diverse nomenclature of processed goods stores belong to complex systems. At the same time the warehouse itself is only an element of a system, which is on a higher level in the logistics chain. This position determines the main technical requirements to the warehouse system. It also determines the goals and criteria for its optimal function and the conditions for cargos processing.

For these reasons, warehouse must not be considered separately. They must be referred to as an integrated part of logistic and distribution chain. Only such approach will provide a successful completion of the main functions of warehouse and achieve a high level of profitability. It is necessary to emphasize that in each particular case for each particular warehouse, parameters of warehouse differ. The elements of the structure and the structure itself also differ when creating a warehouse system. When creating a warehouse system the main principle must be observed: only the individual decision, keeping in mind all factors can make profitable. It is necessary to define the functional tasks and to make a thorough analysis of cargo processing both inside and outside the warehouse. When choosing the type of storage system the options must be limited by application of appropriate practical indicators

Depending on the nature of goods in different warehouses, different devices for storing are used: figures and trenches - indoor and outdoor; hoppers – discharging and self- discharging; bulk tanks - tanks and special capacities; special package - barrels cans, jars, bottles, racks - universal (cellular, console, pyramid, etc.) and special (stand - for sheets, pipes, rolling, metal brackets, cellular, sectional, pyramid, etc.).

These devices, along with equipment for mechanization and automation of various warehouse operations are located appropriately on specific storage sites.

For this purpose, it should be determined:

- the effective area of the warehouse, i.e. the area immediately occupied by the stored products, it is usually determined on the basis on effective admissible load per unit area on the floor or on the basis of norms for filling volume of the warehouse with the stored material [24]:

- the area required for the operations of reception and allocation of material resources (the size of the sites for receiving and dispensing);

- the office space (office space for accommodation of the management staff);

- auxiliary area, including passages whose dimensions are determined by the type of stored material, the type and design means of mechanization and the intensity of cargo turnover. The height of warehouse is also determinated in accordance with the current regulations.

Determining the total area of the warehouse we must be sure that the effective area of the warehouse is located within the boundaries of that area which is eligible for this type of store.

Standardization of goods packaging and consolidation of cargo is fundamental for unification and construction of technological chains for the first step to the final unit of the distribution chain. Technological chain unites participants in the distribution based on standardization and typification of individual packages of goods, consolidation of cargos, dimensions, shape of the transport handling units, equipment and technology to carrying out the necessary operations and activities. Logistic system, logistics and distribution centers are based on this type of unification. It is fundamental for the delivery system "just in time" where there is a need for them, and when it is the right time.

Packaging of goods and cargo consolidation is an issue that should be decided by all participants in the distribution chain, but it is the responsibility mainly of manufactu-rers. The design of packages is part of new product creation. The market acceptance of new goods depends not only on their type but also on their quality and characteristics, on the way of packaging, their functionality, their outlook. It also depends on the participants in distribution, on handling operations, transportation and storage. Packaging of goods and cargo consolidation is an expensive investment, especially for countries like Bulgaria, which has no resource base, well built capacity and enough expertise and experience. However, these costs affect directly the overall distribution costs and under certain conditions may lead to their relative decline. Therefore, when designing products, manufacturer must take into account [25], the impact of the package on the distribution activities and operations, the total distribution costs, including transport, storage and handling of goods lost, damaged, etc. Before taking any decisions it is necessary to analyze the package expenses, transportation, storage, shipping, customer service costs and the resulting consolidation effects.

The expenses for materials, equipment and technology for packaging and cargo consolidation must be balanced against the expected savings in distribution. Optimal solution for goods packaging and cargo consolidation is the one in which all the requirements of distribution to consumers are taken into consideration at the lowest possible total cost. Such decisions can only be taken in a total distribution management throughout the supply chain based on the integration between the participants and at the risk of producers. All participants in the distribution and foremost manufacturers must be prepared to pay more for some activities in order to gain profits from others.

In conclusion, it should be noted that standardization is the most effective way to facilitate trade, to achieve certain social and political goals and to regulate the economy. Therefore, the standardization work is organized at different levels - international, regional, national, sectoral [1].

Standardization is part all spheres nowadays. So the logistics is not an exception. Standardization concerns all steps in the process of transportation, strengthening packaging etc. The main goal of standardization is to make easier the access to different goods and materials at the lowest possible cost. For these reasons in spite of its voluntary character standardization is widely used in countries, which are members of the European Union.

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution ISSN 1314-9784

COMBINING CRYPTOGRAPHY AND STEGANOGRAPHY IN SOFTWARE SYSTEM FOR HIDING CONFIDENTIAL INFORMATION

Zhaneta Tasheva, Antoniya Tasheva

Abstract: *The basic idea of combined use of both cryptographic and steganographic methods is first to do data encryption with AES block cipher and then hiding encrypted data in an image that does not attract any attention. As a consequence, the reliability of hiding information increases which have been evidenced by a comparative analysis of stego-images quality at different levels of protection.*

Key words: *Cryptography, Steganography, Data Encryption, AES*

INTRODUCTION

In modern world many companies and users communicate and exchange both confidential and easily accessible information through the Internet.

Countless are messages and reports that are daily transmitted by e-mail, social networking systems, short message systems provided by mobile operators and much more. Each person had at least once had to send sensitive information that only the recipient needs to know.

Either hot news correspondent, broker offering new price a secret auction or designer, sharing idea for a new product, everyone needs a good enough protecting their information.

In 21st century the basic methods for hiding confidential information gain bigger popularity due to the necessity of new solutions to the problems with illegal information copying and copyright.

There are two main methods for hiding sensitive information: cryptography and steganography. The use of cryptographic algorithm for data encoding proves the fact that confidential information is transmitted. The malevolent party is always aware of the existence of secret information. Even illegible it can be caught and, in some cases, decrypted. Steganography is an interesting and not so popular method for information protection. Information can be concealed in another hidden object but if it's caught, the information can be easily retrieved.

The basic idea of a combinatory usage of both methods in the system for hiding confidential information is data encrypting with AES block code and after that concealing it in an image which does not attract attention.

Consequently, this increases the reliability of hiding information, which is demonstrated by the comparative analysis of the quality of stego-images at various levels of protection.

SYSTEM FOR HIDING CONFIDENTIAL INFORMATION

The symmetric system for hiding confidential information combines the advantages of cryptography and steganography aiming at enhancing the reliability of hiding information. The process of information protection consists of the following basic steps (Fig. 1):

1. Encrypting of open text (message) with AES block code and use of a secret key *K*.
2. Selection of a hiding image.
3. Hiding algorithm via in-building function. The user can choose between two methods in applying the in-building function:

- Consecutive method of selection;
- Pseudo-random method of selection.

The result of the system function is a stego-image containing the confidential information which can be sent to the recipient along unprotected channel and the communication will not arise any interest in a possibly spying party.

Consistently all main elements of the combined system for concealing confidential information will be described.

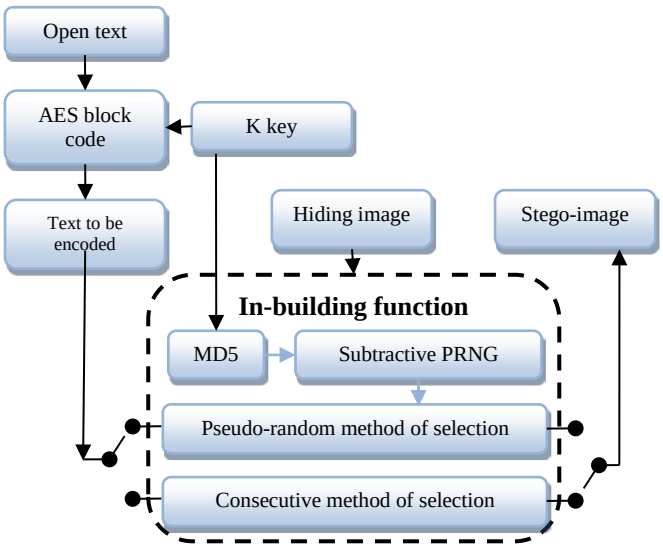

Fig. 1. Basic components of the combined system for hiding confidential information.

AES block cipher

The US government officially introduced the AES standard replacing the Triple DES standard in 2001 as it was suggested by the National Institute of

Standards and Technologies NIST. It uses the Rijndael algorithm developed by Joan Daemen and Vincent Rijmen (Belgium).

AES is based on the principle of a model popular as a substitution permutation network. It is fast both as software and hardware. AES has a block of fixed size with 128 bits and a key size of 128, 192 or 256 bits, unlike Rijndael, which can run on each block, and a key length of a multiple of 32 and not greater than 128 bits.

AES works with arrays of 4 x 4 bytes, called the current state of the block. Most AES calculations are done in an extension of a finite Galois Field GF(2^8).

The aforementioned algorithm was selected because it has been considered one of the most secure and unbreakable.

Selection of a hiding image

There are many steganography types of algorithms depending on the subject, in which secret information is hidden or the very way of insertion. Digital images feature large size of surplus in their digital display and this makes them the most popular hiding objects for steganography [1] [2]. The algorithms to hide data inside an image are based on the fact that the human eye could be insufficiently discernible to insignificant changes in the colour of the image observed.

Basically, digital colour images are saved as 24-bit files using RGB-mode (Red, Green, Blue) [2]. That might lead to a greater amount of data which could be used as regarding the goals of steganography. The software system discussed uses Microsoft Windows Bitmap (BMP) format as an image to hide.

Algorithm to hide

The principle of steganography by modification [1] by which the already existing cover images are altered in the process of incorporation is chosen in order to ensure the functions of incorporation and extraction of the cover image data.

The Least Significant Bit (LSB) algorithm is used because of its ease of concealment of information in images [1, 4]. This very algorithm incorporates the data bits into the least significant bits of the colour components of each separate pixel of the image. It is a symmetric algorithm, i.e. for embedding and retrieving the message identical operations are done in the same order. In its particular implement-tation the method includes several key steps:

1. Determining or recording the length of the message.
2. Determining the pixel for reading / writing.
3. Reading / writing specific bits.
4. Upon reaching the size of the message - end, otherwise return to step 2.

The algorithm function is based on the fact that the secret information is saved within the least significant bits of image pixels without altering the image

significantly. This might be seen in the pallettes in figure 2. The second colour is composed of pure red with incorporation of bits 011. Despite the difference, the human sight is not able to differentiate between the two colours.

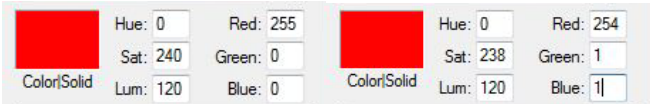

Figure 2 Colours with replaced LSBs

Each single data bit is incorporated into the colour components of three neighbouring pixels of an image. The scheme for the latter is displayed within figure 3.

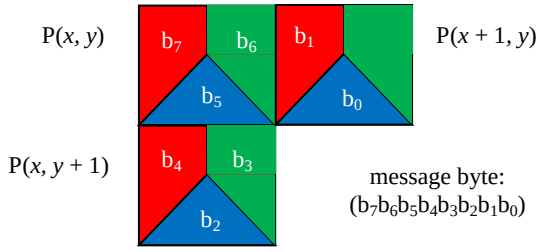

Fig. 3. Replacing LSB bits scheme

Positions of the pixels replaced are usually controlled by the method of selection. The combined system uses the first two of the three selection rules which are consecutive, pseudorandom and adaptive.

The consecutive method of selection incorporates the message bits into separate components of the covering object in consecutive order. For example, starting from the top left corner of the image and going row by row to the bottom right corner. Although the consecutive rule for selection is the easiest one for realization, it provides the least security since the algorithm for steganalysis can investigate the pixels' characteristics in the same order, searching for an abrupt change in their behavior.

In the implementation pixels located at equal distance from one another are used. This distance depends on the size of the image and the length of the embedding message. It is called the step and is determined by the formula 1.

$$currentStepWidth = maxStepWidth = \quad (1) = (bitmapHeight - 1) * bitmapWidth / (2 * messageLength),$$

where *currentStepWidth* is the length of the step, *maxStepWidth* – the maximum of the allowed step, *bitmapHeight* and *bitmapWidth* – respectively the height and the width of the image, and *messageLength* – the length of the message.

The second pseudo-random method of selection builds in the message bites in pseudo-random subsets of the hiding object. The sender uses a secret key K to initialize the Pseudo-Random Number Generator (PRNG), which itself

generates pseudo-random “movement” in the hiding object. The message bits are built in the elements constructing the “movement”.

When entering the same key in transmitting and receiving parties, the generated series of random pixel positions in the image is the same and the built-in message can be correctly decrypted. If the recipient enters a wrong password they will get different series and the read bits will not be from the hidden message.

The idea is realized by a Pseudo-Random Number Generator for generating random numbers by Knuth’s subtracting method. The algorithm uses the following recurrent dependence:

$$x_n = (x_{n-55} - x_{n-24}) \bmod m, \quad n \geq 55, \tag{2}$$

where m is an even number, and $x_0, x_1, \ldots, x_{54}$ are random integers. The constants 24 and 55 in this definition are not chosen randomly, they are special values for which the LSB of the generated pseudo-random sequence (x_n mod 2) has period $T = 2^{55} - 1$. This is based on the fact that the polynomial $f(x) = x^{55} + x^{24} + 1$ is primitive in the field GF(2^{55}).

The Pseudo-Random Number Generator depends on its core, which determines the initial values of $x_0, x_1, \ldots, x_{54}$. Then using one and the same core the PRNG generates the same sequences of random numbers. In order to obtain the core of the PRNG the MD5 hash algorithm is used. The purpose of the MD5 hash function is to calculate for the different passwords different hash values. The length of the passwords might be any, even zero, but the length of the hash value is always the same – 128 bits for MD5. The hash value determines the core of Knuth’s subtractive algorithm for PRNG [2].

The use of MD5 hash algorithm and the PRNG provides a higher level of security of the pseudo-random method for pixel selection in comparison to the consequent one.

INVESTIGATION AND ANALYSIS

Above the implemented combined software system for hiding confidential information numerous tests [4], containing messages of different length and hiding images are done. Different files, containing Bulgarian and English texts are used. For the experiments text files with size of respectively 62 KB, 28 KB, 13 KB, 5 KB and 1 KB are used. The files are not randomly generated. They consist of meaningful text in Bulgarian and English.

The quality of the generated stego-images is investigated. In order to achieve better results the following main characteristics of the images are compared:

- Mean – medium value of the image intensity.
- Std Dev (Standard Deviation) – the width of intensity deviation of the images.

• Median – the value of the image intensity median.

Tests are conducted as every single message is consecutively incorporated into different images by the three stego algorithms:

1. Steganography with consecutive selection method without AES encoding.
2. Steganography with consecutive selection method with AES encoding.
3. Steganography with pseudo-random selection method with AES encoding.

All the experiments prove that there are not any defects or any visible differences from the original image.

Figure 4 shows the histograms of some stego-images obtained by steganography algorithm 1 in hiding object Parrots.bmp. The main characteristics of the image are preserved for all messages except for the longest one, where a small difference with the deviation and the mean value is noticed.

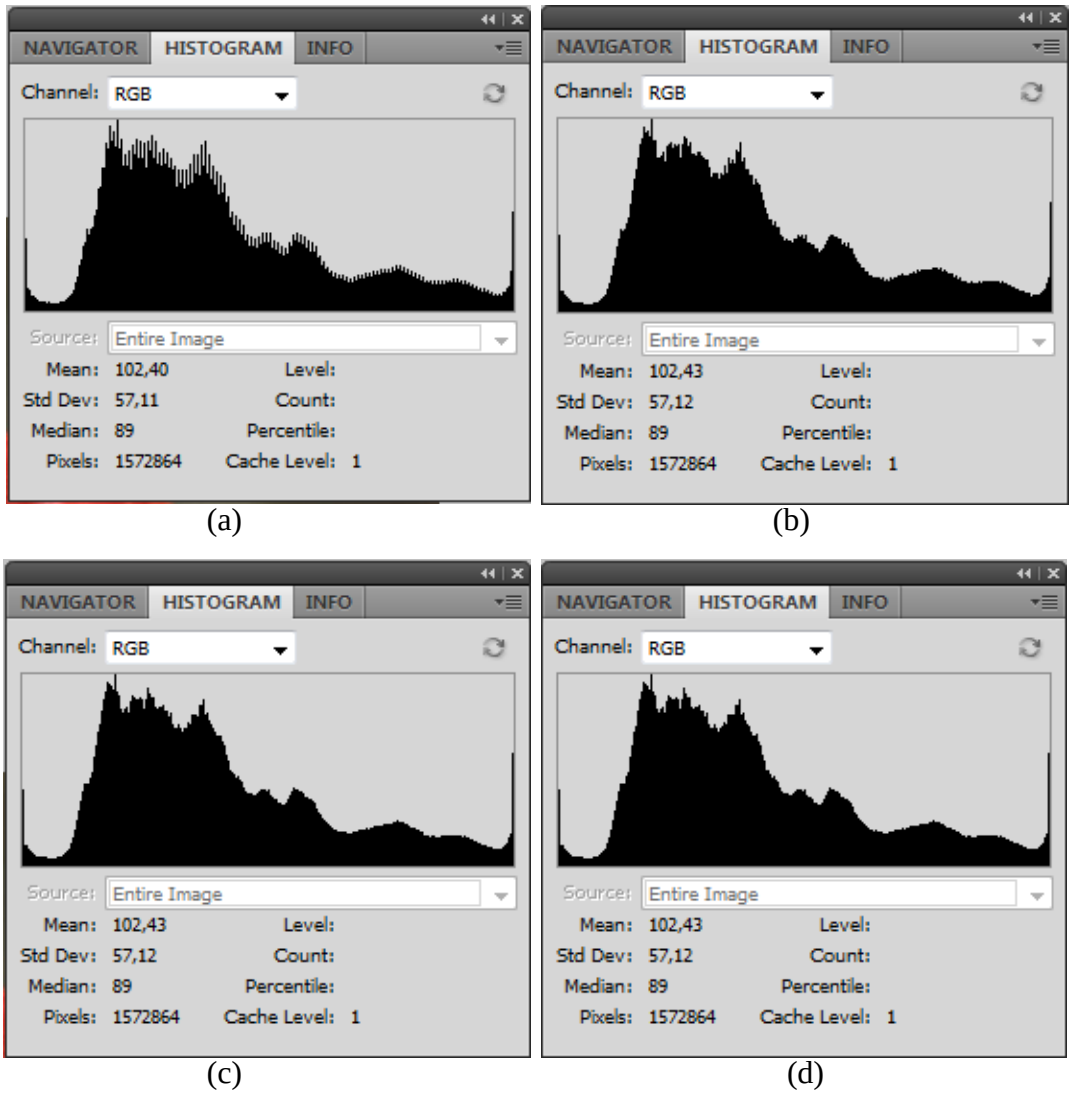

Fig. 4. Histograms of stego-images with (a) 62KB, (b) 13KB, (c) 1KB message and (d) original (first algorithm)

With increasing the size of the message some visible changes are noted in the histogram. For the couples $(2i, 2i + 1)$ of intensities the opposite of the expected leveling typical for the full insertion is observed. Intensities are focused only on one value of the couple and the entire histogram has ctenoid form. The smaller the ratio between the number of pixels of the hiding image and the size of the secret message is, the more pronounced are these ridges.

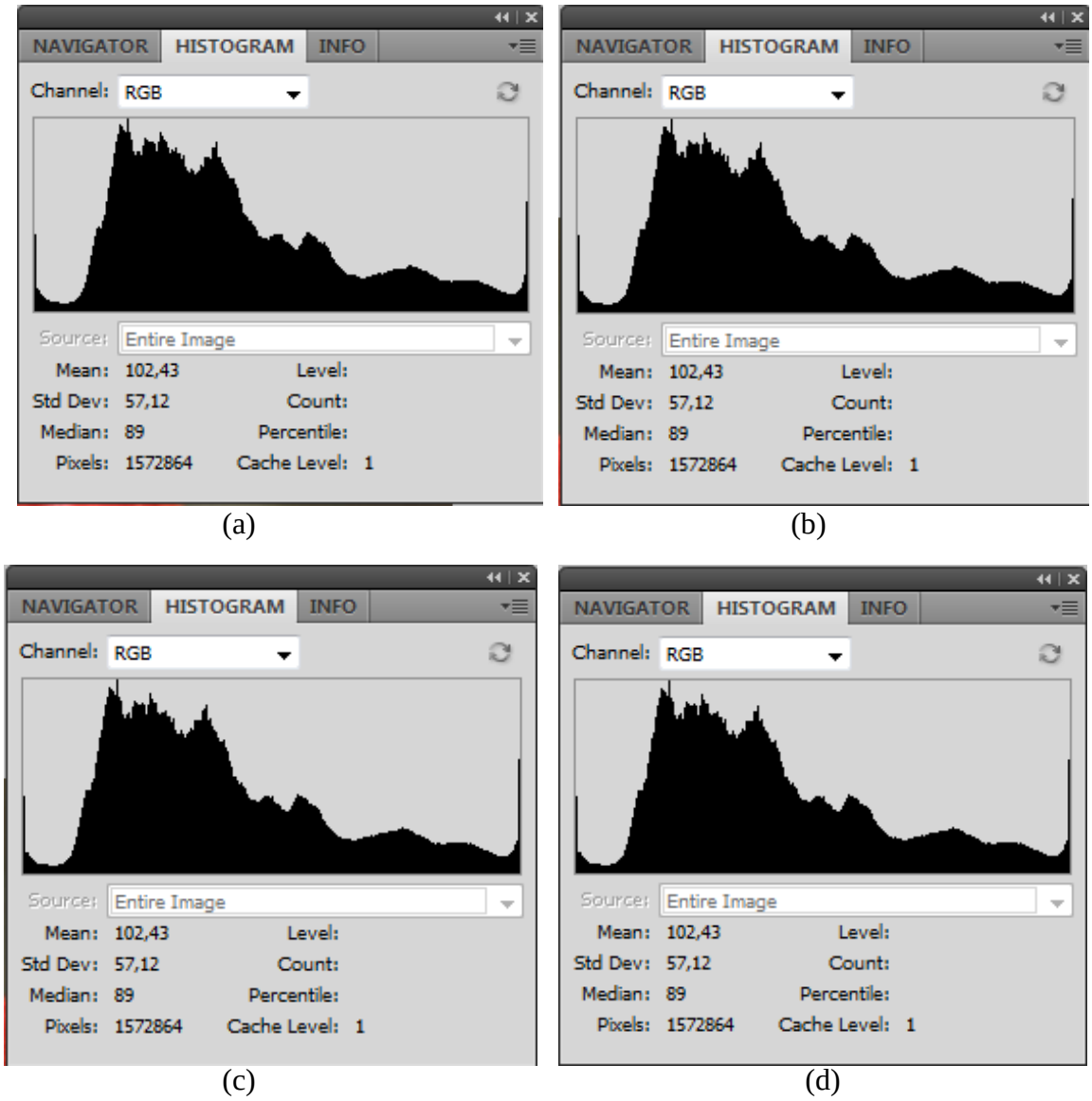

Fig. 5. Histograms of stego-images with (a) 62KB, (b) 13KB, (c) 1KB message and (d) original (additional security)

In steganography algorithm 2 similar to the above results are observed, the ridges in the histograms are lower, but in general are again easily seen.

The third algorithm using AES encryption of the message and PRNG selection of positions gives the best results in terms of the resulting histograms. No ridges occur even in stego-images with a large percentage of the embedded data. In Figure 5 one can see the histograms obtained by embedding test messages into the image Parrots.bmp. These results can be connected to the fact that the embedded message is no longer a sequence of words in natural language, but relatively arbitrary symbols without any meaning. Processing with AES cryptographic algorithm introduces randomness in the distribution of the bits of the message. The approximately equal probability of occurrence of zero and one values of the embedded bits eliminates the possibility of the previously mentioned ctenoid type of histogram.

The statistical characteristics of stego-images remain the same as those of the original image. Exceptions are noticed when the ratio between the number of pixels of the image and the size of the hidden message is less than 10.

CONCLUSION

Due to the conducted experiments one can draw the following conclusions about the operation of the combined system for concealing confidential information:

1. All three algorithms give excellent results for the visual quality of the generated stego-images.

2. Using steganography with pseudorandom selection method and AES encryption achieves the best results in terms of histograms in stego-images, which limits their ability to succumb to modern Stegoanalysis.

3. It is recommended to use a hiding image that provides the needed ratio between their size in number of pixels and the number of embedded bits of the message to be greater than 10, in order to avoid any visible changes in the histograms is a stego-images. As a result, the incorporation of short messages is more difficult to detect.

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution ISSN 1314-9784

EFFICIENCY RESEARCH OF OPTICAL DEVICES

Stiliyan Stoyanov

Abstract: *The goal of the research is to define the background brightness for the range 1.10^{-6} to $4{,}2.10^{3}$ cd/m^2 and to calculate the efficiency of an optical device.a theoretical analysis of the optical device characteristics is done. Physiological abd geometrical optics formulae are presented and the light balance is calculated. The research can be used by experts in the field of optical engineering.*

Key words*: Efficiency, optical devices*

I. Introduction

A lot of factors influence the optical devices' efficiency: time for the distant object discovery, magnification, field of view, geometric luminous power, distance to the object, its resolution at different background brightness, etc.

The available scientific data [1…7] refers to laboratory and theoretical aspects of this problem.

The present research examines the influence of one of the basic characteristics of the optical devices: the magnification upon the time to find a distant object. The analytical correlation is found by means of a one-factor experiment. The background influence is theoretical.

II. Materials and methods

Settings of the experiment

Five optical devices are being observed, Table 1.

Table 1

Optical device	Magnification Γ^x	Field of view °	Diameter of the output pupil
1	2	23	8,3
2	3,6	12	5,4
3	6	8	4,5
4	12	4	3,5
5	24	2	2,8

Following the practically available reverse correlation between the magnification and the field of view, the field of view is corrected in the different systems in such a way that it changes in reverse correlation to the magnification. The same method is used for the geometric luminous power. So, the experiment will read the influence of the magnification in the standards of field of view and luminous power.

In order to randomize the experiment, the following conditions are observed:

1. The object is in front of the observer, in the band of 45°;
2. The object is put at different distances and at different background brightness.
3. For each of the cases, ten measurements are being made by means of one and the same optical device and the average time is taken. Each experiment is repeated four times and each time four different observers with normal sight participate.

The results from the experiment are shown in Table 2.

Table 2

Number	Magnification Γ^x	$t_{1\ aver}$	$t_{2\ aver}$	$t_{3\ aver}$	$t_{4\ aver}$	Ti aver (sec)	Dispersion S_{ti}^2
1	2	1,84	1,68	1,48	1,50	1,62	0,096
2	3,6	2,30	2,42	2,46	2,30	2,37	0,050
3	6	2,98	4,12	3,04	2,86	3,25	0,337
4	13	4,88	4,96	4,66	5,14	4,91	0,115
5	24	9,66	9,98	9,24	9,99	9,97	0,451

$$\sum = 47{,}6 \quad \bar{t} = 4{,}45$$

To find the functional correlation between the time, needed for the discovery and the magnification, the regression analysis is used [7,8]

Processing of the experimental data

A linear correlation of the following type is suggested: $t = b_0 + b_1\Gamma$ as the coefficients b_0 and b_1 are found by the means of the smallest squares of the system equations:

(1)
$$\begin{vmatrix} Nb_0 + b_1\sum\Gamma_i = \sum t_{iav} \\ b_0\sum\Gamma_i + b_1\sum\Gamma_i^2 = \sum t_{iav}\Gamma_i \end{vmatrix}.$$

The following regression is obtained:

(2) $$t = 0{,}74 + 0{,}39\Gamma .$$

The statistical analysis of the regression equation

1. Adequacy check by Fisher's criterion:

(3) $$F = \frac{S_{ad}^2}{S_t^2} = \frac{0{,}335}{0{,}210} = 1{,}59,\ F_{\Gamma ad} = 10{,}13,$$

where: S_{ad}^2 – dispersion of the model adequacy;

$$S_{ad}^2 = \frac{1}{N-2}\sum_1^N (t_{1av} - t_{ch})^2 ;$$

S_t^2 – dispersion of the reproducibility of the experiment

$$S_t^2 = \frac{1}{N}\sum_1^N S_{ti}^2 .$$

2. Defining of the correlation coefficient:

(4) $$r = \sqrt{\frac{S_{tot}^2 - S_R^2}{S_{tot}^2}} = \sqrt{\frac{11{,}48 - 1{,}5}{11{,}48}} = 0{,}95 .$$

where: S_{tot}^2 – total dispersion;

S_R^2 – residual dispersion around the regression line

$$S_R^2 = \frac{1}{N-1}\sum_1^N \left(t_{isr} - t_{izs}\right)^2 .$$

Because r (0,90…0,91), the functional correlation is very big [9]. The determination coefficient $r^2 0{,}9005$ shows that 90,05% of the value of the output parameter is defined by the input one.

3. Checking of the correlation coefficient for significance according to the Student's criterion

(5) $$t = r\frac{\sqrt{N-2}}{\sqrt{1-r^2}} = 5{,}26 > t_{9d=0{,}5;k=N-2)} = 0{,}35$$

The check according to Student's criterion shows not only significance but linearity of the functional correlation between the time for discovery and the magnification of the optical device.

Some other models have been researched. The coefficients are defined by the methods of the smallest squares; by means of proper substitutions and logarithms, the models are pre linearized.

- model of the type $t = b_0 l^{b\Gamma}$ gives $t = 1{,}6l^{0{,}0866\Gamma}$ (fig. 1, line 1), the model is adequate

$$F = 4{,}48 < F_{tabl} = 10{,}13$$

- model $t = b_0 \Gamma^{b1} = 1{,}1\Gamma^{0{,}65}$ $F = 5{,}83$ (fig. 1, line 2)

- model $\frac{1}{b_0 + b_1\Gamma} = \frac{1}{0{,}52 - 0{,}0185\Gamma}$ $F = 4{,}75$ (fig. 1, line 3)

The three models correspond to the adequacy criterion of Fisher but they are less precise than the linear model. All of the models are shown on Fig. 1.

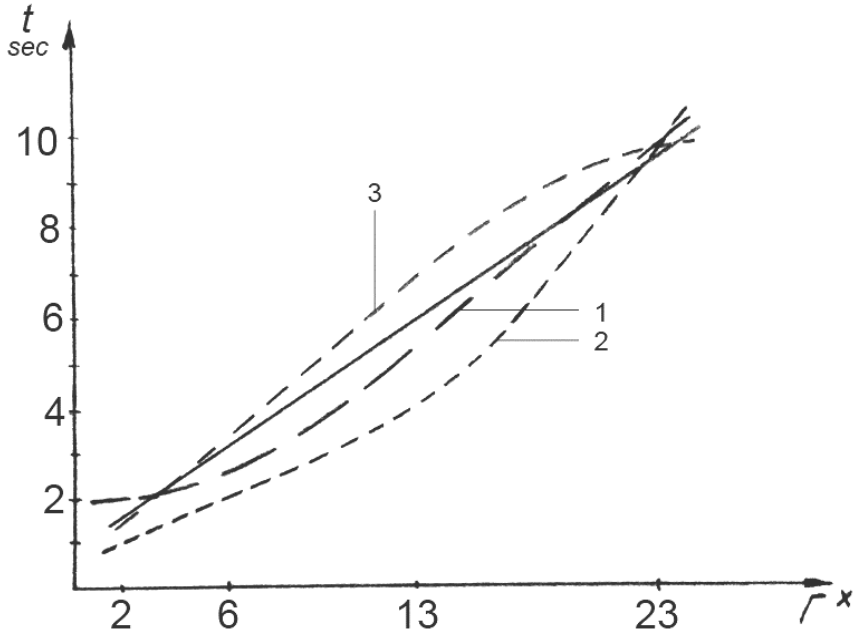

Fig. 1. Researched models

In the center of the field of view, the efficiency of the optical devices N_0 is defined by the relation of the maximum illuminance of the observed object with the naked eye E_n, towards the maximum illuminance by means of optical devices E_{od},

(6) $$N_0 = E_n / E_{OD}.$$

It is known from the physiological optics that the maximum illuminance is a function of the background brightness B,

(7) $$E_n = f(B) = cB^n,$$

where the coefficient c and the exponent n are changed according to the background brightness. The ability of the optic device to create a brighter image is characterized by the luminous power H.

The luminous power H is defined by the relation of the illumination of the image plane of the optical device to the brightness of the object and the additional brightness ΔB from the light diffraction:

(8) $$H = E'/B + \Delta B,$$

w here: $B = \beta(B_{ob} + B_{\Phi})$

object brightness;

background brightness;

diffraction coefficient.

For a distant object, which is observed by an optical device

(9) $$H = g\tau_{OD}D^2,$$

w here: $g = n(n)$ eye constant;

D, d input and output diameter of the optical device;

τ_{OS} coefficient of luminance of the optical device;

(10) $$H_{OD}/H_{EYE} = E_{OD}/E_{EYE} = \tau_{OD}\beta\Gamma d^2/\delta^2,$$

w here: d^2 relation which is characteristic only at $d \le \delta$ which defines the partial usage of the observer's pupil δ.

When the light comes through the optical device:

(11) $$E' = \tau_{OD} \beta \Gamma^2 E d^2 / \delta^2 ,$$

(12) $$B' = B \tau_{OD} d^2 / \delta^2 .$$

If we compare the values of E' and B' from the equations with the maximum illuminance with the naked eye E_n and the aided by an optical device, the following equation is valid for the center of the field of view:

(13) $$E_{OD} \Gamma^2 \tau_{OD} K \delta d^2 / \delta^2 = f(BK\delta d^2 / \delta^2)$$

where K_δ is a coefficient, which adds the Stiles–Crawford effect which shows the total influence of the light flux over the observer's eye.

If we proceed from equations (6), (7) and (13), and if we consider the brightness background in the given range and its change, the following equation is valid for the center of the field of view:

(14) $$N_0 = \frac{c \Gamma^2 \tau_{OD} K \delta d^2 / \delta^2 f(B + \Delta B)^n}{c' \left[\tau_{OD} K \delta d^2 / \delta^2 f(B + \Delta B)^{n'} \right]}$$

where c' and n' are coefficient and exponent, corresponding to a varying background brightness.

The values of the coefficient and the exponent are presented in Table 3.

Table 3

Background brightness, cd/m2	n'	c'
$B>3{,}10^{-4}$	0	$1{,}10^{-8}$
$B=3{,}10^{-4}$	0,24	$1{,}2.10^{-7}$
$B=3{,}10^{-1}$	0,67	$3{,}72.10^{-7}$
B=30	0,84	$2{,}2.10^{-7}$
$B \geq 3.10^3$	0,84	$2{,}2.10^{-7}$

III. Conclusions:

1. The experimental research and the results show that it is possible to use optical devices with 6° field of view in order to discover distant objects and the probability to find the object in this case is over 0,99 for the average time 10 seconds. After the process is sped up and the probability to be increased, it is better to use optical devices with field of view 18…20° and the probability is 0,999 for the time 1…2 sec.

2. There is a big functional relation (r=0,95)between the time for distant object discovery and the standardized magnification by field of view and luminous power. The functional dependency is described by a few models and the most adequate of them is the linear model.

3. To observe distant objects at great distances, it is advisable to use optical devices with small magnification 2^x …4^x, and the time to discover the object is 1 second.

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution ISSN 1314-9784

METHOD FOR DETERMINATION OF THE ANGULAR COORDINATES OF A DISTANT OBJECT BY MEANS OF AN OPTICAL-ELECTRONIC DEVICE

Anton Antonov

Abstract: *Among the methods for angular coordinates determination of the astronomical objects, particularly a topic of the present day is the Turner method based on static processing of data information for three and more stars number.*

With regard to used in astronomical practice optical electronic apparatuses which have high resolution and comparatively closely a field of vision lower than one degree of Celsius, it grows up the actuality of the methods for angular coordinates determination at minimum number of supporting (catalogical) stars. In this conditions it's necessary to be re-examine the respect to orthogonality methods, the accuracy of which can be increase through statistical analyze.

Calculation for ideal coordinates and the equatorial coordinates of an astronomical object are shown as well as the possible errors for their determination.

Apriori it is supposed the orthogonality method is more effective because of the fact that the possibility for appearance in the two stars field of vision is bigger than of the three ones.

Key words: *angular coordinates*

Among the methods for angular coordinates determination of the distant objects, a topic of the present day particularly is the Turner method based on statical processing of data information for three and more supporting pivots number $n \geq 3$ and the method of four constant (orthogonal) ones using two supporting pivots [1,3,9,10,14].

In connection with the widely spread optic-electronical measuring systems in the practice, which have high-resolution ability and a comparatively small field of vision- smaller than one degree [2,4,6,12,13], the actuality of the methods for determining the angular coordinates arises in minimum of number points of support pivots. In these conditions the attitude to the orthogonal methods has to be reconsidered, the accuracy of which can be arised by statistical arrangement way in $n > 2$.

The influence of the differential effects for the optical systems with a narrow field of vision is insignificant.

A method for angular coordinates determination of the distant objects, and their coordinates calculation in methods of least squares is presented.

The correlation between the ideal and the measured coordinates is being putting into formulas [5,7]:

$$(1)\qquad \begin{aligned} \zeta_1 &= ax_i + by_i + c \\ \eta_i &= -bx_i + ay_i + f \end{aligned} \qquad \text{if } i = 1,k$$

where: x, y – calculated coordinates of pivots;
ξ, η – ideal coordinates of pivots.

The expression (1) can be done also in the following way:

$$(2)\qquad \nu_{l.i} = x_{1,i}a_1 + x_{2,i}a_2 + 1a_3 + 0a + \xi_{1,i}$$

or in a matrix form:

$$(3)\qquad \vec{\nu} = \overrightarrow{Xa} + \vec{\xi}$$

when: X is a matrix made by rows

$$(4)\qquad \begin{matrix} \vec{x}_{1,i}\{\vec{x}_{1,i}, \vec{x}_{2,i}, 1, 0\} \\ \text{and} \\ \vec{x}_{2,i}\{\vec{x}_{2,i} - \vec{x}_{1,i}, 1, 0\} \end{matrix}$$

and calculating the equations

$$(5)\qquad Q = X'X, K = Q^{-1}\ ,\ \vec{L} = X'\vec{\xi}, \vec{a} = -K\vec{L}\ ,$$

when: $\vec{a}$ – vector evaluating the constant staff;
Q – a matrix with normal equations as follows:

$$(6)\qquad \begin{matrix} [x_1^2]+[x_2^2] & 0 & [x_1] & [x_2] \\ 0 & [x_1^2]+[x_2^2] & [x_2] & -[x_1] \\ [x_1] & [x_2] & k & 0 \\ [x_2] & -[x_1] & 0 & k \end{matrix}$$

The cell method for the matrix calculation [8] with regards to the symmetry and other characters of the matrix Q applying, it's allowed to find the mostly suitable form for the passage from the calculated coordinates to the matrix K elements forming and transporting the matrix X and forming and rotating the matrix Q. The matrix K is as follows:

$$(7) \qquad K = Q^{-1} = (X'X)^{-1} = \frac{1}{W}$$

when: $R = [x_1^2] + [x_2^2]$;

$$W = kR - [x_1^2] - [x_2^2] \ .$$

For the vector $\vec{L}$ elements are made the values as follows:

$$(8) \qquad \vec{L} = X'\vec{\xi} = \begin{vmatrix} [x_{1,}\xi_1] + [x_2\xi_2] \\ [x_2\xi_1] + [x_1\xi_2] \\ [\xi_1] \\ [\xi_2] \end{vmatrix}$$

For ideal coordinates of the distant object can be expressed:

$$\vec{a} = -KL \ ,$$
$$(9) \qquad \xi_1 = \vec{x}_1, \vec{a} \ ,$$
$$\xi_2 = \vec{x}_2, \vec{a} \ ,$$

The errors in receiving coordinates of the object Δ_α and Δ_δ are collected from the error in the reduction Δ_ξ and the error of the calculated coordinates of the object Δ_x.

$$(10) \quad \dot{\Delta}_\alpha = \dot{\Delta}_{\xi_1} + M\dot{\Delta}_{x_1} \qquad \text{and} \qquad \dot{\Delta}_\delta = \dot{\Delta}_{\xi_2} + M\dot{\Delta}_{x2}$$

Here the scale multiplier $M = \sqrt{a_1^2 + a_2^2}$ [1].

The reduction error in the solving of a system of 2k equations of four unknowns in the least squares method is determined by dispersion [11]:

$$(11) \quad \sigma^2(\dot{\Delta}_{\xi_1}) = \frac{[v_1^2]}{2(k-2)} P_1 \ , \ \sigma^2(\dot{\Delta}_{\xi_2}) = \frac{[v_2^2]}{2(k-2)} P_2$$

when the weight coefficients P_1 and P_2 are determined by formulas [11]:

$$(12) \quad P_1 = \sum \left(\frac{\partial \xi_1}{\partial a_j} \right)^2 K_j + 2 \sum \left(\frac{\partial \xi_1}{\partial a_i} \right) \left(\frac{\partial \xi_1}{\partial a_j} \right) K_i \ ;$$

$$(13) \quad P_2 = \sum \left(\frac{\partial \xi_2}{\partial a_j} \right)^2 K_j + 2 \sum \left(\frac{\partial \xi_2}{\partial a_i} \right) \left(\frac{\partial \xi_2}{\partial a_j} \right) K_i \ .$$

Having an attention to $\frac{\partial \xi}{\partial a} = \vec{x}$, P_1 and P_2 can be presented in a square form suitable of the vectors $\vec{x}_1$ and $\vec{x}_2$ and the matrix K [8]:

$$(14) \qquad P_1 = \overrightarrow{x_1}' K \overrightarrow{x_1} \quad \text{and} \quad P_2 = x'_2 K x_2$$

The final formula view for the accuracy estimation is:

$$(15) \qquad \tilde{\sigma}(\dot{\Delta}_\alpha) = \sqrt{\frac{[v_1^2]}{1(k-2)} P_1 + M^2 \sigma^2 (\dot{\Delta}_{x_1}) \cos D}$$

$$(16) \qquad \tilde{\sigma}(\dot{\Delta}\delta) = \sqrt{\frac{[v_2^2]}{1(k-2)} P_2 + M^2 \sigma^2 (\dot{\Delta}_{x_2})}$$

In conclusion it has to be marked the question for comparison of the effectiveness of that and the other methods can be a topic of special investigation but apriori it is supposed the orthogonality method is more effective.

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution

ISSN 1314-9784

AIR POLLUTION WITH SULFUR OXIDES FROM INDUSTRY IN SOUTH-WESTERN AND SOUTH-EASTERN REGIONS OF BULGARIA

Mariana Todorova

Abstract: *Restructuring of industrial production and the concrete environmental measures such as fuel switching facilities and replacement of process equipment in the energy-intensive industries, the installation of new or increased efficiency of existing treatment facilities have caused emissions into the atmosphere to decrease significantly. However, the concentration of sulfur oxides in air showed no significant improvement, despite reduced emissions.*

Key words: *sulfur oxides, emission, industry, energy.*

Introduction

Bulgarian government and local authorities made efforts in the last years to improve the quality of the air we breathe. There has been a significant improvement but it is insufficient for attaining and ensuring good quality of the air in the city regions. A considerable part of Bulgarian population still lives in cities where the appointed limits of air quality in the EU (imposed in order to preserve human health) are surpassed.

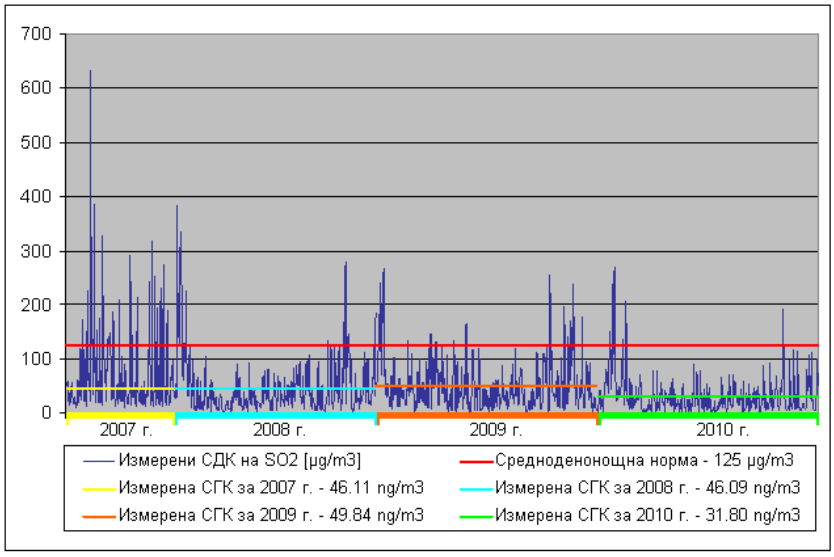

Fig. 1. Average daily concentration of SO_2 in 2007 – 2010 [3]

As a result of restructuring industrial production and the concrete ecological measures applied, such as change of combustible bases and replacement of technological equipment in companies with high energy consumption, fitting new or improving the efficiency of existing purifying stations, toxic emissions in the air are considerably less but the concentration of sulfur oxides in the air did not show any improvement despite the reduced emissions [5].

Exposition

The whole country still has a problem with pollution. Its levels in most cities are about or above the set standards and occasionally surpass the appointed levels of human health protection. The frame directives for managing air quality and better air in Europe appear as a key point in EU strategy for improving air quality as a whole. The corresponding norms in Bulgarian legislature, N 7 from 3 May 1999 for air quality evaluation and management and N 12 from 15 July 2010 for sulphur dioxide limits in the air, arrange both limits of pollution and conditions, order and ways of improving air quality in the regions where the permitted levels are surpassed [4].

In the years of the investigated period 2007-2013 specialists registered excess of the average norms per hour and/ or the average daily norms of sulfur dioxide in two regions for air quality evaluation and management (RAQEM) (South-eastern region – Galabovo and Sliven and South-western region – Kardzhali and Pernik).

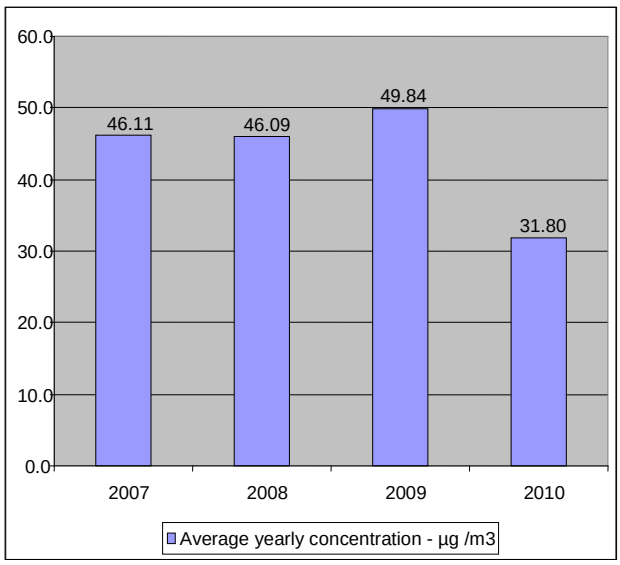

Fig. 2. Average yearly concentration of SO_2 in Kardzhali from 2007 till 2010

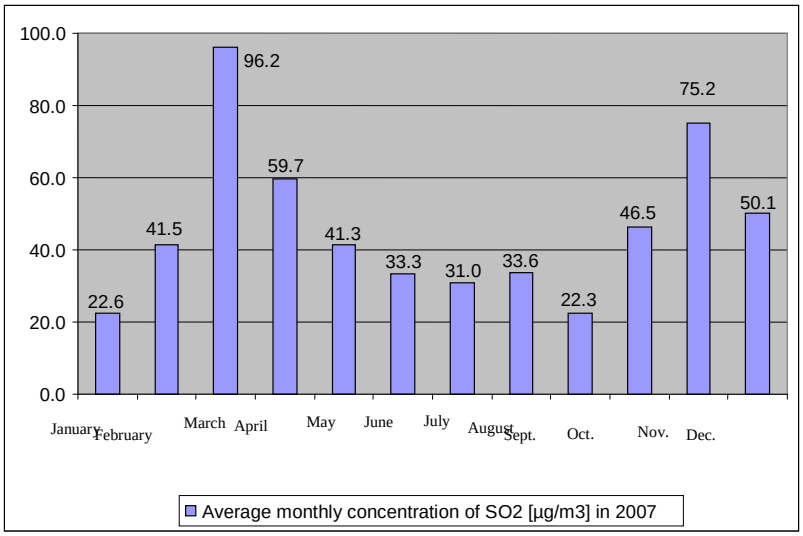

Fig.3 Average monthly concentration of SO_2 in Kardzhali in 2007

Excess above the alarm limit is registered in Galabovo and Pernik. The main sources of sulfur dioxide in the South-eastern region are the thermal-electric power stations of Maritsa Iztok energy complex and *Sliven* thermal-electric power station. In the South-western region the main sources are Lead-zinc Company LTD in Kardzhali and Central Heating Supply Station LTD in Pernik.

On the basis of the investigated emission sources influencing the pollution levels in the region of Kardzhali district the aim of the actual data at the present moment is to suggest new, effective, short-term measures, which should ensure compliance of Air Control with the law requirements about standards of human health protection; to encourage good European practices which increased the emission reduction of particular air pollutants; updating and improving the process of Air Control management via an observation system, increased control and number measurements; to provide the population with more information and better knowledge about the problems of air pollution; to ensure timely and reliable information about air conditions and pollution sources [1] .

Fig. 1 shows the average daily concentration of SO_2, measured in the period from 2007 till 2010. The measurements are made by ”KOS” in the period from 1 January 2007 till 31 July 2008 and by Studen kladenets Automatic Measurement Station in the region of Kardzhali in the period from 1 August 2008 till 31 December 2010.

The number of days with measurements for the corresponding years is as follows:

- 179 days with measurements in 2007 (49.0%);
- 329 days with measurements in 2008 (89.9%);
- 363 days with measurements in 2009 (99.5%);
- 364 days with measurements in 2010 (99.7%).

The red line shows the average daily norm (ADN) of 125 μg/m^3. The maximum number of excesses of ADN of sulfur dioxide (SO_2) per year is 3. The number of excesses of ADN for the corresponding years is [1] :

- 33 days with excesses above the ADN out of 303 days with measurements in 2007 (10.9%);
- 23 days with excesses above the ADN out of 326 days with measurements in 2008 (7.10%);
-23 days with excesses above the ADN out of 363 days with measurements

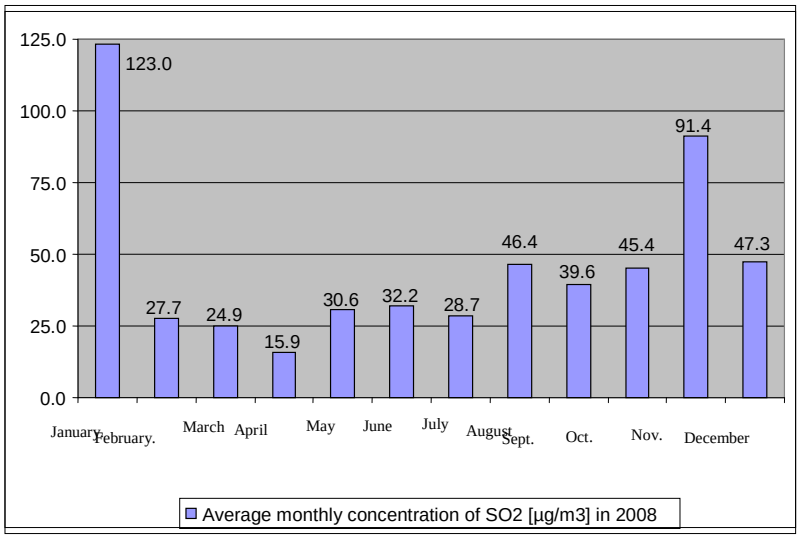

Fig. 4. Average monthly concentration of SO_2 in Kardzhali in 2008

in 2009 (6.3%);

-9 days with excesses above the ADN out of 362 days with measurements in 2010 (2.5%).

There is an average norm per hour (ANH) for the sulfur dioxide of 350 μg/m^3. The maximum number of excesses of ANH for the sulfur dioxide (SO_2) per year is 24 [2] .

The number of excesses of ANH for the corresponding years is as follows:

-28 excesses of ANH out of 902 hours with measurements in 2007 (3.1%);

-171 excesses of ANH out of 5734 hours with measurements in 2008 (3.0%);

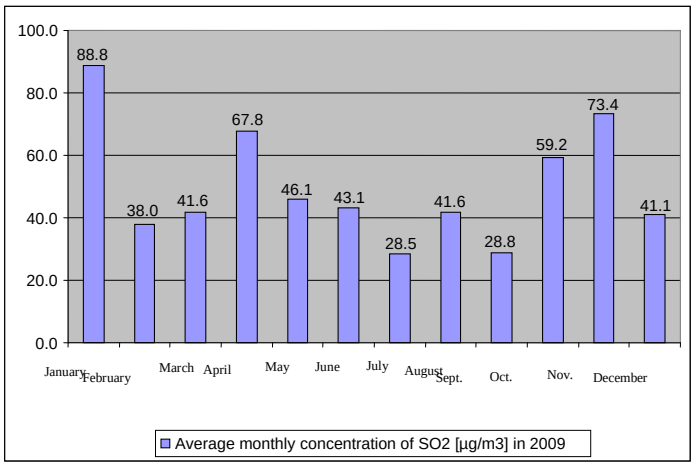

Fig. 5. Average monthly concentration of SO_2 in Kardzhali in 2009

-203 excesses of ANH out of 8301 hours with measurements in 2009 (2.4%);

-88 excesses of ANH out of 8316 hours with measurements in 2010 (1.1%).

The number of days with excesses of ANH in the corresponding years is as follows:

-28 excesses of ANH in 25 out of 303 дни с days with measurements in 2007 (55.6%)

-171 excesses of ANH in 169 out of 326 days with measurements in 2008 (51.8%)

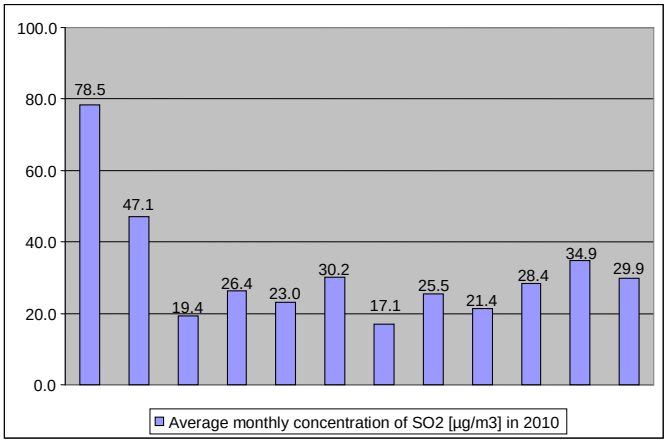

Fig. 6. Average monthly concentration of SO_2 in Kardzhali in 2010

-203 excesses of ANH in 202 out of 363 days with measurements in 2009 (55.6%)

-88 excesses of ANH in 62 out of 362 days with measurements in 2010 (17.1%)

The analysis of Fig. 1 leads to the following conclusions:

1. The number of excesses of the average daily norm (2007 - 33; 2008 - 23; 2008 - 23; 2010 - 9) shows a tendency to decrease.

2. The value of the average concentration per year has considerable decrease in 2010.

3. There is no tendency for increasing the values of the average

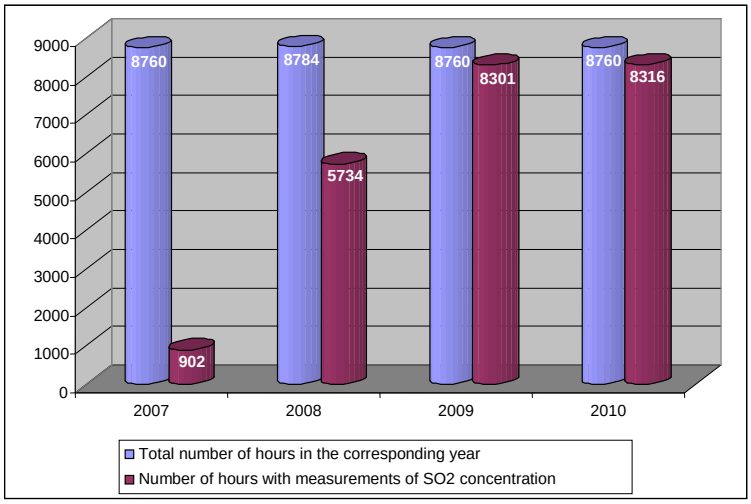

Fig. 7. Comparison of the number of hours with measured concentration of SO_2 from 2007 till 2010 with the total number of days with measurements in the corresponding years

oncentration per year in the winter months. This shows that pollution is not related to the seasonal emissions of domestic heating but to the production processes of the main source of pollution in the district - Lead-zinc Company LTD.

There is an analysis of the number of excesses of the average norm per hour for human health protection in all the years under investigation. The analysis shows that the norm is not kept during the four years and more than the allowed 24 excesses of ANH are registered (2007 – 28; 2008 - 171; 2008 - 203; 2010 - 88).

In chapter 4 of the program ”Character and evaluation of pollution” [1]

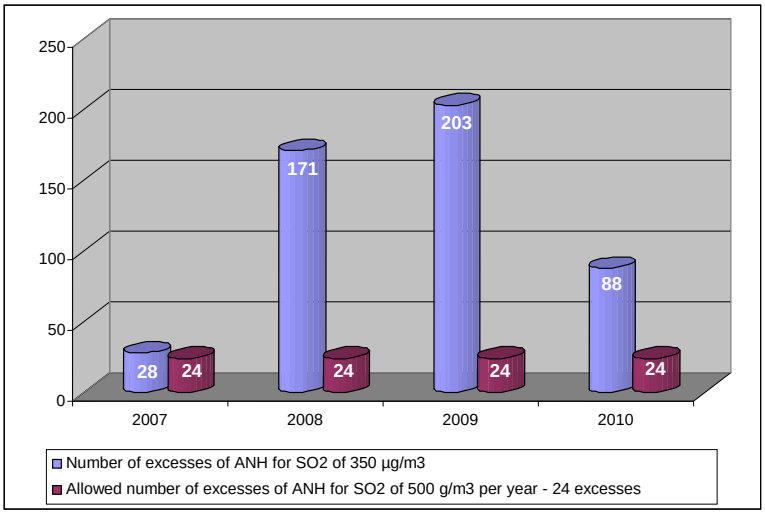

Fig. 8. Number of excesses of ANH of SO_2 in the period 2007 - 2010 of 500 $\mu g/m^3$

there is a detailed analysis of air quality and there are conclusions made about the possible reasons for the values which are measured for this pollutant [2].

Analysis of the SO_2 concentration measured in the region of Kardzhali in the period 2007 - 2010 with the number of allowed days with excesses - 3 days.

According to the presented data of measured air concentration in the region of Kardzhali in the period 2007 - 2010 the following conclusion about pollution with sulfur dioxide (SO_2) can be made:

- during the four years of investigation the average norm per hour for human health protection is surpassed more than 24 times, which is the limit allowed (2007 - 28; 2008 - 171; 2009 - 203; 2010 - 88). And despite the 2010 tendency to decrease, the excesses are 3.7 times more than the allowed limit;

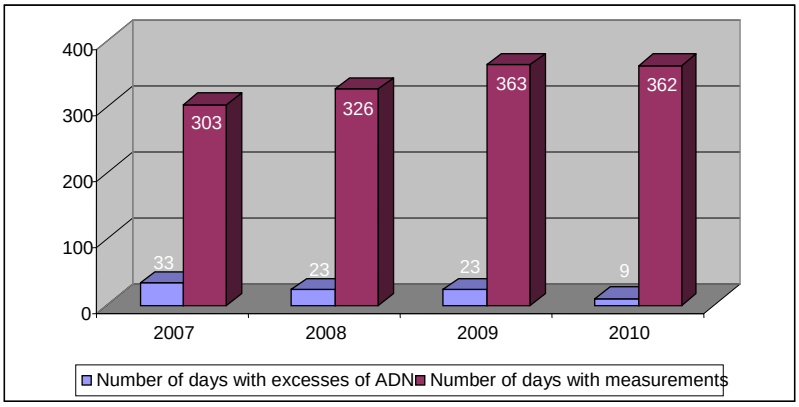

Fig. 9. Comparison of the number of days with excesses of ADN for SO_2 with the number of days with measurements in the period 2007 - 2010

- the number of days with excesses of the average daily norm shows a tendency to decrease (33 days in 2007 - 9 days in 2010), nevertheless it surpasses significantly the maximum number of excesses allowed for the ADN of SO_2, which is 3 per year;

- numerous excesses above the alarm limit for sulfur dioxide of 500 $\mu g/m^3$. According to the instruction the population was informed about 3 successive excesses of the average norm per hour for sulfur dioxide above the alarm limit of 500 $\mu g/m^3$;

- the values of the average concentration per year are not a controlled parameter for the atmospheric air but they are an integral indicator, which is actually directly related to the total yearly emissions of SO_2O.

The value measured in 2010 is lower than the values measured in the period 2007-2010. The following tables give evidence for this:

Table 1

Average measurements per hour of sulfur dioxide [3]

Place	Registered data Concentration per hour	Number of excesses of ANH [350 $\mu g/m^3$]	Maximum average concentration per hour measured [$\mu g/m^3$]	Number of excesses above the AL*
Kardzhali – Studen kladenets	8318	85	1516.63	1
Dimitrovgrad - Rakovski	8481	13	965.09	0

*****AL **–** alarm limit for sulfur dioxide (500 $\mu g/m^3$, measured in three successive hours)

Table 2

Average measurements per day of sulfur dioxide [3]

Place	Registered data Concentration per day (24 hours)	Number of excesses of ADN [125 $\mu g/m^3$]	Number of excesses of *UL [75 $\mu g/m^3$]	Maximum average concentration per day measured [$\mu g/m^3$]	Average concentration per year [$\mu g/m^3$]
Kardzhali – Studen kladenets	363	9	29	271.48	31.56
Dimitrovgrad - Rakovski	357	0	16	123.41	25.38

*****UL – upper limit for sulfur dioxide in the atmospheric air

In the last years sulfur cleaning installations caught 824,4 thousands tons of sulfur. A National program for decreasing the total yearly emissions of sulfur dioxide, nitric oxides, volatile organic compounds and ammonia in the air was approved by virtue of the Law for cleaning atmospheric air (LCAA) under article 10 in order to ensure the application of Directive 2001/80/EO and the fulfillment of the obligations of the country in the EU Accession Agreement. The document was approved with Decision N 261 by the council of ministers. Its application leads to considerable reduction of the pollution with sulfur oxides as can be seen in Tables 2 -6 below**.**

Table 3

Average values per hour for sulfur dioxide – 2011 [3]

Place	Registered data Concentration per hour	Number of excesses of ANH [350 µg/m3]	Maximum average concentration per hour measured [µg/m3]	Number of excesses above the AL*
Kardzhali – Studen kladenets	8366	38	960.70	0
Dimitrovgrad - Rakovski	8379	20	710,74	0

*****AL **–** alarm limit for sulfur dioxide (500 µg/m^3, measured in three successive hours)

Table 4

Average values per day for sulfur dioxide – 2011 [3]

Place	Registered data Concentration per day (24 hours)	Number of excesses of ADN [125 µg/m^3]	Number of excesses of UL* [75 µg/m^3]	Maximum average concentration per day measured [µg/m^3]	Average concentration per year [µg/m^3]
Kardzhali – Studen kladenets	365	4	31	172,07	29,91
Dimitrovgrad - Rakovski	361	2	20	133,83	28,32

*UL – upper limit for sulfur dioxide in the atmospheric air

Table 5

Average values per hour for sulfur dioxide – 2012 [3]

Place	Registered data Concentration per hour	Number of excesses of ANH [350 µg/m3]	Maximum average concentration per hour measured [µg/m3]	Number of excesses above the AL*
Kardzhali – Studen kladenets	8331	8	593,62	0
Dimitrovgrad - Rakovski	8302	19	876,10	1

*AL – alarm limit for sulfur dioxide (500 µg/m^3, measured in three successive hours)

Table 6

Average values per day for sulfur dioxide – 2012 [3]

Place	Registered data Concentration per day (24 hours)	Number of excesses of ADN [125 µg/m^3]	Number of excesses of UL* [75 µg/m^3]	Average concentration per year [µg/m^3]
Kardzhali – Studen kladenets	361	1	8	14,17
Dimitrovgrad - Rakovski	361	2	13	22,20

*UL – upper limit for sulfur dioxide in the atmospheric air

There is a program developed which makes provision for measures reducing the emissions. As a result the program aims at the application of Directive 2001/80/EO and achieving the national limits listed below:

Table 7

Average values per day for sulfur dioxide – 2013 [3]

Place	Registered data Concentration per day (24 hours)	Number of excesses of ADN [125 µg/m3]	Number of excesses of UL* [75 µg/m3]	Average concentration per year [µg/m3]
Kardzhali – Studen kladenets	92	0	1	88.88
Pernik - Shahtyor	82	2	17	183.35
Galabovo	92	0	3	117.85

*UL – upper limit for sulfur dioxide in the atmospheric air

Table 8

Emissions of pollutants in the atmospheric air by anthropogenic sources (without nature) compared to other atmospheric pollutants and international agreements of Bulgaria, kt [3]

Atmospheric pollutants	Emissions in 2011	Agreements according to Directive 2001/81/EO	Agreements according to Gotheburg Protocol to the Convention on Long-range Transboundary Air Pollution (LRTAP)		Aims of the National program approved with Decision N 261 by the Council of ministers	
		2010	2010	2010 г.	2015	2020
SO_x (i.e. SO_2)	514	836	856	380	300	250
NO_x (i.e. NO_2)	136	247	266	247	247	247
NMVOC	92	175	185	175	175	175
NH_3	48	108	108	108	108	108

Summary

In the period 2011 – 2013 there is a tendency to decrease the pollution in the atmospheric air and to reach the allowed norms of pollutants in the region of Kardzhali.

This can be seen in the analyses made for sulfur oxides in the period 2007-2013 of the average daily concentration of SO_2, measured in the period from 2007 till 2013. Data is received from ”KOS” for the period from 1 January 2007 till 31 July 2008 and from Studen kladenets Automatic Measurement Station for the period from 01 August 2008 till 31 December 2013.

These data can be also used when a morphological model is constructed, then the main elements are defined and the risks and criticalities for air pollution with sulfur oxides are determined [5].

We can use a turbulent stream model and the accompanying program PLUME based on it [4].

Scenarios are reproduced which allow the specialists to take decisions about the ecological security of the region.

Air pollution with sulfur oxides in the residential areas and the damages they can cause to the population are evaluated with an improved method of probability. The method uses eight probability criteria for evaluating the risk of pollution. These criteria allow us to analyse and determine the chance character of emissions and immissions that influence the risk and criticalities.

Conclusions

The analysis of the results of the concentration of sulfur dioxide leads to the following conclusions:

1. With regard to the number of excesses of the average norm per hour for human health protection (fig.1-fig.8):

- the diagram shows excesses above the allowed limit for all the years investigated;

- the comparatively small excess above the allowed limit in 2007 can be explained with the fact that the measurements at this place are done with manually taken samples. The analysed data include 902 average values per hour out of all 8760 hours in the year, which is only 10.3%;

- although the data for 2010 (88 excesses) show considerable decrease compared to the values measured in 2008 and 2009, still they are 3.67 times above the allowed 24 excesses of the average norm per hour.

2. With regard to the number of excesses of the average daily norm:

- the diagram shows excesses for all the years investigated;

- although the data for 2010 show considerable decrease (3 days with excesses) compared to the values measured in 2008 and 2009, still they are 3 times above the allowed 3 excesses of the average daily norm.

3. With regard to the average concentration per year (Fig. 10):

- these values are not a controlled parameter for the atmospheric air but they are an integral indicator, which is actually directly related to the total yearly emissions of SO_2;

- the values for the period 2007 – 2009 are almost equal, while the diagram shows a considerable decrease in 2010.

4. The diagrams for monthly distribution of the average daily concentration (Fig.1 - Fig.6) show no tendency for maximal values of the average daily concentration in the winter months.

This means that pollution is not related to the seasonal emissions of domestic heating but to the production processes of Lead-zinc Company LTD.

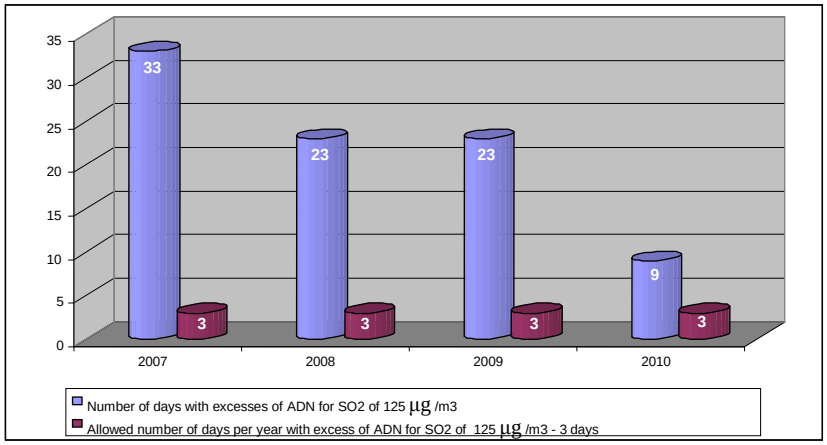

Fig. 10. Comparison of the number of days with excesses of ADN for SO_2

5. The overall evaluation of the possibilities for preventing the pollution with sulfur dioxide is not favourable. The serious breach of the atmospheric air norm determines the necessity for a series of radical measures not only for decreasing the emissions per year but for protection from exceeding the average norms per hour and per day. There are excesses registered above the alarm limit of sulfur dioxide of 500 $\mu g/m^3$ and according to the instruction the population was informed about 3 successive excesses of the average norm per hour for sulfur dioxide above the alarm limit of 500 $\mu g/m^3$.

6. In the period 2011 – 2013 in the region of Kardzhali there is a tendency to decrease the pollution with sulfur dioxide, to reduce considerably the pollutants in the atmospheric air and to reach the allowed norms of harmful substances. This is shown in tables 1- 8.

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution ISSN 1314-9784

ASPECTS OF THE ORGANIZATION FOR COUNTERACTION TO ATTACKS AGAINST THE COMPANY SECURITY

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Abstract: Using a rational organization for counteraction to attacks in the sphere of company security is one of the possible mechanisms for increasing the effectiveness of the process of providing protection of the business organizations from contemporary violations. Therefore the paper researches the organization of counteraction to attacks against the company as a very important stage in the process of managing the business organization. It is a prerequisite for obtaining a higher level of analysis objectivity and evaluation of the organizational unprotectedness.

Key words: Counteraction organization, attacks, management, company security, business organization, threat sources, assets evaluation, organization unprotectedness, mechanisms, means, methods and forms of counteraction

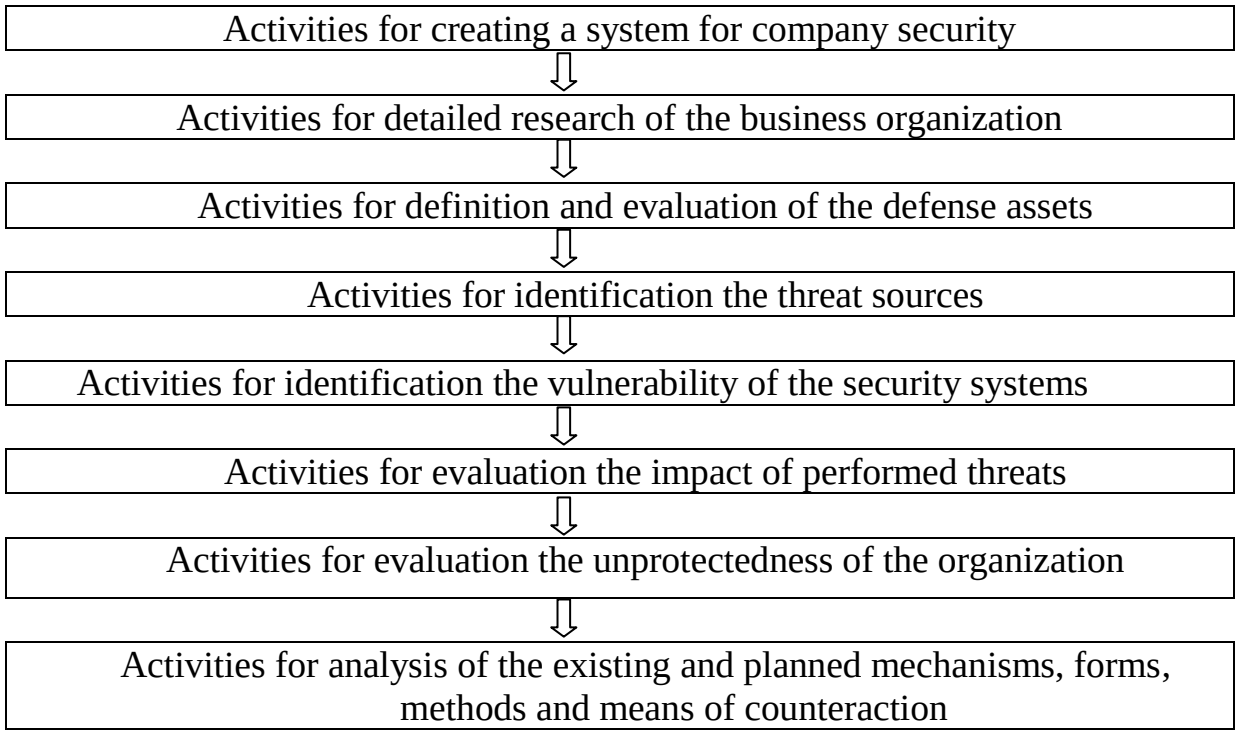
Together with the development of the contemporary global challenges, threats and attacks, we need to optimize the means of timely and reliable detection, neutralization and minimization of the negative consequences from their impact upon the business organizations.

The use of a rational organization of counteraction in the sphere of company security is one of the possible mechanisms for increasing the effectiveness of the process to provide security of the business organization from the contemporary violations. Therefore the paper researches the organization of counteraction to attacks against the company as a very important stage in the process of managing the business organization. It is a prerequisite for obtaining a higher level of analysis objectivity and evaluation of the organizational unprotectedness.

The organization of counteraction to attacks against the company security is a very important stage in the process of the business organization

management which is characterized by a complex and compound nature and includes certain interconnected activities and procedures. The complex and precise performance of each of these activities is a prerequisite for obtaining a higher level of objectivity in the analysis and evaluation of the company unprotectedness and for creating circumstances for rationality of the process of organizing the counteraction.

The organization of counteraction to attacks against the company security in a methodological aspect includes activities, which are presented in Fig. 1.



Фиг.1. Methodology of the organization for counteraction to company security

The complex consideration of the mentioned activities is a compulsory condition for performing a reliable counteraction to the attacks against the organization. Underestimating any of the components or its incomplete characterization means that the reliable identification of the attacks is not possible and it would be an obstacle to performing the next stages of the process organization of counteraction.

„The system for management of the company security is part of the general system for management of the company. Its aim is to develop, implement, perform, observe, inspect and improve the company security. *It includes an organizational structure, policies, planning activities, responsibilities, practices, procedures and resources”[1].*

The first thing, with which we have to start when developing the system, is to define and to motivate the location, the objectives, the scope and the policies of Security Management System (SeMS) *[2]*.

Three of the basic activities in the organization of counteraction to attacks – characterizing the social organization, identification of the threats and identification of the vulnerabilities, have a defining characteristic which is presented in Fig. 2.

The thorough cognition of the social organization, of its nature, mission, goals, objectives, is a basic condition for the successful definition of the assets for protection and identification of the system vulnerabilities. Without having detailed information for all the functions and activities of the organization, we cannot have a reliable identification of all the threats which come out of the organizational activities. It is necessary to know in details the environment in which the social organization operates. Having information about the basic characteristics of the political, social, judicial and cultural environment would allow the formation of objective knowledge about the organizational functioning and adequate identification of the threats and attacks.

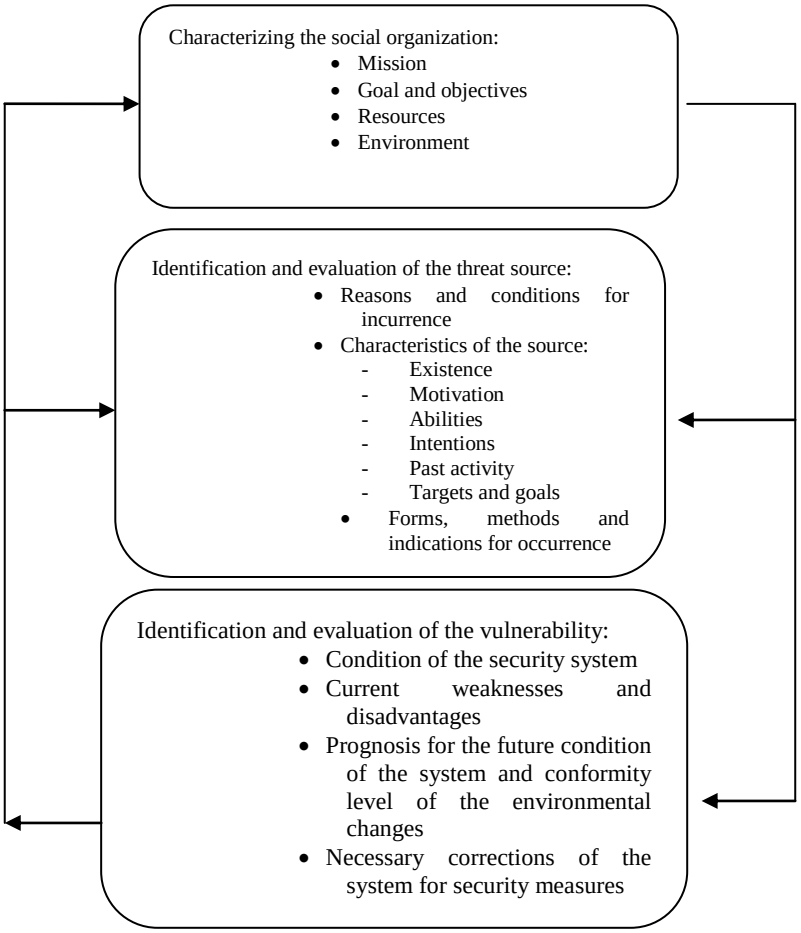


Fig.2: Technological scheme of three of the basic elements of the organization for counteraction to attacks in the security sphere

„In the conditions of complex and dynamically changing environment, to implement the mission of the social organization, it is very important to "obtain absolutely new functional possibilities in the integrity, which is impossible for its components", i.e. by means of achieving a synergistic effect" [3].

Knowing not only the separate structural components of the social organization but mainly the level of achieving synergism in its activities, is of basic importance for the objective characterization of the organization. "The synergism of the organizations is the purpose of their creation and a measure for their effectiveness"[4].

Every organization has its own mission and the whole management activity is aimed at its accomplishment. The organization of counteraction has a basic and principal goal to secure the abilities of the organization to accomplish its mission.

„The mission, by its nature, is the fundamental purpose for creation and functioning of the organization. The mission is the basis on which the common interests, values, intentions, goals and priorities are defined. A well formulated mission, according to Campbell and Yeung, has to include four elements which are the basis of Ashridge's model – purpose, strategy, behavior standards and values. The purpose has to give us an idea about the reason for the organization's existence which can be viewed in a smaller or larger aspect. The strategy defines the road for realization of the basic goal and the boundaries of activity of the organization. The standards transform the purpose and strategy from intellectual products into effective tools which set the rules of operation in the organization. The values are connected to the behavior standards which are accepted by the organization – the common images and values for creating an organizational culture."[5].

The purposes of the organization come from its mission and are preliminarily set, in accordance with the complex nature and the dynamic changes of the security environment.

The detailed knowledge of the mission and purposes of the organization allows objective identification, analysis and evaluation of the threats and attacks so the adequate strategies can be used for the counteraction management.

Defining and evaluation of the values and assets for defense of the organization are the next step of the counteraction organization. For this purpose, the object of the organization defense should be described; the elements in the system and the activities which are performed in it should be defined; the assets of the organization which are object of defense should be specified. Every asset should comply with the question: "Why does it need defense and how does it influence the whole organization security?"

„The first thing from this stage is to describe and evaluate the organization's assets and to define its owners. For this purpose, we can use methodology which is based on a scale with virtual units so the concrete money

value is avoided. The methodology should be chosen when the object of defense and the specifics of the performed activities are considered."[6].

The value of every asset is defined according to its contribution to the organization and according to its type. „Finally, every assessment should be done on the basis of the total injuries from loss of confidentiality, integrity and availability of the assets"[7].

„When defining the value of the assets, the data should be classified according to the consequences from an eventual attack. The following levels of assets security are recommended for use: critical, company, personal and for internal use" [8].

Knowing the threat sources for the social organization, of the conditions and prerequisites for their occurrence, the ways and forms of action, the indications for their existence, the prognosis of development are the basic factors for objective identification of the attacks.

The identification of attack sources, as a considerable step in the process of counteraction, is aimed at the optimum identification of the real and potential threat sources for the social organization, the detailed definition of their origin, structure, characteristics and indications for their manifestation. This step is an important prerequisite for the successful implementation of systematization and prioritization of the threats, depending on the extent of security threat of the social organization and the aim is to adequately organize and implement mechanisms for prevention or neutralization of their impact.

The identification of the sources of threats is done on the basis of "different factors, including ability, intention, influence, attack intensity, etc."[9].

The identification not only of a certain threat source in general, but the strive for a detailed presentation of its nature, structure and organization, reasons and conditions for occurrence, basic components and its sub-components, ways and forms of manifestation, all these advantage the formation of an objective image of the threat.

The formation of a detailed and complex image for the nature, motivation, methods of actions of the threat sources, is done on the basis of identification, analysis and evaluation of past and current manifestations of the source and prognoses for its future development.

The identification of the threat sources as a basic component in the process of counteraction is a very important prerequisite for achieving objectivity in the environment assessment in which the organization functions, for the threats and for the risks which would impede its mission.

The next basic component at the level of counteraction is the identification of the vulnerabilities of the social organization. The aim of this stage is to define all existing and potential weaknesses and disadvantages of the security system of the organization, which create circumstances for negative impact of the threat sources.

The attack occurs when a certain threat source is aimed at exploiting certain vulnerabilities of the security system of the organization and the complex organization of the counteraction requires the performing of objective identification and knowing the weaknesses and disadvantages in the security system which are prerequisites for the occurrence of the vulnerabilities.

„The identification and assessment of the vulnerabilities is a process by which we evaluate "the weaknesses of the physical security system, personal security and the procedures or other spheres of the organization's functioning which can be exploited. The purpose of the process is to reveal weaknesses in the security system, the information systems and networks and the unsecured key infrastructure of the organization."[10].

The vulnerability can be defined as a disadvantage or weakness of the security system of an organization which can be intentionally or accidentally exploited and as a result of this, violations can be observed of the security policy of the organization.

The threat source is evaluated when considering the following factors: presence of the source in the security environment of the social organization; abilities for performance of a negative impact; motivation and intention for performing the threat; activity of the source in the past; credible information for pointing the threat towards the organization and preparation for performance of the negative impact – attack.

The assessment of the vulnerability of the social organization includes: analysis of the goals of the organization and evaluation of the potential influence of the threat sources on the goals' accomplishment; assessment of the elements of the organization of critical influence for its mission accomplishment; evaluation of the security system of the organization; evaluation of the possibility to recover after an eventual attack.

The analysis of the used or planned mechanisms and procedures for defense is aimed towards minimization or elimination of the vulnerabilities of the security system for certain threat sources. The thorough analysis of the mechanisms and procedures for defense includes a differential analysis of the types of mechanisms and the used criteria for their analysis.

The mechanism and procedures for the defense of the system can be divided according to its character, into management, operational and technical and the analysis requires not only their thorough identification at the stage of identification of vulnerabilities but also analysis of the interrelationship and interdependence when creating the security system, a complex assessment of their condition in the past and present stage of functioning and forecast future development.

According to their functional purpose, the mechanisms and procedures of protection can be additionally categorized accordingly into procedures with preventive character and procedures for revealing and neutralizing of performed attempts for attacks over the security system.

The analysis and evaluation of the conformity of the planned and used mechanisms and procedures for defense of the developed criteria for security (at management, operational and technical level) is the concluding stage in the analysis of the condition of the security system. It creates conditions for achieving a higher level of adequacy of the created or optimized security system of minimal standards, achieving a higher level of sustainability of the system in the contemporary challenges and threats and guaranteeing the defense of the social organization in the complex and dynamic security environment.

Defining the level of unprotectedness for a social organization when there exists a certain pair threat–vulnerability, can be expressed as a function of: the probability of a specific threat source to influence a certain vulnerability; the magnitude of the negative impact when the threat source strikes the vulnerabilities; the adequacy level of the planned or used mechanisms and procedures of defense for decreasing or eliminating the unprotectedness.

To present the results from the measurement of unprotectedness visually, we can prepare matrixes for the level of unprotectedness and scale of unprotectedness with assessment of the correction necessity.

The matrixes for the unprotectedness level are prepared on the basis of complex research of the results from the evaluation of probability of the threat source to occur and the level of the negative effect from its impact.

The evaluation of the level of unprotectedness for the social organization can be done also on the basis of analysis of the results from the activities of the organization at a different level of information provision for the threats and vulnerabilities and effectiveness of the chosen strategy for counteraction to the threat sources.

The stage of analysis and assessment of the unprotectedness of the social organization is of great importance for the effective management of the counteraction because at that stage we not only process, systemize and prioritize the information from the threat identification stage and define the probabilities of the threat source to appear and its magnitude of negative impact but also we present the final product of assessment of the unprotectedness and recommendations are given to optimize the security system; a basis for effective counteraction is created.

The development of recommendations for the necessary actions to correct the system of defensive mechanisms and procedures is the final stage of the counteraction. The aim of this step is to build an objective basis for making a decision about implementing the necessary strategies for management of the counteraction in a social organization and at this stage the recommended measures are evaluated, prioritized and applied.

The objective and reliable implementation of the analysis and assessment of the unprotectedness is the most important prerequisite for development and implementation of an effective organization for counteraction, adequate to the

dynamic security environment and it has the characteristics of proactive behavior for detection and neutralizing of the threat sources and attacks.

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution ISSN 1314-9784

APROACHES FOR STEGO DEFENSE OF SENSITIVE INFORMATION FROM INSIDE LEAKAGE

Stanimir Stanev, Hristo Hristov , Donika Dimanova

Abstract: *Using the achievements of computer steganography by insiders to create hidden leakage of sensitive information and some new challenges on the security services are discused. Two new terms: stego-incident and stego-defense are proposed. The possible variants of insiders' activities are marked. Based on the analysis of those threats approaches for protection and countermeasures are proposed.*

Key words: *information security, steganography, steganology, steganography detection, social engineering.*

Steganography is an art, a combination of technical skills and scientific applied field for ways to hide the fact of delivery of information [1]. Experts use the term steganology, comprising two logically opposite components - steganography and steganalysis. Steganalysis is understood as methods and technologies to detect covert communications using steganographic technologies. In analogy to the cryptology the specialist in the field of steganalysis is called steganalyst. Any attempt to uncover, extract, or to destroy the embedded message is stegoattack. The steganalyst plays the role of an eavesdropper of the stego communication [2].

The stego techniques can be applied for the purposes of data protection, as well as for illegal purposes - for example, the creation of hidden leakage of prohibited documents and communications of terrorists. Using steganography incorrect employees of a company (here the term insider is used in its criminal meaning) can transfer outside the security areas of the company stolen secret information to the Internet, overcoming all protective filters [3]. The traditional tools for network security and systems to prevent data loss do not detect the use of steganography by insiders [4].

In this work two new terms are introduced- stego incident and stego defense. Stego incident is a criminal activity using IT steganography to undermine sensitive information through the formation of a secret channel leakage or for an unauthorized access to it.

Stego defense is a complex of administrative, hardware and software measures to prevent stego incidents. Basically there are two forms of the

computer detection of steganographic activity: Steganalysis and disclosure of the stegoprogram used in the stego incident [5]. Problems in the investigation and court proving of stego incidents are the subject of other studies outside the scope of this paper.

The purpose of this paper is to show the main threats to stego incidents in a company or organization and the directions for protecting information against using steganographic methods - i.e. for stego defense of information.

The roles of the offenders and defenders in covert communication, was first examined theoretically in 1983 by Simmons with the “prisoners’ problem” of Alice , Bob and the warden Willy [6]. In Fig.1 it is adapted into a proposed model of stego incident. There Alice and Bob participate in a plan of the intelligence service of a competitive company “B” for the realization of hidden stego channel for transmitting sensitive data from the high-tech company “A” (this company has a subsidiary “A1” in another region). This service has set this task to his agent Bob. He recruited Alice that has access to the desired information in the security zone of “A”. She confirms the presence of specialized security devices at the network output of company “A”. In order not to reveal his agent for delivery of secret information, Bob seeks and finds weakness in the security of “A”. This is the permission for the staff of “A” to use personal computers and mobile phones for wireless Internet connection in the security area. Bob decided to apply steganographic methods for solving the problem.

On Fig.1 is shown a variant of a secret channel for information leakage. After obtaining the secret information, Alice downloads through her personal computer from the “cloud” the ST stegoprogram, delivered by Bob, and appropriate file - containers and embeds it into them. She sends the stego files created from her personal computer using an available wireless network other than the network of “A” to the Web - site – “secret place”, appointed by Bob. Subsequently, Bob downloads from there the stego files by the same ST program, derives the desired information from them and provides it to the company headquarters of “B”.

In the model on Fig.1 Willy is an administrator of information security at a company “A” and should provide:

1. Secrecy transfer of the information from the protected company “A” to its subsidiary "A1", located in another region (country).

2. Leakage protection of confidential information through the created stego channel by the insider Alice from company “A” to a competitive company “B”, represented by the resident of its intelligence, Bob.

3. Infrastructure protection of “A” from penetration by stego methods on behalf of Bob.

To achieve the desired level of reliability in protecting the organization from stego incidents, a prerequisite is the use by the security service of classical operational countermeasures by performing the types of counterintelligence

activity - detection, prevention and suppression of conceived stego attacks against the information security of the organization and preventive activities [7,8].

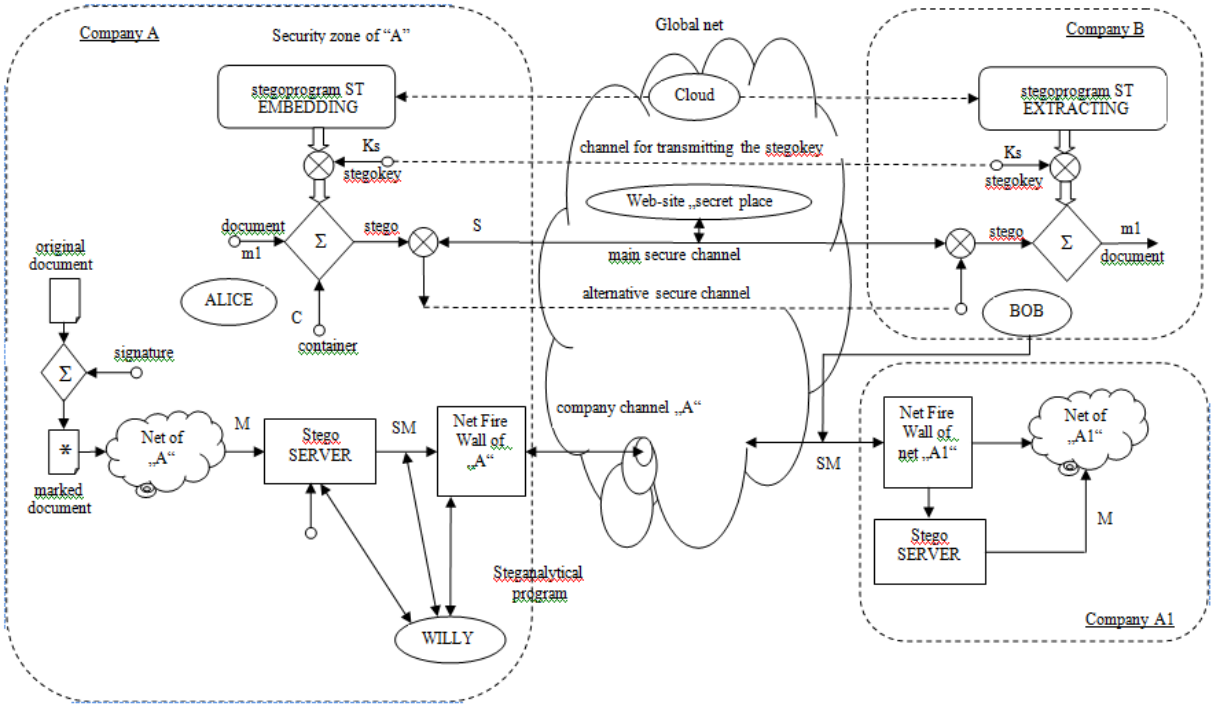

Fig.1 Variant of a secret channel for information leakage.

A preventive activity is a system of organizational, educational, legal and operational measures implemented by the security authorities of the organization to prevent execution of attacks against its information security.

An operational disclosure is a collection, analysis and evaluation of information relating to stego attacks and stego incidents against the security of the organization [8]. In terms of companies of the type of "A" ways of making inquiries, monitoring, intercepting, collecting information from technical channels of communication, a secret view and information gathering "in the dark" are fit for purpose.

For preventing and suppressing stego incidents there should be used:

- Impact on the minds and the will of potential offenders in such a way that they give up their criminal intentions, plans and actions through motivation and training of the people;

- Hindereing the activities of potential offenders through obstacles to implement specific actions by deprivation of the opportunity to gain access to the attacked object, creating difficulty in sourcing funds for crime activity and preventing the conspiratorial carrying out of illegal activities, such as by

jamming with a white noise generator of the area in which important data is being processed.

The latest software tools and techniques should be used in the protection from stego - incidents. One of these solutions are Data Leakage/ Lost Prevention systems (DLP). These systems intercept the whole traffic coming out of the protected network of the organization and scan it for the presence of confidential data in it. Moreover, these systems scan the information recorded by the users of the organization's network on removable media via their workstations. These systems should have modules for steganalysis in their composition like the DLP system of McFee, combined with the steganalytic program StegoSuite of WetStone Technologies Inc. [9]. For the development of a good DLP -system it is necessary to use methods and algorithms for steganalysis, the development of which directly affects the efficiency of the whole system and its value to consumers, as well as the security of the network of a given organization from insiders. Such perspective systems for data steganalysis are called SDP (Steganography Detection Prevention) [10].

- Deprivation of funds for carrying out stego attacks by specific measures set out in the IT - security policy of the organization, such as:

1) ban on the importation, uploading, downloading and using encryption and steganographic programs for personal purposes without the knowledge and permission of the system administrator; ban on access to the Internet on computers, which process confidential company information and ban on re - writing data on information media;

2) ban on the bringing of personal computers and mobile devices in the security areas of the organization with capabilities to access the Internet outside the computer network of the company;

3) organization of control over the outgoing traffic of the company through a proxy server, firewall, etc.;

4) creation of an intermediate unit serving the proxy server with capabilities to jam all free Internet services;

5) creating a server to remove the multimedia files and limiting the capability of the service channel to attach multimedia files;

6) stego analysis of all outgoing multimedia objects through the official network channel of the protected company, transmitted in the channel or their jamming through embedding via stego programs of special analytical reports to destroy any embedded secret information.

Some of the obvious ways of preventing and suppressing crimes should be detention, checks on premises, use of technical devices for obvious observation, introducing temporary restrictions for carrying out activities and open discussions. Upon detection of signs of stego channel leaks, the security service can undertake traffic jam or a cyber attack to the mobile devices of Alice and to the server of the web-site-secret place, to prevent downloading of files through it with classified data.

Besides using a VPN to access the Internet, the capabilities of steganography for countermeasures could be applied. The security service could embed hidden for all employees information about the origin, owner, distribution and provision of confidential corporate documents, and even databases.

In the model of Fig.1, security service of "A" through Willy can create such a protection system.

After the preparation of an important document by an authorized person in corporation "A", a stegomarker of origin should be embedded there. For this purpose, the original object (in Fig. 1 it is designated as "original document") is sent to the server of the company named "stegoserver", which is used for embedding such stego marker (signature). The markers are embedded in such a way that even when the object has been modified or revamped, they remain. This looks like a digital watermark of intellectual property, but the content of the markers is information about ownership, location, time of tagging, description, confidentiality of information, longevity, etc. Company employees are unaware of the stegomarkers. Since these documents or other digital objects are being spread throughout the company, strategically conveniently located security components can detect the markers and implement a security policy that would determine the distribution, access control and correctness of the operations with the object. Hidden markers do not affect the quality of the documents as they are not aggressive to the normal use of the sites and trust of applications. A similar steganographic approach applies the Japanese company TOYOTA when transferring secretdata to its subsidiaries around the world [11].

If the company's security service of "A" has suspected Alice and Bob in their work there should be discovered direct or indirect clues and evidence about that [5]. If things come to a trial against corporation "B" for stealing from "A" of a copyright of a new product, the undestroyed (and probably unknown to Bob) signatures in the digital documents that Alice has sent to Bob will be a direct evidence that they are property of corporation "A."

More detailed consideration of the security measures complex goes beyond the scope of the particular work.

Stego incidents against confidential information are objectively existing negative phenomena in reality representing conscious, secretly committed acts that harm the interests of the individual and the organization. They are driven by conspiratorial methods, tools and techniques, knowledge of them is indispensable for organizing effective and reliable protection of the interests of the individual and the organization.

Methods of hiding data and steganography develop over time and new threats to hiding information could be expected. Should the need arise for creators of malware, criminal organizations, terrorists and government organizations to conceal their criminal activities, it is not only likely but certain as well that they will develop and use new methods of steganography, and other

advanced methods. It is expected that modern methods of covert communication to focus on cloud computing, virtualization, advanced streaming protocols, metadata and databases, wireless protocols, smart phones and tablets. Security services should be prepared to meet these challenges.

Acknowledgment

This paper is supported by the Project BG051PO00l-3.3.06-0003 “Building and steady development of PhD students, post-PhD and young scientists in the areas of the natural, technical and mathematical sciences”. The Project is realized by the financial support of the Operative Program “Development of the human resources” of the European social fund of the European Union

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution ISSN 1314-9784

MODEL OF INTERCULTURAL COMMUNICATION IN GROUP LANGUAGE LEARNING IN MILITARY ENVIRONMENT

Gergana Andreeva, Andrey Andreev

Abstract: *In recent years, English language training has been a priority for the modernization of Bulgarian armed forces as full NATO member. It has been carried out under the Strategy for Development of the system for training and supervision of English, which has successfully implemented the goals and objectives and has laid a strong foundation for future advances. The system of education in English does not exist in isolation and is influenced by a number of factors that affect the armed forces as a whole such as participation in missions and tasks worldwide, facing the globalization and multiculturalism of the world. In addition to the positive results, a significant expertise has been accumulated and lacks of intercultural communication skills among the military were found. The findings require seeking new ways and mechanisms for the optimization of the structure, organization, management, planning and methodology for conducting English language training for the armed forces. In this respect, it was necessary to develop a model for English language training in military environment, introducing modern advances in Intercultural Communication.*

Key words: *Intercultural education, xenophobia, STANAG 6001, multiculturalism, interdependence, fundamentalism*

1. Introduction

Due to the nature of knowledge and skills that must be obtained and maintained in an active form, language learning is a process that requires a long period of time and does not give quick results. This feature poses one of the challenges facing the education system in English related to the separation of a great number of students from their direct duties for an extended period of time. On the other hand is the motivation of individual soldiers and their personal responsibility and striving for self-improvement to achieve the desired results.

The main role of training institutions is to provide the necessary conditions and programs for quality language training tailored to the needs of the armed forces. In addition to teaching the training organizations develop new curricula, training and educational materials.

In this respect it is necessary in this particular environment to take into account some general trends of the modern world:

- The world is multicultural and reducing the effects of opposition and the awareness of differences in international and intercultural plan is crucial.
- The world is globalizing - people find themselves in increasingly economic, scientific, cultural and political interdependence;
- The global dimensions of culture began to dominate local ones.
- The international trends in the modern education overcome the trends of separatism and cultural division.

Intercultural education, pedagogy and communication are an alternative in today's world [1]. Traditional pedagogy is rationalized in other conditions. The majority of teachers are prepared for such conditions. To prepare teachers and administrators to work with students that are different is equally important.

Intercultural education is seen as education for perception the multiculturalism in the society. Intercultural education is not just a slogan and theory but a daily work. It is expressed mainly in the use of effective communication among cultures [2].

Intercultural education has historical dimensions. It is necessary to understand the past: the identity (personal, cultural, social); the history and culture of the other, the evolution of their motives, anti-Semitism, racism, etc. It is also a must for meeting the challenges of the present: xenophobia, fundamentalism and violence. It is the basis of life in the future: peaceful coexistence, solidarity, and respect for other people [3], [4].

Intercultural education along with language training forms knowledge, skills and attitudes, a basis for decision-making and participation in a world characterized by cultural pluralism, interdependence and international economic competition. It is based on creating links in areas such as international relations and international economics, world history, ecology, geography, cultural studies, ethnology, etc. Students should understand the meaning and complexity of the processes of globalization and build skills for intercultural interaction, if they want to become effective citizens of a pluralistic and interdependent world.

An important step to close the cycle of learning and a key indicator of the degree of implementation of national commitments to NATO's objective is the accurate assessment of the knowledge and skills of English language learners. In this respect, it is of great importance that all military and civilian personnel who have undergone English language training passed an examination in English under the NATO standard STANAG 6001.

In recent years, English language training for the armed forces was carried out under the Strategy for Development of the system for training and supervision of English which successfully implemented the goals and objectives and laid a strong foundation for future development of the system for English language training.

In addition to the positive results, a significant expertise was accumulated and the following findings were made in the period. All of them require special attention:

- The program fulfills the objectives set for the acquisition of knowledge and skills in English according to STANAG 6001 but lacks topics connected to the cultural situation in and outside the bases of the multinational peace-keeping operations. The past experience shows that the lack of cultural awareness and the inadequate Intercultural Communication are one of the main purposes for the difficulties in communication which Bulgarian army faces in the multinational military teams.
- No manual exists for effective Intercultural Communication for Multinational Military Team leaders and Commanding staff;
- In some of the declared entities, although the existence of educational facilities, language and Intercultural Communication training does not take place because of the absence of appointed qualified instructors of English;
- Insufficient educational materials such as student books, activity books and multimedia for individual language and Intercultural Communication training for military personnel.

The findings require seeking new ways and mechanisms to optimize the structure, organization, management, planning and methodology for conducting English language training for the armed forces.

In this respect, it was necessary to develop a model for English language training in military environment, introducing modern advances in Intercultural Communication.

2. Purpose and objectives of the model

The purpose of the model is the optimization and improvement of the system in English education with the introduction of Intercultural Communication, so as to meet effectively the needs associated with the implementation of language skills in international military environment.

The tasks of the model are:

- To define the basic elements, goals, objectives and principles of Intercultural Communication in the English language learning system;
- To identify the participants in Intercultural Communication, management and administration of the English language learning system and their responsibilities;
- To give general guidance on planning of Intercultural Communication in English language training;
- Describe the methods of Intercultural Communication in English language training
- To define the requirements for teaching Intercultural Communication to staff;
- To provide guidance on the maintenance and upgrading of training equipment.

3. Basic elements, goals, objectives and principles of Intercultural Communication in the learning system of English

3.1. The main elements of the English language training are:

- The organizational structures for the management, planning and conducting of training in English;
- Personnel: teachers, students, administrative and supporting staff;
- Teaching: forms and methods of training;
- Training equipment: technical training facilities, office equipment, textbooks and materials, language laboratories and buildings.

All these elements are functionally related to the implementation of the teaching of English and Intercultural Communication and the objectives that are set for the system.

3.2. The objectives of the training system in English with the introduction of Intercultural Communication are:

- To conduct training in general and specialized English language in the system of military education and training, enabling students to acquire knowledge and skills necessary to meet the required, in their job description, levels of English proficiency according to NATO standards STANAG 6001 .
- To offer advanced language training programs to meet the needs of a student category, with a focus on Intercultural Communication.
- To choose modern educational facilities for conducting quality language and Intercultural Communication training.
- To have well- trained teaching staff who actively to work for the success of students and the introduction of Intercultural Communication.
- To help students reach that level of language proficiency that will make them "independent", will allow them to deal with language and to improve their skills independently using Intercultural Communication methods.
- To provide a standardized, objective and fair review of language skills.

3.3. Developing intercultural education aims are:

- To develop and add topics for Intercultural Communication in curriculum content.
- To determine the optimal teaching style to different learners.
- To enrich the programs within the various sciences – historical, psychological, philosophical, technical, military and others.
- To develop tolerance and interest in other posts, other cultures and behavior;

▪ To develop learning activities and tasks that enable the development of different learning and communication strategies and meet the individual learning needs and styles of students.

▪ To make preponderance of interactive tasks similar to real communicative situations, contributing to the construction of adequate models of social behavior.

3.4. Objectives require that the following main tasks are faced in regard to teaching English as a foreign language:

▪ Revision of the current input and output requirements in different models of learning English;

▪ Developing and piloting new forms of education that combine general English and Intercultural Communication.

▪ Extending the potential of continuous training courses through the development of new short courses covering topics of Intercultural Communication in its program.

3.5. The main principles to be observed in the system of training are:

▪ Sequence of preparation and ensuring of continuity between models of different categories of training students;

▪ Active and constructive cooperation and shared responsibility among all stakeholders and participants in the learning process;

▪ Balance between the interests of the organization and individual interests, so that there is consistency between the importance of the required results and methods of stimulation and motivation, given their reach.

Conclusion:

This model of Intercultural Communication incorporated into the language learning program, modified and refocused, could serve as the foundation for an expanded cultural education program to create better skills for dealing with other cultures during conflicts, partnerships, or stability operations and support operations. Models and simulations in support of training and education should begin to include cultural factors as the Army moves to an agent-based construct, which will increase the number of variables and complicate environments so they more closely approximate reality.

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution ISSN 1314-9784

CONCEPTUAL MODELS OF RETIREMENT AND PROMOTION EMPLOYMENT OF OLDER PEOPLE IN BULGARIA

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Abstract: *The concept of „active aging" has three main interrelated aspects. The Organization for Economic Cooperation and Development in Europe focuses on the economic dimension of the term as it relates to the ability of older people to effect real economic and social contribution to society. In the foreground appears the possibility of flexibility in choosing the way of life in the elderly - through participation in training, employment, performance of various volunteer activities and care.*

Key words: *The Organization for Economic Cooperation and Development in Europe, economic dimension, in percentage of adults, average age of the population, demographic replacement of the population,*

In the early 21st century, due to the development of technologies, the improvement of the living standard and quality of health services, more and more Europeans live to advanced old age, preserving their ability to lead active, healthy, dynamic and productive lifestyle.

The concept of " active aging " has three main interrelated aspects . **The Organization for Economic Cooperation and Development in Europe** focuses on the **economic dimension** of the term as it relates to the ability of older people to effect real economic and social contribution to society. In the foreground appears the possibility of flexibility in choosing the way of life in the elderly - through participation in training, employment, performance of various volunteer activities and care.

European Commission sets the parameters of "active aging " in Communication of 1999 entitled " Europe for all ages ", according to it the concept is to adapt our lifestyle to the fact that we live longer and in better health than ever before and to take advantage of this as an opportunity. In fact this means **adopting a healthy lifestyle, longer participation in the labor market, later retirement and keeping active after retirement**. Thus promoting active aging means providing opportunities for a better life, not a limitation of rights for individual fulfillment and life choices. An important place is devoted to the adequate remuneration of adults.

The third aspect of the definition of "active aging " belongs to the **World Health Organization** and refers to the need for **complex adult participation in social, economic, cultural, spiritual and civic life**, not just the ability for continued physical activity or participation in the labor market .

The sustained increase in the longevity, in combination with the steady downward trend in the birth rate, however, leads to an aging of the population; witch is connected to significant economic, budgetary and social challenges.

The rapid pace of aging among the population in Bulgaria requires vigorous economic, institutional, administrative, budgetary and financial changes without which the cohesion in

society and the solidarity between generations will be disturbed and new, difficult to solve problems for future generations will emerge. This will have a significant impact on the economic growth and will lead to an increase in the public expenses for pensions, health care, social welfare, education, housing and infrastructure.

Aging is often seen as something negative, although older people are the key human resource for social and economic development, a generator and source of experience and knowledge. Older people give an important support to the society and the family by taking care of the dependent people, by sharing their work experience with the younger generations, and by contributing to the maintenance of life and social relations in rural areas.

In the report published in January 2010 report of the United Nations – "The World Population Ageing 2009" it is said that the number of people worldwide over the age of 60 has increased by 100 million only for 10 years. Currently, their number is 700 million, or 11 percent of the world population. According to the study the process of aging is offensive all around the world. So by 2050, 2 billion people will be over 60, which equal 22% of the world population.

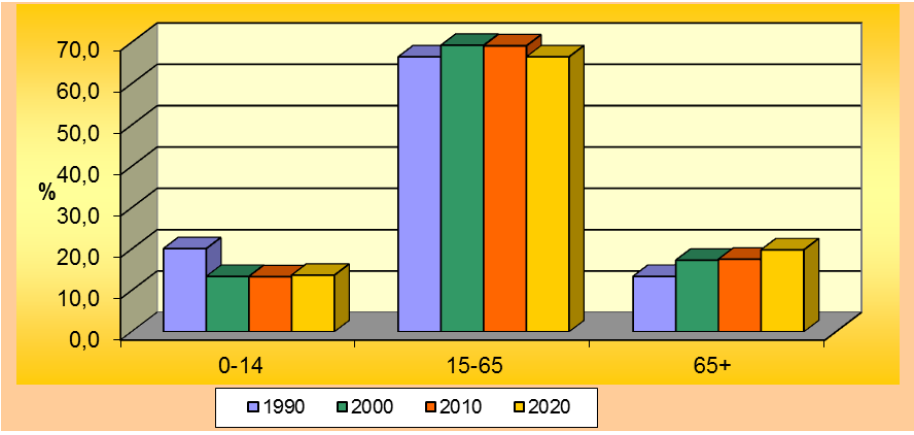
The rate of aging is without any parallel in the human history worldwide. There is a new disturbing trend: in parallel with the rapidly growing number of older people the number of the children under 15 years and the number of people of working age (15-59 years) has decreased.

The main reason for these processes is the decline in the birth rate, which has become a universal problem. It is indicated that the fertility is unlikely to return its highs from the past. In this sense, the changes in the demographic structure of the population in the world are classified as irreversible.

Bulgaria ranks fifth in the world **in percentage of adults** in the general population - 24.2% of the population of the Republic of Bulgaria is over 60 years. With higher performance percentage of the adult population is only Japan, Italy, Germany and Sweden. By criterion **average age of the population**, Bulgaria is seventh in the world. The data from the report show ominous trend of population aging, because in a previous demographic study of the UN in 2007 Bulgaria is seventh in aging with 22.9% of population over 60 years and ninth in average age of its population - 40.6 years.

The tendency of aging of the population in Bulgaria are illustrated most figuratively by the UN indicator for **demographic replacement of the population**, as measured by the ratio of the population aged over 60 relative to 100 people aged from 0 to 14 years.

According to UN estimates, in 2050 Bulgaria will be one of the most aging countries in Europe with values of 301 people aged over 60 to 100 people aged 0 to 14 years, which means that the adult population in Bulgaria will be about three times more than most young people.



Source: National Statistic Institute

Fig. 1: Population of the Republic of Bulgaria by age groups in the period 1990 - 2020

According to the prognoses for demographic projections of the Republic of Bulgaria made by the National Statistical Institute, International Research Centers, the United Nations and the European Commission, for 2050 are expected significant changes in the age structure of the Bulgarian population.

By 2050 the relative number of population over the age of 60 is expected to reach 30% of the total population in Bulgaria.

The country average life expectancy at birth for the period 2008 - 2010 is 73.6 years, or 0.2 years higher than for the period 2007 - 2009. For the men it is 70.0 years and for the women is seven years higher - 77.2 years.

The average life expectancy of people living in cities is 74.0 years, while those in rural areas - 72.3 years.

The average life expectancy for a total European Union (27) is 76.4 for the men and 82.4 years for the women, according to Eurostat, in 2008.

Longevity is influenced by factors such as: health status, morbidity, disability, accidents, living and working conditions, purity of nature and the environment, cleanliness of the food, water, soil, air and others. By guiding the effects of these factors the human lifespan can be managed.

In its Communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions entitled "Dealing with the impact of the aging of population in the EU" in April 2009; the European Commission recognizes that the aging is a significant problem in the programming in the social field. It is expected the public spending related to the aging of the population to increase by 4.75 percentage points of GDP by 2060 in the EU and by more than 5 percentage points in the euro area - in particular through spending on pensions, health and long-term care.

Demographic trends will lead to **a significant increase in public pension expenditure.**

Pension system, respectively – the pension relationships influence the behavior of people in two main directions:

- during the active occupational activity from which they receive income;
- from the moment they begin to receive income from the pension system.

This effect is achieved by contributions to the pension system paid by income received from employment and the rules for determining (access) and sizes of the different types of pensions.

It is in these two directions that the pension reforms are directed, introducing stricter requirements for receiving public pensions by increasing the retirement age and restricting access to early retirement schemes which have to:

• motivate people to extend their working life;

• create conditions for various forms of qualitative and flexible employment of older generations, which is not an obstacle to the employment of young people;

• ensure the sustainability of the pension system.

In the National Strategy for Demographic Development in the Republic of Bulgaria (2012-2030) the following measures are set to adapt the social security system to the aging of the population and the need for improvement the quality of older people's life:

1. Increasing the social-security culture of the employees;

2. Increasing the collection of insurance claims;

3. Promoting the voluntary insurance of the population in the coverage of the insurance risks;

4. Improvement of the control over the insurance payments, increase of the control and prevention of unlawful receipt of pensions (especially of pensions for disability due to sickness);

5. Increasing the range of insured persons and limiting the informal employment;

6. Improvement of the Bulgarian pension model and ensuring financial sustainability of the pension system;

7. Maintenance and prudent management of the created state fund to ensure sustainability of the pension system (known as the "Silver Fund ") and for its financial support;

8 . Strengthening the role of the second and third pillar of the pension system.

One of the main intentions of the Bulgarian pension policy in the medium term, viewed as an integral part of the modernization of the pension model is associated **with the introduction of more flexible elements taking into account the economic and social development of the country; the principles of justice and solidarity; the opportunities for older employees to remain at work.**

In this regard an empirical study on "Factors for the implementation of flexible retirement and promotion employment of older persons" was conducted. The promotion of employment among older workers is one of the key commitments of the Lisbon strategy for employment in the EU, the employment for persons over 55 years was foreseen to reach 50% by 2010. Due to the increasing average age of the workforce, this indicator will have a greater burden on the general level of employment and the competitiveness of the European economy. To achieve this goal, the European Commission recommends pension reforms oriented towards longer working lives, limiting the early retirement schemes, creating opportunities for flexible employment of persons after retirement. Many of the recommendations are directed to the company level, including social partners, to improve the working conditions of the retired workers, and to create opportunities for learning. Special attention is

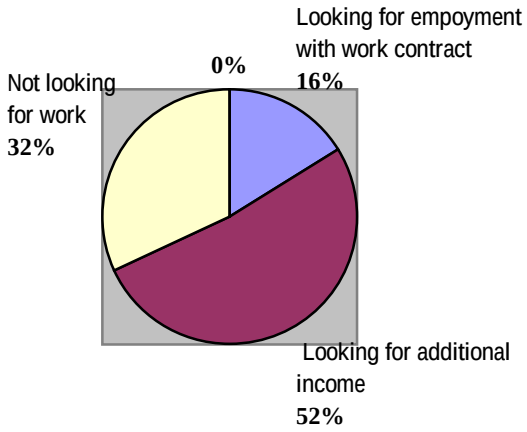
given to the change in public opinion, the formation of positive attitudes to the potential of older people, their work experience and their functions in the modern labor market.

The survey was designed precisely in the context of these national and European trends. They directly identified its purposes, tasks, object and subject. Given that the main aim of the study was **to identify, define and evaluate the factors influencing the decision of elderly people to retire or remain at work.** Object of the study were individuals aged 50 to 65 who were not retired .

The study allowed summarizing some conclusions, assessments and policy recommendations in the area of pensions and the labor market, which could be useful in the further promotion and development of the pension model, the implementation of more flexible retirement and employment promotion among the older people.

In this connection, thanks to the survey the following conclusions for pension policy, with important implications for its modernization were highlighted:

First, there is an explicit and mass disposition for continued employment, even after meeting the requirements for access to the pension system. This can and should be used in the development and implementation of policies aimed at a longer working life, limiting early retirement schemes, creating opportunities for flexible employment of persons after retirement. Policies to promote long-term employment enjoy widespread public support.



Graph. 1. Attitudes to work for early retirement

Table 1. Reasons to stay at work after the conditions for retirement (%)

	Persons of pre-retirement age	Persons over retirement age
I have energy and stamina to work.	51,6	34,4
I feel satisfied on a personal level.	31,9	25,6
I want to continue my career.	18,6	17,8
If I retire, my income will drop significantly, which is not acceptable to me now.	56,9	28,9
I am highly qualified and my work employment is not jeopardized in the near future.	17,0	15,6
The employer appreciates me.	24,5	20,0
I agree to work while the employer keeps me at work.	34,6	20,0
I prefer to work whatever, but not to stay at home.	14,4	6,7
I have to pay a loan.	3,2	0
I have to look after relatives (children, grandchildren…)	20,7	5,6
If I work longer, I will get a bigger pension.	21,8	7,8
Reasons (summary):		
economic	102,6	42,3
labor	117,6	76,7
personal	75	63,4

Second, among the groups in unequal position on the labor market there is a positive attitude towards providing more liberal retirement in three directions - reducing the statutory retirement age /1/ and the reduction of the required work experience while maintaining the retirement age /2/ and early retirement with a reduced pension /3/. These estimates apply to a much greater extent for unemployed, women and those living in rural areas, because these groups are more frequent in the group of people who often have difficulty finding permanent employment, more likely to remain unemployed and have difficulties in meeting the requirements for entitlement to retirement pension and age.

Third, there is a need for more intensive information and education campaign among the population about the objectives of the pension reform and the way which the current pension model functions. A more precise explanation is needed on:

- The conditions for access to pension rights;
- The existing flexible elements of the pension system;
- The existing employment programs and opportunities they provide;
- The damage from unauthorized access to pension rights (through unlawful disability by presenting false documents and other means);
- The damage of tax evasion and non-payment of contributions;

Concluding

The survey of factors influencing the decision of elderly people to retire or to remain working is one of the few studies of the pension system, implemented after the reform. Its results can be used for the formation and implementation of appropriate policy decisions. The study again shows the need for comprehensive and systematic monitoring and evaluation of the progress and results of the pension reform, the attitude of the population towards it, for a preliminary evaluation of possible changes in the parameters of the pension system, for its interaction with other elements of social protection (social support), etc.

All this would help for a smooth and successful running of the political cycle in the area of pensions.

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution ISSN 1314-9784

THE VALUE OF THE SECURITIES (Bonds and shares)

Hristo Totev

ABSTRACT: *Connected to the new feature of the banks in the early 20th century arises the financial capital. Under financial capital must be understood fusion of bank capital with industrial. Marx more than a hundred fifty years has defined this phenomenon as a form of exploitation and get rich quick method that leads to a new class of economically powerful people and organizations in society with political and economic influence in the country - the financial organization expressing the dominance of the big finance capital. (Ivan Nikolov, p.46) The primary form implementing the financial capital is the movement of the securities - shares, bonds, debentures, etc. i.e. what is called a debenture capital. The coverage of the bond funds is usually done through a real capital, but it can exist in the form of fictitious capital.*

KEY WORDS: *financial capital, the financial organization, a nominal value*

INTRODUCTION

Connected to the new feature of the banks in the early 20th century aroused the concept of financial capital. Shortest under financial capital must be understood fusion of bank capital with industrial.

The primary form through which implements financial capital is the movement of securities - stocks, bonds, debentures, etc.., it's called debenture capital. Coverage of bond funds usually done by real capital, but it can exist in the form of fictitious capital.

EXPOSURE

In terms of the dominance of fictitious capital importance gain issues related to: the value of securities, bond yields and stocks, the ratio of income to price and others, related to the problems of risk and return on assets and determining the value of capital .

One of the most important stages in the process of making investment decisions is the determination of the value of securities, which depends on the determination of the current value of future financial flows. Mathematically this situation can be expressed as:

$$V_S = \sum_{t=1}^{N} \frac{CF_t}{(1+k)^t} = \frac{CF_1}{(1+k)} + \frac{CF_2}{(1+k)^2} + \frac{CF_t}{(1+k)^t} + \cdots + \frac{CF_N}{(1+k)^N}$$

Where:

V_S - The value of the securities;

CF_t - Financial flow for the period t;

K – Discount value;

Each bond is characterized by the so-called nominal value - the value that the company is obliged to pay as a repayment of the bond. However, the amount may be higher than the nominal value (over par) which depends on the terms of issue of the bond. On the basis of the nominal value of the bond are determined:
a) the sum of the bond paid after the expiry of emission (often bonds are redeemed at their par value);
b) the amount of interest paid on the bond repayment period.
The value of the coupon bond is determined by the formula:

$$V_B = \sum_{t=1}^{N} \left(\frac{I_t}{(1+K_b)^t} + \mathrm{M}\frac{1}{(1+K_b)^N} \right)$$

Where:

I_t- Coupon payments in proper currency for the period t;

M – Principal amount of the loan for period N;

K_b- Bond income before taxes.

Equivalent formula:

$$V_B = I_t * PVIFA\ (K_b, N) + \mathrm{M} * PVIF(K_b, N)$$

The price that investors pay for a bond issue is related to their nominal value, such as a bond with a par value of 1000 BGN is sold at this price, but more often her rate is slightly higher or lower, depending on the state of the bond market at the time of issue of the securities and the interest rate that investors receive on the bonds.
If the coupon income is paid in the middle of the year the equations should be amended as follows: the pay periods should be computed twice; income on bonds before tax should be multiplied by 2; the annual coupon payments also should be multiplied by 2 without altering the basic payment amount. The equations will be presented as follows:

$$V_B = \sum_{t=1}^{2N} \frac{\frac{I_t}{2}}{\left(1+\frac{K_b}{2}\right)^t} + \frac{M}{\left(1+\frac{K_b}{2}\right)^{2N}}$$

$$V_B = \frac{I_t}{2} * PVIFA * (\frac{K_b}{2}, 2N) + \text{M} * PVIF(\frac{K_b}{2}, 2N)$$

Consider the following example. Eurobonds for BGN 1000 and within 20 years there has been an 8% annual income and coupon for 10%. You need to determine its value if first: coupon paid annually and second: the coupon to be paid in the middle of the year. Calculations show the following: 1) bonds provide income of BGN 100 per year. Using the equation we get:

$$V = 100 * PVIFA * (8\%, 20\text{г}) + 1000 * PVIF(8\%, 20\text{г})$$
$$= 100 * 9.8181 + 1000 * 0.2145 = 1196.31$$

The calculations are carried out with the help of the table of interest rates. Bond pays BGN 50 every six months. 40 payments to be made and payments made on the basis of the estimate of 8% annually - for the first half (8%: 2) = 4%. Using the equation we get:

$$V = 50 * PVIFA * (4\%, 40\text{г}) + 1000 * PVIF(4\%, 40\text{г})$$
$$= 50 * 19.7928 + 1000 * 0.2083 = 1197.94$$

In this case, more important are the following expressions: [3]

- interest accrual period - the period for which interest is accrued, in the example it is 6 months;
- declared annual rate - formed as the interest rate for the period multiplied by the number of the periods;
- effective annual interest rate - the interest accrued to the end of the year, expressed as a percentage of the principal.

According to Mladenov relationship between concepts can be summarized as follows:

$$i_m = \frac{i}{m}$$

Where:

- i_m — Declared annual interest rate;
- m - The number of periods;
- i - Interest rate for the period.

Finally:

$$(1 + i_m)^m = 1 + i_{ef}$$

Where:

- i_{ef} - Effective annual interest rate.

Here you can reverse the effective annual interest rate to get the interest rate per interest period [4]

$$i + i_m = (1 + i_{ef})$$

Zero coupon bonds are redeemed at par value, interest thereon shall be charged to the duration of repayment.

Short-term debt obligations are called zero-coupon discount bonds. Zero coupon bonds are issued at a deep discount with respect to the nominal value. Investors receive income from the difference between the price on the issue and redemption. It represents the interest earned from the investment and can be expressed with an annual interest rate.

So the value of the zero coupon bonds is determined by the formula:

$$V_B = \mathrm{M} * \frac{1}{\left(1 + \frac{K_b}{2}\right)^{2N}}$$

This can be expressed as:

$$V_B = \mathrm{M} * PVIFA * \left(\frac{K_b}{2}, 2N\right)$$

Ways to receive income on securities with a coupon and with a zero coupon (discount bonds) are not identical. It should be kept in mind that zero coupon bonds do not pay interest, its value is defined as the accrual in the middle of the year.

The following features should be kept in mind:

a) for long-term bonds the interest is paid during certain periods, normally 6 or 12 months. The interest rate is expressed as a percentage of the minimum value of the bond, known as coupon;

b) coupon bonds pay a fixed or a floating (variable) interest which do not change in the period of repayment;

c) bonds with a fixed coupon rate without additional derivative instruments such as the seller or customer option or simple interest bonds. The coupon rate is fixed value in terms of nominal value of the bond paid as annual interest;

d) bonds with floating rate (floating rate note), in which periodic income paid at variable rates. The interest rate is set higher than the base rate as a margin. Market interest rate on sterling bonds is normal, equal to 6 -month rate of LIBOR, where interest is paid every six months. Interest on bonds Adjustable rate (FRN) can be for example 1.8% higher than the six month rate LIBOR. The rate fluctuates from one date to another payment due to changes in the base rate. The rate at which interest will be paid next time is determined for a particular day by adding the allowance (margin) to the base rate on the day of change.

Discount bonds - such bond realized lower than their nominal value, i.e. discount. During the address it does not pay interest, but it is repaid at par. The magnitude of the discount can be calculated by the formula:

$$D = \frac{F(d+t)}{360}$$

Where:
D – Discount value ;
F – Nominal value;
d – Discount rate (example 8 ½=0,085)
t – Repayment deadline.

Consider the following example: a 60 day bond has a face value of U.S. $ 100,000. It is issued with a discount rate of 7 ½% per year. Solution: The magnitude of the discount can be calculated by the formula: a) rate of current income - terms of current income to the current market price of the bonds:

$$CY = \frac{I_t}{P_o}$$

b) Rate of income to repay - discounted value of the value of future cash flows include interest paid and the purchase value of the bonds minus the purchase price. General rate income on bonds reflected in the contract is equal to the current price. This is the same as domestic rate in bond yields. The following formula can be used:

$$P_o = \sum_{t=1}^{N} \frac{I_t}{(1+\mathrm{YTM})^t} + \frac{M}{(1+\mathrm{YTM})^N}$$

Where:
YTM - rate of income to repayment on the bonds, which can be expressed as follows:

$$P_o = I_t * PVIFA*(\mathrm{YTM}, \mathrm{N}) + \mathrm{M}*PVIF(\mathrm{YTM}, \mathrm{N})$$

Approximate rate of income on bonds (AYTM) can be found using the following equation:

$$\mathrm{AYTM} = I_t + \frac{(M - P_o)}{\mathrm{N}} ; \frac{P_o + M}{2}$$

c) rate of income bonds calculated to the first maturity (YTS) - this is the discounted present value of cash flows for the period from the date of purchase to its first maturity. Bond yields calculated for the first period of its extinction is the sum of the expected coupon payments to the date of receipt or before that date, except that part of the value that is secured by the price at the rules above it. It is defined by the equation:

$$P_o = \sum_{t=1}^{N} \frac{I_t}{(1+\mathrm{YTC})^t} + \frac{CP_c}{(1+\mathrm{YTC})^c}$$

Where:
YTC – bond yields calculated to the first term of repayment;
CP_c– Price of reimbursement;
C – period up to the first repayment date.
Approximate bond yields calculated by first maturity can be derived by the formula

$$\mathrm{AYTC} = I_t \frac{I_t + (CP_c - P_o)/C}{(CP_c + P_o)/2}$$

Important for the analysis of value securities is the concept of an annual rate of income (ARR). ARR fixed income is primarily determined by the face value of the bond. This is a general amount of all available streams from investments included in reinvestment.

$$TV_N = PV_O * (I + \mathrm{ARR})^N$$

Where:
TV – residual value of the bond;
PV_O – investment in the beginning;
N – number of the investment periods.

The annual rate of income can be determined:

$$\text{ARR} = \left(\frac{TV_N}{PV_0}\right)^{\frac{1}{N}} - 1$$

As it is known the share is title of ownership to the relevant part of the capital of the company.
Shares without voting permission and with a steady income are called preferred shares. They resemble eternal rent, so this value and the current price is calculated in the same way as the present value of the annuity value of eternal permanent income:

$$P_o = PV = \frac{D_{iv}}{r}$$

Where:
D_{iv} – dividend;
r – payback rate;

Annual dividends paid on preferred shares represent a fixed amount, calculated as a percentage of the nominal value of the share. Unlike interest payments on the bonds to be paid from earnings before taxes, dividends on preferred shares are paid before the payment of dividends on simple shares.
Upon liquidation of the company, the owners of preferred shares are stated after the creditors, so that they are prior to owners of ordinary shares in determining the right part of the proceeds from the sale of the assets of the company. However, the amount received by them on these revenues is limited by the nominal value of the shares.
Ordinary shares normally carry a growing income in the form of dividends and capital gains. The latter manifests itself in the form of the difference between the market price over the next year and the current price per share, as is the result of the reinvestment of part of the net profit of the company. [4]
Rate of return on ordinary shares , which was sold after one year can be calculated as follows:

$$r = \frac{D_{iv1+}P_1 - P_o}{P_o}$$

Where:
D_{iv1} – dividend for the first year;
P_1 – the price per share for the first year;
P_o – the price per share at present.

This value and the current price per share is calculated by discounting the expected income in the form of dividend and capital gain.
The company - issuer is not obliged to redeem their shares for a specified period, which is why they are considered an asset of unlimited duration of existence. Income from sale at the share price is obtained in infinite future period. Then the discounted future stock price will be equal to zero and can therefore disregard it. Therefore, the current price of the ordinary shares (20) will equal only the sum of discounted future dividends:

$$P_o = \frac{D_{iv1}}{1+r} + \frac{D_{iv2}}{(1+\mathrm{r})^2} + \cdots + \frac{D_{ivn}}{(1+\mathrm{r})^n}$$

We assume that dividends increase annually by the same percentage g, and therefore may introduce them in the next period as follows:

$$D_{iv2} = D_{iv1} * (1+g)$$
$$D_{iv3} = D_{iv1} * (1+\mathrm{g})^2$$

Result:

$$P_o = \frac{D_{iv1}}{1+r} + \frac{D_{iv1} * (1+\mathrm{g})}{(1+\mathrm{r})^2} + \frac{D_{iv1} * (1+\mathrm{g})^2}{(1+\mathrm{r})^2} + \cdots + \frac{D_{iv1} * (1+\mathrm{g})^{n-1}}{(1+\mathrm{r})^n}$$

Transforming the formula: [4]

$$P_o = \frac{D_{iv1}}{r-g}$$

The above formula is similar to that for determining the present value and the present value of a perpetual annuity with a growing income. Percentage of annual permanent increase of the expected dividend for the first year can be calculated as net income divided by the equity of the company and is multiplied by the coefficient of retention of profits. Used is the formula:

$$\mathrm{g} = \frac{NP_f}{C_s} * (1 - K_p)$$

Where:
g – norm of dividend growth;
NP_f-net profit;
C_s-own capital;
K_p-coefficient of repayment of the dividend to related to the profit
There are two types of preferred shares - permanent and limited duration. Perpetual preferred shares have no repayment date. Its value can be determined by the formula:

$$V_p = \frac{D_p}{K_p}$$

Where:

D_p-Period (annual) dividends;

K_p- rate of income preferred shares.

Example: Determine the value of the current preferred stock dividends on which amounted to $ 6 if the resulting income is equal to 12%. Solution:

$$V_p = \frac{6}{0.12} = 50.00\$$$

Preference shares of limited duration have a specific date of repayment. Their value can be determined, and the value of bonds by the formula in which the dividends are treated as interest payments and the face value of the preferred shares as repayment of the principal amount of the loan. " Direct " , i.e. the usual preference shares are not subject to repayment and have the following features:

a) paid at a fixed annual rate , but only if the company's profits are sufficient to pay dividends ;

b) if the dividends for the current period are not paid the shareholders (owners) are not entitled to them in the future.

CONCLUSION

The observed methods of determining the value V of the security implies that the value may differ from the market value P. To assess the efficiency of investment is necessary to consider the following rules:

- if the calculated value (internal) is greater than the current market price then one have to buy the security (stock or bond) ;

- if the calculated value is less than the current market price then the security must be sold .

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution ISSN 1314-9784

TECHNICAL ACTIVITIES FOR APPLICATION OF TFP OF OUALA FOR TERRITORIES UNDER §4 - MENTESHE LOCALITY, LAND OF AKSAKOVO

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Abstract: *Some colleagues will find strange and outdated the appearance of one such article now after the activities for restoration of the ownership of the agricultural land ended about 10 years ago. However, the technical activities on the restoration of the ownership of the former owners of agricultural land available for use with various acts of the Presidium of the National Assembly, of the State Council and of the Council of Ministers, as well as of the users, under the Ownership and Use of Agricultural Land Act (OUALA) have not completed. The delay of this process is due primarily to the fact that the financing of the activities under §4 from the TFP of OUALA is from the budget of the regional administrations. Also in this aspect it is necessary to note the preparation of the personnel, which participate in the preparation of these specific geodetic activities. It will not be wrong to be said, that the discussed topic to a large extent affects purely legal administrative case studies, which are not directly related to the purely geodetic practice and issues. To some extent this is due to the lack of clear and precise coordinated with each other regulatory laws and guidelines, relating to creation of the auxiliary cadastral plan (ACP) and the plan of the newly formed properties (PNFP).*

Key words: *OUALA, ACP, PNFP, § 4k, TFP, MAO, MAFS, WGB,*

The purpose of the topic is to examine the stages at the awarding, the development, the acceptance and the approval of the plan of the newly formed properties at the restoration of the ownership of the land under § 4k of TFP of OUALA. The topic is up to date not only due to an occurrence of a collision between the restoration the right of ownership and the acquisition the right of ownership pursuant to § 4a and § 4b of the TFP of OUALA from the positions of the legal system, whose lawsuits in certain cases are pending and unsolved until the moment. The interest in the pointed problems is also conditioned by the specificity of the activities, which are carried out from the perspective of the geodetic science and the related with it regulatory and legal requirements.

The current topic discusses the stages at the awarding, the development, the acceptance and the approval of the plan of the newly formed properties. In this aspect the legal framework also includes Rules for the implementation of OUALA and the Methodological guidelines of the Ministry of Agriculture and Forests of 2003, which are issued to specify to a level technical implementation

of the activities arising from the accepted laws and other normative acts. With the acceptance of OUALA is given a opportunity for the restoration and for the ownership on agricultural land, which before that have been provided for use with acts of the Presidium of the National Assembly, of the State Council and of the Council of Ministers. By virtue of § 4, paragraph 1 from TFP of OUALA [3] the right of use is terminated, as to users which meet the conditions of § 4a and § 4b from TFP of [3], is given a opportunity to acquire right of ownership at certain conditions and given deadlines. This regulatory system is trying to regulate relations of ownership for those territories between the persons, of which with decisions of the municipal agricultural offices /MAO/, previous name - Municipal Agriculture and Forestry Service /MAFS/ and land commission /LC/ are restored lands in sites under § 4 TFP of OUALA, and on other hand - the former users of the restored lands

After the so stated facts, it is clear that it is necessary on the basis of a plan under art. 18d of Rules for the implementation of OUALA (where are defined the borders, in which the ownership is restored pursuant to §4, existing on the ground old real limits, and recoverable on the ground old real limits including those under art. 10, paragraph 5, 6, 7, and 9 OUALA, new real limits with a plan for land division), drawn up after examination, survey and design, to be developed a new plan of the land granted for use. A plan of the newly formed properties is drawn up, on the basis of auxiliary cadastral plan, which contains graphical and textual information for the old owners and the users. After the completion of all technical activities for the plan of the newly formed properties should be recognized the right to the persons entitled to acquire property right on the properties, whose limits are established by the same law. According to art. 28, paragraph 4 from [4] under the plan of the newly formed properties under § 4k, paragraph 1 from [3] are established the limits of the properties, the right of ownership, on which it is acquired, respectively restored pursuant to § 4k, paragraph 7 and under the conditions of § 4a, 4b and 4h from [3].

With the law [3], the rules [4] and the methodological guidelines [5] are created auxiliary cadastral plan, plan of the newly formed properties, and the registers to them, to be able legally to settle the relationships between the acquired and the restored right of use of the affected citizens and to make sense to the technical activities, carried out by qualified persons for the territories under § 4.

The purpose of the development is to outline and clarify the specifics of the geodetic activities, inspired by the context of the legal framework, concerning the creation of a plan of the newly formed properties (PNFP). Tasks, which are solved, are:

1. To prepare a PNFP, which to clarify the collision between restored and acquired right of ownership from technical, and not from legal point of view.

2. To identify the ways for indulgence of the problem in legal frameworks.

The methods by which are developed the plans of the users are: digitalization and completion of previous plans, if they meet the requirements for accuracy, or in the absence of a previous plan - through new geodesic measurements including photogrammetry. Regardless of the methods used for creation of the plans under § 4 of OUALA, it is necessary to present the final results of the work of the building surveyors, guaranteeing the accuracy at the performance of the given assignment. They are needed in order legally to be given an opportunity of users and old owners to obtain rights to the acquired or restored ownership, which is entitled to them by law.

By the proper design of the working geodetic base (WGB) depends whether it will be preserved for a long time for carrying out of different geodesic measurements. The compliance of the necessary accuracy at the determination of the coordinates of the points ensure security at performing of geodesic measurements and the necessary authenticity for carrying out of complete capturing of the sites.

On the basis of the geodetic study of the territory, consistent with the normative base, is provided a solution to satisfy the individual parties. The problems, which appear after the approval of PNFP, are rather legal and does not enter in the obligations of the technical persons.

Specifically on the topic for technical activities, carried out in Menteshe locality, municipality Aksakovo, after the awarding of the implementation, were taken steps to inform the citizens, possessing lands in those territories, that is forthcoming to be drawn up a ACP. For this purpose, they were informed to indicate the boundaries, that were not materialized, prior to the start of the geodetic measurement. After a field view was made a project for WGB, which was applied to the locality. The newly created points are placed and stabilized under a model from the Geodesy, Cartography and Cadastre Agency. They are attached to 3 pcs. of points from geodetic networks of local importance. From the newly applied WGB are captured the limit points of the properties and the constructed buildings. The old property limits of the owners, before the formation of cooperative farms and state farms, are defined by archive aerial photographs after affine transformation and vectorization. The achieved accuracy of the affine transformation is comparable to the graphical accuracy of the source ≈ (M 1:20 000), i.e. at 1 mm respond 20.00 m (0.2 mm x 20 = 4.00 m). On fig. 1 is shown enclosed in red view of the territory, object of the development.

Fig. 1 Technical activities, carried out in Menteshe locality, municipality Aksakovo

The auxiliary cadastral plan (ACP) contains information for the limits and the numbers of the properties, buildings and facilities, objects of the over ground and the underground infrastructure, hydrography, relief, as well as the points from the working geodetic base. The properties, provided for use are differentiated in individual cadastral surveying areas, as the numbers of the cadastral areas does not coincide with the numbers used in the card of the restored property (CRP), respectively, in the cadastral plan of the populated area. The numbering of the properties within the boundaries of the cadastral area start from the northwest corner of the cadastral area in direction east. For the properties, owned prior the formation of farming co-operatives or state farms, are differentiated in the auxiliary plan in independent cadastral surveying areas. The numbers of the areas are written accordingly with black color in ACP for the users, and for the old owners, with green color. In PNFP the cadastral area is written with black color. On fig. 2 is shown part of ACP.

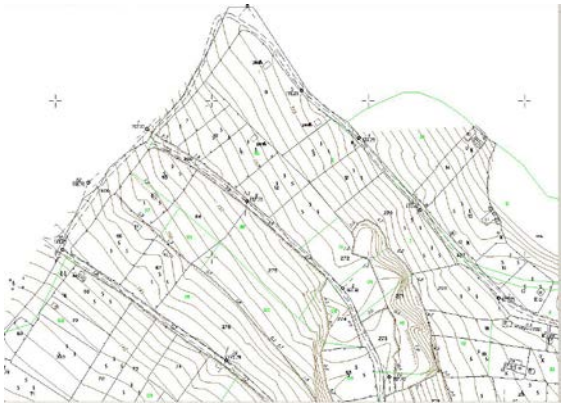

Fig.2 Part of ACP

ACP was set out in Aksakovo municipality, for the citizens to be able to identify their properties, as well as to attach copies of their documents for ownership. A survey was made of the applicants for restoration of ownership. The old owners

after inspection and consent for their allotted areas affixed their signature on the plan and in a list, prepared for them. After final specification ACP and PNFP are submitted for examination by a Commission, which is appointed by the District Governor. With this plan are established the limits of the properties, with acquired or restored right of ownership pursuant to the order and the conditions of paragraph 4 of TFP of [3]. PNFP is drawn up in the scale and on the basis of the auxiliary plan as it contains:

1. The limits and the numbers of the newly formed properties;
2. The limits and the numbers of the buildings;
3. Existing and newly designed streets and roads.
4. Existing objects of the technical infrastructure;
5. Relief of the terrain;

The data for the ownership of the newly formed properties are recorded in a register of the properties, which is an integral part of the PNFP. He is drawn up in graphical and in digital form and is established with a view of right spatial development, as for each property is provided access to street or road with minimal width between the limits of the property - 5 m.

PNFP of Menteshe locality is made with the preconditions of § 4a as it falls within a area with a radius of 30 km from the center of the town of Varna (>300 000 population), i.e. the properties of the users are < 600 m^2, and for those with permanent crops ≤ 1,000 m^2.

With the plan of the newly formed properties to each rightful claimant in accordance with the requirements of the transitional and final provisions of [3] is determined a property, as its location conforms with the existing in it buildings and facilities or permanent crops. The properties retain their limits and sizes, when their area does not exceed 600 m^2 or 1,000 m^2 and they are provided with access to street or road. The difference above 600 m^2, respectively 1,000 m^2 to the actually used land is restored to the former owner, for formation of a new property (properties) with a size not less than 250m^2. Each new property is formed from one or more adjacent differences, which are restored to the same owner. The differences, of which may not be formed a new property, remain in the property, designated for the user, which is paid at market prices after the entry of the plan in force. Within the limits of a differentiated property in old limits by law there can be no co-ownership. The law does not provide for admission of co-owned property.

The size of the person and the area of the newly formed properties are determined with the plan in accordance with Article 28, paragraph 2 and (8) [4]. The properties with exit to a dead-end street or road may have a surface with size not less than the width of the street or the road. For the urbanized territories are observed the minimum dimensions according to the rules and the regulations for Spatial Development. On fig. 3 is shown part of PNFP.

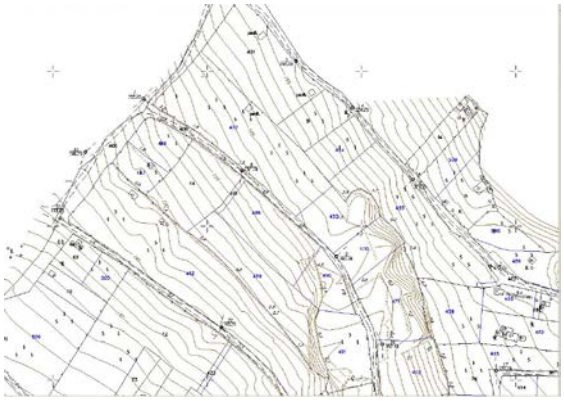

Fig.3 Part of PNFP

The specific requirements to the plan of the newly formed properties according to the specific characteristics of the respective municipality are determined by the technical service of the municipality with terms of reference.

On the basis of data submitted by the Municipality of Aksakovo for the users, who have paid the land according to the drawn up cadastral plan of users and former owners with recognized law is drawn up the plan of the newly formed properties. The requirements for the design of the newly formed properties are satisfied in the normative acts, orders, instructions, etc. The newly formed properties are determined in accordance with the requirements of § 4h, paragraph 1 of [2]. When within the limits of a property owned prior to the forming of cooperative farms or state farms, are available properties of users, but are not acquired by them, is designed as one newly formed property for the former owner. For the limits of a property, for which there is issued a title deed for the acquisition or entered into force order under § 62, paragraph 3 TFP No. 456 of 1997 for amendment and supplement of [4] and if for the property is performed a writ (sale, donation, partition, etc.) before the development of PNFP, are plotted in the plan without amendment.

Specifically for the adoption of PNFP of Menteshe locality was issued a report with conclusions for the finished work. The contents of the register to the plan includes: Total number of the properties 307 - properties with recognized and restored right of ownership - 61, properties, for which are missing data for ownership - 57. A table is made with the due compensation. The table has a very important function: To direct the paid in from the users amounts to the owner, of whose land is formed the property of the particular entitled user.

An acceptance protocol is formed, which certifies the handing over of ACP, PNFP, as well as the accompanying registers and records from inspections of the digital models between the District authorities and a representative of the municipality of Aksakovo. The plans are notified to the interested persons pursuant to art. 28b, paragraph 4 of [4]. The draft of PNFP after the adoption form a Commission is set out for examination and submission of objections within one month from the persons concerned. The mayor of the municipality sends the full documentation to the District Governor at the attention of the

chairman of the Commission, together with acceptance report, act for notice and data for the publications in State Gazette and the local means for information. A report of findings is drawn up, where area described the submitted objections within a period and outside of it. The submitted objections are considered by a committee, appointed by the District Governor in 30 day period. For the consideration of the submitted written requests and objections is drawn up a protocol. The protocol is submitted to municipal office **"**Agriculture**"** and municipal administration. The honored objections are removed by the contractor within the time limit set by the Commission, after which the plan of the newly formed properties is examined again from the receiving commission. Also a test of the digital model is applied, which is result of verification of the model with controlling software. The contracting company again sends the materials for final examination to the Commission, appointed with an order of the District Governor. In connection with the final activities on the approval of PNFP is drawn up a memorandum from the Chairman of the Committee to the District governor with a draft for order. Follows issuing of Order No. RD-10-7706-269/20.09.2010 from the District Governor, publication of advertisement in "State Gazette" and sending of Order from the approval of PNFP to the mayor of the municipality and copy to the Chief of the Municipal Office of Agriculture. Complaints against the plan shall be addressed in 14 days after the date of notification in SG by the District Governor to the administrative court. They are not subject of the plan as the actions, resulting after this, are described in details in the Civil Procedure Code.

As a result of the implementation of the technical activities under the TFP of OUALA for territories under paragraph 4 - Menteshe locality, land of Aksakovo, Aksakovo municipality, Varna District are created and approved all graphical and text materials, required from the terms of reference. From the correct delimitation of the boundaries of the properties (former owners, users and newly formed properties) and the registration of the ownership at the technical activities for the development of PNFP depends whether the requirements of the legal framework will be met and to reach to Order of the District Governor as the right of use will become property right. Through all performed activities are created the necessary prerequisites for the restoration of the recognized right of ownership of the former owners and acquisition by the users.

The newly formed properties, which are restored to the former owners, are 131. For another 451 properties the users have acquired a property right. The acquisition of property right by the users is important, because they have invested many resources in the use of the land properties, such as construction of buildings, planting of permanent crops, as well as improvement of these properties, as they are usually in stony and infertile land (of course, this statement is not valid for all cases). The law on the other hand allows the old owners to restore their ownership prior to the creation of cooperative farms and

state farms. Despite the application of the statutory provisions are not received 100% fair decisions. They are handled by the Civil Procedure Code (CPC) and this is not a topic of the technology of the geodetic activities. The main purpose in front of PNFP is establishing of preconditions for acquisition of ownership, and given property is not governed and regulated within the meaning of art. 19 of the Spatial Planning Act.

The determination of the status of the properties under §4 from the TFP of OUALA is important, except in addition to the above stated reasons, and for making an order (transactions) with them, as well as for construction.

After opening of a procedure for drawing up of cadastral map and cadastral surveying registers for land of Aksakovo, Aksakovo municipality, the created graphical and semantic database is integrated in the future cadastral map by deleting the elements of the specialized cadastral surveying maps (CSP) and the registers of PNFP are set to the requirements of the Ordinance for the content, the creation and maintenance of the cadastral map and the cadastral registers [7]. The integration is possible, because the requirements for accuracy of ACP are identical to the requirements of accuracy, regulated in [7].

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution ISSN 1314-9784

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JOURNAL SCIENCE EDUCATION INNOVATION , VOL. 1. 2013
Association Scientific and Applied Research
International Journal

Original Contribution ISSN 1314-9784

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