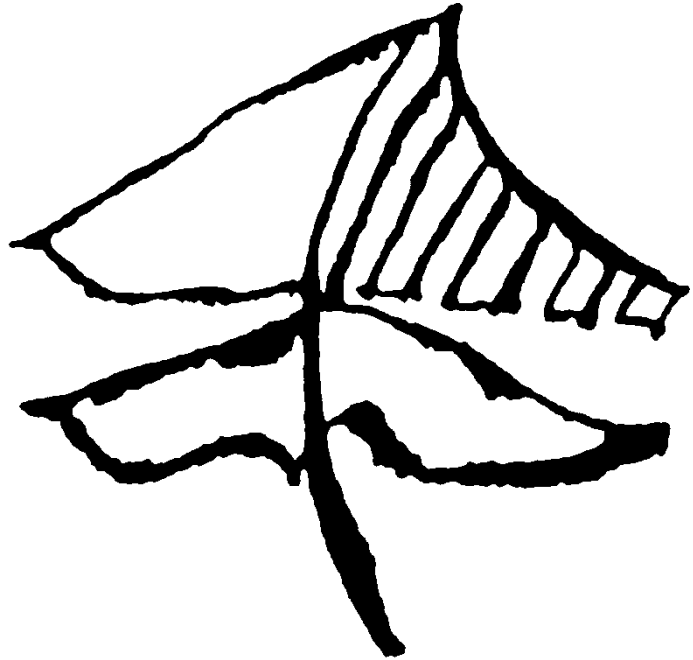


ISSN 1640-3622



INTERCATHEDRA

No 30/4

POZNAŃ 2014



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Published by: Department of Economic and Wood Industry Management
 Poznań University of Life Sciences,
 ul. Wojska Polskiego 38/42, 60-627 Poznań, Poland
 intercathedra@intercathedra.pl

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ISSN 1640-3622 (print) original version

www.intercathedra.pl

Poznań 2014

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Dear Readers!

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No 30/4 contains articles ordered by the Editorial Board in second part of 2014 year - approved for printing following reviewers' positive opinions and necessary amendments.

Scientific Quarterly INTERCATHEDRA are published under the auspices of IATM - International Association For Technology Management. The members of this scientific network volunteered to write their reviews, prepare materials for publication. I would like to take this opportunity to thank them for their contribution and dedication.

Wojciech Lis



*Zdzisław Czaja*¹

RESTRUCTURISATION AND MANAGEMENT IN THE INFORMATION SOCIETY

Abstract: The beginning of 60's of the former century witnessed the introduction of the idea of the information society into the theory of organisation and management. The characteristic feature of the societies in focus is their interactivity taking place via media. Paradigm of this information revolution is the Finnish society. The world economy evoked the process of globalisation independently of all the crises and destabilisation going on. It created multicultural bases of interdependences. The cultural post-modernism, modification of social space and time are determined by the structural transformation in the area of production and management relations. Market economy does not lose its profit - ownership relations. In the context of modern information technologies the capital is introduced into permanent circulation and numerous configurations.

Key words: information society, transformation,, networking, informationalism, management, internet, virtuality

INTRODUCTION

The concept of information society was introduced into the theory of organisation and management in the 60's of the XX th century.

It denotes the process of the society transformation acting on the basis of common information and telecommunication.

Society of the future is determined by economic information.

Production is powered by information taking the form of economic activity, whereas social activity of any kind is based upon information techniques. Professional activity in the information sector reaches beyond 30% of the employed.

Scientific literature has been using the idea of the information society since 1963 and its creator was T. Umesamo.

It denoted the characteristics of the Japanese society, based upon the information and telecommunication sector in the area of its socio-economic life.

However, the issue of a definition results from lack of parameters enabling to measure the problem of information saturation, as well as doubts concerning the issue of defining the information sector [R. Kluszczyński, Kraków 2002]

The determinants of the information society are: economic categories, technologies and communication techniques, and the number of individuals active in the information sector.

An attempt to build a definition may be undertaken viewing various criteria, e.g. economic, technological, cultural, spatial, professional, and others. Its essence will be e.g. information, technology, telecommunication, information flow costs and knowledge.

It is believed that in the information society, from the point of view of politics, the efficiency of political decisions, as well as offices will be improved. The scope of the direct democracy will be broadened, and the government-society relations improved.

In its original form, elements of totalitarian information elements will be appearing, alongside with freedom and privacy limitation dangers, and general informative society safety, including exterior disturbances attempts, as well as disturbances on the line government-society. Disproportional social dichotomy into creators and excluded in which dictatorship of information creators will govern is undoubtedly expected in the initial stage.

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At the threshold of its birth and operating, there will be obstacles of technical economical and educational nature such as: lack of access to tele-information technology infrastructure, issues of implementation costs of modern technologies, or technological illiteracy, especially among the old generation members. The characteristic feature of new technologies of the information society is their interactivity being carried out by help of media [<http://www.wos.org.pl>].

Moreover, the development of the global information economy creates a strong opposition resulting from past experience and endangerment to the cultural identity. The contradiction between the identity and net is a contradiction between global information society, and systems of values. The relationship between the information society and varied cultural identity becomes a problem.

Finland is the country which can serve as an interesting example in the social discourse and deliberation. It is a country of strong identity, without ultranationalistic social movements, without religious fundamental groups, with a low crime rate and symbolic number of antiglobalistic groups. Finnish information society is based upon the native identity. Integration of the society with the welfare state moderates the influence of the model on social diversity and is the country's support. Finland's independence is only three generations long. The country is not placed in the category of richest countries and its society belongs to agricultural categories. The second half of XXth c. was the period of the industrial society transformation, and the last two decades of the mentioned period brought about changes in the information society. The other dimension of the Finnish society is its political-cultural context. The Finnish nation placed between East and West had no guarantees to keep their independence and the right to self-determination. Both historical experiences and existential wisdom kept the awareness of the geopolitical position with no guarantees of perpetual self-determination. While facing the political survival of the nation the most crucial question has become the issue of preserving the national culture with its native language. The inspiration to build a modern country was the strategic project of the legitimization guaranteeing the survival of the nation. Focusing on the information society was the project bringing about the legitimization of the state and approved of by the society. The foundation of the Finnish society in its information dimension is strong national identity based upon the ethnic homogeneity and national language. Information transformation is easier in younger generations groups, who again look for their identity. "Reports of the Future" are submitted to the Parliament. A significant role in the development is played by the Future Affairs Committee. Finnish identity has become a feature of the structural information economy, in which companies compete with one another for the good of the development which is a proof of advanced level economy. The symptoms of the orientation are found at the highest level of advancement and modernity. Information society is a new type of Finnish identity.

Information technologies discredit backwardness and any subordination [Castells M, Himanen P, 2009]. The beginnings of the new world reach back to the coincidence of the independent processes of the 60's and 70's of the XX c. Namely, the revolution in the information technologies, economic crisis of capitalism, as well as full-time job employment, increased activity of social-cultural movements, such as human rights, feminism, natural environment, libertarianism, etc. Their interrelations and reactions have created a new social structure, i.e. the network society, new form of economy, i.e. information economy, as well as new culture i.e. the virtuality culture.

The process of information technology spread, richness of cultural codes creation, as well as process of holding power have been superseded by technologies of new capabilities of societies. Information technology has become a tool of implementation of socio-economic restructuring bringing about the possibility of networking the organisation of social activity. In the period of developed market economy both firms and governments offered means and political programs directed towards new forms of turbo-capitalism, or casino capitalism marked with economic globalisation, organisational flexibility and new labour management. The power of competition, labour flexibility and organised work depreciation led to the weakening of the state prosperity, as a

fundamental value of social contract in the era of industrialisation. Dynamic information technologies have significantly contributed to creating a new form of capitalism by providing tools to gather and process information, remote communication, coordinated labour organisation, simultaneous concentration and decentralisation of decision making processes, i.e. networking elements.

World economy, independently of the existing crisis and systematic destabilisation, gave rise to the globalisation process, creating multicultural foundations of mutual economic interdependences [Staniszki J. 2003].

Capital, labour, information and market, interconnected by the network, integrate both societies and regions. Those that are not interested in the global dynamics of the broadly meant market, owing to their fear of losing their dominancy, as well as endangerment of having to submit to the net rules, are ignored. Both conscious and unconscious attitudes of this type lead to socio-economic exclusion. The full time jobs ruins observe the development of a new type of capitalism. Despite the enormous diversity it penetrates countries, regions, cultures and all fields of life, which organise themselves around a set of economic rules, as well as socio-cultural ones, but the latter evolutionally. It is a new form of capitalism which is different from the Keynes economics and social wealth state. Its feature is high flexibility in the area of means. It is information capitalism founded on innovative efficiency, global economic competition and selective ownership. It has been equipped with technologies and creative culture based on knowledge and information, connected by network interdependence, unprecedented in history [Bendyk E. 2004]. The culture of the society of the future, modification of social space and time forms are determined by structural transformation of production relations, management relations and experience. The current production relations have taken up the character of information capitalism in which both the efficiency and competitiveness, resulting from innovation and flexibility, dominate. The basis of the new system becomes another type of organisation and management, adaptive and coordinative, describing the basics of a network enterprise which, connected with a new system, redefines the idea of labour based on education and access to both knowledge and information. The work is of creative character- it is a capability to carry out and create tasks constantly changing in the production process.

TRANSFORMATIONS OF THE NEW INFORMATION SOCIETY

The cultural postmodernism, modification of social space and time forms are determined by structural transformation of production and management relations. The current production relations have taken up a form of information capitalism, in which the above-mentioned efficiency and strong competition are dominant. Organisational flexibility of a network enterprise needs to employ both permanent and changeable labour subjects e.g. self-employment and outsourcing forms. Continual changeability of the relations leads to coordinated decentralisation and labour individualisation. The capitalist system transformation in its entirety does not lose its significance i.e. profit and ownership right. According to the classics, the processes take place at three levels. The first one corresponds to the title deeds which divide the holders into anonymous and institutional, the second group of title deeds are owners of family firms, the third group consists of individual enterprise owners for whom transforming into information capitalism is the easiest task owing to innovative capabilities, flexibility of undertakings and effective mobility. The second level comprises the class of managers. They are the intellectual driving force of the information capitalism, especially in multinational corporations. The third level is taken by global financial markets, where profits from numerous sources are cumulated in the form of e.g. profit margin on the share market, obligations, foreign currency market, fixed term contracts, and others, which generally are higher than the value of direct investments.

The processes take place in the conditions of new technologies, informationalism, and continual search for investment possibilities. The capital is put into constant circulation and



numerous configurations in a frightfully short time. This type of actions named casino capitalism equipped with technologies of the future, as well as controlled management, help to avoid dramatic market collapse, changing some subjects' losses into profits to others which finally results in achieving a balance and keeping it dynamic. The characteristic feature of a system under reform is a tendency of increasing social inequality and polarisation, being an effect of the difference between highly productive self-programmed labour and redundant labour resulting from its individualisation and the weakest links of the labour force without organisation and professionalism. It is also an effect of a loss of the welfare state (country) power, resulting from labour individualisation, globalisation process and delegitimation of the state and further, just like in the domino avalanche, cutting on social benefits and in general reduction of the social sphere. The tendencies of inequality and social polarisation are generally unavoidable, imposed upon people, and more and more dominant if no preventive compensation actions are undertaken. Destabilised social relations may then lead to exclusion i.e. breakdown of ties between people, workers, consumers alongside with the dynamics of the information capital. New system of production will significantly reduce the labour force-more vividly the general labour mass circulation will be observed, variety of workplaces and increased amount of casual, as well as seasonal work. Workplaces fluctuation, including the numerous non formal actions, will generate criminal economy. The reverse in the system will be: loss of stability of employment relationships, poor bargaining force of employees, avalanche type unemployment, personal crisis, illnesses, drug addiction and other life dramas, bringing about a series of problems resulting in inability to find a way out, and finally personal tragedies. In the situation when innovations constituted the source of productivity, and knowledge as well as information were the basis for new production processes, the new producers of the information capitalism will be knowledge creators and information processing individuals. Their achievements and reserves of activities enrich the firm, region and the economy alongside with management, data processing, production and services.

Information producers constitute a group of professionals, managers, engineers or production units in cooperation with the labour subjects that cannot be separated. Their percentage reaches approx. 30% of the employed in OECD countries. The others are a generic labour category, i.e. reproductive and replaceable by machines, or periodically by some other labour force. The transformation process, as far as the authorities relations are concerned, is connected with the crisis of the national state, independent, and suffering from the political democracy crisis. Ineptitude to act, inertia, and tardiness question the legitimization, blur the limits of independence in the process of democratisation – of delegating the will of the people. Transformation of the capital, multilateralisation of the power institutions, and power decentralisation are at the base of the new form of the state, horizontal state, network state. According to M. Castell the network society is the one in which the process of transformation of group-type gatherings with stabilised interior links and distinguished boundaries of affiliation to network structures has taken place- more extensive, less tightly integrated with undefined boundaries of activity. Social ties are based mainly on information exchange thus creating communication networks. Current vertical, hierarchized bureaucratic structures are gradually driven away by flexible network function and resources mobilization co-ordinations. Network system gradually covers also the areas of states and regions, and their varied interior structure will constitute a premise that no institution is capable of gaining permanent dominance over the entirety- which is one of the network system features. New competitiveness dynamics is based upon innovativeness. Initiated and innovativeness-powered processes raising the importance of the metropolis, becoming the knots of labour market network, commerce, services, media and others, along with the influx of human resources, initiating new technologies investments. The post-market economy property is driven out by the access to the network-currently verified and updated. The situation in the labour market network develops rather paradoxically. On the one hand, the markets offer fewer and fewer career perspectives, despite the

earlier promise connected with the development of the services sector. The reality proved though that many professional groups will have become dequalified, parallel to its development. Modern computer program technologies will be limited to some routine proceedings not calling for specialised qualifications. A narrow circle of highly specialised professionals, operating as symbolic analysts, strongly individualises the labour market situation. Symbols, access codes and cyphers become the creative engine of the new economy. The market goods offer denotes a certain value to the customer, providing it enables him to build his own identity. Information processing, and symbols utilization constitute the symbolic analytics with its "creative class" and the Internet knots control by netocracy. The above mentioned approx. 30% population possesses capabilities to continually requalify and adapt to new tasks [Bard A, Soederqvist J, 2006]. The information policy of the mass media provides pace to the continually diminishing world of power ratio. Political systems lose their power which in the process of informationalism at its basic level becomes part of cultural codes serving as departure point favouring activities of a given leadership type. Cultural conflicts in the era of informatisation are a form of struggle for power by help of media, frequently treated as fourth power. The power is not in reality exercised since it is rooted in the information exchange and symbolic manipulation networks carried out by leading social actors, institutions and cultural movements, by means of icons, spokespeople, and "intellectual boosters".

Virtuality is a new reality since within the frames timelessly separated from places of symbolic systems, new categories will be formed referring to images creating our behaviour and following it a defined policy with elements of dreams, nightmares and others [Castells M, 2003]. The network society is supposed to be constructed of the production network, power and experience creating virtuality culture in global flows out of spatio-temporal context. The information societies will be soaked with the omnipresent network logic absorbing and subordinating the earlier social forms. They will not be free of conflicts, contradictions and challenges from the alternative social organisation forms, as well as values inherited after industrial capitalism and full-time employment pattern.

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*Zdzisław Czaja*²

HETERARCHY OF MANAGEMENT IN INFORMATION SOCIETY

Abstract: In the global information society we have reduced management structures, low costs of market entry via the Internet, rapid IT development, access to worldwide resources and international virtual reality. A scattered distribution of knowledge forms a heterarchy of network organisations with a flattened power and knowledge structure, corporations adapting to the labile environment by dynamic strategies, more effective design processes, R&D structures integrated by computer-aided methods and organisation, many nerve centres with overlapping connections and blurred boundaries between humans, nature, technology and artificiality. A key element modifying networks is the social capital created through lifelong learning. Manipulations in IT systems threaten the management process. Hackers and hactivists perpetrate destructive actions. A threat to network resources is posed by any incident potentially causing material or immaterial losses.

Keywords: information society, Internet, management process, cyberspace, heterarchy, social capital, networking, nanotechnology, hackers, hactivists

INTRODUCTION

The contemporary world of the information society is becoming increasingly flatter – more and more horizontal. One of the symptoms of this process is reflected in changes in the functioning of corporations, which are setting worldwide trends. This is because corporations have been divided into departments having their own internal organisational structures operating on different continents, where they are running mutual enterprises based on world resources. This flat world according to S. Bloch and P. Whiteley is also connected with reduced hierarchical management structures, low costs of market entry via the Internet, a rapid development of information and communication capacity, software created by communities of enthusiasts, access to worldwide resources and e.g. international teams creating a virtual world. The reduction of communication costs dramatically improves access of individuals and societies to the global market. In the horizontal world team work, motivation and networks of interpersonal connections greatly gain in importance. Economic barriers are gradually vanishing. The poorest regions have been incorporated in the world economy thanks to the development of microcredit funds and global communications. In the newly created cyberspace access to teleinformation technologies is becoming a characteristic of organisations with adequate resources of information, skills, knowledge potential and motivation [Bloch, Whiteley 2008]. The changing world affects our knowledge about the world and the manner in which we manage and direct out development. Virtual connections have replaced traditional communication methods, network structures comprising relationships between entrepreneurs, owners and the management class, supervisors and managers, administration and customers. This new variable allocation of the decision-making process results in an increase in the number of partners on the management plane. Multilateral management in the opinion of H. Simon creates collegiality and numerous coalitions. New models of functioning of authority will be determined by an increased inflow of the information resources based on the knowledge of experts, managers, executive officers and other professionals, as decision-making authority in numerous organisations will be delegated to regional and local levels, thus reducing red-tape and excessive formality of central management and leadership structures [Doktor 2009]. The dispersed location of knowledge creates the heterarchy of network organisations with a scattered and flattened structure of authority and knowledge, facilitating adaptation of corporations to the labile environment, creation of

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dynamic strategies, more effective design, integration of R&D structures, etc., in line with modern computer-aided methods and organisation techniques. The social capital, particularly its intellectual dimension, determines material and human resources for the modernisation of network systems, thus creating the new organisational structure of learners and stakeholders. Sceptics of the management revolution warn against excessive fascination with the economy based on knowledge, global network, common informatisation or knowledge management at the highest organisational levels. Concern has been expressed e.g. by M. Castells or U. Beck that the postmodern network society or risk societies may lead to the alienation of contractors, passivity of stakeholders and marginalisation of partners leading to poverty and decline, disturbed principles of common democracy, and as a consequence to the dual division of the world into rich empires and bankrupt peripheries [Castells 2009]. In the new configurations exchange of information is executed with the exclusion of financial agency, i.e. in the barter system. The increasing networking will be a kind of turbulence in a way determining the process of globalisation, within which sophisticated non-zero-sum games will be conducted at mutual interdependencies and an increasing degree of complexity. This radical progress is connected with consequences, which are difficult to predict, and which in the modern information society will definitely require in-depth knowledge on the mechanisms and analysis of network dynamics. The information society organised into networks with leading curators and managers will have the status of an authority replacing the authority and policy of the state, including the disappearance of borders. The unique role of curators as guardians, prosecutors and judges will consist in the supervision over law and order in the network. In the new system both principles of public life and the right of citizens to transparency will be difficult to maintain. In place of actions and the public space a complicated labyrinth of informationism will arise with no potential to supervise the entire structure. It will be a process opposite to totalitarianism [www.waip.com.pl]. The market economy, referred to as the capitalist model, will be an important component in the overriding information system. Capital will not lose its value and finances will retain their function as a measure of the level of production and consumption. However, they will assume the digital, i.e. virtual form. Politicians and bureaucrats will no longer hold the power of management, while impoverishment of the middle and lower classes will result from the lack of access to information. The gap and diversification between the informed and those lacking information will be increasing and the flow of delayed information will make it outdated and eventually worthless.

THE PROCESS OF INFORMATION NETWORKING IN THE MANAGEMENT CONTEXT

In social sciences the concept of networking was coined in the 1990's in reference to the Internet. The primary characteristic of the omnipresence of the network is its spatial dimension and dynamics with behavioral elements, variability, temporality and rapid flow of information. In structural systems as a rule we deal with hierarchies, i.e. vertical relationships, or with heterarchies, i.e. overlapping complex relationships. Hierarchy is a vertical system of issuing orders and execution of tasks. In a heterarchy there are many nerve centres with overlapping connections. In politics the network analysis is a relative approach – power becomes an aspect of existing or potential interactions between many units and collective subjects. In such a case management is situation-oriented, dynamic and unstable, in which coercion, violence, consent or compromise may undergo continuous changes. In the network approach to the political system the concept is to show that the distribution of power is a derivative of the position of entities in the social structure, i.e. the position in the network of exchange of information and resources. A network is a complex adaptable system – it is a labile environment of individual entities. Effective adaptation creates conditions for flexible actions aiming at changes or stabilisation. In this context modern communication technologies constitute the area of continuous communication and social

connectivity. Computers, the Internet, GPS, mobile phones and other advances in technology facilitate instantaneous cooperation, provide tools for interactions and joint activities, make it possible to create new, complex network forms exhibiting swarm intelligence, such as e.g. the Zapatistas, anti- or alterglobalists, various anarchist, nationalistic or terrorist groups forming a network within a network of decentralised, scattered entities with no formal structure or leadership, extremely flexible and mobile, capable of effective realisation of tasks. Technology following its own dynamics enters into relations with other political, economic and cultural systems, which all together form and are formed by technologies, creating a network of interdependencies with a specific effect of the situational context. In this process a crucial role is played by the psychological factor of human knowledge and skills as a collective intelligence capable of verification and selection of optimal forms of activity within the limited framework of individual technological systems and specific historical contexts. Convergence, mutual development of networking, technologies and organisational processes are executed on the peer-to-peer basis. It refers to an open technological infrastructure, i.e. the Internet, which – while not always available to the participants, is controlled by systems of autonomic communication and exchange of information among users. Based on the ptp principle all users are linked in scattered networks with no limitations, forming a heterarchic structure and a system of cooperation with the feed-back mechanism [<http://www.ethory.net/articles>]. In such a situation in the political sense we will deal with a social movement, such as e.g. Free Software or Open Source, i.e. open access to the network, a liberal culture, etc. Moreover, a scattered network structure becomes a form of self-organisation and adaptation as a pre-condition for survival in a complicated environment, convergence, hierarchy and heterarchy, a network of organisational systems, a management structure for the private and public sphere of the society, politics, culture or economy. In this apparently complicated reality boundaries between the human, nature, technology and artificiality are blurred. This results in a quasi-symbiosis, in which technology undergoes the process of self-organisation. A particular characteristic of self-organising computer programmes is connected with their capacity to identify and adapt to human needs, problems, interests, customs, etc. [Rother 2008]. All these processes are executed in billionth parts of the basic unit, which essence is a construct based on the control of physical and chemical properties at the molecular level. An example may be provided here by non-invasive, highly complicated laser surgeries. Nanotechnology, increasingly omnipresent and invisible to the naked eye, faces no boundaries. It becomes a certain juxtaposition to the virtual world created within the computer and open for manipulation. This is the cyberspace, in which the virtual nature of computers is transferred to the material world, simulation of problems and variants of their solutions are transferred to our everyday lives. Nanotechnology embedded in the surrounding environment makes it possible for us to use various data and diverse operations, while its perfection transcends human imagination. These unlimited potential resources make the development increasingly dynamic. Systems become more and more complicated, forming new, previously unknown structures at an unprecedented pace, which poses a risk of symptoms of chaos, resulting in a state of imbalance and destabilisation. The constructive feedbacks provide a cumulative socio-technological development including the powerful network structure operating on a global scale. The entire network of cyborg connections results in a situation when individuals and societies strengthen their mutual ties entering complex configurations with technologies, offering in the future the potential to transcend temporal and spatial barriers [Urry 2004].

HUMAN CAPITAL AS THE FOUNDATION OF THE INFORMATION SOCIETY

The primary element in the modification of a network is provided by human capital created in the process of lifelong learning. Its elements include health state, vitality, motivations, age structure, skills, capacity resources, predispositions, professional prowess and entrepreneurship, attitudes, creativity, competences, communication skills, ability to cooperate, etc. They are unique and

multidimensional characteristics affecting productivity of an individual. They are not subject to market turnover, being inalienable and exclusive, i.e. non-transferable. Development of human capital is a strategy directed at investment in the network society with multiple advantages, such as innovative character and competitiveness, as well as the capacity to implement advances in science, technology and international culture, modernisation of social, institutional and economic structures, modification of the modern economic, organisational, IT and social infrastructure, improved standard of living, labour efficiency, culture and ethos, creation of consumption patterns, etc. [Pocztowski 2001]. The entire body of the human capital forms the social capital, comprising resources of skills, knowledge, information, culture, social creativity of individuals as well as relationships between people and organisations. The level of social capital determines creativity, innovativeness, openness to changes, the capacity to establish permanent social, economic and cultural ties. It is a network of mutual connections, trust and activity, forming foundations for the civil society. The process of informatisation will impose a particular challenge on the innovative social policy, especially in the field of employment, social integration and education. In view of the growing unemployment we need to re-define the concept and essence of labour, ownership, redistribution, etc. The future labour market will acquire new, previously unknown characteristics, i.e. uncertainty concerning operation forms, maintenance of employment levels, qualifications and requirements for their continuous improvement, development of personal professional skills, etc. The re-defined labour will dramatically change in character. We will need to look at its essence in view of flexibility, plurality, diversity, frequency, location, personal orientations, transience, feminisation, polarised quality, autonomy, corporate culture, dynamics within trades and professions, specificity, etc. Labour in the future will require, among other things, appropriate changes, adequate to occurring changes in interpersonal relations, proper atmosphere at the workplace, greater awareness and the sense of responsibility, corporate culture, mobility, ability to face new challenges, dynamics in professional development, rapid adaptation to changing situations, incessant activity and creativity, commitment, high qualifications, etc. The main programme of socio-economic development within the Lisbon Strategy assumes, among other things, improved effectiveness of the education policy, as it was stated that by 2013 50% new workplaces would require higher education, approx. 40% secondary education and approx. 15% elementary education, respectively [European Parliament legislative resolution on the proposal for a recommendation of the European Parliament and of the Council on key competences for lifelong learning (COM(2005)0548 – C6-0375/2005 – 2005/0221(COD))]. The EP recommendations contained the following aims: 1) to identify and define the key competences necessary for personal fulfilment and social cohesion, 2) to undertake actions ensuring a basis for adult life and continuous development, 3) to provide adequate development conditions for policy makers, the education system, employers, etc. to implement the commonly agreed objectives on the national and European levels [Morofi 2009].

DESTRUCTION AND THREAT IN CYBERSPACE

Numerous, remote and illegal manipulations in teleinformation systems, disturbing their operation or aiming at the retrieval of data base resources or acquisition of control over such resources, constitute a serious threat to the entire management process. These systems are used for personal, public and professional communication; they are an important tool used when working in any given sector of the economy, they control production processes and operations in mass media or transport. Perpetrators of network crime may include representatives of the state structure (intelligence agencies, secret service) operating in intelligence, information offensives and activities in the time of military conflicts. Such crime may also be committed by entities other than the state, which numbers are increasing as a result of common access to the network and the growing numbers of professionals. This category includes terrorist groups, organised crime, groups involved

in ransom kidnapping or hostage operations, political organisations, associations, sects, informal, difficult to identify groups or even single individuals [Madej 2007]. Statistics reported in studies on cybercrime, according to reports published by Symantec, are steadily increasing exceeding a million cases annually [Symantec Global Internet Security Threat Report 2008]. Their informal, simplified structure, primitive motivation and in the case of individuals also their current emotional state result in rapidly taken decisions to launch an attack. Hackers and hacktivists may serve as an example. They are individuals or informal groups, whose motivation is psychological in character and provides them with a sense of self-fulfillment. Hackers based on acquired knowledge, computer skills and individual talents are capable of overcoming safeguards and electronic codes of computer systems and thus gain access to information stored in data bases. Such actions were initially incidental, aiming at the verification of one's prowess and show success in penetration of networks, or even indication of faults in their operation, which was praised by many users, as it contributed to innovativeness of teleinformation systems. At present it would be difficult to select amateur hackers or idealists acting pro bono [Haber, Niezgodna 2006]. Among IT enthusiasts hackers are treated as an elite, affiliation to which is considered to be a privilege and recognition of one's talent, knowledge and skills. Using bootleg software and formats they incapacitate individual servers and websites. Such cyberattacks under specific conditions may rapidly lead to computer failure, shutdown of a specialist teleinformation system and other network destruction forms. Threat posed by hackers is completely unpredictable, resulting from randomness of their targets as well as the method and time of the attack, i.e. incidental timing and arbitrarily selected systems to be attacked [Lehtinen et al. 2007]. Top-class computer professionals may overcome practically any security measure in teletechnology systems when motivated by greed. The Internet underground is an arena for the activity of not only criminals, but also individuals, private firms, groups motivated by different ideologies, terrorist groups, etc. In such a situation hacking services are provided at modest prices in order to destroy other users, including disturbance of socio-economic life. A separate group of cybercriminals is composed of hacktivists. They are political activists using hacking methods to impose pressure on the public concerning various problems, opinions or political dispute. Information, announcements and comments presented in blogs frequently incite fierce emotions and provoke specific actions – when the background for these activities is connected with political crises or international conflicts the situation may get out of the control of the establishment. In order to reach their political goals they may perpetrate coordinated attacks paralysing the national computer network system disturbing the strategic areas of the socio-economic life, including business, government administration, the financial and banking or energy sectors as well as other compatible teleinformation systems. A comprehensive attack may trigger a chain reaction, leading within a short period to equipment failure or material losses. From the point of view of destabilisation of the management process threats are also posed by penetration, manipulation and fabrication of data stored in data bases and sent on-line, constituting a specific type of services in business, as well as in cooperation with other networks, also used by the state and local government administrative bodies. A threat for network resources is also posed by any event, which may be a source of material or non-material losses. They may be involuntary, accidental, natural errors, negligence of users, application of bootleg software, etc. The number of computer-related incidents threatening teleinformation security is very low in Poland. However, they may easily threaten security of servers and web portals integrated with local area networks of offices, institutions and companies and gather information e.g. on software architecture and data bases, thus posing a risk to the operation of the network [www.cert.pl/PDF/Raport CP 2007].

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ECONOMIC AND LEGAL ASPECTS OF PAYMENT LAGS IN POLAND

Abstract: The aim of this paper is to present economic and legal aspects of payment lags in commercial transactions in Poland. In the economic aspect the analysis concerns such factors as variation in the structure and average collection periods of enterprises, payment periods, the scale of losses due to payment lags and causes of payment lags. Analysis of the economic aspects was based on data from reports of international credit management and insurer companies Intrum Justitia and Atradius. The analyses showed that payment reliability of economic entities in Poland, measured based on the so-called Payment Index, is low and is deteriorating. In terms of legal aspects concerning payment lags the paper focuses particularly on the Polish Act on payment terms in commercial transactions of 2013 and presents an analysis of the evolution of proposed legal measures to protect creditors against negative consequences of payment gridlocks.

Key words: payment lags, payment periods, commercial transactions, law, Poland, EU

INTRODUCTION

The common practice of late payments in commercial transactions is a negative element in the contemporary market, which rules are established particularly by the strongest players. Backlog of late payments at individual levels of the market structure leads to payment gridlocks, which actual burden is experienced especially by contractors with the weaker market position, whose liquidity is based on monetary assets generated as receivables paid by the counterparties. The primary risks resulting from late payments include problems with maintaining an adequate degree of financial liquidity, tangible losses of forecasted profits or the necessity to use external financing sources for continuation of enterprise. We also need to remember that payment arrears constitute a real obstacle in the development of enterprises and eventually may even result in their closure or bankruptcy.

Late payments are also manifested in tangible effects in the national economy in the form of multi-million losses in budget revenue and general economic slowdown. In view of the increasingly serious implications of payment lags and the need to meet the assumptions of the EU policy, the legislator tries to introduce to the Polish legal order specific legal instruments, which final form was incorporated in the Polish Act of 8 March 2013 on payment terms in commercial transactions [Act... 2013].

The aim of this paper is to present a characteristic of the economic and legal situation in Poland concerning late payments in transactions. Recent years, particularly in relation with the investment boom in infrastructure and construction projects as well as opening Polish borders within the framework of the common EU market, have brought dynamic changes in the structure and effects of arrears in payments experienced by Polish enterprises. For this reason we need also to focus on Polish legal regulations, which are to curb this negative economic phenomenon, and thus their characteristic will be presented in a comprehensive manner.

The analysis of economic and legal aspects of late payments in Polish economy is based on the reports of international credit management and insurer companies Intrum Justitia [European... 2008-2014] and Atradius [Atradius... 2014] and on the Act of 8 March 2013 on payment periods in commercial transactions [Act... 2013].

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ECONOMIC CHARACTERISTICS OF PAYMENT LAGS IN POLAND

Table 1 presents average payment periods in Poland in the period of 2008 - 2014 in terms of sectors (B2B, B2C, PA), coming from the reports of the international credit management company Intrum Justitia [European....2008-2014]. Their analysis shows that apart from the B2C sector the contract and actual payment periods have been reduced, resulting in the last years of the analysed period in their establishment at around 20 days (contract terms of payment) and 38 - 40 days (actual payment periods). However, the scale of changes in this respect was small and thus did not significantly affect the average payment lag. Towards the end of the investigated period (2012 - 2014) payment backlogs were high in all analysed sectors and amounted to approx. three weeks (18 - 21 days).

Relatively more optimistic conclusions may be drawn from the analysis of changes in the structure of receivables in Poland, presented in Table 2. These changes indicate an improved efficiency in the management of receivables, manifested primarily in the reduced proportion of receivables in arrears for more than 90 days, from 11 - 17% in the years 2008 - 2010 to approx. 8% in the years 2013 - 2014. Reduction of the share of receivables overdue for more than three months was reflected in the comparable increase in the proportion of receivables with shorter payment periods, i.e. up to 30 days and 30 - 90 days.

In turn, taking into consideration other characteristics of the analysed phenomenon we may observe that the weak dynamics in the shortening of payment periods did not limit two very important problems. Firstly, the scale of losses resulting from late payments continues to increase dynamically, as reflected in the Payment Morality Index given by Intrum Justitia. It results from the presented data (table 3) that losses caused by overdue receivables in the years 2013 - 2014 amounted to 3.8 - 4.0% total income, while in previous years they did not exceed 3%. In turn, when taking into account the Payment Index, Poland continues to be a country with a high payment risk and thus it is perceived as a country with a low payment morality. In the years 2008 - 2014 the Payment Index for Poland fell within a rather narrow range of 159 - 166 points and showed a weak upward trend. This means that the payment risk in Poland is growing.

Table 1. Payment term, payment duration and payment delay in Poland according to sectors in 2008-2014

Sector ¹	2008	2009	2010	2011	2012	2013	2014
average payment term							
B2C	17	15	17	20	20	20	20
B2B	30	21	20	20	20	20	20
PA	28	20	20	20	20	20	20
average payment duration							
B2C	33	33	32	34	40	39	38
B2B	47	39	35	36	41	40	38
PA	48	44	40	38	39	38	38
average delay							
B2C	16	18	15	14	20	19	18
B2B	17	18	15	16	21	20	18
P-A	20	24	20	18	19	18	18

¹B2C – business to consumer sector, ²B2B – business to business sector, ³PA – public sector

Source: European Payment Index 2008-2014, Intrum Justitia



Table 2. Time structure of receivables in Poland in 2008-2014

Dni	2008	2009	2010	2011	2012	2013	2014
< 31	61	53	53	53	54	55	57
31-90	28	30	32	38	39	37	35
> 90	11	17	15	9	7	8	8

Source: European Payment Index 2008-2014, Intrum Justitia

Table 3. Losses on late payments and Payment Index in Poland in 2008-2014

Specification	2008	2009	2010	2011	2012	2013	2014
Loss (% of turnover)	2,9	3,0	3,0	2,8	3,2	4,0	3,8
Payment index (points)	159	163	163	161	164	166	165

Source: European Payment Index 2008-2014, Intrum Justitia,

Despite the reduction of payment periods and advantageous changes in their structure, the increased risk and its persistent high level are experienced by Polish entrepreneurs. It results from analyses conducted by Intrum Justitia that as many as 57% entrepreneurs in Poland declared in 2014 serious problems with the maintenance of a safe level of financial liquidity as a result of late arrears in payments [European....2008-2014]. It needs to be stressed here that arrears in payments may stem from various causes. As it is indicated by the results of analyses presented by Atradius [Atradius...2014], the range of these causes is extensive, and differentiated also by the type of customer (Polish, foreign), with whom commercial transactions are concluded.

Table 4. Main reasons for payment delays by domestic and foreign B2B customers in Poland (%)

Main reasons for payment delays	domestic customers	foreign customers
Insufficient availability of funds	51,2	31,5
Dispute over quality of goods delivered or service provided	8,0	13,7
Goods delivered or service provided do not correspond to what was agreed in the contract	12,9	8,9
Complexity of the payment procedure	19,9	41,9
Inefficiencies of the banking system	23,4	37,1
Incorrect information on invoice	18,4	18,6
Buyer using outstanding debts / invoices as a form of financing	35,3	25,8
Formal insolvency of the buyer (example: liquidation, receivership, bankruptcy)	29,4	19,4
Invoice was sent to wrong person	11,0	16,1
Other	2,5	1,6

Source: Atradius Payment Practices Barometer - results June 2014

In the case of commercial transactions between Polish clients entrepreneurs (B2B) perceive the primary causes for payment lags in (Table 4): insufficient availability of funds (51.2%), financing of economic activity of buyers using outstanding commitments (35.3%), formal insolvency of the buyer (29.4%), the inefficient banking system (23.4%) and complicated payment procedures (19.9%) as well as errors in invoices (18.4%). In turn, in the case of commercial transactions with foreign partners the ranking of causes for payment lags is different from that for Polish clients. In the transactions with foreign clients the complicated payment procedure ranks first (41.9%), followed by the inefficient banking system (37.1%), while insufficient availability of funds (31.5%), financing of economic activity of buyers using outstanding commitments (25.8%) and formal insolvency of buyers (19.4%) are less important.

LEGAL ASPECTS OF PAYMENT LAGS

A HISTORIC OVERVIEW OF POLISH LEGAL INSTRUMENTS REGULATING PAYMENT LAGS IN COMMERCIAL TRANSACTIONS

The Polish legislation, which is to eliminate the common practice of payment lags in commercial transactions, is closely connected with the fulfillment of assumptions of the EU policy. Each Polish normative act regulating the analysed problem, which entered into force after 2000, needs to be seen as an attempt to implement EU directives and should also be evaluated in view of the applications of concepts adopted by the EU legislators. Unfortunately, taking into consideration only the fact that within the last 15 years the next two EU directives were passed, while in the Polish legal system three successive acts were introduced, it may be stated that to date the proposed legal measures have not been sufficiently effective to curb this negative practice.

Before 2013 in the Polish legal order two acts were binding, introducing specific legal instruments, which primary objective was to implement EU assumptions contained in the no longer binding Late Payments Directive of the Parliament and Council of 2000/35/EC of 29 June 2000 [Directive2000]. In view of the brief and laconic content of the first Polish Act of 6 September 2001 on payment terms in trade turnover [Act...2001], it is difficult to evaluate its effect on the evolution of the arrears structure in payments in Poland in the period, when this Act was binding. It only needs to be mentioned here that the introduction of that Act was universally criticized [Tollik 2002, Marquardt 2002], while the proposed legal instruments created favorable environment to common practice of law evasion [Kwaśnicki 2004].

A remedy to the above mentioned problems was proposed with the Act of 12 June 2003 on payment terms in commercial transactions [Act... 2003], which came into force on 1 January 2004 and remained binding until the new act was passed in 2013. The passing of this Act was an attempt to more effectively adapt Polish legal regulations to those of Directive 2000/35/EC [Directive... 2000]. The new act included several specific improvements, e.g. thanks to the considerable extension of the subjective scope and the introduction of the definition of a commercial transactions covered by that Act [Kwaśnicki 2004]. The Act also introduced other key changes, e.g. in terms of court fees (*exemption from court fees*) and civil procedure (*order for payment*), advantageous to creditors in pursuing claims for receivables in court [Staniek 2004]. However, the no longer binding legal regulations need to be definitely criticised, as the instruments proposed in those Acts proved to be ineffective and failed to limit in a considerable degree intensification of the negative effects of payment lags, deteriorating also as a consequence of the economic crisis.

EVALUATION OF EFFECTIVENESS OF BINDING LEGAL REGULATIONS IN POLAND

On 28 April 2013 in the Polish legal system the new act has come into force, i.e. the Act of 8 March 2013 on payment periods in commercial transactions (hereinafter referred to as the Act of 2013) [Act...2013]. First it needs to be stressed out that the main body and content of this normative

act reflects the directions and assumptions contained in the currently binding Late Payments Directive of 2011/7/EU of 16 February 2011 [Directive ...2011].

The primary aim of the Act is to create a catalogue of specific guarantees for creditors, protecting them against negative consequences of late payments and analogously, to establish respective obligations imposed on debtors being late with their payments (art. 1 Act of 2013). Also in this respect the Act enforces the unconditional application of the law, indicating that any agreement excluding or limiting, majority of the creditors' assured rights and obligations of the debtor will be considered in principle as absolutely invalid (art. 13 Act of 2013).

Provisions of the analyzed Act are generally addressed to professional market players, i.e. a wide range of entrepreneurs as well as the public bodies (art. 2 Act of 2013). Regulations concerning payment periods in commercial transactions are thus binding in the case of economic relations between entrepreneurs, between entrepreneurs and public bodies, and between public bodies⁴. However, provisions of the Act do not cover transactions, in which one of the parties is the consumer, operating outside the scope of economic activity [Biezuński 2013].

The objective scope of the application of the provisions of this Act covers commercial transactions understood relatively broadly as each example of paid supply of goods or paid performance of services concluded by entities mentioned in the Act in relation with their activity (art. 4(1), Act of 2013). The Act also introduces a closed catalogue of objective exemptions (art. 3 Act of 2013)⁵. Specification of the relatively broad scope of application and the extensive list of exemptions from application is to limit the freedom to evade the Act provisions.

When analysing the provisions of the Act we need to focus on the rights of the creditor, since in this aspect we should perceive the most important regulations limiting the practice of late payments. Particularly extensive provisions concern interest, to which the contractor is entitled. The Act provides the creditor with two independent claims – for interest on benefits currently being before their due dates (art. 5 Act of 2013) and interest due, connected with the payment being in arrears (art. 6 and 7 Act of 2013).

In the case of commercial transactions, which terms include the payment period of more than 30 days, the creditor is entitled to charge interest starting from the 30th day from the supply/performance of goods/services (art. 5 Act of 2013). The only precondition that must be met, next to the supply/performance of the said goods/services, is the necessary delivery of an invoice or bill to the debtor, confirming the supply of goods or performance of the service. It also needs to be stressed here that such a right is active even when the said commercial transaction does not stipulate a specific date; what is more, the legislator does not even require a request to pay delivered to the debtor at 30 days from the supply/performance (art. 6 Act of 2013). Thus the right is active by law (*ex lege*). Creditors are entitled to charge increased interest until the date of payment, unless the payment becomes mature earlier⁶.

Moreover, the legislator also introduced specific rules concerning the interest charged on already mature payments, which as special regulation (*lex specialis*) exclude the application of general provisions of the civil code. In the case of commercial transactions covered by the analysed Act, the creditor is entitled, with no need for the request to pay sent to the debtor, to charge interest for late payment in the amount specified based on art. 56(1) of the Act of 29 August 1997 – the Tax Code (art. 7(1), Act of 2013 and art. 8(1) Act of 2013) [Act..1997]. Thus the creditor is entitled to

⁴ Excluding contracts, which parties are solely entities in the public sector as defined in the regulations on public finance (art. 3(3) Act of 2013)

⁵ The Act does not apply e.g. to debts included in bankruptcy and recovery proceedings, specified banking operations (e.g. bank guarantees, credits, collaterals, securities trading) as well as supply and services covered by art. 346(1 b) of the Treaty on the European Union (e.g. trade in weapons and ammunitions).

⁶ Maturity of payments occurs with the date of due payment specified in the contract or – in the case of no such indication – with the date specified in the written request for payment sent to the debtor (art. 6(2 and 3) Act of 2013)

request interest for late payment starting from the maturity date, in the amount higher than that stipulated by general regulations [Act ...1964]⁷.

The Act also contains provisions, which to a considerable degree, limit the basic principle of civil law, i.e. freedom to modify the content of a given legal relation [Biezuński...2013]. On the power of Act provisions, the payment period stipulated in a given contract meeting the definition of a commercial transaction may not exceed in principle 60 days, starting from the date of delivery of an invoice or bill to the debtor, confirming the supply of goods/performance of services (art. 7(2) and art. 8(2) Act of 2013). In the case when the debtor is a public body, the Act introduces the maximum period of 30 days (art. 8(2) Act of 2013). The considerably limited right to extend the statutory terms is also specified in the provision, the right is exceptional and incidental in character, and in the case of public bodies the payment period may be extended to max. 60 days.

A new regulation in the Polish law concerning payment periods in commercial transactions is the introduction of a specific right of the creditor to claim a pecuniary compensation in the amount equivalent of 40 Euro for costs incurred in relation with the pursuance of the due receivables (art. 10, Act of 2013). The right to this claim is active starting from the date, on which the creditor is entitled to charge interest on overdue payment. Obviously, creditors still retain their right to claim the actual costs exceeding the statutory amount.

CONCLUSIONS

Specified in the contract and actual payment periods have been reduced in Poland in recent years. However, the scale of these changes has been small and thus has had no significant effect on the average delays in payments, which in the period of 2012 - 2014 remained high and amounted to approx. three weeks. Relatively more optimistic conclusions may be drawn from changes in the structure of receivables. These changes indicate improved efficiency in the management of receivables, manifested first of all in the reduced share of receivables with payment periods exceeding 90 days. However, the generally poor dynamic of reductions in payment periods has not curbed two very important problems, i.e. an increased scale of losses caused by overdue payments and the deteriorated payment morality as measured by the Payment Index, presented by Intrum Justitia.

In turn, in view of the legal instruments presented in this paper and proposed in the new Act on commercial transactions it is difficult to draw definite conclusions concerning its effectiveness in curbing the negative phenomenon of payment lags in Poland. On the other hand, it needs to be stated here that in theory the analysed legal measures contribute to the improvement of creditors' position and may discourage dishonest contractors against the practice of late payments. Still, in view of the limited effectiveness of previously binding normative acts, we need to treat the present regulations with a certain degree of caution. The fear remains that irrespective of the absolute binding force of the Act, particularly entrepreneurs with a markedly dominant market position will continue to impose their terms on their weaker contractors. The binding legal order, although leading in a good direction and trying to meet the justified postulates to protect the weaker parties, may not be able to change the widely-spread mentality of entrepreneurs.

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⁷ Cf. art. 481 Civil Code [Act...1964]

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SELECTED METHODS OF CURBING RISK IN AGRICULTURAL ACTIVITY

Abstract: Risk accompanies every economic activity. In view of the dependence of agriculture on the difficult to predict and impossible to control natural and climatic conditions agricultural activity is characterised by extraordinary level of risk. On account of that the article discusses risk in agricultural activity. The paper presents a review of risk classification peculiar to the sector. Moreover, the article discusses the process of risk management in agriculture and selected methods of curbing the phenomenon.

Keywords: agriculture, risk, risk management, methods of curbing risk

INTRODUCTION

In times of ongoing globalisation and intensification of competition, both at home and abroad, risk is an indispensable element of every economic activity. In particular the phenomenon pertains to agriculture. It is a consequence of the dependence of the volume of crop production on the difficult to predict climatic conditions which a man has practically no influence on. Additionally, the cyclical character of the production process and a considerable shift in time of the incurred expenses and the achieved results make the risk accompanying agricultural activity greater than in companies operating in other sectors of the economy. In animal production there are various diseases that may significantly influence financial results of agricultural enterprises.

In the process of risk management risk awareness and the possibility of defining its significance are of great importance for a given enterprise. Sources of risk cannot be eliminated thoroughly, however, there are various methods of handling the phenomenon. Undoubtedly, strategies that are to curb the negative consequences of risk are often implemented in agricultural activity.

RISK DEFINITIONS

The word 'risk' stems from the Latin 'risicum' defining a chance or likelihood of an occurrence of a positive or negative phenomenon, success or failure [Nahotko 2001, p. 37–38]. Often in literature a reference is made to the origin of an old Italian term 'risicare', which means 'to dare' [Bernstein 1997, p. XIX]. A. H. Willett [1951] is referred to as a pioneer interested in risk on the scientific level. He claimed that risk was an objective uncertainty of an occurrence of an unwanted event. In his opinion risk changes together with uncertainty and not with the level of probability. As regards F. Knight [1985], he claimed that an uncertainty that can be measured, in other words risk is so different from an uncertainty that cannot be measured which in result is not an uncertainty at all.

In literature on economics and management there is a wide range of definitions of the term risk. For instance, according to Crichton [1999, p. 102-103] risk is the probability of a loss, and this depends on three elements, hazard, vulnerability and exposure. If any of these three elements in risk increases or decreases, then risk increases or decreases respectively. As Granger has it [1999, p. 38] risk means the expected number of lives lost, persons injured, damage to property and disruption of economic activity due to a particular natural phenomenon, and consequently the product of specific risk and elements at risk. As regards T. Kaczmarek [1999, p. 11], risk signifies a possibility of failure, in particular an occurrence of events independent of the subject that they cannot predict and

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prevent to the fullest and which with a decrease of useful results and/ or an increase of outlays – they completely or partially deprive the action of effectiveness, profitability or economy.

The above-presented definitions accentuate the negative dimension of risk, emphasising that it signifies a loss. It is the so-called defensive approach. However, when taking into consideration that at present every decision entails risk taking, there is a more and more popular belief according to which risk may also be a chance for achieving extraordinary effects. This approach is presented by M. Sayers, according to whom risk is a combination of the chance of a particular event, with the impact that the event would cause if it occurred. Risk therefore has two components – the chance (or probability) of an event occurring and the impact (or consequence) associated with that event. The consequence of an event may be either desirable or undesirable. Among the Polish researchers of risk such a conviction is presented by, inter alia, M. Krupa, who claims that it is a probability (potential, likelihood) of achieving success or/ and failure (profit or/ and loss) in result of the undertaken action of economic character.

TYPES OF RISK IN AGRICULTURAL ACTIVITY

The first concepts presenting types of risk peculiar to agricultural activity were put forward in the first half of the 20th century. For instance, Dummeier [1940, p. 424] distinguished the following: natural, personal and market risks. According to Baquet et al. [1997], there are five distinct risk factors in agriculture: productive risk, marketing risk, financial risk, human risk, and environmental risk.

According to the classification presented by Hardakera et al. [1997] there is also business and financial risk. The first category comprises production risk, which is related to the unpredictable nature of the weather and to the uncertain performance of crops and livestock, price risk, which refer to the uncertainty of prices of farm inputs and outputs, personal risk, like illness or death of people who operate the farm and institutional risk which originate from uncertainty about the impact of government policies on farm profits. As regards financial risk it pertains to methods of financing an agricultural enterprise [Meuwissen et al. 2001, p. 343-344].

Table 1. Types of risk in agricultural activity together with its causes and effects.

Risk	Factors	Effects
Weather risks	Rainfall, temperature variability, wind	Lower yields, loss of productive assets or income
Biological risks	Pests, disease, contamination	Lower yields, loss of income
Price risks	Low process, market supply and demand, volatility	Lower process, loss of income
Labour and health risks	Illness, death, injury	Loss of productivity, loss of income, increased costs
Policy and political risks	Regulatory changes, political upheaval, disruption of markets	Changes in costs, taxes, market access

Source: *Agricultural risk and risk management, Agriculture and Rural Development Discussion Paper, p. 2;*
https://www.agriskmanagementforum.org/sites/agriskmanagementforum.org/files/Chapter_1_WII_Paper_Nov_2011.pdf

APPROACHES TO RISK MANAGEMENT IN AGRICULTURE

Risk management began to be studied after World War II. Several sources date the origin of modern risk management to 1955-1964 [G. Dionne 2013, p.1]. In literature on the subject there are various definitions of risk management. For instance, according to T. Michalski [2001, p. 40-41] risk management is a process of restraining risk that comprises all the actions connected with analysis, elimination and limitation of risk as well as risk management in a particular case. As

regards L. Korzeniowski [2002, p. 90-128], he defines the process as identification, controlling and deciding in order to curb risk and protect against threats.

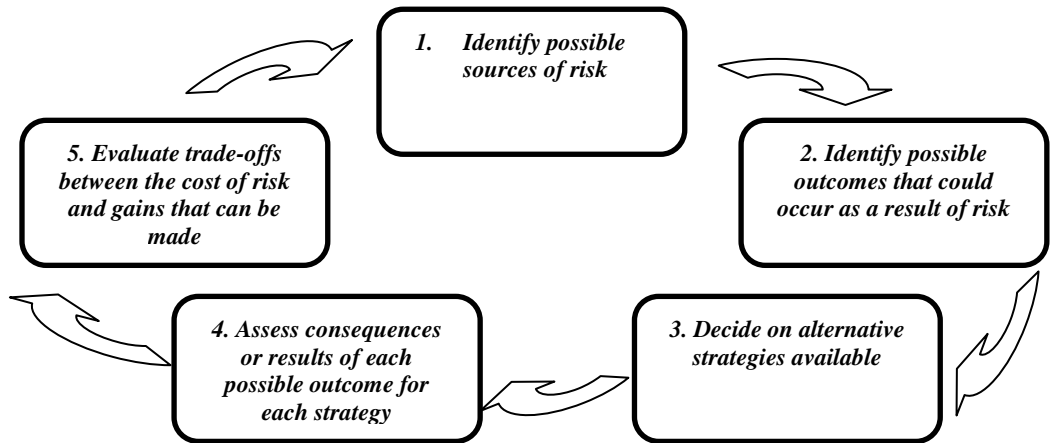


Fig. 1. Steps to be followed by farmers in managing risk

Source: study on the basis of R. Kahlan, *Managing risk in agriculture*, Food and Agriculture Organization of the United Nations, Rome 2008, p. 15.

Researchers of risk management define the stages of the process in a different way. Often the process of risk management is divided into 4 phases. The first one comprises risk assessment which includes its identification and risk evaluation. The second stage is risk treatment in which one of the strategies to solve the problem is chosen. The next stages of risk management are risk acceptance and risk communication [Risk Management 2008, p.18].

Similar stages in the process of risk management that refer to agriculture were distinguished by R. Kahlan [2008, p. 15]. According to him the initial stage comprises identification of the sources of risk peculiar to agricultural activity (picture 1). Next, there is the identification of effects, both the negative and positive ones that may accompany risk. The next step is to choose the strategy of risk management and the evaluation of effects that came into being as a result of the implemented actions at a given moment of company existence. In the end, there is costs assessment connected with risk incurrence and benefits that may occur as a result.

STRATEGIES OF RISK CONTROLLING IN AGRICULTURAL ACTIVITY

There are various strategies of controlling risk that can be included in one of the four categories: avoidance, reduction, transfer and acceptance [P. Brühwiler 2007, p. 36,62, 114, H.P. Berg 2010, p. 86, T. T. Kaczmarek 2010, p. 27-28].

The first of the mentioned strategies that is risk avoidance is an abandonment of activities that are burdened with too great a risk. Reduction of risk is meant to limit the likelihood of risk occurrence and its effects, it is to bring the potential of risk to the acceptable level. One of the methods of risk handling is also risk transfer which is sharing the risk with other partners. It is connected with transferring responsibility for covering potential losses. As there is not always a possibility of risk elimination, one of the methods of managing it is its toleration, which is a conscious acceptance of risk and suffering the consequences stemming from it. This strategy is



applied when a possibility of certain risk occurrence is little and when its negative consequences are less acute than the cost of risk insurance.

Among the strategies of risk management that are to curb its negative consequences there are, *inter alia* [Agricultural Outlook 2000, p. 4]:

- Enterprise diversification – presumes that yields from various enterprises do not move up and down in lockstep, so low yields on some activities would in result likely be offset by higher returns from other activities. Diversification can even out cash flow.
- Vertical integration – generally decreases risk associated with the quantity and quality of inputs (or outputs) because the vertically integrated firm maintains ownership control of goods across two or more levels of activity. Vertical integration also branches out profit sources across two or more production processes.
- Production contracts – guarantee market access, improve efficiency, ensure capital access, and lower start-up costs and income risk. Production contracts usually detail inputs to be supplied by the contractor, the quality and quantity of the goods to be delivered, and compensation to be paid to the grower. The contractor typically provides and maintains ownership of the goods (usually livestock) and has considerable control over the production process. On the negative side, though, production contracting can limit the entrepreneurial capacity of growers, and contracts can be terminated at short notice.
- Marketing contracts – set a price (or pricing method), quality requirements, and delivery date for goods before harvest or before the goods are ready to be sold. The grower generally maintains ownership of the goods until delivery and takes management decisions.
- Futures contracts – shift risk from a party that desires less risk (the hedger) to one who is willing to take risk in return for an expected profit (the speculator). Farmers who hedge must pay commissions and forego interest or higher earning potential on money placed in margin deposits. Generally, the effectiveness of hedging in reducing risk diminishes as return variability increases and the relationship (correlation) between prices and yields becomes more negative. Hedging can reduce, but never completely eliminate, income risk.
- Futures options contracts – give the holder the right, but not the obligation, to take a futures position at a specified price before a specified date. The value of an option reflects the expected yield from exercising this right before it terminates and disposing of the futures position gained. Options provide protection against adverse price movements, while allowing the option holder to gain from favourable movements in the cash price.
- Crop yield insurance – provides payments to crop producers when realized return falls below the producer's insured yield level. Coverage may be through private hail insurance or federally subsidized multi-peril crop insurance.
- Crop revenue insurance—pays indemnities to farmers based on revenue shortfalls instead of return or price shortfalls.
- Household off-farm employment—may provide a stream of income to the farm operator household that is more reliable and steady than yields from farming. In essence, household members working off the farm is a form of diversification.

CONCLUSIONS

The beginning of scientific interest in the subject of risk was connected with accentuating its negative aspects. First of all, both in the world and home literature on the subject it was emphasised that risk means a loss for a man or a company. At present the phenomenon accompanies every economic activity and more and more often its positive dimension is accentuated. Risk taking may also imply a chance for achieving extraordinary effects, greater than planned or expected.

In view of the specific character of agriculture, agricultural enterprises and companies functioning in the sector, both at home and abroad, encounter situations that generate risk on a regular basis. On account of this it is important to be aware of risk and its proper assessment. The accuracy of economic decisions taken depend on that. Entrepreneurs more and more often apply various strategies controlling risk that accompany agricultural activity. They include, among other things: enterprise diversification, vertical integration, marketing and production contracts. Undoubtedly, one of the most often applied methods of protecting against the negative consequences of risk is insurance of crops and income from agricultural activity.

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FOREIGN TRADE WITH RUSSIA AND UKRAINE IN POLISH WOOD AND FURNITURE INDUSTRY— INTERNATIONAL CONTEXT

Abstract: The paper presents changing trends in the foreign trade of Polish wood and furniture sectors as compared to the whole industry. The analyses focus mainly on the trade exchange with Russia and Ukraine. Moreover, the analyses include information on the alterations in the value of major exported and imported wood and furniture products. This research highlights the role of Russia and Ukraine in the international trade exchange as regards the goods in question. The analysis covers the period between 2008 and 2012.

Keywords: wood industry, furniture industry, foreign trade, Russia, Ukraine

INTRODUCTION

International trade exchange is the driving force of all economies. The favourable influence of foreign trade on economic growth was emphasized already in 1776 [Smith 1776]. Theoretical pondering on the nature of international trade exchange and its role in the domestic economic development continued later on [among others Feder 1982, Findlay 1984, Lucas 1988, Rumer 1990, Grossman and Helpman 1990, Frankel et al. 1996].

Foreign trade has a considerable significance also for the development of the Polish wood sector [Grzegorzewska 2014a]. During the transformation period of the Polish economy, the possibility to overcome the crisis and, subsequently, develop wood industry was closely related to export, especially in the case of furniture, in which most wood-based panels and a significant amount of bores materials are used [Ratajczak 2000]. Over the past 20 years, the significance of the Polish furniture exporters has grown visibly. While in 1995 Poland took the 10th position in the ranking of exporters [Dunne, 2000, p. 7], it took the 4th place in 2012 in terms of the value of exported furniture products and the 2nd place in terms of export volume [Grzegorzewska 2014b]. International trade exchange is another important aspect in the development of wood industry.

The factors which influence international trade also depend on political relations between particular countries. The stability of a general political situation plays an important role here as well. Considering the escalating conflict between Russia and Ukraine, the role of these countries as consumers and suppliers of wood and furniture products in Poland is a relevant issue. This is the reason to analyse the subject of foreign trade between Poland, Russia and Ukraine.

PURPOSE AND METHODOLOGY OF RESEARCH

The purpose of this article is to analyse the changing trends in foreign trade of wood and furniture industry as compared to the whole industry, with particular emphasis on Russia and Ukraine. The study covers the years 2008-2012. The primary source of research material was "Statistical Yearbook of Foreign Trade" published annually by the Central Statistical Office of Poland (GUS). The prepared analysis presents the level of export and import of industrial products, in particular the values obtained for wood and furniture industry. Additionally, it includes the details of import and export of major products in these industries.

This article provides a horizontal analysis (dynamic changes) and a vertical analysis consisting in defining the share of Russia and Ukraine in the Polish import and export value. This is the basis on which the ranking positions of the distinguished countries are presented.

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RESEARCH FINDINGS

The study prepared by the Central Statistical Office of Poland indicates that in the period 2008-2012 the value of industrial goods for export increased by 44.3% from 405.4 billion PLN to 603.4 billion PLN (Table 1). The weakest dynamic was recorded in 2009 (104.4%). One of the main reasons of this situation was the negative impact of the global economic crisis, which affected Polish economy with a certain delay. In turn, the highest dynamic of the growth of exports of industrial goods was recorded in 2010-2011 and respectively amounted to: 113.7% and 116.1%.

In the analysed period, the export of products in the wood industry increased by 30.7%, and in the furniture industry by 35.8%. As for the furniture market, the most intense dynamic of the value of exports was recorded in 2011 (115.8%). In the following year, the increase was much weaker and stood at 3.9%. It is worth pointing out that at the end of 2012 the level of export of furniture products exceeded 28.7 billion PLN. In turn, the value of wood products was much lower and amounted to 11.5 billion PLN, but it should be noted that trends in the industry are favourable, which is reflected in the increase of the said figure by 30.7% in 2012.

Table 1: Export value of wood and furniture industry as compared to the whole industry in 2008-2012 [million PLN]

Specification	2008	2009	2010	2011	2012
Industry total	405 383.1	423 242.0	481 058.2	558 739.0	603 418.6
Wood Industry	8 822.9	8 826.4	9 888.7	8 472.6	11 535.5
Furniture industry	21 179.5	22 258.4	23 918.4	27 689.1	28 765.8

Source: own compilation based on Statistical Yearbook of Foreign Trade 2009-2013.

In 2008-2012 the value of industrial goods import increased by 30.4% from 497.0 billion PLN to 648.1 billion PLN (Table 2). The export value of these products grew faster than the value of imported goods, which resulted in a favourable position in the trade balance, because its deficit changed from -91.6 billion PLN to -44.7 billion PLN.

Table 2: Import value of wood and furniture industry as compared to the whole industry in 2008-2012 [million PLN]

Specification	2008	2009	2010	2011	2012
Industry total	497 028.3	463 382.6	536 220.6	623 372.7	648 127.6
Wood industry	4 557.9	3 802.9	4 324.9	5 179.2	4 774.1
Furniture industry	4222,8	4 079.5	3 847.9	4 380.4	4 424.9

Source: own compilation based on Statistical Yearbook of Foreign Trade 2009-2013.

In the case of the wood and furniture industry the value of the export of goods exceeded the level of import, which resulted in a favourable balance of trade that increased in the analysed period. In the wood industry the discussed amount reached 6.7 billion PLN. The balance of trade of the furniture industry, on the other hand, increased from 16.9 billion PLN to 24.3 billion PLN.

Crucial information on the condition of Polish wood and furniture industry may be found in the analyses of major foreign trade products. Tables 3 and 4 present data illustrating export and import of relevant products in the analysed sectors, particularly foreign trade with Russia and Ukraine.

Table 3: Export value of major products in wood industry with Russia and Ukraine in the years 2008-2012 [thousand PLN]

Specification	2008	2009	2010	2011	2012
Sheets for veneer and for plywood; other wood sawn lengthwise of a thickness ≤6 mm	140 898.4	134 545.7	114 776.0	100 967.3	108 296.2
Russia	no data	no data	2638.7	no data	2040.5
Ukraine	5 967.7	11 122.8	9 639.5	9 235.4	11 950.0
Particle board and similar board of ligneous materials	621 924.1	448 438.3	463 807.5	555 560.0	595 518.7
Russia	105 751.9	71091.4	77649.9	99125.4	119566.6
Ukraine	60 302.8	53436.0	64661.7	82418.6	73382.0
Fibreboard of ligneous materials	1 160 364.1	1 212 916.4	1 434 099.6	1 513 505. 7	1 608 524.7
Russia	103 284.2	49 076.2	71269.2	75 830.2	79 724.2
Ukraine	125 700.1	111 103.3	130995.5	160 148.6	157 992.6
Plywood, veneered panels and similar laminated wood	342 247.6	280 259.4	304 714.6	382 338.8	446 838.0
Russia	no data	no data	no data	no data	6750.1
Ukraine	5194.3	2032.3	no data	2278.1	2879.8
Seats, also convertible into beds and their parts	10 159 410.4	11 410 71 3.7	12 076 175.1	14 318 38 5.7	14 898 647.8
Russia	114 469.1	84 743.1	154 054.5	253 641.5	333 683.6
Ukraine	51 446.1	32 012.6	28 162.4	44 349.8	39 745.6
Medical, barbers furniture and parts thereof	354825.3	396624.8	399695.8	385939.8	411248.7
Russia	12342.5	4062.9	8528.7	6642.2	15755.9
Ukraine	4553.4	1398.6	1640.8	no data	3878.6
Other furniture and parts thereof	8639620.5	8280101.1	8777889. 8	10171703. 0	10467674. 1
Russia	267 028.5	183484.9	181558.8	258388.5	359 733.5
Ukraine	192 453.9	125339.3	95527.3	92044.1	102 706.8

Source: own compilation based on Statistical Yearbook of Foreign Trade 2009-2013.

Hardboards belong to the most important export goods in Polish wood industry. Their value in 2008-2012 increased by over 38% from 1.16 billion PLN to 1.61 billion PLN. Ukraine (1st or 2nd place) and Russia (drop from the 3rd place to the 5th one in the analysed period) were in the group of the leading countries to which these products were sent. In 2012 the value of the hardboards export to these countries reached accordingly: 158.0 million PLN and 79.7 million PLN.

On the other hand, the value of export of chipboards and wood-based panels noted a slight decline (by 4.2%) to 595.5 million PLN. Russia was an unquestionable leader among foreign consumers of this product, whereas Ukraine was within the first three. Additionally, the important role of Ukraine in external trade of sheets for veneer and plywood is worth noticing. It is confirmed by over a double increase of the export value of these products to Ukraine and a leap from the 5th position to the 2nd one in the consumers' ranking.

Considering the analyses of the furniture industry it is particularly worth mentioning the significant increase, almost triple, of the sitting and sleeping furniture export to Russia. In 2012 the value of shipped goods of this kind exceeded 333.6 million PLN, which resulted in rising from the

16th to the 8th position in the consumers' ranking. At the end of the analysed period Russia was occupying the 5th place among the receivers of medical and hairdressing furniture and the 8th one in the case of other types of furniture. The importance of Ukraine in the international exchange of furniture was smaller.

The maintenance of the stability of Polish economy depends a lot on goods imported from other countries. In the case of wood industry it should be emphasised that Ukraine, as the supplier of charcoal, is an important partner (table 4).

Table 4: Import value of major products in wood industry with Russia and Ukraine in the years 2008-2012 [thousand PLN]

Specification	2008	2009	2010	2011	2012
Wood charcoal	42 498.1	67868.3	65113.5	80400.8	98442.7
Russia	no data	no data	no data	no data	2673.1
Ukraine	25 937.2	48 913.7	42 536.8	50 539.9	53 861.0
Wood in the rough, also roughly squared	344223.0	265196.9	372621.4	601567.9	409602.5
Ukraine	59220.4	46446.1	41397.4	51299.7	49996.4
Wood converted or planted lengthwise, sliced or peeled, of a thickness >6 mm	793243.6	655408.9	685312.6	937388.0	825528.3
Russia	128896.2	116648.9	81857.4	91707.0	64457.1
Ukraine	96738.0	62716.2	76513.3	94301.2	77345.8
Sheets for veneer and for plywood; other wood sawn lengthwise of a thickness ≤6 mm	217513.7	206830.9	193142.2	199962.5	182969.9
Russia	4591.0	2466.5	2084.0	no data	1901.0
Ukraine	25960.9	51205.3	42049.6	42461,1	43157.2
Particle board and similar board of ligneous materials	728526.6	645447.5	819456.6	797764.7	749625.7
Ukraine	7610.9	32217.9	53805.3	48078.9	19831.6
Plywood, veneered panels and similar laminated wood	316112.9	214930.5	288811.9	368637.6	379320.5
Russia	53749.9	39272.2	63721.7	69552.3	82118.9
Ukraine	5788.1	5512.6	11949.0	15538.9	24856.6

Source: own compilation based on Statistical Yearbook of Foreign Trade 2009-2013.

Since 2008 this country has been an indisputable leader among the suppliers of this product to Polish market. The value of the charcoal import from Ukraine increased more than twice, from 25.9 million PLN to 53.9 million PLN. Russia and Ukraine also occupy high positions in the ranking of the suppliers of converted, sliced and planted lengthwise wood, over 6 mm thick. The above mentioned countries sent wood to the Polish market in the value of 64.5 million PLN and 77.3 million PLN respectively.

The statistical data from GUS (Central Statistical Office of Poland) also confirms the importance of Ukraine as a supplier of sheets for veneer and plywood as well as lengthwise converted wood, over 6 mm thick. The value of this product, brought into the Polish market from Ukraine, increased in the period 2008-2012 by 66.2% from 25.9 million PLN to 43.2 million PLN. Another fact worth noticing is the improvement of the position of this country as an exporter of

chipboards and wood-based panels to Poland (rising from the 12th to 8th position). Russia, on the other hand, has been an unquestionable leader among the suppliers of plywood and veneer plates to the Polish market since 2008. The value of these products increased in the analysed period from 53.7 million PLN to 82.1 million PLN.

It is also worth emphasising that neither Russia nor Ukraine plays a major role in the import of furniture industry products to Poland.

CONCLUSIONS

Foreign trade is one of the most important factors influencing the economy growth. This is also true about the wood sector, especially the furniture industry, considering that Poland comes 4th in the ranking of furniture exporters, in terms of value. Ukraine and Russia play an important role in the international trade of wood industry goods and the political conflict that has been emerging between these two countries in the last few months may also influence their foreign trade with Poland.

In the years 2008-2012 the level of export of wood industry products increased by 30.7% and furniture industry products by 35.8%. When talking about the export of goods in both industries, the value of exported goods exceeded the value of import. It resulted in a favourable balance of trade, as it increased in the analysed period.

The above analyses show that Russia is an indisputable leader among the chipboards and wood-based panels receivers, whereas in 2012 Ukraine took the 3rd place in the same group. In the ranking of hardboards receivers Ukraine occupied the 1st position and in the ranking of veneer and plywood sheets exporters – the 2nd. It is also worth mentioning that the export of the sitting and sleeping furniture to Russia almost tripled. In 2012 the value of the export of this kind of goods exceeded 333.6 million PLN. It resulted in rising from the 16th position to the 8th in the consumers' ranking.

Considering the import of wood industry products to Poland, it is important to emphasize the role of Ukraine as an indisputable leader among charcoal suppliers. Russia and Ukraine also come high in the ranking of suppliers of the converted, sliced or planted lengthwise wood, over 6 mm thick. During the analysed period Russia also took the 1st place as a plywood and veneer plates exporter and launched these goods in the Polish market. The significance of the countries in question in the import of furniture industry products to Poland was not considerable.

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CONDITION OF POLISH SMEs SECTOR IN THE CONTEXT OF THE RELATION OF ENTREPRENEURS WITH THE LOCAL GOVERNMENT

Abstract: Polish SMEs sector is developing successively. However, it is contending with a peculiar problems which became especially apparent in the activities of microenterprises and small companies. Their activities are less effective than the one of average and large companies, as well as they have a smaller chances to survive.

For supporting SMEs both state and a self-government are obliged. Meanwhile the dimension of their action isn't sufficient. The state is responsible for a significant administrative and fiscal charges. They transferring on the entrepreneurs anxiety of the employment policies. Also the local government should have the influence on conditioning of the entrepreneurship. However, results from the research of Rzetelna Firma show that no more than a dozen or so percentage of companies use this support. Amongst obstacles and impediments deficit in a direct relations of entrepreneurs with the self-government can be pointed out.

Keywords: Entrepreneurship, development, difficulties, self governments, relations.

INTRODUCTION

As many as 99% of European companies belong to the sector of SME (MŚP), which groups the activities of micro, small and middle enterprises. In Poland, according to GUS data, there were 1.67 million enterprises. 99.8% of them belonged to the MSP sector and 96% of them were microenterprises, 2.8% were small ones and 0.9% were medium. At that time the EU's average pointed 91.8% of the smallest firms, 6.9% of the small ones and 1.1% of the middle size [GUS, 2011].

Chart 1. Amount of (non)financial enterprises in 2009

Amount of enterprises	Up to 9	10-49	50-249	above 249
Poland	96.0%	2.8%	0.9%	0.2%
EU's average	91.8%	6.9%	1.1	0.2

Source: Personal elaboration [PARP 2011]

Also the effectiveness of its activities is the testimony to Polish enterprises' specificity: in 2009 the sector of MSP generated 48.4% of GDP; 30.4% is microenterprises' share; 7.9%- small enterprises and 10.1% is middle size enterprises' share. The data concerns the added gross value generated by enterprises (chart 2) reveals that Poland is characterized by a still increasing share of large and medium enterprises and a lower share of the small ones. At the same time the share of micro enterprises is almost equal to the European Union's data [PARP 2011]. Comparing the above date (concerning the structure of the sector and the produced goods) shows that the Polish large and medium enterprises' effectiveness is higher from the EU's, but the effectiveness of the micro ones is lower.

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Chart 2. Added gross value of enterprises In 2009

Amount of workers	to 9	10-49	50-249	above 249
Poland	21.1	11.9	21.4	46
EU's average	21.6	18.9	17.9	41.6

Source: Personal elaboration

Regarding the enterprises' size (put together with the number of employees) the Polish companies are smaller than the ones operating in different EU countries: medium Polish firms employ 3.8 people while in EU – 4.2. The highest employment is provided by German enterprises, which is 12.5. As a result Poland was placed in 18th place in a group of analysed EU countries. But when you summarize the number of employees based in the other types of work agreements (such as selfemployment, orders etc.) the average in Polish enterprises increased to 5.6% persons which places Poland 15th among 24 EU countries. It is worth underlining that the difference between the number employed and those who work in Poland is one of the highest in the whole of the European Union, similar to the number of self-employed itself, which in 2011 amounted to 2.9 million [PARP 2011].

Year 2009 was described as a crisis year for business activity. In the next few years MSP was about to catch up on losses and at the same time they became similar to other European enterprises. Unexpected increases in the number of enterprises had taken place. In 2012 microenterprises constituted 95.8 percentage of all. The percentage of medium and large enterprises had remained on the same level as in 2009 [GUS, 2013].

THE CONDITIONING OF THE SUCCESS AND FAILURE OF SMES (MSP) SUBJECTS

Each year the number of enterprises in the EU increased by about 10%. Only every second of them was functioning longer than 5 years (European Commission, 2014). The rate of failures in Poland is one of the highest in the European Union. In 2011 the rate was on the level of 14%. Only Spain achieved a lower result (16%). At the same time the EU average was 9% [PARP, 2011]. General reasons for failures are known: they are most often based on lack of capital, know-how or experience. However, panel researches carried out by the Central Statistical Office enable us to recognize the chosen features of companies which carry out their activities successfully or which finish their activities. The study from 2014 included data about enterprises which started their activities in 2008 and were still operating in 2013 [GUS, 2014]. According to this source in 2009, REGON registered 294.3 thousand subjects. From that number 97 thousand were still active in 2013. That means two thirds were not successful. Researches allowed to establishment, that survival rate (chart 3):

- is higher for those enterprises established by legal persons rather than by a physical person
- is more beneficial for companies employing hired workers than, without them
- is dependent on the industry. A health care and a service of the real estate and companies turned out to be the most beneficial; while the riskiest industries were "hotels and restaurants" and financial intermediation (25,4%)
- a previous business experience gives a bigger chance of survival; chances also grow higher with a higher level of education
- enterprises which invest from the very beginning have a bigger chance of success than those enterprises which do not
- barriers to supply or lack of them can herald bigger chances for the enterprises than demand-induced problems or demand-induced problem together with supply.



Chart 3. Chosen features of companies incurred in yr 2008, active in 2013 r

Features	Categories of features	%
Employment	Hired workers	43,0
	Excluding hired workers	30,6
Legal form	Legal person	57,3
	Natural person	31,5
Chosen industries	Health care	59,9
	Service of Real estate and enterprises	45,6
	Hotels and restaurants	24,3
Owners' features	With earlier experienced	52,8
	Without experience and unemployed	37,3
	Basic education	31,9
	Middle/high school education	36,3
	Higher education/University/Mature exam	54,1
Investments' expenditures in 1 year	incurred	52,1
	unincurred	39,0
Earlier reported barriers	none	50,0
	demand-induced barriers	38,5
	Supply barriers	51,7
	Supply and demand-induced barriers	36,3

Source: own study based on Main Statistic Office data 2014.

Entrepreneurs who had problems with supply blamed them mostly (82.4%) on the lack of financial means. These problems more often concerned enterprises run by natural people rather than legal people (lack of difficulties pointed out in the research 64.3 enterprises of legal people and 48.3 enterprises of natural people). Other difficulties which were high-lighted by the novice entrepreneurs in 2008 were:

- difficulties to get a bank credit (concerned 1/3rd of the analysed enterprises)
- difficulties to get appropriate workers (concerned 1/4th)
- difficulties with the collection of due (concerning 1/4th examined community).

None from the above mentioned can be treated as a guarantee for success or failure, but their accumulation increases the possibility of failure. Particularly disadvantageous is the lack of an owner's previous experience. Meanwhile from the group of people who had started business in 2008, unemployed without previous experience was as high as 46.3% [GUS, 2014].

The above data shows that an increasing number of New companies do not come from the vision of entrepreneurship as a chance for development, but rather from the need, due to the lack of other possibilities. On the part of those people who decide to run their own business it would be a good decision, but they would be in a minority. For most of them it will bring more complications in life. It shows how the support for unemployment or graduates is important, also a proper preparation for possible business activity. Also the state and local government support for the beginning businessman and even for those experienced ones is quite important, especially during economic crisis. On the other hand, the above data demonstrates that it is incorrect to judge the economic development on the number of new enterprises.

ENTREPRENEURS' NEEDS AND EXPECTATIONS AND RELATIONS WITH THE LOCAL GOVERNMENT

In 2013, increases in new enterprises of the MSP sector in Poland was 2% higher comparing to 2012. Micro enterprises were still 96% of them. Low rates of surviving companies from previous

years are being restricted by obligations to the state and self-government. Numerous stipulations which transfer into impediments for entrepreneurs' activities (more and less justified) are addressed by both state and self-governments. In the evaluation by the Ministry of Economy "*it is possible to notice the considerable progress in such areas as the entrepreneurship and efficient administration, which is as a result of removing many administrative burdens for new companies and the reduction of registration costs*" [Ministry of Economy 2014, page 10]. In the same document it is noticed that "*Polish activities towards SMA are little below the EU average*". Those activities are needed both for the whole sector as well as for the individual entrepreneurs, especially those who are at the beginning of their business activities.

Basically entrepreneurs' expectations haven't changed in years and can be put together with two directions:

- simplifying the administrative procedures
- reducing fiscal charges.

Both can be addressed by the state, but self-government also has competencies and tools which influences local businesses. Quick and effective formality while setting up the firm, support from the local work office or from the proper City Hall department which can influence decisions where set up for business activity. This decision was surely influenced also by presenting attractive investment areas together with access possibilities and other infrastructure elements, together with fiscal charges reducing [Latowska 2013]. The optimal solution for those needs are economic spheres which combine all these elements. Mentioned activities assure competitiveness of cities and companies. Unfortunately local government does not always understand its mission towards business. This makes the business environment initiate different research projects, which diagnose entrepreneurs' needs, difficulties and expectations towards its relationship with local government. Research and analysis of Konfederacja "Lewiatan" or Rzetelna Firma "Business and local government – common relations", [2014].

Research are an example of actions like that. Research initiatives of Konfederacja Lewiatan concentrate on MSP conditions and their perspectives. They confirm the key meaning of the smallest market subjects and at the same time turn the attention to their difficulties. Research from 2011, 2012, 2013 shows that many business don't function according to their owners will. During analysed years the percentage of companies which applied the strategy of staying in the market was increasing (from 39,4% up to 45,4 in 2013). The growth of sale is establishing with each fifth company and each tenth is aiming to increase its shares in the market. Non-development strategies, which are based only on survival, are applied by 57,1% of micro enterprises [Wyźnikiewicz 2014, page 40]. As it was shown earlier, there is a better chance of survival for those enterprises which invest into their own development. At the same time the smallest companies, which are at the base of the sector, don't implement any innovations. Each third apply only the product innovations [Wyźnikiewicz, 2013, page 45]. That is the reason why in MSP sector in 2009-2012 48.8% of enterprises had not taken any innovations, but 57,6 of the enterprises had believed that they were quite necessary. There are a few factors which form basic barriers to this process: almost 40% of owners of MSP believe that the industry does not need any innovation, 36% - that the enterprise is too small, 33,3% - that the capital is too low [Wyźnikiewicz, 2013, page 48]. The last factor is connected with the common lack of trust to creditor's funding, so their investment is based only on their own capital. Also EU funds are not sufficiently used. In 2013 only 14,4% enterprises of MSP applied for them, 9,3% had gained them (among micro enterprises 7,8% had gained them). [Wyźnikiewicz, 2013, page 55].

In 2014 a research report which was done among participants of Rzetelna Firma program was published. Also representatives from local government were asked to answer questions. Answers gave the pictures of their common relations and presented issues seen from different points of view [Rzetelna Firma 2014]. The results showed the lack of local government knowledge on the matter of



entrepreneurs' needs and barriers between these two. For example for a question: what kind of support is expected from local government by entrepreneurs (chart 4) representatives of MSP underline "investment co-financing" and "loan for activities development", also "help in innovations' implementation". "Workshops for workers" and "establishing the cooperation between business and science" are less valued. At the same time the local government representatives point out help in establishing the cooperation between business and science as the most important. The answers given by entrepreneurs are the least valued by local government representatives. Both groups gave the equal answer about the importance of help in the innovations' implementation (51,8 in the business group and 50,5 government group).

Chart 4. Local government help for the business sector in opinions of both groups

Kind of help	entrepreneurs	member of the local government
Investment's co-financing	62,8	40,9
loan for activities development	53,8	28,0
help in the innovations' implementation	51,8	50,5
Workshops for workers	34,9	47,3
establishing the cooperation between business and science	30,7	62,4

Source: Personal elaboration [Rzetelna Firma 2014].

Both groups had given also the opened answers in which entrepreneurs said about their expectations and members of the local government about their competencies. Answers were collected in a few categories. First one was about financial support. Entrepreneurs differed 7 different expected support:

- . "concessions and dismissals",
- "support to create new work place "supporting the work\ creating new seats",
- "help in acquiring the subsidy from UE",
- "subsidies to the start-up of the company",
- "developmental loans",
- "spreading in installments or the resignation from tax",
- "help in recovering the amount due from debtors"

Members of local government confirmed their competencies only on the third level. Subsidies to start-up the company or development loans can be understood as a part of competences. Possibly they understood it as a form of the obvious financial support. Surely entrepreneurs would like to get a guarantee that they can use above mentioned support. However loans or tax exemption are used by local government, help in recovering the debts is rather impossible. In the meantime the need shows the reality which entrepreneurs have to face.

The second category concerns business friendly infrastructure. Members of local government mentioned "plan of land usage", "a good road and techniques infrastructure", "creation of investments lands" and also "creating areas of office blocks". Entrepreneurs expectations are coincidental on a few points. They talk about "the adaptation of the plan for land usage for the businessmen need", "creating of zones for small business", "offers of cheaper land or office places for the firms development". They also mention about "assurances for a good infrastructure (life-friendly conditions: children care, office-home connection, efficient social care)". So the businessmen' demands are more specific. They turn their attention not only to the investment land, but to the "cheaper zones". Also help for the entrepreneurs is important to them... Members of local

government don't analyse infrastructures in such a detailed way. Also businessmen' demands for "good infrastructures (a life-friendly conditions: children care /.../)" shows that business is understood as a way of living and other elements are equally important and cannot be separated. It is possible that these factors influence a decision where to start a company. Lack of the direct interest in these matters does not mean ... It is quite the opposite, since it is one of local government's activities. Unfortunately members of this government are not always conscious of bonds between business and the more private sphere of living.

Promotion and help in the support of business – is the next category which was described by the participant of Rzetelna Firma research. Both groups agreed about similar points of co-operation, such as help in establishing business contacts, promotion of local companies and local tourism etc.

In the field of support and workshops organization members of local government pointed out:

- Entrepreneurs meetings;
- Personal consulting;
- EU funds consulting;
- Workshops;
- Help in problems solving;
- Help for the beginners;
- Help In workers research.

Entrepreneurs' expectations are more detailed. They do not need legal consulting, but tax consulting. They value businessmen meeting, but only with the chance of communication with the representatives of government. The most effective way to give businessmen's opinion to government representatives is according to every third respondent, a direct conversation, private relations. Each fourth had circled chamber of commerce membership which represent entrepreneurs towards government.

In the category co-operation and dialogue possibilities, members of local government formulated "good climate" and "kindliness". Entrepreneurs pointed out a list of demands. Most of them have an emotional relationship with clerks (city halls' workers) (such as: face to face contact, cognition of businessmen problems and needs", "a bigger interest of local community", "taking businessmen as an honest people", "clerks education (methods of a good communication)". If those demands come from the entrepreneurs negative experiences they give not a good picture of clerks: a person who does not know needs of a local community, all the more entrepreneurship and does not want to get to know them, who more interrupts and treats a businessman as a "con man" and also does not know principles of a proper communication. If that is the case it is difficult to say about any dialogue between them, all the more common expectations or difficulties' exchange. Entrepreneurs formulated the concrete propositions: inviting them (by the local government) to consult the most important opinions concerning the city, creating points where they would find a proper service. So the bottom line is to treat businessmen in a partner, kind and helpful way. Results of researches shows that entrepreneurs are aware of difficulties on the way to build a good climate while members of the local government don not have a full knowledge to them and their negative experiences. Results also show that entrepreneurs expect an acceleration and a simplification of procedures, a better access to the information (through a city webpage, also personally, through the phone or via email). The lengthiness of proceedings is recognized as the significant problem, however entrepreneurs are conscious, that it is not always exclusively the result of the lack of a clerks' goodwill. Two thirds acknowledges that behind problems with settling matters this way clerks, as well as provisions/laws are to blame. On exclusive clerks' fault point out 13.5% business men [Rzetelna Firma 2014, s.19]. .

The percentage of respondents who used a local government's help can be a good conclusion to Rzetelna Firma research: 11%. So 89% of them have never used its support. For 52,6% "bureaucracy, which stands behind it" is the reason for that. For 47,9% - the lack of knowledge

about this possibility. However 86% of clerks say, that local government has an influence on economic activity in the city. For the question does your city government provide help to the businessmen? Only 46,2% of clerks said “yes” [Rzetelna Firma 2014, s. 9].

CONCLUSIONS

The initiative of Rzetelna Firma is supposed to constitute a point of departure to an open discussion between entrepreneurs and self-government. They pointed to aspects, in which one can see understanding and goodwill of the cooperation. However there are quite a lot of objectives which are perceived from both sides differently. A lot of expectations are recognized, but the regional civil servants don't know the priorities of the owners of companies - don't know, what form of support is preferred. They also don't understand the meaning of formal elaborating of the presented offer. It is worth mentioning that local government understands the meaning of companies promotion, but does not demonstrate the adequate initiative in reaching entrepreneurs with information about their own offer. Meanwhile towards anxieties of entrepreneurs tied up with the wall of the bureaucracy, single assuring about the financial or other city government support seem to be only propaganda.

State support and of self-government for the sector SMEs is poor and even what they are indicating in EU structures as well. Also low productivity of Polish companies is noticed (small and micro). Amongst the causes of this state of affairs one should emphasize the lack of solid arrangements (capital and of competence) for the business activity of almost a half of new owners. The support for the MSP sector from both central and local government is so far poor, which is similar even in EU structures. Also the low productivity of Polish companies is noticed (small and micro). Amongst the causes of this situation is the lack of solid preparation/competencies to run a business, a half of all new owners are guilty of this. Together with the poor support companies do not have a better chance to exist. The survival rate of Polish companies is one from lowest in the EU. However companies which manage to survive, which develop themselves, aren't interested in creating additional places of employment. The cause of this situation is made by the non-financial cost, which are definitely higher than in other EU member states and also the tougher labour laws are a problem [WEI 2014]. Polish entrepreneurs are also negative about innovations. It seems that the difficulties in capital access are a cause, but a bigger problem is the lack of understanding what innovations mean to the company. The above applications explain how important central and local support is for the MSP. Entrepreneurs notice this deficit, while the other side believes in a well performed objectives.

Regional civil servants aren't conscious that their service is a serious barrier at the commune office. Discussions about the bureaucracy arduousness in Poland have run practically for years and government carry out projects which are supposed to result in simplifications. In 2014 a bill about the standardization of some templates for letters in administrative procedures was passed. Thanks to that it is possible to submit on-line applications in over 64 administrative procedures. In the opinion of the Ministry of economy progress in the fight against bureaucracy is significant [Ministry of economy, Entrepreneurship in Poland 2014]. However presented results do not show the significant improvement in discussed issues. Probably, these divergences result from the difference of the bureaucracy vision which isn't only a set of legal documents, but the entire system of managing the institution.

An improvement is possible and necessary, but under the condition of closer relationships between entrepreneurs and representatives, with appropriate administrative actions towards reducing the bureaucracy and increasing the economic freedom.

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DEVELOPMENT OF ENTREPRENEURSHIP ON RURAL AREAS ON THE EXAMPLE OF GNIEZNO DISTRICT

Abstract: The article discusses the current state of development of entrepreneurship in Gniezno district, the changes which have been taken place in recent years, as well as the factors distinguishing rural areas of the district, that it is a place which is enterprises-friendly. It was pointed out that local factors have a particularly important role to play in the development of entrepreneurship. Opportunities and threats to the development of entrepreneurship with particular focus on business entities operating in rural areas have also been identified.

Key words: entrepreneurship, rural areas, Gniezno district

INTRODUCTION

The development of entrepreneurship in the country, provinces, districts and communes is one of the key elements of local development. Therefore, it is a part of *the Strategy for Development of Gniezno district*, consistent with *the Strategy of Development of the Greater Poland Province for 2007 - 2020* and *the National Strategy of Regional Development*. What seems particularly important for the district is a creation of conditions conducive to the development of entrepreneurship and supporting business entities, especially in rural areas.

As Wyszowska notes (2012, p. 299) non-agricultural activities play increasingly important role in rural areas, whereas agricultural production ceases to be a leading function of the country. The new, non-agricultural functions of rural areas are indicative of adjustment processes for new challenges connected with the development of a market economy and civilization transformations, especially after Poland joined the European Union. Significant changes in the way of farming in rural areas have been observed under the conditions of European integration, aiming at developing multi functionality of the agriculture. As Bucka notes (2014, p. 26), the multifunctional development of rural areas in Poland led to emergence of new forms of activity of the rural population, which has been particularly manifested in non-agricultural activities on the rural areas. There is no doubt that business activity in rural areas generates now a growing number of jobs and becomes an attractive form of employing labour force surpluses present in the rural areas, ensuring a fair standard of living for the agricultural community concerned.

The purpose of the article was the analysis of the development of entrepreneurship in rural areas on the example of Gniezno district, as well as identification of local factors in the development of entrepreneurship. Changes in the industry structure of the companies and their diversity between communes of the district were also analysed. Data coming from the Polish Central Statistics Office (*Local Data Bank*), the County Office and the Commune Offices formed the factual basis for the studies carried out. A strategy of development of Gniezno district and its communes has also been analysed. A method of comparative analysis and basic methods of descriptive statistics - analysis of structure and dynamics were applied to solve the submitted problems.

TEST RESULTS I - A DIAGNOSIS OF THE CURRENT STATUS OF DEVELOPMENT OF ENTREPRENEURSHIP IN THE RURAL AREAS OF GNIEZNO DISTRICT

Gniezno is not a big urban centre, but the historical character of the city which was the first capital of Poland and its over a thousand-year history maintain its high value and importance in the

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history of Poland. Today¹² Gniezno district occupies the fourth place in terms of the population and the sixth place in terms of area in the Great Poland Province. Gniezno district is situated in the eastern part of the Great Poland Province, within a distance of 50 km from Poznań city and 10 km from the border of the Kujawy-Pomerania Province. The capital of the District - Gniezno is situated at the cross-roads of international and national roads and railway routes. There is an international airport and cargo - Poznań Ławica within a distance of 50 km from Gniezno.

The city of Gniezno is one of the five sub regional centres in the Great Poland which are to be a driving force of economic growth and social development of the region. The district consists of: the city of Gniezno, Czarniejewo, Kłecko, Trzemeszno, Witkowo; urban-rural communes: Czarniejewo, Kłecko, Trzemeszno, Witkowo; and also rural communes: Gniezno, Kiszkowo, Łubowo, Mieleszyn and Niechanowo, occupying a total of more than 1254 km² with a population of over 144 thousand (BGL).

There are 15 293 business entities in the district, of which only 402 (2.6%) belong to the public sector, while 14891 (97.4%) are private companies. The political transformation and changes in the industry structure that prevailed in the region until the 90s resulted in a dominant share of family businesses in the district, involved in manufacture of wearing apparel, footwear, footwear accessories, construction, production of windows, agricultural and food processing, manufacture of furniture, metalworking and manufacture of machinery. The largest group among the registered enterprises are micro companies - self-employed persons and employing no more than 9 employees. In 2013 there were 14608 of such companies, that constituted 95.5 of total business entities. Businesses employing 10 to 49 people constituted 3.6% of the enterprises (551); while the companies employing more than 49 people in the district were only 127 that makes less than 1% (0.83), of which only 7 enterprises may be listed as large companies¹³. The figures show that it is the sector of small and medium-sized enterprises that constitutes an important element of the development, particularly in rural areas of Gniezno district. Under the high unemployment conditions prevailing now among rural population, self-employment may become more and more popular form of employment, inter alia due to considerable flexibility and performance of small enterprises operating in the market.

The business entities were located mainly in urban centres, i.e. 8944 in Gniezno, 263 in Czarniejewo, 301 in Kłecko, 689 in Trzemeszno and 769 in Witkowo. But a considerable portion of them constituting 28.3% were located in rural areas: 1117 in the Gniezno commune, 368 in the Czarniejewo commune, 418 in the Kiszkowo commune, 327 in the Kłecko commune, 622 in the Łubowo commune, 313 in the Mieleszyn commune, 425 in the Niechanowo commune, 428 in the Trzemeszno commune and 309 in the Witkowo commune (table 1).

From the data provided, it is clear that the number of business entities registered in Gniezno district increases. It is definitely worth stressing that the number of business entities of the district's rural areas also increases, faster than in the entire district. During the period covered by this study, the number of entities in the district increased of almost 6% while, in the same period, we can notice more than 24% increase in number of entities in rural areas of the district. The share of entities operating in rural areas in relation to total number of entities in the district also increased from 24% in 2009 to 28.3% in 2013 (Graph. 1).

At this point it is interesting to observe that the population living in urban areas of the district increased of 1.0%, in the rural areas of 5.0%, while the total population of the district increased of 2.0% (3 317 residents) during the period covered by the study.

¹² Gniezno district was reactivated on 1 January 1999 under the Act of 5 March 1998 on District Government, when the residents of Gniezno district established a local self-governing authority.

¹³ Own study based on BDL data.

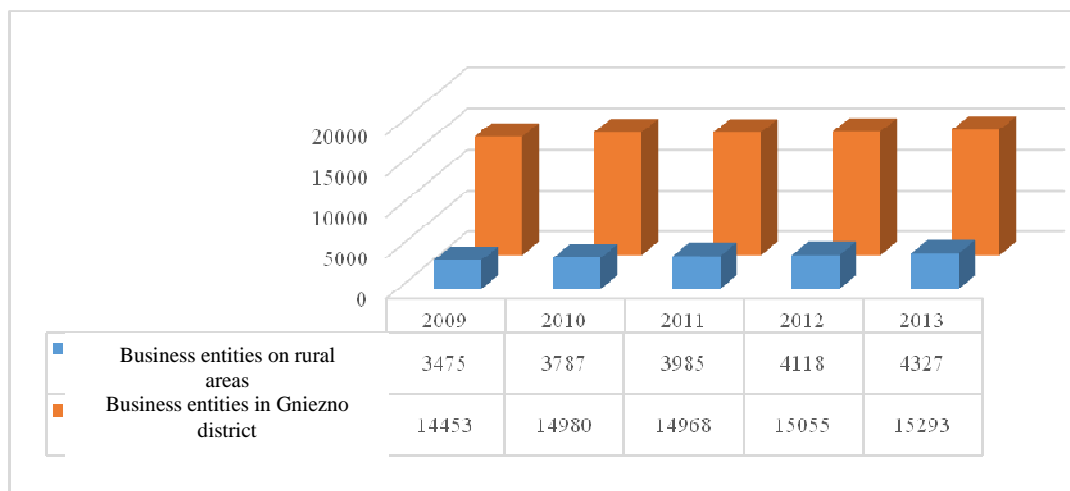


Table 1. Business entities registered in Gniezno district in years 2009-2013

Specification	2009	2010	2011	2012	2013
Gniezno - city	9001	9158	8969	8927	8944
Gniezno – rural commune	792	903	1007	1044	1117
Czarniejewo – town	251	272	272	273	263
Czarniejewo – rural area	308	321	343	347	368
Kiszkowo	392	418	415	414	418
Kłecko – town	308	319	317	311	301
Kłecko – rural area	248	264	279	299	327
Łubowo	439	505	555	585	622
Mieleszyn	299	316	316	312	313
Niechanowo	348	377	395	407	425
Trzemeszno – town	676	690	676	673	689
Trzemeszno – rural area	382	404	388	408	428
Witkowo – town	742	754	749	753	769
Witkowo – rural area	267	279	287	302	309

Source: Own study based on data of the Polish Central Statistics Office (Local Data Bank, www.stat.gov.pl/bdl).

Despite the much higher increase of entities number in rural areas in comparison to urban areas of the district, a number of registered entities per 1000 inhabitants in the rural areas of the district is still lower than in the cities. In 2013 there were 120 registered entities per 1000 inhabitants living in urban areas of the district, in comparison to 81 entities registered in the rural areas.

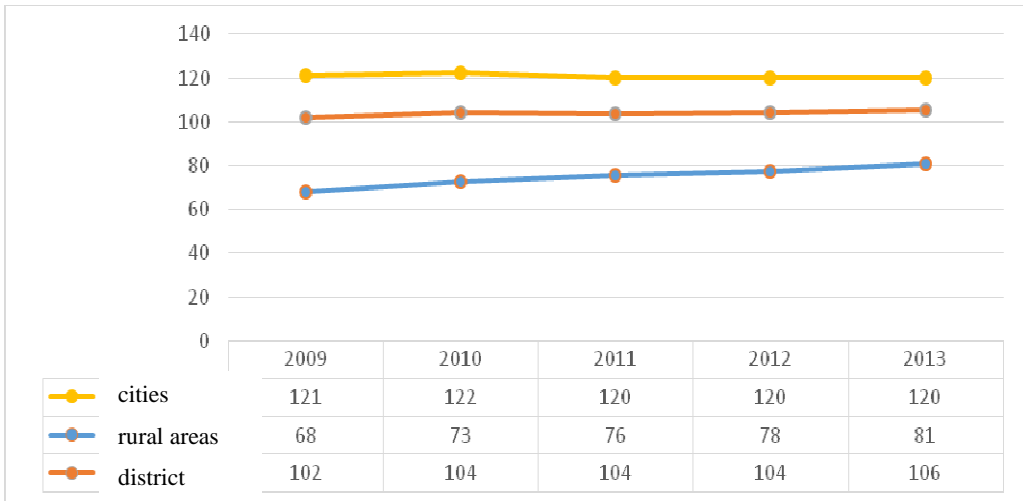


Graph 1. Number of business entities registered in the entire Gniezno district and in rural areas of the district over the period 2009-2013

Source: Own study based on data of the Polish Central Statistics Office (Local Data Bank, www.stat.gov.pl/bdl).

But it is also worth pointing out that during the period covered by the study a number of entities per 1000 inhabitants in the district increased from 102 to 106, in the urban areas decreased from 121 to 120, while in the rural areas increased from 68 to 81. This means that the disproportion

in development of entrepreneurship in urban and rural areas has progressively decreased. Rural areas are more and more often considered an attractive place for business start-up. It should be pointed out here that there are relatively large and inexpensive labour resources to be used. According to Wyszowska (2012, p. 299-300) the key factors promoting a business friendly environment in rural areas in comparison to large urban areas (apart from labour resources) include construction, lower rents for premises, lower utility cost and lower land prices, which results in lower costs of conducting business activities.



Graph 2. Number of business entities per 1K of Gniezno district inhabitants

Source: Own study based on data of the Polish Central Statistics Office (Local Data Bank, www.stat.gov.pl/bdl).

Table 2. Business entities in the rural areas of Gniezno district per communes over the period 2009-2013

Specification	2009	2010	2011	2012	2013
Czarniejewo - rural area	308	321	343	347	368
Gniezno	792	903	1007	1044	1117
Kiszkowo	392	418	415	414	418
Kłecko - rural area	248	264	279	299	327
Łubowo	439	505	555	585	622
Mieleszyn	299	316	316	312	313
Niechanowo	348	377	395	407	425
Trzemeszno - rural area	382	404	388	408	428
Witkowo - rural area	267	279	287	302	309

Source: Own study based on data of the Polish Central Statistics Office (Local Data Bank, www.stat.gov.pl/bdl).

The analysis of the number of business entities in rural areas of the district considering the communes show that the increase in number of entities was observed in all communes. The definite leaders in the development of entrepreneurship were rural communes of Gniezno and Łubowo, where a similar increase of more than 40% in the number of entities was noticed (increase of 325 and 183 entities respectively). The lowest increase was observed in the Mieleszyn commune (+5%, 14 entities) and Kiszkowo commune (+7%, 26 entities) (table 2).

When analysing the newly established entities it can be noted that most of them were established in the communes of Gniezno and Łubowo, which two communes are also characterised by the highest number of newly registered entities per 1000 inhabitants - 11.22 in 2013, with the average for Gniezno district of 9.48 and average for rural areas of the district of 8.67. The best in this respect were the years 2010, 2011 and 2013, during which 462, 455 and 465 new enterprises respectively were established in rural areas of Gniezno district (table 3).

Table 3. Newly registered business entities in the rural areas of Gniezno district per communes over the period 2009-2013

Specification	2009	2010	2011	2012	2013
Gniezno district total	1323	1500	1361	1229	1373
Czarniejewo - rural area	37	34	49	35	44
Gniezno	106	111	129	105	117
Kiszkowo	34	58	35	28	32
Kłecko - rural area	27	30	34	42	44
Łubowo	45	65	62	58	69
Mieleszyn	39	37	27	27	25
Niechanowo	36	53	45	45	45
Trzemeszno - rural area	22	41	34	33	44
Witkowo - rural area	24	33	40	35	45
Rural areas in total	370	462	455	408	465

Source: Own study based on data of the Polish Central Statistics Office (Local Data Bank, www.stat.gov.pl/bdl).

When analysing directions of activities conducted by entities in the rural areas of Gniezno district (according to the Polish Classification of Activities PKD) it can be noted that the largest number of entities represent commerce and construction industry. During the period covered by the study the number of commercial entities increased from 966 to 1071¹⁴, and their highest number was localised in the communes of Gniezno (344) and Łubowo (144). When analysing companies operating in the construction industry, their increase from 677 in 2009 to 823 in 2013 can be also observed. These entities were distributed more evenly in the communes of the district, but also in that case the leader was the rural commune of Gniezno, where the number of entities operating in construction industry increased of 50 entities, that gave a total number of 189 business entities in 2013. The industrial processing (section C), as well as transportation and warehouse management (section H), can be also listed among the sections with the highest number of business entities. In section C the number of entities in the period covered by the study increased from 334 to 412, while in section H the number decreased of 5 entities, from 294 in 2009 to 289 in 2013. The changes were

¹⁴ Over the same period the number in the entire district decreased from 4570 to 4387

consistent with the changes of numbers of entities in these sections in the entire district. Another important directions of the activities performed include: agriculture (307 entities), repair of equipment (315), professional, scientific and technical activities (163) and administration services (145), financial activities and insurance (111) and health care (108)¹⁵.

TEST RESULTS II - DETERMINANTS OF THE DEVELOPMENT OF ENTREPRENEURSHIP IN RURAL AREAS ON THE EXAMPLE OF GNIEZNO DISTRICT

The factors determining the development of entrepreneurship include administrative and legal issues, economic conditions, local conditions, as well as social, cultural and personal conditions. This quite detailed division includes most aspects of its development. Bieniok in his study proposes the following categorisation of the factors [Bieniok, 2005]:

1. Legal and institutional conditions - including legal system, freedom of establishment, proprietary rights, protection against unfair competition, institutions, legal measures, supporting the development of small enterprises and other.
2. Economic conditions - including dynamics of economic development of the state and EU member states, access to capital and credit, tax system and other fiscal burdens, level of labour costs and insurance, currency exchange rates and other.
3. Social and cultural matters - including development of the education system, especially business education, social attitude to entrepreneurs and business, social mobility and activity, level of bureaucracy in administrative procedures and other.
4. Local conditions - including objectives and implementation of local policy, development policy of cities and communes, spirit and mood of local initiatives, tradition of independent economic activity, local labour resources, qualifications and morale of the employees, activity of residents, attractiveness of location and other.
5. Personal conditions - including level and type of education, system of values, perseverance and consistency of actions, creativity and innovation, cooperative abilities, place of birth, age, sex and others [Bieniok, 2005].

According to Starczewska-Krzysztozek [2008], the factors which significantly affect the development and economic situation of companies include: non-wage labour costs, lack of transparency and clarity in indirect taxes, lack of transparency of income tax on business activities, income tax rate, inflexible labour law, competition from the grey market, insufficient application of flexible employment forms, lack of qualified employees, as well as complex administrative procedures and competition from preferred companies.

It is easy to notice that among the categories given above a significant part of the determinants are the ones on which the local authorities have hardly any influence and the obstacles created are the same for all companies in the country. Like other economical conditions of macroeconomic nature and regulated at the state or the European Union level. Among the conditions, there is a group of factors directly or indirectly affecting business activities which are regulated locally, hereinafter referred to as the local conditions.

The factors stimulating development of entrepreneurship in rural areas of the district and at the same time reflecting their potential include: a relatively large number of enterprises registered in the system of Polish Business Registry Number REGON, prevalence of micro enterprises employing to 9 employees, good communicational location¹⁶ and close proximity of Poznań, as well as quite well-developed transport and telecommunications infrastructure in the district. Unfortunately, a number of factors may be also identified as an inhibitor of development, including: company's lack of

¹⁵ Own study based on data from BDL

¹⁶ A particular attention should be paid to the express road S5 already reaching the borders of Gniezno and close proximity to Ławica Airport in Poznań.

financial means for their development and improving skills of the employees, a limited number of foreign direct investments in the region¹⁷. Attention must be also drawn to the lack of prepared areas for investments and low correlation between education profile in schools and expectations of potential employers. Limited access to financial instruments supporting enterprises and lack of a business incubator also has a negative impact on functioning of the enterprises.

A growing domestic demand, export of Polish goods and a very high potential of the region to develop farm tourism and other non-agricultural activities on rural areas of the district should be indicated¹⁸ as providing a good chance for development of entrepreneurship. Among its major threats the following factors can be identified:

the prevalence of commercial companies in the region, lack of funds for skill improvement trainings and acquiring aid from the European funds, very low proportion of innovative companies and finally, worsening situation of the companies¹⁹. One of the basic problems in the rural areas of the district is still underdeveloped non-agricultural activity on rural areas and lack of the farmers' general assessment of the actual demand on their products.

CONCLUSIONS

1. The level of entrepreneurship among the inhabitants of Gniezno district may be described as high. For almost 56 thousand inhabitants there is more than 4200 business entities registered with 81 business entities per one thousand of inhabitants.

2. A number of business entities in rural areas of the district is increasing systematically and faster than the number of entities in urban areas, which proves a high potential and triggers changes in function performed by the rural areas. The largest growth could be observed in the communes of Gniezno and Łubowo.

3. The entities in rural areas of the district constitute a growing part of entities operating in the district - the share of entities on rural areas of the district to the total number of entities increased from 24% in 2009 to 28.3% in 2013.

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¹⁷ There are only 33 foreign direct investments located in the district.

¹⁸ A particular attention should be drawn here on the fact that the area of the holiday resort in Skorzęcin, as well as Niedźmieł Lake have been listed as one of the most attractive regions in terms of their tourist and recreational values in the Great Poland.

¹⁹ This can be noticed, for example, in self-assessment made by the companies - they stress the lack of development prospects, particularly with respect to the smallest one-man companies.

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ANALYSIS OF FACTORS HARMFUL FOR PETROL CHAINSAW OPERATOR

Abstract: The paper presents an analysis of the factors harmful to the chainsaw operator. It analyses the fundamental group of harmful factors such as physical, chemical, biological and psychophysical ones. Among the dangerous factors occurring for the chainsaw operator that directly affect the post and occupy an important place are primarily physical factors: noise, vibration, microclimate, lighting, dust and mechanical hazards. Very hazard are accidents at work. Accidents at work are of the economic importance both for the company, the victim, as well as for society. Incurring such costs represents a significant loss in relation to GDP both in Poland and also in highly developed countries of the European Union. At present the employment in the State Forests is only 25.5 thousand people, and the number of employees in this department of the national economy is gradually decreasing. At the beginning of the 1990s the number of employees fluctuated between 100 thousand. [<http://www.wprost.pl> (accessed 05.17.2014)] Most of the employees of the State Forests are employed as manual and maintenance workers.

Key words: harmful factors, Professional Risk Assessment, petrol chainsaw

INTRODUCTION

EU forests are defined as the surface area exceeding 0.5 hectare where the stand concentration exceeds 10% of trees, and in which the trees can reach a height of at least 5 meters at maturity. They cover an area of 159 million hectares (4% of the forest area in the world). They cover 38% of the European Union, while two-thirds of the European forests are located in six member states (Spain, Finland, France, Germany, Poland and Sweden) [4].

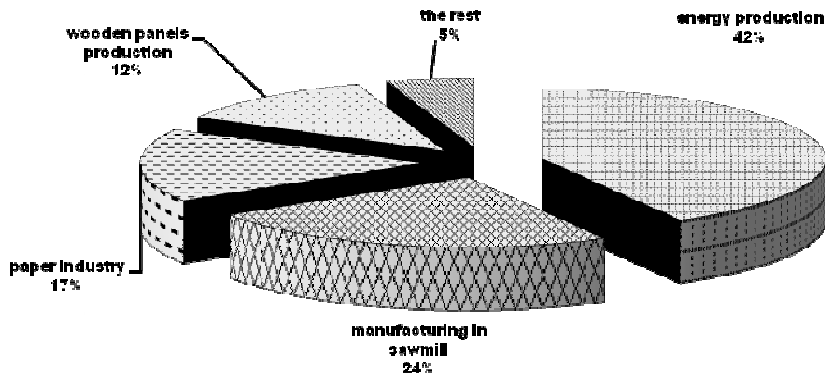


Fig.1 Structure of timber application. Source: Own research based upon [<http://www.lasy.gov.pl> (accessed on 05.17.2014)]

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In the sphere of the importance the forests are characterized by versatility. From the economic point of view, the use of forests generates resources, in particular wood. As many as 135 million hectares from 159 million hectares of forest are designated for timber production.

Raw materials, such as wood, is used mainly for the production of energy, for sawmills, paper industry and for the production of wood panels. The use of timber structure is shown in Fig. 1. In EU wood is the primary source of production used in renewable energy. At the same time it's not just wood but such products such as berries, mushrooms, cork, resin, oil, etc. Forests are also the basis for certain services including those related with tourism or hunting.

INDUSTRIAL SAFETY FOR STATE FORESTS EMPLOYEES

Forests are also a source of employment, especially in rural areas. The forest sector (forestry, wood and paper industry) generates nearly 1% of GDP in the European Union. The forestry employs approx. 3.4 million people (forestry industries and its derivatives).

Polish forests cover 29.2% of the country, growing on the area of 9.1 million hectares. The vast majority are state forests, with nearly 7.6 million acres managed by the State Forests National Forest Holding [<http://www.lasy.gov.pl> (accessed 17.05.2014)].

According to the Regulation of the Minister of the Environment of 24 August 2006 on occupational health and safety on the performance of some work in the field of forestry (Journal of Law 2006 No. 161, item 1141) the works considered particularly dangerous are those while removing difficult trees (e.g. broken, subversive, exceptionally thick or heavily slanted against the assumed direction of felling) and such work is mainly performed by chain saw operators [Pudło 2007].

Such a classification of work requires from employers to ensure adequate training for employees, a thorough risk assessment and the provision of protective clothing and personal protection (helmet with visor, gloves, hearing protection, trousers and shoes suitable for work performed).

All these activities require from the employer to cover all the costs connected with the provision of adequate health and safety of work. One of the basic components of health and safety costs are those connected with accidents at work, which include, among others, social insurance contributions accidents, occupational diseases, costs arising from work in hazardous conditions and harmful to health and the costs of prevention.

The company in connection with the accident of an employee shall bear the costs associated with its sickness absence, lower productivity and quality of work performed and it can disrupt the course of production. For the employee an accident results in a reduction of income, medical expenses and temporary or total incapacity to work. However, the costs borne by society are largely hidden and they are associated with various types of public sector services (including public health service) [Rzepecki 2012].

The economic consequences of accidents at work make it necessary to incur expenditure on preventive activities in order to create and maintain an adequate state of health and safety in the company. The relation between the costs components of job security and costs of preventive measures is shown in Fig. 2.

In Fig. 2 it can be observed that the increase in the cost of prevention activities will also reduce the expenditure incurred in the event of accidents and potential accidents. Every company should strive to achieve a minimum at the point M, which corresponds to the general costs of accidents and is the lowest point, at a relatively high level of safety (B).

Preventive activities which support the efforts to raise the level of safety and health at work may concern activities related to the identification of hazards in the workplace and specifying the probability of this risk, the so-called risk assessment in the workplace. Awareness of the present dangers affects the reduction of accidents at work and occupational diseases.

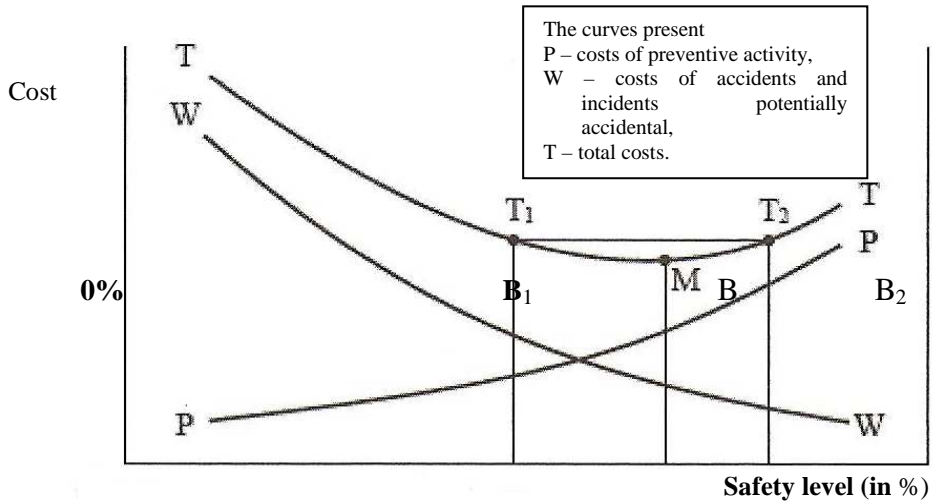


Fig. 2. The principle of determining the optimal level of security.

Source: Own research based on [Zawieski 2007]

Among the various jobs that exist in forestry the position of the chainsaw operator is worth noticing, which involves a number of harmful factors whose impact on the worker leads or may lead to an occupational disease or other condition associated with work.

ANALYSIS OF FACTORS HARMFUL AT THE POST OF PETROL CHAINSAW OPERATOR

The influence of material environmental conditions reflects, among other things on productivity and quality of work, but also on the state of health of the worker, and the overall impact is often more important than the impact on individual organs and systems of the body.

The basic groups of harmful factors are physical, chemical, biological and psychophysical ones. Among the factors that occur dangerous for the chainsaw operator that directly affect the worker are physical factors: noise, mechanical vibrations, microclimate, lighting, dust, mechanical hazards.

Noise should be considered as one of the most arduous factor of material environment in forestry. Unwanted noise, which is the noise impact [Sołyński K. et al 2001]:

- 1) on the audition receptor creating a risk of hearing damage to the inner ear, the eardrum, the occurrence of hearing loss,
- 2) on the nervous system, reducing concentration, acting stimulates vegetative system, greatly hindering the smooth running of psychomotor activity.

Acceptable exposure to noise for employees serving chainsaws is about 60 min/work shift taking into account the high, because close to 103 dB (A) noise level. Therefore, it is necessary to organize working time and the time of breaks in order the total daily noise exposure does not exceed the sound 60 minutes. The exposure time can be significantly increased by using appropriately selected hearing protection. The level of noise emitted by chainsaws far exceeds the legal acoustic limit [Rzepecki 2012].

Mechanical vibrations (vibrations) from the viewpoint of work protection are a group of phenomena occurring in workplaces, based on the transfer of energy from the source of vibrations to the human body by certain parts of the body that are in contact with the vibrating source in the performance of professional activities. Vibrations can have a negative impact on the health of the worker, leading in some cases to permanent lesions. From the point of view of health and safety mechanical vibrations are harmful physical factors that need to be eliminated or at least limited [Zawieski 2007]. The negative effects of occupational exposure to vibrations concern, in particular the skeleton and internal organs of man. While the vibration transmitted to the body by the upper limbs (for example when working with the chain saw) is principally caused by lesions in the circulatory system, nervous system and osteoarthritis [Kucharski 2004]. Permissible exposure to mechanical vibration is the time in which the effects of vibration do not cause danger to human health. Its value is calculated depending on the level of mechanical vibration energy and their duration [PN-91 / N-01353: 1991]. A significant role in reducing exposure to mechanical vibration meets the proper design of machines, tools and the use of shock-absorbing devices [Koradecka 1999].

Microclimate is the entire physical environment factors involved in the heat exchange with the environment of the human body. The key factors affecting the microclimate are primarily air temperature, air humidity, air movement, thermal radiation and atmospheric pressure [Rzepecki 2007].

Lighting in the workplace and in its environment directly affects the speed and certainty of vision and defines how the forms, silhouettes, colors are seen. For the optimal conditions of visual work the workplace and the environment must be well lit for the convenience of view [Bak, 1981].

The dust is one of the main harmful factors occurring in the workplace. Effects of dust on the human body can cause, among others, mechanical damage to the skin or mucous membranes, allergic disease, pneumoconiosis, and cancer. An important element in determining the impact of dust on the human body are: dust concentration, size and shape of the particles and chemical composition and crystal structure of the dust and the solubility in body fluids [Sowa 1995].

Mechanical hazards are a very diverse group of hazards and can be caused by moving the machine, moving parts, sharp parts, fluids under pressure, slippery, uneven surfaces, restricted areas, etc. The basic mechanical hazards include: crushing, grinding, cutting, abrasion, slip, strike, stumble.

Another group of factors, hazards in the work environment are *chemical factors*. Exposure to these factors is present in virtually all sectors of the economy. The chemicals are in the form of gases, vapors, liquids or solids. In terms of occupational exposure to chemicals absorption occurs primarily in the body by inhalation, skin and gastrointestinal tract [Zawieski 2007]. Effects of exposure to harmful chemicals may be local (irritation and sensitization to skin and mucous membranes) and systemic (changes in the central and peripheral nervous system, liver, kidney, cardiovascular etc.), and their severity can be acute or chronic [Pośniak 2005].

Assessment of occupational risks in the performance involving harmful *biological agents* includes the assignment of a specific factor risk groups and to establish the necessary preventive measures. Biological risk factors can be divided due to the pathogenic effects on the human body: causative agents of infectious diseases, biological allergens, toxins, biological, carcinogens, biological vectors [Dutkiewicz et al 2007].

Psychophysical factors that have an impact on the work performed by employees include, in particular: physical load (static and dynamic), conflict and stress.

In tab. 1 there were shown the hazards present in the workplace of chainsaw operator and occupational risk estimated by the method of PN-N-18002.

Table 1. Hazards present at the workplace of chainsaw operator. Source: own research.

No.	Hazard	Hazard source	Severity of the damage	Probability	Risk assessment
1	Moving parts of machinery	Chainsaw	Average	Probable	Average
2	Hazard made by basic tools and self-propelled tools	Basic tools, chainsaw	Average	Probable	Average
3	Slip, fall, a trip over	Accesses, field work stations	Small	Probable	Small
4	Fall of people and objects from heights	Pruning and felling of wood	Average	Probable	Average
5	Protruding parts, sharp edges, rough surfaces	Felling and pruning	Small	Probable	Small
6	Mechanical vibrations	Chainsaw	Average	Probable	Average
7	Noise	Chainsaw	Average	Probable	High
8	Changeable microclimate	Open working area	Small	Probable	Small
9	Biological agents (pathogens)	Microbes in the open workplace	Average	Little probable	Small
10	Animal aggression	Forest animals	Average	Little probable	Small
11	Forced posture	Field workplace	Small	Probable	Small
12	Physical effort	Moving and lifting the chainsaw, cut branches	Average	Probable	Average
13	Dustiness with wood dusts	Tree felling	Average	Little probable	Small

The developed card of risk assessment can be the basis for the development of prevention activities related to, inter alia, the purchase of a suitable work clothes and individual and collective protective equipment

CONCLUSIONS

EU forests cover an area of 159 million hectares. They cover 38% of the European Union. Polish forests cover 29.2% of the country, increasing the area of 9.1 million hectares. The vast

majority are state forests, with nearly 7.6 million acres managed by the State Forests National Forest Holding. Forests are, among others, a source of employment. Present employment in the State Forests is 25.5 thousand people. According to the Regulation of the Minister of the Environment of 24 August 2006 on occupational health and safety in the performance of some work in the field of forestry (Journal of Law 2006 No. 161, item 1141) the works considered particularly dangerous among others are those on removing difficult trees (e.g. broken, subversive, exceptionally thick or heavily slanted against the assumed direction of felling) and such work is mainly performed by chainsaw operators. For this position an analysis of the development of harmful factors was presented in the paper. On the basis of the risk analysis in this workplace the occupational risk was estimated by the PN-N-18002 method, which can be the basis for preventive actions related to e.g. the purchase of a suitable work clothes and individual and collective personal protective equipment

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BENEFITS AND COSTS OF ENVIRONMENTAL MANAGEMENT IN ENTERPRISES OF WIELKOPOLSKA

Abstract: The benefits and costs of environmental management system (EMS) according to ISO 14001 in enterprises of Wielkopolska were discussed in the paper. The presented data originate from survey conducted in 35 companies with implemented ISO 14001. Most of them were medium and large enterprises with legal personality. The main goal of the research was identification of benefits and costs resulting from implementation and maintenance of the EMS. The conducted survey proves that in result of the EMS implementation the enterprises gained direct (reduction of raw materials consumption and increase of competitiveness) and indirect benefits (improvement of image). They incurred lower costs for maintenance than for implementation of environmental management system.

Key words: enterprises, environment, management system,

INTRODUCTION

The benefits and costs of environmental management system (EMS) according to ISO 14001 in enterprises of Wielkopolska were discussed in the paper. In the initial stage 62 companies with implemented environmental management system ISO 14001 and located within wielkopolskie voivodship were qualified for the investigation. Eventually, there were obtained questionnaires from 35 companies in return. The survey was carried out between November 2013 and March 2014. The vast majority of enterprises, i.e. 94.4% were limited liability companies (68.6%) and joint-stock companies (25.8%). Over half of them (54.3%) were medium-sized enterprises and every third (34.3%) were large companies. A basic criterion for inclusion to the group of large or medium-sized enterprises was the number of the employees, because the information on total assets of the balance sheet or value of net sales, necessary to carry out such division, were not available. The survey questionnaire consisted of 18 questions, which were divided into following parts: 1/general information on a unit, 2/benefits of environmental management system in company, 3/costs of implementation and maintenance of the EMS.

BENEFITS OF THE ENVIRONMENTAL MANAGEMENT SYSTEM

A trial to identify direct (quantifiable) and indirect (non-quantifiable) benefits was undertaken. The first group consists of such benefits, which are possible to define with the use of quantitative indicators, e.g. reduction of pollution, in turn the benefits in the second group are incommensurable [Brauweiler 2013, s. 324]. In the group of direct benefits almost 94.3% responders indicated benefits resulting from reduction of the amount of waste requiring disposal (fig. 1). Over 60% of the surveyed included reduction of pollution emission and use of energy, water and resources into this group of benefits. Over half of the companies indicated decrease of charges for the economic use of the environment. Relatively lowest percentage of the surveyed linked the implementation of the system with reduction of costs connected with recovery and disposal of waste (48.6%). Those benefits result from the fact the EMS stimulates companies to implement new solutions resulting in quantifiable economic and environmental effects [Kazimierzak-Piwko 2012, s. 540].

One of the analyzed financial aspects of the EMS implementation, related to direct benefits was the identification of reduction scale of costs caused by lower use of raw materials and decrease

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of pollution. In 58.8% surveyed enterprises the reduction of energy and water use costs occurred and in every second there was a drop in costs related to environmental charges and waste management. The other effects in form cost reduction were irrelevant and were noted in less than 50% companies.

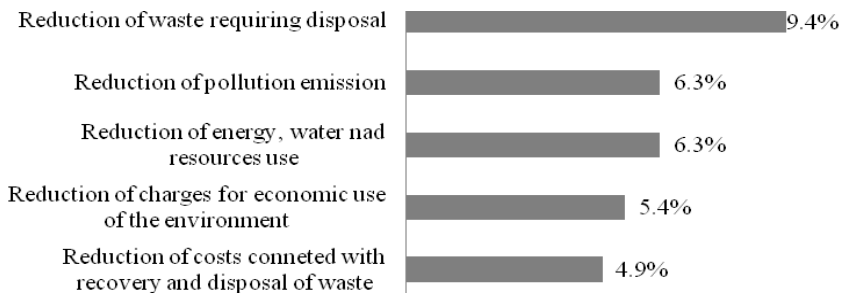


Figure 1. Direct benefits stemming from implementation of the EMS (%)

Source: Authors' own elaboration based on survey [35].

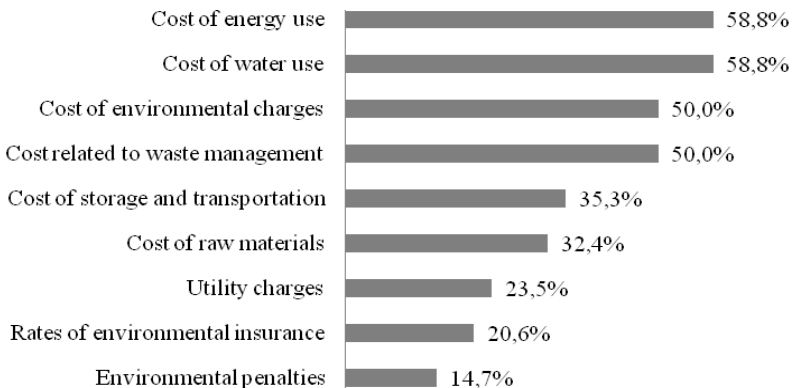


Figure 2. Reduction of costs influenced by the EMS (%)

Source: Authors' own elaboration based on survey [35].

Besides identification of the EMS influence on cost reduction, the investigated enterprises were also asked about its effect on use of particular production factors. The analyzed data show that over half of the companies – 55.6% gave the positive answer, in turn the rest, i.e. 44.4% responded negatively. From the range of production factors, in case of which the fall of use was noted the electricity, water consumption, as well as materials and raw materials were named. Additionally, in order to picture the reduction size of particular factor in each organization the enterprises were requested to give reduction share. After implementation of the EMS the electricity use fell in the interval from 2.5 to 20%, water consumption in the interval of 0.1 to 30% and use of materials and raw materials minimum by 5% and maximum by 25%.

From the variety of indirect benefits, the most important were company's image improvement, which was indicated by 100% of the surveyed (fig. 3). It may prove the significance assigned to positive image in the area of environmental responsibility. Building of image with the use of environmental management system is in case of many enterprises one of its strategic aims and a tool for competitive position improvement. In the ranking of the achieved benefits the next places were taken by increase of efficiency and transparency of environmental management system (91.4%), satisfying requirements and expectations of customers (85.7%) and growth of company's competitiveness (71.4%).



Figure 3. Indirect benefits of the EMS implementation (%)

Source: Authors' own elaboration based on survey [35].

An important effect of the EMS is competitiveness growth. The group of enterprises, in which these benefits occurred indicated a range of symptoms of competitiveness improvement. According to Wolodźko-Pasala [2013, s.119] "in order to remain competitive, companies include environmental elements and criteria in marketing strategies as well as in sale and management strategies". In every second enterprise, higher competitiveness reflected mainly in increase of sale and market share (fig. 4). Growing sale, due to EMS, may relate to better possibilities of effective participation in Green Public Procurement - GPP, where the environmental aspects are included.

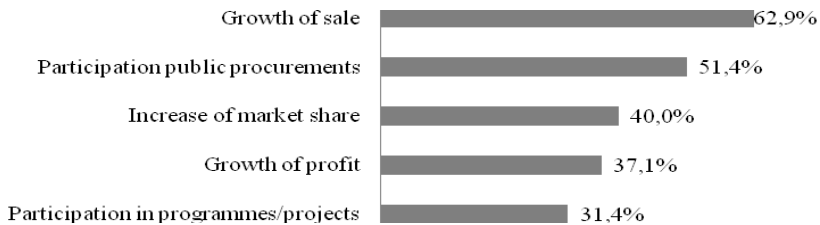


Figure 4. Influence of the EMS on company's competitiveness growth (%)

Source: Authors' own elaboration based on survey [35].

COST OF THE ENVIRONMENTAL MANAGEMENT SYSTEM

In the investigated units the record of environmental protection costs is carried out mainly in frames of existing solutions in cost accounting without extracting detailed accounts. Therefore information on environmental protection costs is given based on general estimations. Costs of the EMS implementation are determined by varied factors, i.e. company's size, including number of employees, core business profile and organizational structure. Enterprises on particular stage of preparations to implement the EMS, in order to minimize their costs, may base on their own staff potential. However the majority of medium and large companies choose external enterprises specializing in the EMS implementation, which is connected with particular costs.

In order to identify the EMS costs in the investigated enterprises, they were divided to categories: 1/ cost of the system implementation, 2/ cost of the system maintenance. Part of the costs is one-time cost, in turn, the majority occurs during the entire period of system functioning.

The most important costs of the EMS implementation are advisory service costs, management and staff training, cost of proxy employment and elaboration of the EMS documentation as well as audits costs [Kryk 2001]. The conducted research prove that the implementation cost was in the interval between 2.5 thousand PLN and 20 thousand PLN (fig. 5). None of the enterprises spent less than 2.5 thousand PLN. In turn, the highest share of the surveyed, i.e. 38.2% were the enterprises, in which the cost of implementation was at the level exceeding 20 thousand PLN.

Besides the EMS implementation cost, enterprises also bear costs related to maintenance of the system (costs of environmental actions, additional monitoring, costs of system documentation maintenance, recertification, etc.). These costs are a bit lower compared to the costs of implementation. In case of environmental management system maintenance, the dominating was the group of enterprises, in which the costs were at the level from 5 thousand to 10 thousand PLN. The fewest enterprises bore the cost at the level to 2.5 thousand PLN. In turn, costs exceeding 20 thousand PLN were incurred mainly by large companies, which constituted 20.6% of all surveyed units.

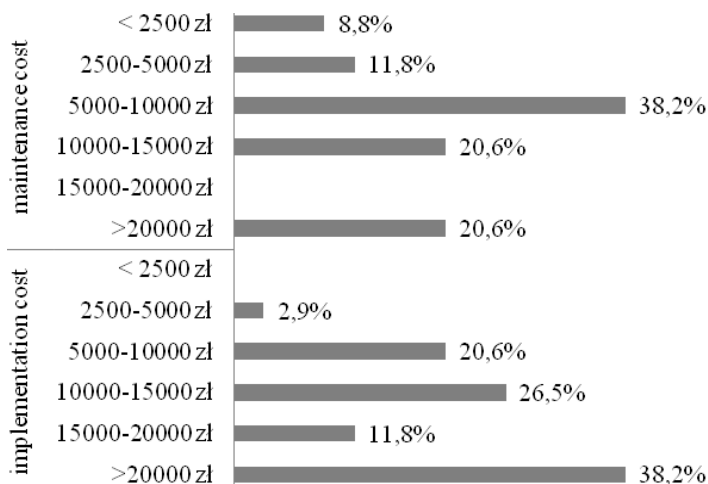


Figure 5. Costs of implementation and maintenance of the EMS (%)

Source: Authors' own elaboration based on survey [35].

Despite relatively high cost of system implementation, the vast majority of enterprises, i.e. 68.8% did not use external financing sources. Three of the units that gave the positive answer, used the EU funds aid. Moreover, the additional source of support for one organization was other foreign funds. The minimum share of resources originating from external sources amounted from 11 to 30%, in turn maximum – over 50%. Low level of use of funds in frames of the Operational Programme Infrastructure and Environment, measure 4.1 Support for the environmental management systems by the surveyed enterprises may be worrying.

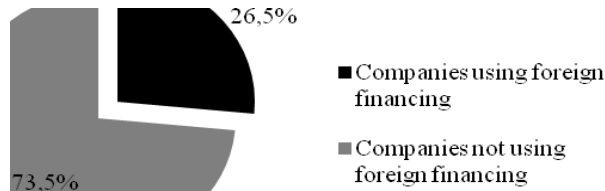


Figure 6. Financing of the EMS implementation (%)

Source: Authors' own elaboration based on survey [35].

Realization of the environmental goal requires incurring current costs of environmental protection. Basing on the conducted research, the percentage share of costs, which inquired companies spend on that goal was defined. The vast majority of the responders, i.e. 77.8% spend on environmental protection up to 5% of total costs, whereas costs exceeding 20% was declared by one unit. In the other units these costs were in the interval from 6 to 10%.

The conducted research provides an opinion on occurrence of negative effects of environmental management system implementation according to ISO 14001 and their significance. The enterprises indicated three negative effects of the EMS implementation: increase of bureaucracy (57.1%), costs (51.4%) and legal requirements (45.7%) growth (fig. 7).

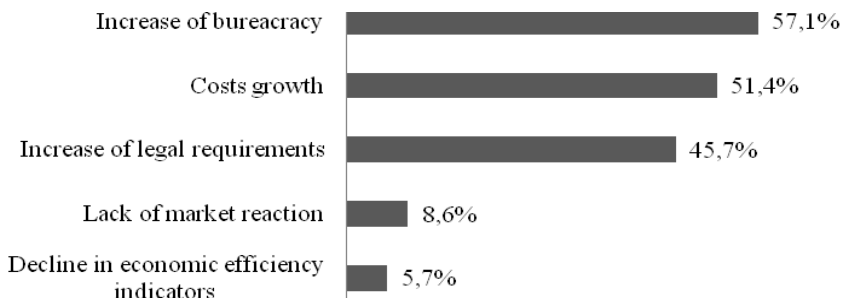


Figure 7. Negative effects of the EMS implementation (%)

Source: Authors' own elaboration based on survey [35].

In relation to the fact that the EMS is formalized, its implementation and recertification require meeting particular procedures, which are related to defined costs and are very time-consuming. The conducted research proves that implementation and certification lasted minimum 3 and maximum 24 months. In almost half of the investigated enterprises (44,4%) this period lasted from 4 to 8 months. The main factors conditioning the implementation time were: size of the company, business profile and range of occurrence of environmental aspects.

The essence of the EMS is moreover the process of constant improvement, therefore its implementation in some measure obliges the companies to systematic monitoring and controlling of the significant environmental aspects and realization of new plans of minimization of its influence [Wirkus, Chmielarz 2013]. In turn, it may create some technical difficulties on operational level and problems with staff resulting from additional responsibilities.

CONCLUSIONS

The conducted research proves that implementation of the EMS in companies resulted in a number of direct benefits, such as: reduction of the amount of waste requiring disposal, reduction of pollution emission and the use of electricity, water and resources. From the range of the indirect benefits, the most important was company's image improvement. The costs related to implementation and maintenance of the EMS were spread depending on the size of enterprise and its business profile. Generally the enterprises incurred lower cost for maintenance of the EMS than its implementation. Basing on the conducted research one may believe that the enterprises having implemented EMS belong to the group of the units actively working for the environmental protection. They undertake a number of environmental actions towards rationalization of natural resources use and reduction of natural environment threats.

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POLISH ORGANIC FARMING IN THE PERIOD OF INTEGRATION WITH THE EUROPEAN UNION

Abstract: The aim of the paper is to show the changes in the Polish organic farming in the period of Poland's accession to the EU. The analysis of changes covers the period between 2004, i.e. since the moment of integration with the European Union, until 2012. The analysis of the elementary features of organic farming was carried out based on the data of Agricultural and Food Quality Inspection (AFQI), the Ministry of Agriculture and Rural Development as well as EUROSTAT. The paper presents changes in organic agricultural area, number of farms and transformations in organic food market in comparison to the other EU member countries. The growth of basic indicators describing the Polish organic farming resulting from the growth of its support in the accession period was also indicated.

Keywords: development, integration, organic farming.

INTRODUCTION

The organic farming is a study subject of a number of authors representing different research centres. A significant study progress in this area was made due to works of U. Sołtysiak [1993, s. 23-38; 1995], W. Łuczka [1993, 2007], H. Runowski [1996, 2007, 2009], K. Gutkowska and S. Żakowska-Biemans [2003], J. Tyburski and S. Żakowska-Biemans [2007], M. Golinowska [2013]. The rules, quantitative status and basic determinants of organic farming, demand and supply factors conditioning its development, functioning of the organic products market, support instruments as well as stimulants and obstacles were defined in the study. The changes in Polish organic farming in the period of integration with the EU countries constitute a new research area in this field.

In the European Union the organic farming is considered as such farming system that fulfils the conditions defined in the Council Regulation (EC) No 834/2007. It consists of legal base specifying organic production of crops and farm animals, guidelines for labelling, processing and placing the organic products on the market as well as trade in organic products within the EU. Since the integration, Poland has adjusted the regulation in the area of organic farming to the binding legal status in the European Union. On the 1st of January 2004 the Act on Organic Farming came in force [The Act... 2004], which specified requirements concerning conditions of agricultural production with the use of organic methods, inspection and certification system as well as trade in organic farming products and their labelling. Since that moment the organic farming has been included in the system of the European support, first in frames of the Rural Development Plan 2004-2006 and then 2007-2013 and finally in years 2014-2020. The organic farming is framed by the support as one of the components of the so-called agrienvironmental programme. In the programme, farmers undertake agrienvironmental actions serving natural environmental protection and conservation of rural natural heritage. The size of former support was so large, that it contributed to dynamic increase in organic farming in Poland.

ORGANIC AREA IN POLISH ORGANIC FARMING COMPARED WITH THE EUROPEAN UNION

For several decades, high increase in organic area and growth of amount of organic farms has been noted in the European Union countries. According to the latest data (2012) this area amounts to 8.7 million ha. In the last decade this farming was the most dynamically developing sector of the

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European agriculture. However, its significance in particular countries is different. One may distinguish a group of countries with relatively high share of organic farming in the structure of agricultural area – over 10% (Sweden, Austria, Czech Republic, Estonia and Latvia), medium share in the interval of 5-10% (Spain, Italy, Germany, Portugal, Finland, Slovakia and Lithuania) and low share below 5%. Although Poland is included in the group of the share below 5%, it has large potential in this area, which in the nearest years may result in high dynamics of organic farming growth.

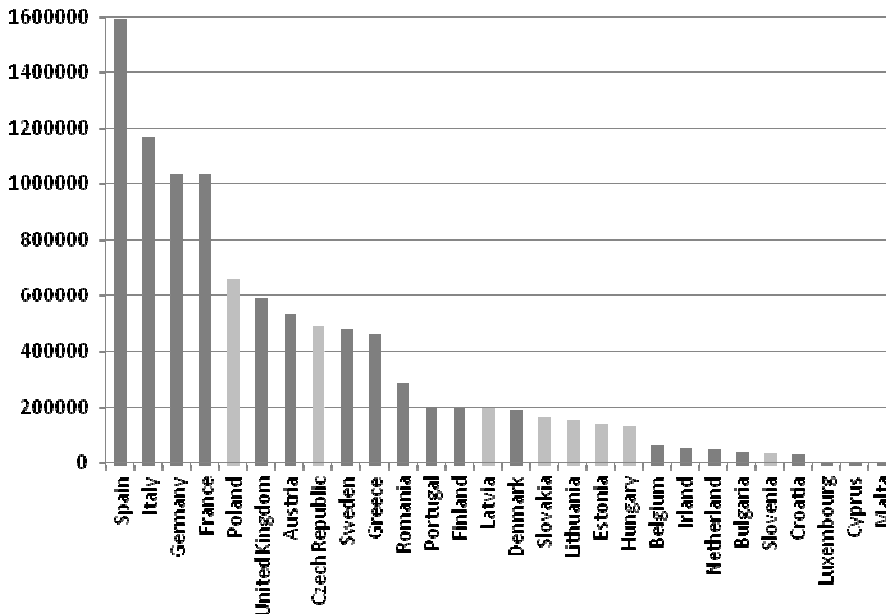


Figure 1. The organic area in the European Union in 2012 (ha)

Source: authors' own elaboration based on [www.organic-world.net].

In the last years the organic area has been dynamically growing in so-called new European Union countries. The highest increase, by about 600% was noted in Poland, then in Latvia (246%), Cyprus (185%) and Estonia (113%). As it comes to the total organic area, in 2012 Poland came fifth.

In 2012 the organic area constituted about 3.5% of total agricultural land. The largest organic agricultural land occurred in the three voivodships of north-eastern Poland: zachodniopomorskie (135.4 thousand ha), warminsko-mazurskie (112.9 thousand ha) and podlaskie (55.8 thousand ha).

Simultaneously with the growth of organic area, the number of the farms converted to organic methods increased as well. In 2004 there were 3.8 thousand organic farms (with certificate and in conversion period) and in 2012 25.9 thousand (December 31st 2012). The average area of farms running production with the use of organic methods amounted to over 22 ha. In 2005 the average size of the organic farm amounted to 25.5 ha.

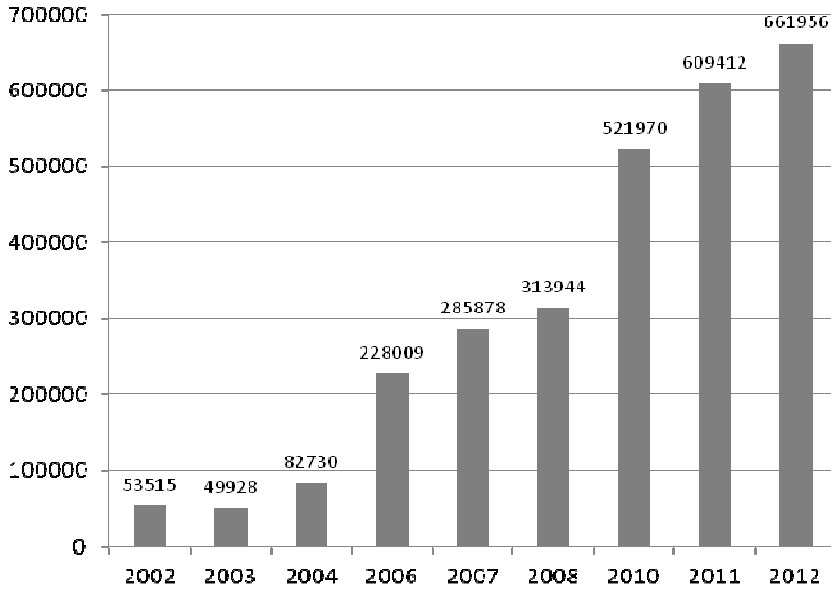


Figure 2. Organic agricultural in Poland between 2002 and 2012 (ha)

Source: authors' own elaboration based on [Raport o stanie rolnictwa ekologicznego... 2013, s. 24].

Table 1. The area structure of organic farms in Poland in 2004 and 2012

Farm agricultural area	up to 5 ha	5-10 ha	10-20 ha	20-50 ha	50-100 ha	over 100 ha
2004	19.0	25.0	26.0	18.0	7.0	5.0
2012	19.3	24.1	25.5	17.4	9.1	4.6

Source: authors' own elaboration based on [Raport o stanie rolnictwa ekologicznego... 2013, s. 26].

The average area of organic farm in Poland was more than 2.5 times larger than the average area of conventional farms (approx. 10 ha). The presented data deny views that organic production method was applied only in small farms, which engage mainly their own workforce [Gotkiewicz and Szafranek 2000]. Since the Poland's accession to the EU the number of organic producers increased more than 7 times, to over 25 thousand (fig. 3).

Growth of number of organic farms and organic agricultural area is spatially differentiated. The most organic farmers functioned in such voivodships as: warminsko-mazurskie (3793), zachodniopomorskie (3579), podlaskie (2924). In these three voivodships there was 39.7% of total number of organic farms in Poland. The fewest organic agricultural producers were noted in opolskie (95), śląskie (257) and kujawsko-pomorskie voivodship (406).

The vast majority of organic farms carry out only crop production. In 2012, these farms constituted 76.5%, whereas the share of farms with crop and animal production amounted to 23.5%. The structure of organic agricultural land was presented in figure 4.

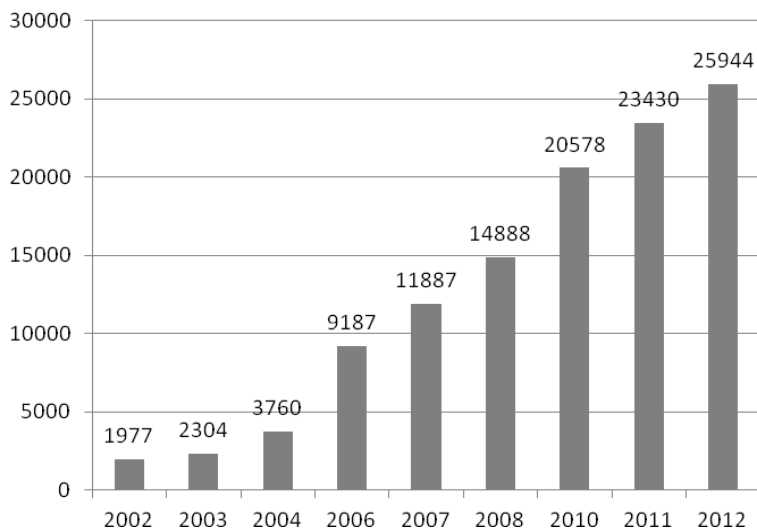


Figure 3. The number of organic farmers in Poland between 2002 and 2012

Source: authors' own elaboration based on [Raport o stanie rolnictwa ekologicznego... 2013, s. 20].

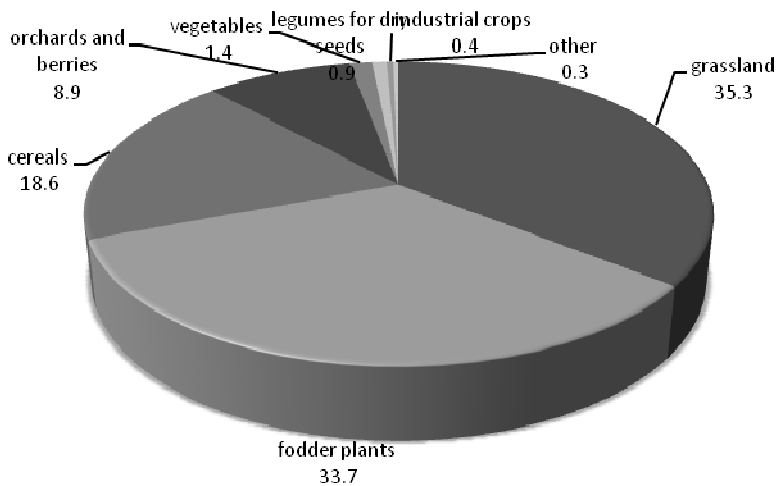


Figure 4. The structure of organic agricultural land in Poland in 2012 (%)

Source: authors' own elaboration based on [Raport o stanie rolnictwa ekologicznego... 2013, s. 25].

The reason for such dynamic growth of the organic area and number of organic farms in Poland in the recent years was subsidisation from the Rural Development Programme 2004-2006 and 2007-2013. The level of subsidies was the highest comparing to other agrienvironmental schemes. In frames of the RDP 2004-2006 and 2007-2013 they amounted to 1800 PLN maximally for orchards, which encouraged a number of farmers to convert to organic methods. In turn, the production was increasing at a much slower pace. In these two financial RDP periods, grassland constituted over half of the organic area, 21% permanent crops, including walnut orchards. High dynamics of growth of organic area and the number of organic farms did not result in high dynamics of supply volume increase. A significant part of the converted farms did not run production for the market. It resulted in fall of subsidies in RDP 2014-2020 organic farming scheme, which in the nearest future may weaken the dynamics of organic farming growth [Szansę i zagrożenia... 2013].

ORGANIC FOOD MARKET

As it comes to the volume of the organic market, the first place is taken by Germany, in which in 2012 the turnover amounted to 7.0 billion euro. Such amount constitutes 14% share in global market of organic food. The second place with market worth 4.0 billion euro and share of 8% is taken by France and the third – the United Kingdom. High share of the market is also noted in Italy, Switzerland, Austria and Spain. On the other hand, the countries with the highest market share of organic food are: Denmark (7.6%), Austria (6.5%), Switzerland (6.3%), Sweden (3.9%) and Germany (3.7%). Luxembourg France and the Netherlands also have relatively high share.

In Poland the organic food market is small and does not exceed 0.2% of total food market, but its value is systematically growing and it amounts to approx. 500-600 million PLN. The most popular purchased products are organic fruit and vegetables, milk and dairy food as well as cereal products. This market is described by relatively weak product range amounting to a few hundreds of units, most of which are cereal products. In the European Union countries with developed market, the product range reaches a few thousand units. Therefore, the Polish market is partly supplemented by imported products. This is also influenced by seasonality of some fruit and vegetables, lack of exotic fruit and low level of organic food processing.

Poland's accession to the EU had positive impact on organic food export growth, which was conditioned by two determinants: 1/price advantage of domestic producers, 2/existence of demand barrier caused by income situation of domestic consumers. The importance of these factors, although they have temporary character, is so great, that organic food has become an obvious export product. In result of integration, reduction of transaction costs has become an important export-oriented impulse as well.

CONCLUSIONS

Since the integration with the European Union, in Poland there has occurred a very dynamic growth of organic farming, which is resulted in 7-times increase of organic agricultural area and 6-times growth of number of organic farms. As it comes to the organic agricultural area in 2012 Poland took fifth place in the EU. The main factor accelerating dynamic growth of organic farming was the system of support in frames of agrienvironmental programme. High rates of the support were very strong incentives encouraging to participate in the programme. However, dynamic increase of organic area and farms did not result in comparable degree to dynamics of organic production growth. Therefore, market of organic food was developing more slowly and was characterised by low product range differentiation.

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BEHAVIOURAL HUMAN RESOURCES MANAGEMENT METHOD. THE NEW TREND IN FORMATION OF HUMAN CAPITAL IN POLAND

Abstract: Behavioural human resources management method covers the full life cycle of an employee in an organisation. Its application begins with the process of selecting candidates to work, through career planning, till the cyclic work evaluation. The method is based on direct observation of the employees or candidates to work behaviour, and the confrontation of the follow-up results to a desired candidate or employee competence profile. Although the method is focused on designing and enforcement of desired behaviours in the work environment, it also influences life outside work environment, affecting the formation of human capital. The paper presents the techniques and procedures of the method, which is gaining popularity in Poland. The presented analysis is based on the author's observations made during the cooperation with transnational corporations in the creation and implementation of behavioural selection and employees evaluation techniques.

Key words: behavioural method, human capital, targeted selection, transnational corporation

INTRODUCTION

Behavioural human resource management method covers the full life cycle of an employee, starting with the selection process of candidates to work, through career planning, till the cycle employee evaluation. It is based on direct observation of the behaviour of employees or candidates to work. The method was brought to Poland and popularised by the transnational corporations. The American corporations have begun to use the behavioural approach in building human capital in the 70s. Over time, through the activities of the American transnational consulting companies, the method has been taken over by the Japanese corporations. Due to the well-defined, easy to adapt procedures, nowadays this method prevails in transnational corporations of different origin.

Behavioral method abolished the primacy of previously used emotional method, also known as hypothetical, based on the assumptions and questions in the conditional mood, the end result of which was not confirmed by the specific observed behaviours. In the case of emotional methods, the full weight of designing and implementation of procedures was ceded on human resources specialists. The responsibility for the management in the context of behavioural methods is divided equally between HR specialists (designing the techniques and procedures) and employees (awareness of desirable behaviours in the organisation gives rise to promoted actions), or candidates to work (since assessed are in fact present and past behaviours reported by the candidates).

The purpose of this article is to introduce the techniques and procedures of the method gaining popularity in Poland. Due to the fact, that the method is oriented to design desired behaviours or even attitudes, it is not only the direction of the management, but it also creates the human capital. In societies where behavioural method is commonly used (Japan), it can be noticed, that the profile of an employee becomes as well a citizen profile.

The analysis in the paper is mainly based on observations made during the author's years of cooperation with transnational corporations in the creation and implementation of the selection and staff evaluation methods.

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THE BEHAVIOURAL METHOD OF HUMAN RESOURCES MANAGEMENT

Behavioral method has proved to be helpful in overcoming a number of deficits, that are widespread by using the emotional method, such as:

- omitting the relevant information about the candidate (for e.g. focusing only on one area, like knowledge);
- ignoring motivational matching;
- asking illegal or unrelated to work questions;
- asking overlapping questions;
- the lack of merged selection system components;
- discouraging, deterrent selection process;
- insufficient record on observation/contacts with candidates and employees;
- assessment issued on the basis of just one feature of a candidate;
- misinterpretation of information (overinterpretation);
- pressure to fill a vacancy.

This method allows for the collection of information and assessments on:

- education and work experience;
- specialist knowledge (to be checked by an expert in the field);
- motivation (work related, organisational, locational - the seat of the employer- region, city);
- behaviour (behaviour in the previous work environment).

In all techniques used in this method: targeted interview, assessment center, etc., it is important to put together a complete description of the behaviour (situation):

1. the situation, in which a candidate for the job/ employee found him/herself
2. the action, that they have taken or were involved in;
3. the effect, that the candidate received as a result of the taken action

The result of the application of behavioural methods should be a full diagnosis of the competence of candidate for the job, and in case of an employee, an effective employee evaluation. The competence in the work context is defined as a set of features, which include aspects such as motivation, abilities, skills, relations in the group and knowledge, that the person assimilated, and which is able to apply [Whiddett, Hollyfirde 2003].

To the most sought competences with help of behavioural method are so-called optimal competences. These are not fully developed competences, however, they can lead to achieve the most desirable competences in the company, under the condition of creating the optimal conditions for development. Therefore, at the beginning of work a new employee is required to have the core competencies, which would allow for the fulfillment of simple tasks [Armstrong, 2002].

The second type of competences preferred in the behavioural method are so-called hard or functional competences. These are described in detail and are directly related to the requirements of the particular job. In the catalogue of these competencies dominate the aspects of substantive knowledge and skills.

Each type of competence requires a precise definition. This is the first step towards a competence profile of an employee. The model of describing competences includes its name, general definition and the specific determinants. Detailed behavioural determinants allow to distinguish positive and negative powers, together with giving the specific, relevant behaviours [Hamel, Prahalad 1999].

In addition to the competencies, the work performing and quality is also influenced by the attitudes. Some researchers perceive attitudes (just like behaviours) as the components of competence and emphasise, that the attitudes expected in the workplace should be also assessed

[Oleksyn 2006]. The attitude consists of: the cognitive assessment of the situation, positive or negative emotions accompanying this assessment, as well as, behaviour, that is dictated by the previously mentioned aspects. It is believed, that the attitude depends on the effective use of knowledge and skills in the workplace [Kossowska, Sołtyśńska 2002].

It seems, however, that attitudes cannot be equated with competences. Attitudes, as values or stereotypes are acquired in the process of socialisation. These are formed from an early age, mainly due to parents and distant family members, so it is very difficult to change them. Attitudes do not change through trainings and workshops. Therefore, the undesirable attitudes identified thanks to behavioural method disqualify a potential employee.

M. Armstrong singled out a several research techniques based on the behavioural observation [Armstrong, 2002]:

- Structured interviews focused on the identification of positive and negative behaviours specified in the competence profile.
- Workshops involving an employee, manager, HR specialist or an external consultant. The purpose of these workshops is to determine the desired behaviour for previously accepted competence areas.
- The technique of critical events – it boils down to the observation, on the basis of which the events, that are examples of both effective and ineffective behaviours are being described. The card/ report of an event contains the circumstances of the critical incident, behaviour of the employee and the consequences of this behaviour.

In particular competencies the level of knowledge and skills is being identified and diagnosed. Knowledge is defined as the information embedded in the right context, which enables effective and efficient operation of the company and its employees. It is difficult to distinguish knowledge from information, because for some information stays information, and for others it becomes knowledge [Brdulak 2005]. For an enterprise counts only the kind of the information, which could be effectively transformed into ready-to-use knowledge.

The expected skills fall into two main categories: technical skills, which boil down to the physical performance of functions, that are the hallmarks of professionalism and intellectual skills: thinking, perception of reality, creating a vision of the future [Brilman 2002]. The first and the second category is desirable and diagnosed, assessed and trained in modern companies.

BEHAVIORAL TARGETED SELECTION. THE PROCESS STAGES

The first step in the selection are so-called targeted competency tests. These are the tools used to perform the pre-selection of candidates to work and exclude the largest number from further proceedings. These are the tests by which the first evaluation of the desired competencies is carried out. Typically, the candidates take part in a number of tests, the most popular are:

- Motivational tests: contain questions or statements to which the candidate has to respond (usually on a scale of 1-5, with 1 being the least preferred position, 5 - the most). The questions concern motivating factors relating both to the process of work and work environment.
- Situational tests: are meant to find out how the employee behaved (what kind of actions he or she has taken) in certain situations, that occur in the workplace. It is not only about the situations related to the job exercising, but also about the aspects related to broadly understood work environment. Such aspects like: the occupational health and safety, internal communication, attitude towards the timeliness and punctuality, etc.
- Ability tests: they check the level of mastery of the skills required in the performance of the job or, more generally, in a particular industry or workplace. Sometimes the questions relate to substantive skills closely related to exercised work. The ability tests are also a good tool to check the ability of concentration on the task, and the pace of work.



The second stage of the selection are exercises carried out in so-called assessment center. During these exercises, the participants perform tasks commissioned by the administrators (assessors), allowing the candidates to demonstrate their competences and the assessors to assess the competence profile in confrontation with the position for which the candidate is applying. The type of assessment center exercises also allow the HR specialists to identify the competency deficits. Such diagnosis will allow, after the employment, to plan appropriate trainings in order to eliminate the competency gaps. So that, on the occasion of the first employee evaluation, it would be possible to assess the evolution of an employee in the previously deficit area. Both: the competency tests and the group exercises (group problem solving) as part of the assessment center, are performed by all the candidates to work in the enterprise, regardless of the level of education and the type of position they applying for.

A specific type of manual exercises are these intended for the candidates to work in production positions. The designed exercises are closely related to the activities conducted at a given position. Another type of exercises aimed at a specific group of candidates are the simulations. These are individual exercises in which besides the candidate, the assessor is also taking a part. The administrator creates an exercise situation and plays a role provided for him in the simulation. Simulations are often used in the selection of persons to any position over the group: leadership, management.

The last type of exercise as part of the assessment center is an exercise designed to verify the candidate's level of written communication, his or her delegation skills, effective decision-making, work organisation, prioritisation, etc. In this exercise, candidates receive a file with unsolved issues and time to deal with them. To take on this task the candidates for the specialists posts are requested.

The last stage of selection in the behavioural method is the targeted interview, commonly called the job interview. The interview techniques may differ, but the scheme remains the same:

1. The asked questions should provide information about the behaviour with respect to any competence desired in the enterprise;
2. There may be a need to ask a supplementary question, so that the candidate/ employee provide complete answers, because they are the most important source of information in the behavioural method;
3. It is necessary to keep detailed notes during the interview;
4. Creating a friendly atmosphere, stimulating the delivery of complete responses;
5. Sticking to the established plan of an interview (a formulary prepared in advance may be very useful during the interview).

The targeted interview usually starts with a description of the meeting plan. Then the recruiters proceed to the candidate's education and professional experiences, they ask planned, behavioural questions. The behavioural questions should be related to a specific behaviour. One should avoid theoretical, hypothetical questions and hints.

During the targeted interview the final verification of the motivational factors affecting the job applicant/ employee is carried out. Depending on one's preferences the motivating factors can be, as follows:

- fast pace of work, decision-making,
- provision,
- fast visible work results, achievements,
- human interactions,
- continuous development (learning),
- diversification of tasks (for those who fear the routine at work),
- a position or a function of a leader.

After the completion of targeted interview, follows the integration, verification and evaluation of the collected data. For this purpose, the human resources specialist shall identify the provided by the candidate complete situations (behaviours). As it has been already mentioned, the complete description of behaviour consists of a situation, taken action and reaction (result). Then the relevant situations described by the candidate are matched with the desired competencies, which are covered in the profile of a candidate to work in an organisation. The last stage is to evaluate the behaviour with the correlation to a potential working position.

THE CYCLE EMPLOYEE EVALUATION IN BEHAVIOURAL METHOD

The cyclic evaluation of employees fulfills several functions in the organisation. Firstly, it is a function of information, the assessment provides knowledge about an employee, and hence also about the potential of an organisation. The evaluated employee gets a feedback as well, in order to know how he or she is perceived in the enterprise. Secondly, the assessment has also got a motivational value. Its effect can be a form of an employee reward for their efforts inserted in the development, improvement of qualifications or, on the contrary, it might decide of depriving the employee of such profits. The third function, decision-making one, is correlated to the employee career planning. Based on the outcome of the assessment decisions are made as far as the horizontal redeployment, promotions are planned training are concerned.

The evaluation should concern the competences, the formal ones (obtaining a diploma, certificate, etc.), professional ones (directly related to their work) and so-called soft skills (interpersonal relations, communication). Among the assessed aspects there is also the effectiveness of the work method and the quality of work. The assessing procedure of the behavioural method time and effort are relevant aspects as well.

Among the most important principles of an effective assessment is a precise definition of the subject of evaluation and the clarity of assessment criteria. About the scope and criteria for evaluation, the employee should be informed before even commencing work, preferably during the initial training. One shall be also focused on the objectivity of assessment process (referring to facts and verified information). The effectiveness of assessing procedure depends on the level of transparency, the ease of understanding and conduct, as well as, on the cost-effectiveness.

What distinguishes the employee evaluation in the behavioural method is its direct link with the selection process for a position. As it has been already pointed out, during the selection process of candidates for work, competency deficits are identified. The identified deficiencies, if they are not so severe to disqualify a candidate, should be completed until the first evaluation of the employee. These are, therefore, only the deficits, that can be overcome through training, courses or study. If the competence deficiencies were not properly identified during the selection process or if the employee has not been covered with the necessary training, such area of competence should not be assessed. Since one can only evaluate those competencies, that employees have the opportunity to improve or complete.

To the most commonly used techniques of employees evaluation belong:

- **Descriptive Assessment:** this is a characteristic of an employee in writing, containing information relating to successes in a given period, failures and proposals for training, that should be done in the next period.
- **Spot grading scale:** each criterion has got a note, for e.g. 1-5, then the arithmetic mean is calculated; one can also use graphic scales.
- **Questionnaire:** it reminds of a test, because it contains questions and various answers options, which are assigned a different weight.
- **The method of critical events:** the evaluation of these events is made by direct supervisors during the entire evaluation period. The supervisors have got special forms prepared for this purpose for noting the successes and failures of the employee. Every major event



(positive or negative), in which the employee participated is reported. The supervisor identifies the problem and completes it with a brief description.

- Behavioral scales: an analysis is conducted of completed tasks and behaviours that are of particular importance at the workplace and contribute to the objectives of the organisation. Description and evaluation concerns both well and poorly executed tasks, as well as, the desirable and undesirable behaviours.
- Assessment center: as in previously described case of assessment center in the selection process for candidates to work, as part of an employees' assessment center the tests and exercises are carried out, which are aimed at checking the competence development of an employee. This technique can be criticised as artificial. Since it is not based on real events and behaviours, which actually took place and had a direct impact on the functioning of the company, but it refers to a designed situation to assess the extent of progress bar.
- The 360° method is used to collect information on the employees behaviour, which later on is translated into assessing the level of competence. Information is obtained from a number of people with whom the evaluated employee is in constant contact during their daily duties. These people are supervisors, subordinates, colleagues occupying similar positions. Evaluation forms are passed also to contractors outside the company: customers, vendors. The method allows for the assessment of different competencies from the point of view of the person for whom the specific assessed employee's behaviours are most important.

The results of cyclical evaluation are passed to the employees during so-called evaluation interview. The evaluation interview comes down to discuss the successes and failures of the employee, opportunities for advancement and professional development training needs. The evaluation reviews should begin with the positive information, focus on the description of the observed behaviour rather than on its assessment, so that the employee can also independently draw conclusions from these events. The supervisor, who provides the information should stick to the concretes and relate only to those behaviours that can be changed (for e.g. through trainings). As part of the corrective actions, some suggestions for alternatives should be made, however, the employee should be allowed to choose how to act. What is important, during the evaluation interview only these facts should be discussed, that the employee have previously read. A proper evaluation interview has got a strong motivating feature.

CONCLUSIONS

As it is clear from the above analysis, based on the behavioural method, boiling down originally to the behaviour observation, a comprehensive system of human resources management in an enterprise has been created. The techniques used in the context of behavioural method are very often mistakenly identified with psychological research (especially by people who have got the first contact with the method). In fact, the components of the method are clearly defined competencies and rigid procedures and the behavioural observation itself has nothing to do with the psychological research. The method combines the two categories listed in the model of strategic human resource management: it expects certain kinds of behaviours from the employees, that they contribute to the company, and, at the same time, it creates the desired behaviours. The numerous applications of the method have shown, that the correct gathering of information on human behaviours, their proper interpretation and understanding of the motivations of these behaviours, contributes to the work efficiency growth. The behavioural method is characterised by an individual approach to employees, treating them more in terms of capital, which should be given a chance to develop, than in terms of simply supplemented resources. Thanks to the results of the method evaluation carried out by the consulting companies and enterprises it is known, how the behavioural method affects the functioning of an organisation. Nevertheless, further research is required on the phenomenon of the method influence on the formation of employees' behaviours outside the workplace. Due to the fact,

that in the work environment the employees spend a significant part of life, a management method, through repetitive procedures and appropriate motivation system, must also have an effect on behaviour outside work. It can be concluded that, that the behavioural method not only forms human resources, but also the human capital of a society. What remains an open question is: in which direction will tend the formation in the future and whether, in connection with the expansion of the method, we will have to deal with a standardised employee/ citizen.

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ASSESSMENT OF THE USE OF SALE PROMOTION INSTRUMENTS OF LIPIKAR DERMOCOSMETICS BY LA ROCHE-POSAY

Abstract: The aim of the paper was to evaluate the use of sales promotion instruments of La Roche-Posay's Lipikar dermocosmetics line for atopic skin available in pharmacies in Poznan in the time between 01 October – 31 December 2014. The results of the analysis showed that sales of the Lipikar dermocosmetics have been activated by use of such sales instruments as: leaflets, free product samples, additional exposures of dermocosmetics in pharmacies, limited promotional packaging, special sets of products with one free of charge product and the program of rewarding each consumer who buys three Lipikar La Roche-Posay products, receiving one free of charge. Very important factor in selling La Roche-Posay Lipikar dermocosmetics are dermocosmetic consultations conducted by qualified consultants in pharmacies. The additional finding of the carried out study is that La Roche-Posay depends on building and maintaining long-lasting relationships with its customers. An example of such an action, standing out on the pharmacy market, is a program called "A Lipikar Family" offering a free annual Lipikar care for improving life quality of children with atopic dermatitis. In the analyzed period, the brand used more instruments to promote the sale of dermocosmetics atopic skin care than its competitors. All promotional actions of Lipikar products have influenced the increase of their sales in the fourth quarter of 2014.

Keywords: dermocosmetics, sales, promotion, instruments of sales promotion, pharmacy market, Poland.

INTRODUCTION

Dermocosmetic is a cosmetic of a special care for specific skin conditions and specific skin types, distributed exclusively in pharmacies [Butcher et al. 2012]. The term "dermocosmetics" was first used in the scientific literature by Selles et al. in 1990. The concept of "dermocosmetics" is not regulated by law and has been developed primarily for marketing purposes [Butcher et al., 2012]. From the point of view of European law, "dermocosmetics" are cosmetic products that are subject to the same regulations as all other cosmetics. In accordance to Article 2 of the Regulation of the European Parliament and Council Regulation (EC) No 1223/2009 of 30 November 2009: "cosmetic product shall mean any substance or mixture intended to come into contact with the external parts of the human body or with the teeth and the mucous membranes of the oral cavity with a view exclusively or mainly to cleaning them, perfuming them, changing their appearance, protecting them, keeping them in good condition or correcting body odors "[Regulation No 1223/2009].

Dermocosmetic should not have to act beyond its role of nursing, perfuming, protecting, purifying or beautifying. A common practice of manufacturers producing dermocosmetics is enhancing their products' values by attributing to them the characteristics and special properties which distinguish them from other cosmetic products available on the market, especially assigning to them properties which support the treatment of skin diseases.

Dermocosmetics can be used as a booster for skincare in the presence of various skin diseases, but it cannot influence the course of the disease or its treatment [Technical Guide PZPK 2011; Jeżewska 2013].

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Developed marketing communication in companies producing or selling dermocosmetics makes these products not only widely distributed but also properly promoted. On the pharmacy market the promotion of products is more and more sophisticated, highlighting their advantages, making it easier for a consumer with certain skin problems to grasp more eagerly for dermocosmetics rather than traditional cosmetics available in every drugstore.

The aim of this study was to evaluate the use of sales promotion instruments of Lipikar line dermocosmetics for atopic skin by La Roche-Posay available in pharmacies in Poznan in the period between 01 October – 31 December 2014.

MATERIALS AND METHODS

The object of the analysis was Lipikar dermocosmetics by La Roche-Posay care for very dry and atopic skin of infants, children and adults, available in pharmacies across the whole country. The line consists of cleansing products: Lipikar Syndet Cleansing Body Cream-Gel Anti-Irritation, Lipikar Surgras Concentrated Shower-Cream Anti-Dryness, Lipikar Surgras Lipid-Enriched Cleansing Bar, Lipikar Lipo-Replenishing Cleansing Oil Anti-Irritation and caring products: Lipikar Balsam AP+, Lipikar Lipo-Replenishing Body Milk Anti-Dryness and Lipikar Xerand Hand Repair Cream. The Lipikar line selected for evaluation was created 20 years ago and now is in the phase of market maturity. The Lipikar products have been constantly modified, for example, its last modification took place in September 2014. The new product was introduced in the Lipikar Balsam AP + line. The choice of the La Roche-Posay brand was dictated by the fact that it is: a) most frequently recommended brand by dermatologists in Poland [Study Tracker 2014], b) a leader in atopic skin care [www.laroche-posay.pl], c) carries out the most promotional campaigns. The study was conducted in public pharmacies in Poznan in the period between 1 October to 31 December 2014 in order to assess which promotion instruments increased the sales of Lipikar dermocosmetics in that period.

RESULTS AND DISCUSSION

The analysis showed that the brand actively promotes the sales of all products, intensely focusing on individual lines offered in the analyzed period, depending on the strategy. In the period from October to December 2014 due to the novelty introduced in September 2014 in the Lipikar line - Balsam AP+, the brand drew the attention of its consumers to the entire range of the line with an emphasis on the new product. On the basis of the observation of how the brand was presented in pharmacies, it can be easily noted that La Roche-Posay stands out from the competitors, especially with additional exposures and numerous testers with different lines of dermocosmetics through the pharmacies. Moreover, consumers can test many products organoleptically.

To activate the sales in pharmacies, the Lipikar dermocosmetics has used the following instruments:

- leaflets in the form of booklets informing about atopy with the presentation of dermocosmetics and a free sample of the product available in pharmacies (also distributed by dermatologists in clinics),
- free samples of dermocosmetics given to consumers after the purchase of medicines in pharmacies,
- additional exposures of products and testers of key and new brand products, such as: Lipikar Balsam AP+ Lipo-Replenishing Balm Anti-Irritation and Anti-Scratching,
- limited promotional packaging of Lipikar Balsam AP+ Lipo-Replenishing Balm Anti-Irritation and Anti-Scratching at a reduced price of 40% (Fig. 1),
- special sets of 400 ml of Lipikar Balsam AP+ Lipo-Replenishing Balm Anti-Irritation and Anti-Scratching with 200 ml of Lipikar Syndet Cleansing Body Cream-Gel Anti-Irritation free of charge (Fig. 2),

- program relying on rewarding consumers for buying Lipikar AP+ Balm in the period from 1.09.2014-28.02.2015 - for every purchase of 3 pieces of products of 200 ml or 400 ml capacity, each consumer receives a gift: 1 tube of Lipikar AP+ Balsam of 200 ml or 400 ml capacity depending on the volume of products purchased within the program.



Fig. 1. Promotional packaging of Lipikar Balsam AP+ with a 40% discount

Source: www.e-farm.pl (entry on 04.12.2014).



Fig. 2. Set of Lipikar AP+ Balsam with free Lipikar Syndet Cleansing Body Cream-Gel

Source: www.dom.zdrowia.pl (entry on 4.12.2014).

In addition to these instruments, the brand offered in the analyzed period a 50% price discount on a product bought with the second one of any brand's product line, e.g.: (1+1 for 50% of the price discount). Very important part of the dermocosmetics sale is the dermocosmetics consultation conducted by qualified consultants in the pharmacies with skincare section. They advise consumers on the choice of appropriate products. Such a promotion method is of great significance, especially for consumers struggling with skin problems who are not always willing to ask dermatologists for an advice. Launching a new product from the Lipikar line can help acquiring new customers as well as bringing back the old ones. Promotional activities carried out by the brand in the analyzed period performed the function of increasing brand exposure and providing competitive information, especially when it comes to new products being introduced.

Described giveaways offer consumers additional benefits related to the acquisition of products, increase interest of dermocosmetics and encourage their purchase. Professionally prepared, in the form of leaflets, they are a source of expertise on the causes, symptoms and atopic skin care. An important element of the competitive advantage of La Roche-Posay is the fact of being No. 1 brand recommended by dermatologists in Poland [Study Tracker 2014], about which the consumer is informed by reading these materials, as well as the brand's website. Given the dermocosmetics market saturation and the fact that often occur skin allergies caused by the use of cosmetics, this message can actually persuade customers to choose and purchase products of the brand. In addition, the product sample included in each leaflet increases interest in the innovation and encourages its purchase. Dermatological consultations have informative value; these are carried out by trained consultants who help to recognize the type of skin, skin problems, as well as choose the right line. In addition, skincare consultants accurately convey information and knowledge about the new products to consumers.

The analysis showed that La Roche-Posay depends on building and maintaining long-lasting relationships with its customers. An example of such an action, standing out on the pharmacy market, is a program called “A Lipikar Family”, offering a free annual Lipikar care and improvement of the quality of life for children with atopic dermatitis. The program was introduced on the Internet platform www.infoatopia.pl, dedicated to families whose members are struggling with skin dermatitis. The application to the program was conducted between 1-10 November 2014. All pharmacies were informing about the action with posters and written messages (Fig. 3). The applicants were accepted by filling in the registration form (Fig. 4) under the Internet site www.infoatopia.pl. The program covered 50 families in which at least one child is struggling with atopic dermatitis. Each of these families received from the producer a year's supply of free products for very dry and atopic skin care: Lipikar Syndet Cleansing Body Cream-Gel Anti-Irritation and Lipikar Balsam AP+. In addition, these families have a chance for consultations with dermatologists during the program and one year after the program, as well as sharing their experience on the subject of atopic skin and atopic dermatitis on the platform in the form of a discussion forum [www.infoatopia.pl].



Fig. 3. Informative board on „A Lipikar Family” program
Source: www.laroche-posay.pl (entry on 04.12.2014).

Fig. 4. Application form for the program
Source: www.laroche-posay.pl (entry 04.12.2014).

This program is a promotion based on loyalty and aims to build lasting relationships with the consumers. It is distinguished by a desire to support and care for family and a professional approach to the process of dermatologist consultation with a consumer. The most common type of advice on skin problems on the pharmacy market are dermoconsultations conducted by trained skincare advisors. However, consultations with a dermatologist are much more professional, associated with prestige and show an individual approach to the consumer. The innovative idea is the Internet information center, which is designed to help individuals, children and their families to better understand the disease of the skin and improve their health and quality of life by articles, tips and stories of people who are in contact with the problem. The program makes a person participating in it remain loyal to the brand.

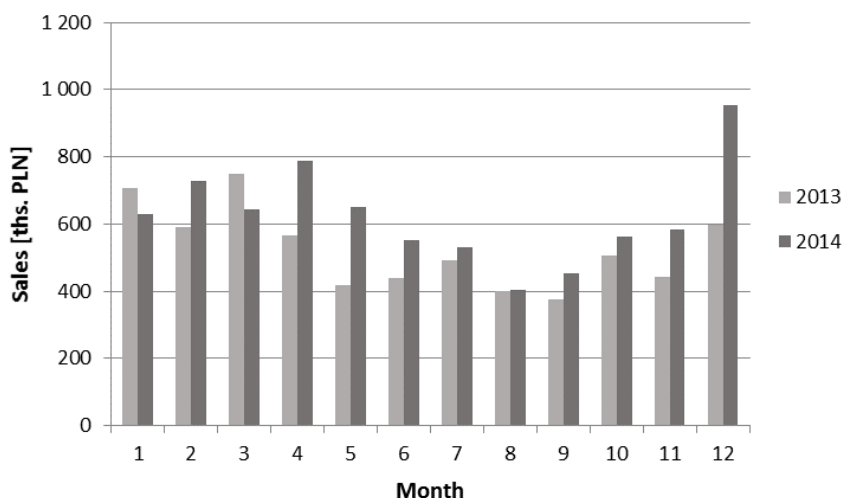


Fig. 5. Comparison of the sales (in thousand PLN) of all products from the Lipikar line in 2013 and in 2014.

Source: own research based on IMS Health Report 2013-2014.

In order to promote the Lipikar line for atopic skincare the La Roche-Posay did a much greater use of sales promotion instruments than the competition. Promotional campaigns of the Lipikar dermocosmetics in the fourth quarter of 2014 resulted in sale increase by 19% compared to the fourth quarter of 2013. At the beginning of the promotion period, in October 2014 was recorded 11% growth in sales of this line, in November 32% growth, and in December 2014, the sale of this line increased by 59%. [IMS Health Report 2013-2014; Fig. 5]. Such a high increase in sales of the Lipikar line confirms the success of properly selected and applied promotion instruments.

RESULTS

It is a challenge to conduct profitable promotional campaigns, especially in an era of increasing competition on the pharmacy market. The La Roche-Posay brand conducts the highest number of the promotional dermocosmetic campaigns. The reason for that might be the fact that most of product lines launched by others are currently in the phase of the market maturity. Therefore, the brand introduces both completely new products, or products with improved formulas, and initiates promotions, as well as loyalty programs.

La-Roche Posay Brand activates the sale of all its products, intensely focusing on individual lines in selected periods of the year. Each time promotions include several product groups for consumers with a variety of skin problems. As a result, consumers can find a product for themselves which is subject to different promotional campaigns. Actions carried out by the brand do not always stand out from the competition, but certainly they increase the sales of La-Roche Posay products.

The brand made a much greater use of the sales promotion instruments of dermocosmetics for atopic skin than the competitors. The analyzed Lipikar line was intensively promoted in the fourth quarter of 2014 which resulted in increased sales value of the lines by 19% compared to the same time period in 2013 [IMS Health Report 2013-2014]. The novelty of Lipikar Balsam AP+ has been

of a particular interest to consumers. The outstanding action of the brand is the loyalty program "A Lipikar Family" the aim of which is to maintain long-lasting relationships with its customers.

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ANALYSIS OF DIRECT MEANS OF PROTECTION USED IN FOREST WORKS

Abstract: The study shows the analysis of particular direct protection means used in forest works. Basic groups of forest workers' protection means, such as clothing and footwear, were examined. Requirements for head, hearing, sight and face protection were investigated. Separately, hands and feet safety were scrutinized. The conclusions of the analysis may be useful for instructing staff working in forest development.

Key words: forest works, direct protection means, protective clothing

INTRODUCTION

The most important rules regulating the Occupational Safety and Health (OSH) aspects in forestry are: the Regulation of the Minister of Environment on OSH in forest works as well as the Labour Code. National Forest Holding "State Forests" (Państwowe Gospodarstwo Leśne "Łasy Państwowe") on the basis of the abovementioned regulations developed a OSH manual for works in the field of silviculture. The current instruction was implemented by Order No. 19 of Director General of State Forests (Dyrekcja Generalna Lasów Państwowych) dated on July 14th 1997 and defines entirety of forestry occupations as working operations. In the following step, it assigns to each single operation or their group appropriate required safety level, which requires from the operator(s) implementation of the safe conduct method [<http://rop.sejm.gov.pl>, access 10.11.2014]

Control over the implementation of safety and health resolutions is performed by the OSH service existing within the structure of National Forest Holding "State Forests". The duties of OSH services in every dependent unit of Direction General of State Forests, i.e. 17 Regional Directorates (Regionalne Dyrekcje Lasów Państwowych) and 430 Forest Districts were entrusted to appropriately qualified staff. Adequate manner of OSH service organisation guarantees sufficient supervision over the safety and health of the personnel at each management level of State Forests.

Since the responsibility for hiring personnel was overtaken by Forestry Services Company (Zakład Usług Leśnych) the OSH services often perform the supervisory function at the areas managed by State Forests by verifying the accuracy of activities executed by an external party as well as by consulting companies, which provide services for State Forests. In relationship between State Forests and suppliers high pressure is put on appropriate training of workers providing service for State Forests. Trainings in safe forest works are carried out even though these are not included in Regulation on OSH instructing. The main assumption of these practices is State Forests participation in reduction or complete elimination of risks, which result in accidents.

General OSH in forestry rules on workers' allowance to work in forest conditions. A worker, in order to work on the appropriate position, must comply with the following:

- to possess a suitable, and above all an up-to date doctor's certificate of no impediments to execute a particular job,
- to possess the appropriate qualifications certified with suitable documents, if the current regulations constitute on a requirement of their possession at a given post,

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- to possess successfully completed each kind of OSH trainings, which provide knowledge of regulations and present rules,
- an employee should be acquainted with all risks appearing in a specific work environment, as well as with professional risk assessment,
- an employee should be equipped with all means of individual protection, as well as with clothing and work shoes, which meet requirements of separate regulations,
- an employee may be allowed to work when he/she is disposable in psychophysical state, without reporting any disorders [OSH manual, <http://www.lasy.gov.pl>, access 6th of November 2014]

It is unacceptable to:

- assign juveniles to works they should not execute, which are determined in executive regulations or other requirements,
- consent women for onerous or harmful work.

Protective and work wear is a basic mean of health and life protection in all branches of forestry. Protective wear are clothes substituting personal clothing or outerwear, which protects from hazards. Such type of clothing is used in particular works, which are threatened by penetration of hazardous factors and substances or suffering injuries. Dangerous features include: low or high temperature, fire, electric current, moisture, chemical substances, biological hazards, etc. [<http://www.procurator.pl>, access 25th of November 2014]

While working an employee is obliged to use allotted personal protection means, footwear and work clothes in accordance with their intended use. Damaged or worn individual protection means are forbidden to be applied.

After end of the work shift, individual protection means, as well as footwear and work clothes should be thoroughly inspected for their further usefulness to work.

HEAD PROTECTION WHILE EXECUTING FOREST WORKS

Cranial traumas are the most dangerous threats for human life and health. The brain is an ingenious instrument, which controls all the processes in the person's body. Therefore head protection is as important.

Protective helmets structure is diversified if it comes to their application; however each helmet has some basic features in common:

- Shell – it is the outer part of a helmet, which imparts a determined shape. While being hit, it partially absorbs the energy, transmitting its remaining value into Skeletal Sub Structure. Helmet's shell has multiple elements, such as: air vents, mount points for helmet earmuffs, face shields or headlamps. Shells are usually made of polyethylene or ABS.
- Skeletal Sub Structure – it is an inner part of a helmet, which directly adheres to the head. It is fastened to the shell from inside and absorbs the energy transmitted by the shell. Skeletal Sub Structure is usually made of polyethylene strips or synthetic fibres.
- Main strip – it girds a head at the base of skull and at the forehead height. Together with the Skeletal Sub Structure it assures stable helmet's placement on the head.
- Chin strip – it constitutes an auxiliary element, which prevents the helmet from falling off the head at each movement. It is not necessary to use it when the Skeletal Sub Structure together with the main strip embraces the occipital part of the head.

HEARING, EYE AND FACE PROTECTION

Hearing is one of the basic human's senses. Twenty-year-old individual's hearing is less sensitive to high frequency sounds. Hearing protection from harmful noise basically means removal of its destructive dosage. The limit over which the noise becomes harmful equals 85dB. It is a noise dosage which is acceptable in a regular eight-hour work day. The following requirement for using

ear protection is the quantity of noise levels, which maximal amount may not exceed 115 dB. Exceptions are so called impulsive sounds, which simultaneously may not exceed margin of 140 dB. [<http://www.procurator.pl>, access 25th of November 2014]

Appropriate usage of hearing protection depends on the fact if the employee complies to the recommendations for the entire period of working with noise. Therefore, besides applying an appropriate hearing protection, earmuffs should be comfortable in usage, as discomfort is the main reason the employees reject wearing ear protection. Appropriate fitting of ear muffs depends on individual features of each employee, such as shape and size of hearing organ or tendency toward allergic reactions, as well as features present in a workplace: dustiness, temperature and humidity.

There are two types of hearing protection gears: ear plugs and earmuffs. Hearing protecting plugs are plugged into the ear. They are available in two variants, as single plugs (disposable) and plugs connected with a cord (mainly reusable). Ear plugs are usually produced in different sizes for fitting them into an employee's ear. These are made of tight-fitting and soft materials, such as mineral wool, silicone, rubber and other plastic materials.

An earmuff appears in several options, most frequently placed on a protective helmet. Because of diversified size, they are suitable for miscellaneous noise level. Ear cushions fitting tightly are padded with soft pads. They are made of polypropylene, polyamide, ABS, etc. The vibration damping liner is usually produced from polyurethane or PVC foam. Very useful and common are two-way communication earmuffs with built-in radio, which enable radio contact without additional communication equipment.

Face and eye injuries are mainly caused by solids slivers while wood- and metalworking. Eye protections are divided into:

- safety glasses made of plastic or unbreakable glass. They are transparent and serve mainly as a protection from slivers of solids or liquids spills;
- face shields – the most frequently created from steel mesh or polycarbonate, they may be additionally equipped with filters, which protects from UV radiation.

Shields are suitable for working with chemicals as well as with wood.

HAND AND FOOT PROTECTION

Safety and work gloves belong to the most frequently and most willingly used personal protection equipment. It is caused by the fact, that the employee's hands are exposed to harmful elements while working. Gloves are divided into three groups:

- category one – gloves used in low risk conditions, they protect against the abrasion of epidermis, temperature not higher than 50°C and light chemicals[Pacana J, Budzik G., 2014].
- category two – gloves used at activities of medium risk of injury. These gloves protect against mechanical damages as well as against chemicals. Furthermore into this category one may include gloves protecting against frost and heat to 100°C.
- category three – gloves used for works fraught with high risk of serious hand injury. These gloves have to comply with PN-EN 420 requirements and are divided into gloves:
 - a) protecting against thermal, chemical and biological effects,
 - b) protecting against static electricity,
 - c) protecting against mechanical damages.

Cut resistant trousers are designed to save an employee from hazards resulting from improper machines work as well as from other accidents. They are made of a material consisting of several fabric layers of extremely resistant fibres, which in contact with a chain of a chainsaw enmesh into it and stop the device.

Footwear, as of purpose, may be divided into protecting against:

- a) chemicals,

- b) mechanical factors,
- c) thermal factors,
- d) biological factors,
- e) atmospheric conditions,
- f) electric shock.

The appropriate safety footwear protect against overload and damage simultaneously increasing safety and comfort at work. Protective boots are manufactured in very wide product range. Usually shoes protect feet and legs against several types of injuries. Protective parameters depend mainly on materials used for production.

EVALUATION OF PERSONAL PROTECTION EQUIPMENT SUPPLIERS

The form with detailed assessment criteria is the basis of frequently applicable evaluation of supplies. Typically these criteria are:

- price,
- product quality,
- timeliness of delivery,
- service/warranty.

A form example :A list of qualified suppliers, serving for qualifying appropriate contractors is presented at pic. 1. If an organisation complies with a quality management system, then these steps are described in the quality system's procedure entitled e.g. Purchases.

Table 1. The form example: A list of qualified suppliers

F-01		List of qualified suppliers		Effective from:	
Page ... of				Version 01	
* 1- bad, 2- average, 3-rather good, 4- good, 5-very good					
No.	Suppliers name – provided goods	Criterion	Grade Year	Removed from the list, date and signature	
		Price			
		Product quality			
		Timeliness of delivery			
		Service/warranty			
:	:	:	:	:	

Source: own study.

On the basis of the analysis of suppliers carried out, one may draw a conclusion that OSH issues at purchase of personal protection equipment are interpreted alternatively. The basic requirements must be fulfilled and the real evaluation is based upon the criteria presented in tab. 1. However it is not the best solution, as it does not allow to define the level of meeting expectations in the area of occupational safety and health. Therefore it seems to be appropriate to extend the actual set of four criteria, of another criterion, which would assess the level of safety and hygiene at work. Accordingly, the list of criteria would consist of:

- price,
- OSH level,
- product quality,



- timeliness of delivery,
- service/warranty.

Relatively wide range of suppliers on market offer personal protection equipment products, which not only meet the fundamental requirements, but also are distinguished by increasingly better protection standards. Therefore, introduction of OSH level assessment would increase the competence of evaluation of a personal protection equipment purchase and due to the above, would result in running safe works in forests.

CONCLUSIONS

Polish forests cover 29,2 % of the country territory, which amounts to 9,1 million ha. Straight majority of them are national forests, from which almost 7,6 million ha are managed by National Forest Holding "State Forests". The forests are inter alia source of employment. Current employment in "State Forests" amounts to 25,5 thousands of people. It is an employer's obligation to ensure the appropriate personal protection equipment for employees. In order to fulfil the task, the manager makes an alternative estimate of meeting the minimal OSH requirements, and also very often (in following sequence) makes a criterial evaluation of a delivery and a supplier. It seems to be intentional, at relatively rich market of the personal protection equipment, to take the abovementioned fact into consideration in assessing the deliveries and the suppliers. Such a suggestion, after the analysis of the aforesaid protection means, appears from the above study.

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INFLUENCE OF EXPLOITATION OF VERTICAL GROUND HEAT EXCHANGERS ON HEAT POTENTIAL OF GROUND AND THE EFFICIENCY OF HEATING SYSTEM

Abstract: The study of exploitation of vertical ground heat exchangers with heat pump was conducted. Recovered heat was used in central heating and hot water installations. The daily heat production yield from two vertical ground heat exchangers with depth 70m amounted 0.23GJ and coefficient of performance was $COP = 2,46-3,05$. Continuous exploitation of ground without thermal regeneration did not cause any significant reduction of the heat obtained from the ground in next heating seasons in studied installation. There is no need to regenerate of the ground in summer which is associated with an additional energy inputs.

Key words: exchange of heat, geothermal energy, heat exchanger, energy

INTRODUCTION

Acquisition of heat from renewable energy sources is now a key issue for Poland and other European countries, which are obligated to fulfill international agreements on reducing greenhouse gas emissions at the same time increasing the share of energy production from alternative sources. Particularly agriculture has a considerable energy potential increasingly recognized and currently used for everyday farms needs. One of the basic mechanism used for heat acquisition and recovery from animal production processes is a heat pump [Pedersen 1986; Nawrocki, Myczko 1998; Kupczyk i in. 2001; Domagalski i in. 2011]. The heat pump is a device that acquire and process solar heat accumulated in the soil, water or air for heating purposes. The process of heat exchange and transformation derived from a renewable source occurs in the power cycle, which involves working medium. The compressor and circulation pumps drives require electricity to be provided to heat pump. The soil is very good accumulating medium, therefore it is one of the best sources of heat for the heat pump. According to Czekalski [2011], regardless the season, on the depth of 20 meters the ground temperature is positive and comes to 10°C.

The heat is extracted from the ground using ground heat exchangers, that may have horizontal or vertical arrangement [Rutkowski 2011].

The vertical ground heat exchangers are placed in the boreholes up to 200 meters deep, while the horizontal ones are arranged over a large area at a depth of 1-1.5 meters. Heat exchangers operate in a close system, where the working fluid taking heat from the ground is mostly an aqueous solution of glycol. The capacity of heat exchanger is affected by thermal properties of soil surrounding it. Therefore, it is important to efficiently determine the thermal properties of the soil while designing the ground heat exchangers [Li, Lai 2012]. The thermal regeneration of ground can raise its performance. For this purpose, one can use the heat from the solar collectors [Pahud, 2000; Yumrutaşa, Ünsalb 2012] or from cooling of the buildings in the summer [Joniec 2012]. Hanuszkiewicz-Drapała [2008] reported that the amount of heat absorbed from the of soil by the heat exchangers in the second heating season was lower than in the first season, due to lack of thermal regeneration of soil in the summer. A system based on a combination of solar collectors and

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heat pump was described by Trillat-Berdal et al. [2007]. The authors report that the regeneration of soil heat from surpluses produced by solar panels and heat from cooling of the buildings during the summer help to maintain system performance at a satisfactory level in the long term.

Based on the analysis of available knowledge, research and own observations the purpose and scope of the work has been set as to analyze the thermal performance of vertical heat exchangers in the heat pump system. It has been verified, whether within three years of continuous boreholes exploitation and utilization of heat acquired this way leads to lowering of heat potential of the ground, without the cyclic (in summertime) thermal regeneration of ground provided through heat redistribution obtained from solar panel. The hypothesis that support such approach is that, while exploiting vertical heat exchangers in the winter there is no need for ground thermal regeneration in the summer time from e.g. solar panels. The fact that the ground is sufficiently large heat capacity and few month of exploit it through vertical heat exchangers should not reduce the value to the degree which could have a negative impact on the collection of the heat in the subsequent heating seasons, support taken hypothesis.

MATERIALS AND METHODS

The aim of the research was to analyze the thermal performance of vertical ground heat exchangers used in heat pump system and to verify if within three years of continuous exploitation and utilization of the heat from the ground without cyclic recharging during the summertime by the heat obtain from e.g. solar panels has led to lowering of ground heat potential. The base for such an approach was the hypothesis that in the case of vertical ground heat exchangers operating in the wintertime, there is no need for ground regeneration support from other heat sources e.g. solar collectors. The fact that ground has a sufficiently large heat capacity and that the exploitation of limited space takes place only for few month in year is a justification for that hypothesis. What also has to stated is the fact that such limited usage of ground heat should not deteriorate its potential or reduce its value to such an extent that would have negative impact on the acquisition of the heat in subsequent heating seasons. In the aspect of above findings the research problem has been formulated in the form of the following questions:

Does continuous obtaining of the heat from the ground without parallel supported regeneration of its potential affect the heat obtained from the ground in subsequent heating seasons?

What is the efficiency of the heating system that acquires the heat from vertical ground heat exchangers?

The research uses the research methodology used during the studies conducted in 2011 and 2012 that have been described by Szulc and Grace [2012]. The test site was located in the ITP, Poznań at the renewable energy workshop "ekobudynek" with dimensions of 12 meters by 6 meters having steel walls filled with 10 centimeters of styrofoam. The lower heat source was ground and two "U-tube" shaped vertical heat exchangers filled with technical glycol that were placed in special 70 meter deep boreholes. The heat installation based on renewable heat sources include Vitocall 200 an 8kW heat pump and a hot water tank with a capacity of 200dm³ (Fig. 1). Calorimeters as a basic measuring and testing equipment have been installed at the entrance and exit of the heat exchanger as well as in hot water installations leading to the radiators in heated rooms. They made it possible, among others, to determine the amount of heat obtained from the air and the ground, the electricity consumption of the installation, the instantaneous power of the system, as well as the temperature of the heating medium that route ground heat from exchangers to the heat pump. The installation diagram of the heat acquisition was presented on Fig.2. The basement with the capacity of approx. 125m³ and "Ekobudynek" lab equipped with 6 traditional radiator were heated. The study was conducted from 12 December 2011 to 14 February 2012, from October 2012 to March 2013 and from October 2013 to January 2014. Analysis of the results was developed using appropriate formulas and presented as output from Excel 2010 spreadsheet. Determination of Coefficient Of

Performance (COP) expressing the energy efficiency of the system exploited was obtained by dividing the retrieved heat (GJ) by expenditures of energy (kW; GJ).

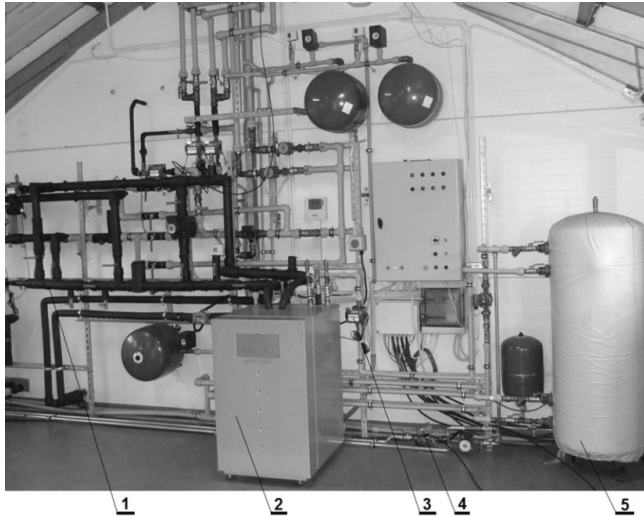


Fig.1. Heat recovery system. 1 – installation for providing heat to heat pump, 2 – heat pump, 3, 4 – heat meters, 5 – buffer tank.

Source: own study.

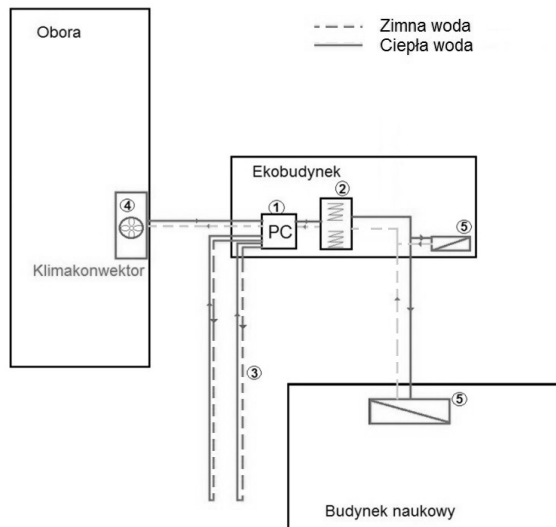


Fig. 2. Block scheme of tested installation: 1 – heat pump; 2 – buffer tank; 3– vertical heat exchangers; 4-fan coil unit, 5 – heaters.

Source: own research

STATISTICAL METHODS

While analyzing the results gathered in the course of research in the laboratory of renewable energy "Ekobudynek" the usage of basic statistics was necessary in the aim of validating the results presented but also to facilitate them for further analysis. The statistical parameters allowing to obtain the aforementioned conditions were arithmetic mean, standard deviation, as well as minimal and maximal values of measured results. The values of these parameters were obtained using Excel spreadsheet tables and they were presented directly under the partial results.

RESULTS AND DISCUSSION

The research over the system used for heat retrieval from vertical heat exchangers, having later its level increased by the heat pump and using it for powering up the heating were shown in the table 1. The results clearly show that vertical ground heat exchangers operate flawlessly in every season. The analysis of the results after more than two month operation period of vertical ground heat exchangers showed that the daily heat sourcing directly from the ground was at an average of about 0,23GJ (Table 1). This value is statistically comparable for both 2011/2012 and 2012/2013 seasons (Table 2 and 3). Heat pump operation resulted in raising the energy state to a level that the average value was 0,463 GJ·Dz⁻¹ (Table 1) and is comparable with the 2012/2013 winter season (0,486 GJ·Dz⁻¹– Table 2) and slightly lower than in 2011/2012 (0,538GJ·Dz⁻¹– Table 3). This means that the system working continuously for three years showed the same efficiency despite the fact that at that time there were no heat recharging made during the summer time, especially from solar collectors, that would recharge the energy potential of the ground. That confirmed the hypothesis made at the beginning of the experiment. On this basis, it can be concluded that there is no need for artificial recharging of the ground heat potential using additional sources like e.g. solar collectors. This in turn gives guideline for energy cost savings from unneeded ground heat pumping from solar collectors in the summer time, that was supposedly be used for recharging worn out ground heat potential. According to current scientific and practical knowledge on the subject indicated the need for such a recharge process.

CONCLUSIONS

The energy demand, regardless its form, is steadily increasing. This is mainly due to the fact of increasing development of civilization, the degree of automation and replacing human labor by machines. The economic growth intensify the energy demand even more. On the other side, the increasing degradation of the environment, higher extraction costs of raw materials such as natural gas, petroleum and coal stimulate research on seeking new sources of renewable energy, improving existing technologies but also on implementation of installations allowing recovery of lost energy in many processes, including heat energy.



Table 1. Fragment of results of the examined installation for recovery of heat from ground heat exchangers –winter 2013/2014 [Source own study]

Data	Ciepłomierz z odwiertów										Ciepłomierz zbiornikowy					Pomiary z POMPY CIEPŁA										COP				
	Temp. zewn. (°C)	Temp. w "Ekobu dyluku" (°C)	Ilość ciepła (GJ) stan licznika	Dzienny przyrost ciepła (GJ)	Ilość cieczy roboczej (m ³) stan licznika	Prędkość przepływu (m ³ ·h ⁻¹)	Moc chwilowa (kW)	Czas pracy (h) stan licznika	T1 (°C)	T2 (°C)	ΔT (°C)	Stan ciepłomierza (GJ)	Dzienny przyrost ciepła (GJ)	T1 (°C)	T2 (°C)	ΔT (°C)	Przepływ czynnika roboczego (m ³ ·h ⁻¹)	Moc chwilowa (kW)	Obj. (m ³)	Przepływ czynnika (m ³ ·h ⁻¹)	Moc chwilowa (kW)	T1 (°C)	T2 (°C)	ΔT (°C)	Czas pracy (h)		Stan ciepłomierza (GJ)	Dzienna ilość ciepła (GJ)	Stan licznika energii elektr. (kWh)	Dzienne zużycie energii elektr. (kWh·Dz ⁻¹)
30 października			184,035		6476,082	0,741	2,8	64686	4,6	1,4	3,2	107,54		32,72	8,18	24,54	0,087	0,81	8011,389	0,856	5,815	44,4	38,6	5,8	66194	389,204		43368,8		
31 października			184,234	0,199	6491,421	0,763	3	64710	4,7	1,2	3,5	107,74	0,2	40,37	33,51	6,86	0,379	2,95	8031,98	0,857	6,438	40,9	34,6	6,3	66219	389,625	0,421	43417,8	49,000	2,387
1 listopada			184,46	0,226	6509,09						0	107,99	0,25			0							0		390,133	0,508	43478,85	61,050	2,311	
2 listopada			184,68	0,22	6525,5						0	108,222	0,232			0							0		390,64	0,507	43537,85	59,000	2,387	
3 listopada			184,9	0,22	6542,79						0	108,462	0,24			0							0		391,133	0,493	43595,85	58,000	2,361	
4 listopada	8	21	185,158	0,258	6562,112	0,741	2,795	64806	4,1	0,9	3,2	108,749	0,287	41,12	33,75	7,37	0,349	2,93	8114,093	0,852	5,98	41,3	35,3	6	66314	391,659	0,526	43662	66,150	2,209
5 listopada	8	22	185,395	0,237	6597,597	0,745	2,708	64854	4	0,9	3,1	109,257	0,508	40,84	33,71	7,13	0,329	2,69	8155,184	0,859	6,07	41	35,1	5,9	66362	392,683	0,512	43785,6	61,800	2,301
6 listopada			185,62	0,225	6606,16						0	109,378	0,121			0							0		392,93	0,247	43815,45	29,850	2,299	
7 listopada		20	185,849	0,229	6614,724	0,725	2,703	64878	3,9	0,8	3,1	109,499	0,121	40,92	33,80	7,12	0,348	2,85	8175,298	0,857	5,992	41,3	35,1	6,2	66386	393,187	0,257	43845,3	29,850	2,392
7 listopada		20	185,874	0,025	6616,649	0,74	2,627	64880	4,1	1	3,1	109,526	0,027	41,3	34,18	7,12	0,353	2,85	8177,609	0,853	5,962	41,5	35,5	6	66389	393,242	0,055	43852,1	6,800	2,247
8 listopada	8	23	186,077	0,203	6632,695	0,736	2,568	64902	4,1	1,1	3	109,758	0,232	42,13	34,73	7,4	0,352	2,99	8196,363	0,858	6,062	42,3	36,3	6	66410	393,702	0,460	43908,4	56,300	2,270
15 listopada	4	21	187,716	0,23	6755,001	0,742	2,772	65070	3,4	0,2	3,2	111,455	0,212	39,46	32,26	7,2	0,329	2,69	8339,683	0,857	5,9	39,9	33,8	6,1	66578	397,239	0,505	44321,7	59,043	2,377
16 listopada			187,95	0,234							0	111,687	0,232			0							0		397,74	0,501	44355,5	33,775	4,120	
17 listopada			188,16	0,21							0	111,897	0,210			0							0		398,22	0,480	44389,3	33,785	3,947	
18 listopada			188,39	0,23							0	112,09	0,193			0							0		398,74	0,520	44423,3	34,000	4,248	
19 listopada	7	21	188,667	0,277	6826,194	0,762	2,772	65166	3,5	0,4	3,1	112,424	0,334	40,4	33,13	7,27	0,353	2,92	8424,060	0,852	6,024	40,6	34,7	5,9	66674	399,245	0,505	44456,8	33,540	4,182
20 listopada			188,9	0,233							0	112,663	0,239			0							0		399,737	0,492	44565,5	108,700	1,257	
21 listopada		20	189,127	0,227	6861,414	0,749	2,77	65213	3,4	0,3	3,1	112,902	0,239	39,71	32,95	6,76	0,356	2,75	8461,116	0,855	5,878	39,9	34,2	5,7	66721	400,229	0,492	44674,2	108,700	1,257
22 listopada	4	19	189,358	0,231	6880,569	0,747	2,756	65238	3,3	0,1	3,2	113,164	0,262	38,8	31,75	7,05	0,348	2,81	8482,737	0,846	5,990	39,1	33,0	6,1	66746	400,764	0,535	44736,3	62,100	2,393
23 listopada			189,606	0,248							0	113,406	0,242			0							0		401,263	0,499	44794,7	58,430	2,372	
24 listopada			189,82	0,214							0	113,636	0,230			0							0		401,763	0,500	44851,7	57,000	2,437	
25 listopada	0	18	190,099	0,279	6934,141	0,754	2,887	65310	3	0,3	2,7	113,890	0,254	36,99	30,45	6,54	0,351	2,63	8543,329	0,852	5,602	37,6	31,5	6,1	66818	402,262	0,499	44911,6	59,870	2,315
5 grudnia	0	16	192,569	0,25	7112,795	0,744	2,854	65549	2,6	-0,7	3,3	116,190	0,192	37,00	30,35	6,65	0,348	2,64	8746,546	0,846	5,735	37,3	31,5	5,8	67058	407,297	0,504	45478,6	56,700	2,467
6 grudnia			192,829	0,26	7130,958	0,746	3,078	65574	2,3	-1,3	3,6	116,422	0,232	34,26	28,07	6,19	0,352	2,49	8767,185	0,848	5,865	34,8	28,8	6	67082	407,813	0,516	45534,9	56,300	2,546
19 grudnia	0	16	196,006	0,244	7358,465	0,747	2,947	65886	2,3	-1	3,3	119,379	0,246	36,1	29,28	6,82	0,348	2,71	9028,260	0,851	5,962	36,5	30,6	5,9	67394	414,246	0,495	46251,1	55,092	2,495
30 grudnia	2	18,5	198,657	0,25	7553,300	0,746	2,812	66150	2,4	-0,9	3,3	121,963	0,258	37,28	30,51	6,77	0,340	2,65	9250,509	0,843	5,779	37,6	31,7	5,9	67659	419,717	0,497	46876,7	56,873	2,429
31 grudnia	-2,5	14,5	198,896	0,239	7570,459	0,734	2,877	66173	2,1	-1,3	3,4	122,175	0,212	35,1	28,97	6,13	0,347	2,42	9270,000	0,846	5,927	35,5	29,6	5,9	67682	420,198	0,481	46930,0	53,300	2,507
Średnia arytm	2,50	18,92		0,23		0,74	2,80		3,11	-0,08	2,18	113,90	0,22	38,42	31,57	4,69	0,35	2,72		0,85	5,90	38,76	32,79	4,08			0,463	53,693	2,645	
Min.	-2,50	14,50		0,03		0,73	2,57		2,10	-1,30	0,00	109,50	0,03	34,26	28,07	0,00	0,33	2,42		0,84	5,60	34,80	28,80	0,00			0,055	6,800	1,257	
Maks.	8,00	23,00		0,28		0,76	3,08		4,10	1,10	3,60	122,18	0,33	42,13	34,73	7,40	0,36	2,99		0,86	6,06	42,30	36,30	6,20			0,525	108,700	4,248	
Odch. Stand	3,52	2,46		0,05		0,01	0,13		0,71	0,86	1,53	3,76	0,06	2,49	2,14	3,29	0,01	0,16		0,00	0,13	2,39	2,36	2,85			0,114	24,280	0,866	



Table 2. Fragment of results of the examined installation for recovery of heat from ground heat ex

Data	Ciepłomierz z odwiertów		Wskazania ciepłomierza zbiornika buforowego				Temperatura w piwnicy		Wskazania POMPY CIEPŁA				Dzienne zużycie energii elektr. (kWh)	COP		
	Temp. powietrza zewn. (°C)	Temp. powietrza w pracowni (°C)	Wekazania ciepłomierza - Odwierty (GJ)	Dzienny użycie ciepła (GJ)	Dzienny przrost energii (GJ)	T1 (°C)	T2 (°C)	Δ T (K)	Temp. powietrza (°C)	Temp. grzejnika (°C)	T1 (°C)	T2 (°C)			Δ T (K)	Dzienny użycie ciepła (GJ)
19.11.2012	3	21	147.365		0,239	39.5	23.1	16,4	18	25	40.8	34.9	5,9	0,52	58,2	2,482
20.11	5	14	147.412	0,047	0,066	27.16	17.94	9,22	12.5	17.5	30.7	25.1	5,6	0,103	16,8	1,703
21.11	3	22	147.591	0,179	0,236	39.44	30.28	9,16	12	16	53.1	53.0	0,1	0,47	68,2	1,914
22.11	2	21	147.824	0,233	0,243	41.62	36.64	4,98	19	32	42.6	36.5	6,1	0,513	61,5	2,317
23.11	1	19	148.062	0,238	0,217	39.4	34.93	4,47	17	29	40.4	34.4	6	0,523	62,4	2,328
24.11			148.297	0,235	0,228	38.42	31.45	6,97						0,524	63,4	2,296
25.11			148.532	0,235	0,228	39.82	32.71	7,11						0,524	63,4	2,296
26.11	0	20	148.768	0,236	0,23	39.58	34.84	4,74	18	30	40.5	34.6	5,9	0,524	63,4	2,296
27.11	5	22	149.002	0,234	0,233	40.82	35.60	5,02	18.5	31	41.6	35.6	6	0,519	62,6	2,303
28.11	6	23	149.236	0,234	0,26	40.99	35.79	5,2	18.5	31	41.8	35.9	5,9	0,532	65,2	2,267
29.11	3	20	149.464	0,228	0,243	36.20	34.08	2,12	17	27	37.0	33.9	3,1	0,506	59,7	2,354
30.11	1	18	149.712	0,248	0,286	37.85	32.64	5,21	18	26	38.6	32.7	5,9	0,526	58,3	2,506
12.01.2013			150.479	0,259	0,274	33.1	26.98	6,12						0,514	60,7	2,816
13.01			150.738	0,259	0,274	32.45	23.4	6,21						0,514	60,6	2,822
14.01	-7	10	160.998	0,25	0,275	29.12	23.42	5,7	11	19	30.1	24.1	6	0,514	50,7	2,816
15.01	-7	11	161.263	0,265	0,27	31.00	25.55	5,45	12.5	21.5	31.8	25.9	5,9	0,519	49,9	2,889
16.01	-7	12	161.518	0,255	0,281	30.31	24.28	6,03	11.5	20.5	31.1	25.0	6,1	0,504	49,3	2,840
17.01	-9	11	161.778	0,26	0,287	30.37	25.00	5,37	12	21	31.2	25.3	5,9	0,513	50,2	2,839
18.01	-7	11	162.038	0,26	0,279	30.16	24.66	5,5	12	20	31.0	25	6	0,512	49,5	2,873
19.01			162.300	0,262	0,266	28.95	23	5,95						0,512	49,0	2,902
20.01			162.562	0,262	0,266	28.21	22.98	5,23						0,512	49,1	2,897
21.01	-11	8	162.825	0,263	0,267	27.96	22.59	5,37	11	18.5	28.9	22.9	6	0,512	49,1	2,897
22.01	-11	9	163.094	0,269	0,263	28.43	22.97	5,46	11	18.5	29.4	23.4	6	0,513	46,9	3,038
23.01	-10	10	163.356	0,262	0,262	30.37	25.05	5,32	12.5	21	31.3	25.2	6,1	0,509	46,7	2,903
24.01	-9	11	163.614	0,258	0,259	30.75	25.33	5,42	12.5	21	31.5	25.6	5,9	0,510	50,0	2,833
25.01	-12.5	7	163.875	0,261	0,253	28.06	23.35	4,71	12	19.5	29.1	23.2	5,9	0,509	49,0	2,885
26.01			164.135	0,26	0,254	29.54	23.5	6,04						0,509	49,5	2,856
27.01			164.395	0,26	0,253	31.28	25.14	6,14						0,509	49,5	2,856
28.01	-1	14	164.655	0,26	0,254	33.6	27.44	6,16	13	24	33.7	27.8	5,9	0,509	49,4	2,862
11.02	-3	14	168.082	0,25	0,278	31.88	25.87	6,01	12	22	32.5	26.8	5,7	0,503	52,7	2,615
12.02	-4	12	168.334	0,252	0,272	31.57	25.82	5,75	13	22	32.3	26.5	5,8	0,524	50,9	2,860
13.02	-3.5	14	168.588	0,254	0,29	32.28	26.62	5,66	12	22.5	33.0	27.1	5,9	0,511	51,7	2,746
14.02	-2	15	168.835	0,247	0,287	33.62	27.83	5,79	12	23	34.3	28.5	5,8	0,506	52,7	2,667
15.02	-2	15	169.079	0,244	0,285	33.3	27.30	6	13	23	33.9	28.2	5,7	0,503	52,9	2,641
16.02			169.329	0,25	0,29	32.8	26.58	6,22						0,511	52,7	2,693
17.02			169.579	0,25	0,29	32.79	26.9	5,89						0,511	52,7	2,693
18.02	-3	14	169.829	0,25	0,29	32.68	27.07	5,61	13.5	22.5	33.4	27.6	5,8	0,512	52,7	2,699
19.02	-3	14	170.08	0,251	0,277	32.40	26.79	5,61	13	22	33.1	27.2	5,9	0,511	52,2	2,719
20.02	-4	13	170.33	0,25	0,283	29.48	25.33	4,15	11	20	32.2	26.1	6,1	0,511	52,1	2,724
21.02	-6	12	170.584	0,254	0,278	30.87	25.3	5,57	12.5	21	31.6	25.7	5,9	0,509	50,1	2,822
22.02	-6	11	170.842	0,258	0,272	30.46	24.92	5,54	12	20	31.2	25.3	5,9	0,517	50,8	2,827
23.02			171.094	0,252	0,276	31.49	25.41	6,08						0,511	51,1	2,778
24.02			171.346	0,252	0,276	32.87	26.91	5,96						0,511	51,1	2,778
25.02	0	15	171.599	0,253	0,277	33.01	27.4	5,61	13	23	33.7	27.9	5,8	0,511	51,1	2,778
26.02	-0.5	16	171.842	0,243	0,283	33.66	27.86	5,8	12	23	34.3	28.5	5,8	0,505	52,9	2,652
27.02	1	16	172.086	0,244	0,283	34.13	28.46	5,67	13.5	24	34.8	29.0	5,8	0,510	53,5	2,648
28.02	0	16	172.324	0,238	0,287	34.1	28.44	5,66	14	24	34.8	29.0	5,8	0,503	54,4	2,568
1.03	0	15	172.565	0,241	0,282	33.68	28.18	5,5	15	23	34.3	28.5	5,8			
2.03			172.799	0,234	0,272	32.93	26.97	5,96						0,492	52,4	2,607
3.03			173.033	0,234	0,272	32.72	26.66	6,06						0,492	52,4	2,610
4.03	-1	14	173.268	0,235	0,271	32.83	27.61	5,22	13.5	24.5	33.6	27.9	5,7	0,492	52,5	2,603
5.03	4	10	173.501	0,033	0,202	27.23	8.80	18,43	12.5	6	29.3	22.6	6,7	0,164	23,8	1,914
6.03	2	17	173.505	0,204	0,176	46.97	38.08	8,89	12.5	8	47.3	41.8	5,5	0,424	60,2	1,956
7.03	2	9	173.531	0,026	0,034	10.3	9.52	0,78	11.5	7	10.6	10.5	0,1	0,075	15,9	1,310
8.03	-2	17	173.739	0,208	0,14	43.95	33.94	10,01	10	5	44.4	38.5	5,9	0,493	64,8	2,113
9.03			173.927	0,188	0,128	44.18	34.9	9,28						0,472	65,0	2,017
10.03			174.115	0,188	0,128	43.12	33.98	9,14						0,472	65,0	2,017
11.03	-7	16	174.303	0,188	0,127	43.26	33.07	10,19	9	3	43.7	37.9	5,8	0,471	65,1	2,010
12.03	-5	17	174.499	0,196	0,124	44.23	34.26	9,97	9	5	44.5	39.0	5,5	0,487	66,8	2,025
13.03	-5	18	174.689	0,19	0,118	44.26	34.13	10,13	9.5	4	44.6	39.0	5,6	0,474	65,4	2,013
14.03	-10	17	174.888	0,199	0,119	37.84	29.13	8,71	10	4	39.1	33.0	6,1	0,462	59,0	2,175
15.03	-4	16	175.078	0,19	0,115	41.19	30.73	10,46	10	4	42.1	36.1	6	0,449	58,7	2,125
16.03			175.261	0,183	0,111	42.88	31.45	11,43						0,453	62,2	2,023
17.03			175.447	0,186	0,111	43.08	31.98	11,1						0,453	62,2	2,023
18.03	-4	16	175.627	0,18	0,112	43.82	32.28	11,54	8	2	44.3	38.5	5,8	0,453	62,3	2,020
19.03	-3	16	175.817	0,19	0,112	44.27	32.61	11,66	9	4	44.7	38.9	5,8	0,478	66,4	2,000
20.03	-2	19	175.996	0,179	0,108	46.43	34.75	11,68	10	5	46.7	41.2	5,5	0,475	69,5	1,898
21.03	-3	19	176.171	0,175	0,104	45.86	34.11	11,75	9	4	46.3	40.8	5,5	0,463	67,4	1,908
22.03	-4	18	176.347	0,176	0,105	45.32	33.35	11,97	9	3	45.5	40.0	5,5	0,479	69,8	1,906
23.03			176.536	0,189	0,1	44.09	33.1	10,99						0,460	62,2	2,054
24.03			176.725	0,189	0,1	42.73	32.48	10,25						0,460	62,2	2,054
25.03	-3	18	176.914	0,189	0,1	41.61	31.03	10,58	9	3	42.6	36.5	6,1	0,459	62,3	2,047
26.03	-4	18	177.093	0,179	0,096	44.62	32.59	12,03	8	2	45.1	39.2	5,9	0,449	62,5	1,996
27.03	-2	18	177.266	0,173	0,094	43.82	31.68	12,14	7	2	44.5	38.8	5,7	0,447	63,6	1,952
28.03	-0.5	19	177.442	0,176	0,095	44.63	32.7	11,93	7	3	45.2	39.4	5,8	0,453	64,8	1,942
29.03	-1	20	177.607	0,165	0,093	46.68	34.12	12,68	8.5	3	47.1	41.5	5,6	0,450	66,9	1,868
Srednia arytm	-1,0	16,3	-	0,231	0,239	35,9	29,2	6,6	14,2	21,4	36,9	31,2	5,7	0,486	54,498	2,465
Minimum	-13,0	7,0	-	0,026	0,007	10,3	8,8	0,0	7,0	2,0	10,6	10,5	0,1	0,048	10,9	1,121
Maksimum	12,0	25,0	-	0,269	0,321	47,0	38,1	18,4								

Table 3. Fragment of results of the examined installation for recovery of heat from ground heat exchangers –winter 2011/2012

	Ilość przepompowanego glikolu (m ³)	Chwilowa moc układu (kW)	Przepływ wody (m ³ ·h ⁻¹)	Temp. T ₁ (°C)	Temp. T ₂ (°C)	Δ T (K)	Wskazania czasu pracy instalacji (h)	Wskazania licznika energii elektr. (kWh)	Licznik energii cieplnej (GJ)	Dzienna ilość energii cieplnej (GJ)	Dzienna ilość energii elektr. (kWh)	
25.I.2012	8299,42	6,20	0,9	37,6	31,4	6,2	50736	21623,3	209,857			
26.I.2012	8320,93	6,39	0,897	35,4	28,8	6,2	50760	21681,1	210,399	0,542	57,800	2,539
27.I.2012	8342,60	6,28	0,888	32,8	26,7	6,1	50784	21735	210,942	0,543	53,900	2,723
28.I.2012	8364,28	6,30	0,889	34,5	28,4	6,1	50808	21783,866	211,482	0,540	48,866	2,979
29.I.2012	8385,95	6,31	0,89	29,9	23,7	6,2	50832	21832,732	212,022	0,540	48,866	2,979
30.I.2012	8406,96	6,34	0,888	28,4	22,2	6,2	50856	21881,6	212,564	0,542	48,868	2,990
31.I.2012	8428,32	6,46	0,891	29,3	23	6,3	50880	21928	213,105	0,541	46,400	3,138
1.II.2012	8449,79	6,24	0,884	27,9	21,7	6,2	50904	21974,3	213,649	0,544	46,300	3,162
2.II.2012	8471,22	6,31	0,889	27,9	21,7	6,2	50928	22019,8	214,194	0,545	45,500	3,222
3.II.2012	8492,68	6,38	0,890	29,3	23,1	6,2	50952	22065,1	214,727	0,533	45,300	3,164
4.II.2012	8514,40	6,28	0,891	31,4	25,3	6,1	50976	22110,6	215,263	0,536	45,500	3,169
5.II.2012	8536,00	6,31	0,888	30,5	24,2	6,3	51000	22155,9	215,805	0,542	45,300	3,218
6.II.2012	8557,70	6,25	0,890	29,4	23,3	6,1	51024	22201,6	216,343	0,538	45,700	3,167
7.II.2012	8579,38	6,30	0,888	28,9	22,8	6,1	51048	22247,1	216,883	0,540	45,500	3,192
8.II.2012	8599,73	6,39	0,891	29,8	23,6	6,2	51072	22292,6	217,41	0,527	45,500	3,115
9.II.2012	8621,48	6,27	0,896	32,5	26,5	6	51096	22341	217,945	0,535	48,400	2,979
10.II.2012	8642,63	6,34	0,892	28,4	22,3	6,1	51120	22387,6	218,481	0,536	46,600	3,096
11.II.2012	8664,30	6,35	0,896	30,9	24,8	6,1	51144	22433,93	219,014	0,533	46,300	3,096
12.II.2012	8685,98	6,30	0,894	31,1	24,9	6,2	51168	22481,43	219,552	0,538	47,500	3,051
13.II.2012	8707,05	6,35	0,897	32,6	26,5	6,1	51192	22526,0	220,080	0,528	44,570	3,184
14.II.2012	8728,56	6,23	0,896	34,0	27,9	6,1	51216	22577,3	220,621	0,541	51,300	2,847
średnia arytm.	8514,255	6,313	0,892	31,071	24,895	6,157	50976,0	22108,565	215,254	0,538	47,700	3,051
min.	8299,424	6,197	0,884	27,900	21,700	6,000	50736,0	21623,300	209,857	0,527	44,570	2,539
max.	8728,555	6,464	0,900	37,600	31,400	6,300	51216,0	22577,300	220,621	0,545	57,800	3,222
odch. stand.	123,661	0,056	0,004	2,190	2,177	0,074	138,391	268,201	3,101	0,005	3,236	0,172

Source: Szulc, Łaska 2012

Selected devices and systems using renewable energy sources allow you to cover about 35-50% of the energy demand of family farm. The exact contribution of renewable energy depends however of several factors:

- the efficiency of the system and installation used for heat retrieval/recovery,
- the number of energy-efficient appliances and the effectiveness degree of solutions used for energy consumption reduction. The more energy demanding the installation, the smaller the share of renewable sources is,
- proper system management of energy restoring/generating from renewable sources. Modern heat pumps operating in winter as heating devices can also work in the summer as A/C equivalent what not only increases their efficiency but also shortens the period of amortization,
- proper selection of equipment for existing farm renewable energy sources.

The research was conducted during consecutive winter seasons. At that time heat was acquired from the ground through vertical boreholes and was used for powering the heating system along with water warming, what led to draw following conclusions:

1. The efficiency of heat extraction from the ground stands at COP = 2,46-3,05
2. Daily heat acquisition directly from the ground was on average about 0,23GJ
3. There is no need for additional supply of the heat to the ground from other sources in the summer, that would recharge worn out heat reserves in the winter.

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CLASSIFICATION OF MANUFACTURING PROCESSES APPLIED IN WOOD INDUSTRY

Abstract: The paper discusses the characteristics and proposes a classification of manufacturing processes applied in wood industry enterprises. All types of processes currently used in the wood sector were characterised and classified. For the needs of the classification two groups of characteristics were distinguished as classification criteria: external and internal, in relation to the production organisation methods. In the first group three characteristics were identified and in the second there were nine.

Key words: manufacturing processes, wood industry enterprises, classification

INTRODUCTION

Wood industry includes: timber conversion enterprises (sawmills, flooring material manufacturers and manufacturers of large-sized glulam construction elements), wood-based board manufacturers (article boards, fibreboards, plywood and glued furniture boards), furniture factories (outdoor and indoor furniture), carpentry manufacturers, wood-frame and log home manufacturers, factories producing pallets and wood-based packaging, pulp and paper industry enterprises and safety match producers. A common characteristic of these enterprises is the conversion of wood as the basic raw material and the input material for production. In turn, the factor differing wood industry enterprises is connected with the final products manufactured in a great variety of assortments, of different processing degrees and with various utility functions. This fact is directly reflected in the variety and complexity of manufacturing processes used in wood industry enterprises.

The aim of the paper is to present the characteristics and classification of manufacturing processes applied in wood industry enterprises. The proposed classification orders and systematises concepts concerning types of manufacturing processes and indicates their mutual relationships. In literature on the subject the characteristics of manufacturing processes used in the wood industry are presented specifically referring to a detailed scope of the discussed problem. There is a shortage of characteristics and classifications of manufacturing processes, which would refer to the entire wood industry (Rogowski 201, Grandys 2013, Brzeziński 2013).

The production process³⁸ (manufacturing process) of wood industry products is a set of actions organised in the form of production operations, in turn constituting its elementary components. It aims at a transformation of timber, wood materials, elements, subassemblies and assemblies into final products. Operations constituting the production process are performed in the order resulting from technological, structural and utility requirements of manufactured objects. Initiation of successive manufacturing operations is mutually coordinated in terms of the time and place of performance as well as technological and organisational requirements of the process. The manufacturing process in relation to products of the same type is performed cyclically (Muhlemann 2001, Gryffin 2013).

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³⁸ Process (Latin *processus* – advance, procedure) – an ordered series of successive actions, linked with cause and effect relationships, i.e. results of preceding actions are inputs (initiate) successive actions. Based on: Dictionary of foreign words and phrases by Władysław Kopaliński. Internet edition. De Agostini Polska, Sp. z o.o., Warszawa.

The term “manufacturing process” is used in a static sense – exclusive of the occurring quantitative and qualitative changes in products processed during the process, or in the dynamic sense – taking into consideration such changes occurring in time. In order to indicate the latter situation the term “the course of production process” is used.

The Dictionary of foreign words by PWN (2013) defines classification (Latin *classis* = division + *facio* = I do) as “a logical division of the scope of a given concept (name), consisting in the listing of subordinate concepts so that the sum of their scopes is equal to the shared scope and so that these scopes are mutually exclusive”. The basis for the classification is connected with the selection of criteria used to distinguish individual types of processes.

CHARACTERISTICS OF MANUFACTURING PROCESSES IN TERMS OF EXTERNAL CHARACTERISTICS

Features characterising any production process may be divided into two basic groups: external and internal. The former group of characteristics describes the production process as a whole. In turn, the latter group of features characterises the production process in terms of the method of its organisation.

For the needs of classification three external features of the production process were distinguished: the objective, the object as well as the location and complexity of the product. They are constitutive (basic) characteristics describing the concept of “production process”, i.e. such that facilitate definite identification of process types and thus constitute classification criteria. The first two identified criteria constitute the basis for the division of production processes, irrespective of the other criteria. In turn, the characteristic of product complexity is an additional criterion, which divides the manufacturing process of a product into two subordinate process types: simple and complex. Criteria and relationships between the descriptors of the type of manufacturing processes, distinguished on the basis of their external characteristics, are presented in Fig. 1.

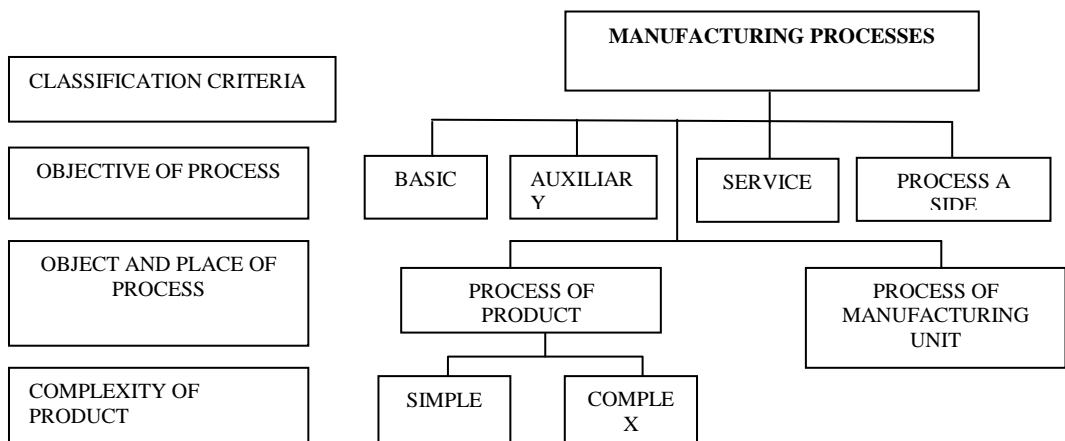


Fig. 1. Classification of manufacturing processes based on their external characteristics

Source: Own study.

In terms of the objective we distinguish the following production processes: basic, auxiliary, side and service (servicing). During the basic process basic products are manufactured (e.g.: particle

boards, lumber, furniture, paper, cardboard) to be sold to external customers. Specific production enterprises are established to produce basic products (Pająk 2011).

As a result of the performance of an auxiliary process auxiliary products are obtained, e.g. tooling for drilling machines, special tools: milling cutters, spotting drills, etc., bleaching agents, heat and electric energy. Auxiliary products are used for the realisation of the basic process and they are not produced for sale. Auxiliary processes are performed simultaneous with the basic process and determine its proper performance.

In most wood industry enterprises in the manufacture of basic and auxiliary products waste is generated (e.g. bark, chips, sawdust, wings, sticks, edging, pieces of veneer, pieces of wood-based materials, etc.). Some of them are sold, e.g. waste particle board panels or waste studs, chips, edging for further processing or as biomass for energy purposes. Numerous waste products (Michniewicz 2005) are formed during physico-chemical conversion in pulp and paper enterprises (bark, pulp chips, waste paper, black liquor, tall oil). Such wastes are treated as by-products (industrial), if income from sale exceeds the costs of their disposal as wastes and on condition that they meet parameters specified in technical and ecological standards.

The service process is a set of actions connected with services for other processes performed in the enterprise, e.g. quantity and quality inspection, administrative services, technical production support, maintenance and repairs of equipment, etc. Muhlemann 2001).

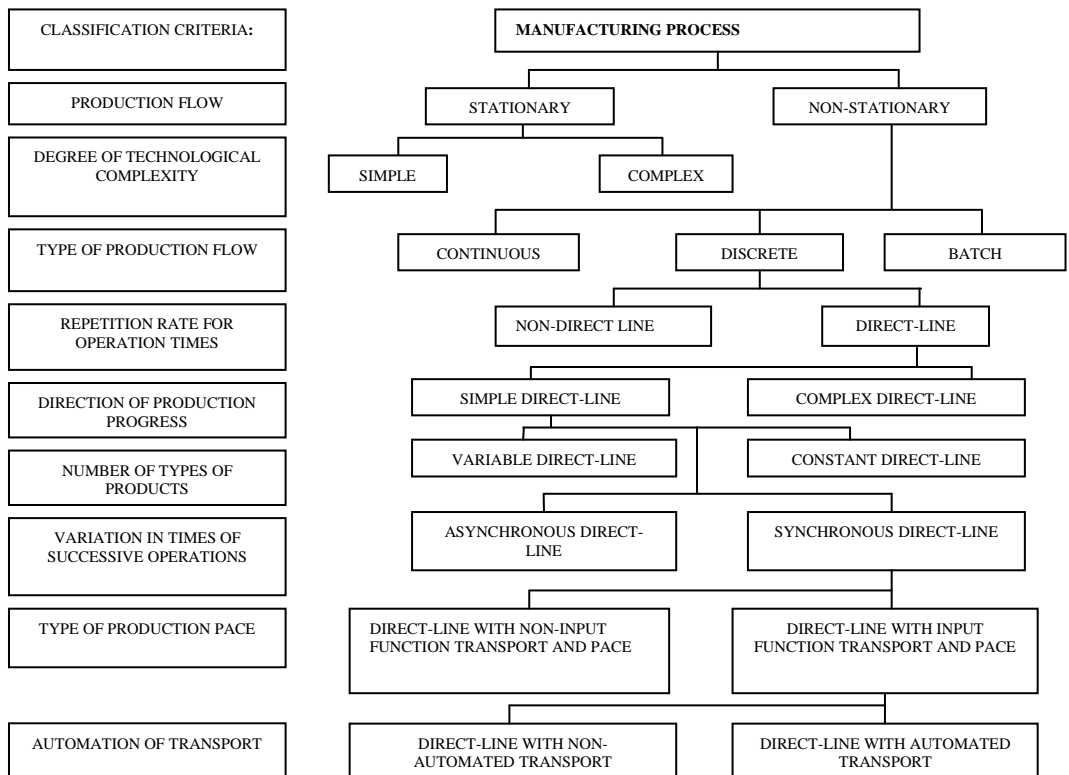


Fig. 2. Classification of manufacturing processes in terms of the method of organisation

Source: Own study.

The manufacturing process of wood products may be analysed in relation to the product or the manufacturing unit. The manufacturing process of a product is a set of production operations, which performance makes it possible to obtain semi-finished products (elements, subassemblies, assemblies) or final wood products of a specific type. The manufacturing process of a product may be performed in more than one manufacturing unit of the same degree of aggregation. The process of a manufacturing unit is a set of different operations, which are used to manufacture all types of semi-finished products or final products in a specific unit. A list of types of technological operations (e.g. in terms of mechanical processing) which may be performed in a specific manufacturing unit is called the assortment programme of operations. An analysed manufacturing unit, depending on the degree of its aggregation, may include different fragments of manufacturing processes for final products.

The second group of characteristics of the production process, which may be used as classification criteria, comprises methods of its organisation. Depending on the volume of demand for wood products, their structural complexity, manufacturing technology and technical conditions different forms (methods) of organisation are applied for production processes. Figure 2 presents a classification of manufacturing processes in terms of their identified organisational characteristics.

A manufacturing process of wood products may run entirely or may be divided into segments, which are executed at different locations of the production floor (in manufacturing units or in warehouses). For this reason two situations are distinguished for products in the course of the process. In the first case products (elements, subassemblies, assemblies) remain at one location (on the same workstation) throughout the process (e.g.: assembly of furniture built-in on site, construction of wooden houses and structures). It is a stationary form of organisation of the production process. Such an organisation of production is also referred to as task, on-spot, turnkey, investment project (Muhlemann 2001).

The non-stationary form of organisation of a production process is characterised by quantitative and temporal translocation of objects (e.g. chips, pulp, furniture elements, etc.) by production maintenance units (production units and warehouses) in the performance of the process. Translocation of products is referred to as product flow (flow of product streams, flow of production). Such a phenomenon is observed in most manufacturing processes conducted in wood industry enterprises. Manufacture of products during the production process is equivalent to the realisation of production tasks. For this reason translocation of products also means the translocation of tasks, which is referred to as flow of tasks through production units (through the production system).

A non-stationary production process is divided into segments (technological phases, operations) and is performed in a specific order at different locations of the production floor (at different workstations). Through these locations products of different processing rates are translocate. Workers are highly specialised and generally have a narrow range of qualifications. In a non-stationary production process the flow of work objects may be executed in a continuous or interrupted (discrete) manner. A continuous process is characterised by translocation of products without them being stopped at workstations for the performance of production operations. A continuous flow is applied first of all in the case of manufacture of amorphous and uniform products. It is found in factories producing particle boards, fibreboards and pulp and paper industry enterprises (Brzeziński 2013).

A discrete production process is characterised by the fact that in the course of its realisation products (e.g. board elements, squares, subassemblies, assemblies) are translocated and periodically detained at workstations for the performance of manufacturing operations. This means that periods of product transfer are interrupted by their (relative) idle periods. These periods divide the manufacturing process into cycles of transport, manufacture and waiting periods. A discrete process

is used first of all in relation to unit products and is found mainly in furniture enterprises as well as sawmills and carpentry manufacturing plants. Discrete processes performed on amorphous products are referred to as apparatus (batch) processes. They are typical of pulp and paper industry enterprises. Examples of such solutions include boiling of wood chips in digesters in order to dissolve lignin and hemicelluloses in wood fibres.

A discrete manufacturing process may be found in two forms (varieties): non-direct line (non-rhythmic) and direct-line (rhythmic). These two forms of processes differ in the degree of repetition of operation times at a specific workstation. In furniture factories and carpentry manufacturing factories both forms of production process organisation are applied. In turn, the direct-line production form is predominant in board factories and in pulp and paper enterprises (Brzeziński 2013).

In a non-direct line production process operation performance times at a specific workstation are varied and non-repeatable or irregularly repeatable. Allocation of operations to workstations, belonging to a specific production unit, is executed on an on-going basis, depending on the organisational conditions found there. For this reason cooperation relationships between workstations, consisting in the transfer of a lot of elements from one workstation to another, are not permanent. Production is organised in a non-direct line form, if orders for final products arrive at different times and volumes of these orders vary. As a result the enterprise has no fixed assortment quantity schedule for the production of final products over a longer time period.

In the realisation of a non-direct line production process we distinguish two types of waiting periods for elements. In the first case individual parts, belonging to a specific batch of production wait in line for the performance of operations. The other type of time is connected with the whole batch of parts waiting for the initiation of the next operation on this batch in a waiting line in front of the workstation. Such a type of waiting time results in a situation when the time passing between the initiation of two successive operations of a batch of parts may be many times longer than the total time consumption for the performance of all parts belonging to this batch.

If different batches of production may go through the same operations, in the same time, then they compete for the same production resources (workstations and workers). Batches which wait for the workstation to be free are detained in the waiting line of jobs, most frequently at warehousing locations next to workstations. They constitute the work in progress stocks. The number of batches in the waiting line changes irregularly. Determination of the performance of batches of elements to ensure the shortest waiting line of these batches is one of the most difficult problems faced when managing a specific group of workstations constituting a segment of production.

In a direct line (rhythmic) process production is regularly repeated. At a uniform interval, called production repetition period or the rhythm of production, identical operations are performed on the same workstations. Cooperation between workstations is stable and a constant, planned allocation of operations to workstations. Production may be organised in the direct line form if the inflow of orders for final products (or specific parts) to the enterprise is constant in terms of assortment and quantities and occurs at regular time intervals. Then production orders for tasks realised by enterprise units may be initiated in a cyclical manner.

In wood industry enterprises generally mixed types of production are found. For this reason the type of a production enterprise or its individual units is determined by the type of load for most of its workstations. If e.g. in the same period most workstations in a department will operate within the lot production system and less numerous groups of workstations will work within the small-lot or large-lot production, then the type of production for the department will be defined as lot production.

The type of production influences the system of production planning and organisation. In mass production, in the course of the production preparation process material consumptions standards,

labour consumption standards and procedures (flow charts) are determined in detail. Production preparation processes for small-lot and unit production are less detailed and greater deviations from the assumed mode and standards are admissible in the course of their performance. Tasks of production units are established in periods close to their performance. In the case of high variability of task loads for workstations it is only at the workshop planning that workstations are allocated for the performance of individual manufacturing operations. Under these conditions the distribution of jobs gains in importance.

A combination of the type and form of production results in variations of direct line organisation of production. Direct line manufacturing processes are found in two basic varieties: a simple direct line and a complex direct line. A simple direct line is found at the unidirectional flow of products (furniture elements, subassemblies, assemblies). A complex direct line is characterised by a lack of a unidirectional flow of production. This is manifested in reversals. Production batches return to workstations, on which earlier specific operations are performed in relation to these batches. As a result on certain workstations more than one operation is performed on the same batch of parts. Complex direct lines are organised for more than one type of parts and operation times are not synchronised. A complex direct line is the most complicated variety of the rhythmic form of production process organisation.

A simple direct line is found in four varieties: synchronous and asynchronous simple direct lines and synchronous and asynchronous complex direct lines. A direct line is constant if the manufacturing process specialises in the manufacture of one type of parts. The direct line is defined as variable if it was adapted to the performance of more than one type of parts. A direct line is considered synchronous if the performance times of successive manufacturing operations are equal (or almost equal) or if their multiplicities occur between them. When these conditions are not met, the direct line is asynchronous. Among synchronous direct lines we distinguish direct lines with non-input function transport and pace and those with input function transport and pace. In the latter case the direct line is most frequently equipped with an automated transport.

CONCLUSIONS

The characteristic and classification of manufacturing processes used for wood industry enterprises, proposed in this paper, provides the reader with a comprehensive brief presentation of nomenclature concerning manufacturing processes and the identification of relationships between them. The basis for the classification is connected with the selection of such characteristics of processes, which definitely identify them and make it easy to distinguish them from the others. The characteristics were selected based on the analysis of characteristics of these processes. Rapid technical and technological progress observed in manufacturing processes indicates that in the future new types of processes, not included in the presented classification, will appear. The proposed classification may be treated as open for new solutions.

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