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Wojciech Lis

Marek Bodziany[1]

SOCIAL AND CULTURAL FACTORS OF THE ECONOMIC CRISIS IN GREECE

Abstract: This article aims to analyse social and cultural factors of the economic crisis in Greece. For the purposes of assessing their impact on the crisis, there were used statistical data describing the Greek society before and during the crisis, as well as results of surveys and three categorised interviews conducted in 2013 among Polish economic migrants living in Athens. The first part of this paper provides the analysis of selected macroeconomic categories showing the scale of the crisis and their influence on shaping the social capital in Greece particularly with regard to the demography, the social structure and the labour market. The second part presents the Greeks' cultural characteristics contained in classical typologies of cultures and their impact on the crisis based on the perception of the Poles living in Athens.

Keywords: Greek society, national culture, economic crisis, social capital.

INTRODUCTION

For the last few years the crisis in Greece has been one of the most important economic problems detrimental not only to the Greek society but, what is important, to the interests of the majority of Member States of the European Union. Almost on a daily basis on each online portal one reads press reports concerning public debt, inflation, GDP, unemployment and consumption in Greece. We are "bombarded" with information on the alarming scale of the economic degradation, the enormity of internal debt as well as the level of corruption and unjustified social packages intended for the public. The extensive knowledge shows the economic "collapse" of this country which is very attractive in terms of the economic development, however, it is exclusively limited to the exemplification of the robber economy effects and to predictions for the future not only for the Greek people, but also for Europe. Nevertheless, in this knowledge there is a certain gap, since it lacks in the real causes of the crisis which are rooted in the society specificity and its cultural characteristics.

It imposes the need to seek answers to simple and yet difficult to resolve questions: *why has the developmentally attractive state having a thriving sector of tourism services, being ranked first in the global shipbuilding industry, as well as having the greatest tonnage of sea and ocean vessels, quite prosperous agriculture and a relatively small number of educated citizens fell into the trap of the economic crisis? Why with such a great potential resulting from the location not only at the seaside, but also at the meeting point of influences of Western countries and Russia, has Greece become a failed state?* Many analysts claim that the reason for this is the excessive consumption and the policy of successive governments caring for the interests of the power and economic elites as well as the demoralisation of the society accustomed to living beyond their means. This is probably true, even tough the meaning of the questions is much more complex and induces to search for true sources of the recession, which have been steeped in the Greek society.

Thus, if we assume *a priori* that no crisis occur without people involved, in each case the analysis of its sources should turn attention to the society and its cultural characteristics. Therefore, while analysing the Greek crisis factors the emphasis will be put on numerous topics focused under one common denominator which is the social capital and within it - the social structure and cultural characteristics.

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THE ANALYSIS OF THE CAUSES AND THE SCALE OF THE CRISIS

There are numerous causes of the Greek economy degradation. While the Greeks themselves see merely the impact of external factors on the current state of affairs, it is only a part of the truth. Although, in fact, the condition of the Greek economy was significantly influenced by the crisis of the eighties, it is worth noting that it affected not only Greece, but most of the European countries. Nonetheless, it did not generate the same effects everywhere and not all countries managed to resist them. Among them was just Greece. Probably the global crisis only confirmed its situation, exposing the weakness of the economy. At the same time it revealed the true face of the foreign policy and the Greeks' propensity to reap economic benefits from Western European countries. The efficient management of their own potential, undoubtedly driven by geopolitical factors, in particular the geographical location at the interface between Eastern and Western spheres of political influence, allowed for many years of the economic "idyll" and unbridled consumption. The 1980s and 1990s proved to be a kind of a harbinger of "the collapse" of Greece, which was downplayed to such an extent that even unfavourable macroeconomic indicators did not force the authorities to implement profound reforms, especially in the sector of public finances. This happened since there was too high resistance of the society to cover the costs of the long-term predatory economy and the scale of benefits led to its demoralisation.

Despite the decline in production and GDP and the increase in unemployment, the Greek society lived beyond their means and used the social packages offered by the state. Consumption, mismanagement and the fairly liberal approach to work resulted in the budget deficit (according to various sources) even at 16% of GDP and public debt at 110% of GDP in the early 1990s [Greece in the 20th and 21st century, 2014]. This turned out to be only a prelude to a real disaster, as in the following years the Greek economy almost completely collapsed.

The year 2008 was a breakthrough when the Greek society first suffered from the actual effects of failing policy and overconsumption. No later than at the turn of the year 2008 and 2009 there was observed the growth in the unemployment rate from 8.1% to 9.1%, which at the end of 2010 reached 14.75% and in 2011 - 21.3% [Greece – The unemployment, 2015]. As a result of the decrease in production and the high costs of maintaining workers, the unemployment continued to increase and in 2012 it reached the level of 26.41% and in 2013 the record level of 27.92% [Greece – The unemployment 2015]. At the same time the negative growth rate was recorded, which dropped to -7.1% in 2009 and -9.6% in December 2011. The rate remained negative until April 2014 and in January 2015 its positive level of 1.2% was obtained as a result of launching assistance packages from the European Union [Greece - The annual GDP growth rate 2015].

Due to the poor condition of the economy, foreign capital was almost immediately withdrawn from the market, which, in turn, resulted in another wave of collective redundancies, withheld demand and a decline in inflation. It is noteworthy that even with such unfavourable economic indicators, consumption and social packages were still not reduced and the spending of money was not monitored. Here is an example of the demoralisation scale of the Greek society given by one of the Polish migrants who has been working in Athens since 1994:

(...) The Greeks ate up money from the European Union, robbed their own country by not paying taxes, taking bribes and overstating investment costs. (...) In one of the regions subsidies were collected for the cultivation of orchards for many years. Satellite monitoring did not detect anything wrong, as orchards existed there. The inspection revealed that in fact the trees were pumped dummies (...) another example: a bus driver got a bonus of about EUR 500 for the timely arrival at the bus stop. It awakens some reflections, doesn't it? Just imagine that a Greek employing a migrant pays his family contributions from the migrant's accident insurance. He simply robs the

employee making his social insurance deductions only for a few days - the rest goes for his family members[2].

The most acute consequence of the recession turned out to be national debt, which reached the most unprecedented proportions since the Argentinean crisis. In 2010 its level was of 129.7% of GDP, a year later it increased to 146% of GDP. Subsequent years saw a rapid growth of public debt, which in 2012 reached 173.1% of GDP, in 2014 - 175% of GDP and 185% of GDP in 2015. The exception was the year 2013, when public debt fell to 156% of GDP, which was the effect of launching aid packages by the European Union. This, however, turned out to be only the incidental aid measure, as it allowed to cover merely current expenses and debt interests. Forecasts for the coming years are alarming, since the increase in public debt to 188% of GDP in 2016 and to 197% of GDP in 2020 is projected [Greece - Public debt to GDP, 2015].

The decline in production and a rise in unemployment affected the gradual reduction in demand and, consequently, the decline in inflation that, while remaining at an average level of 5% in 2010, already in 2011 experienced a significant regression to the level of 2.4% and 0.8% at the end of the year 2012. Since early 2013 until today we have been observing in Greece deflation at an average rate of 2%, which means that as a result of the lack of money the demand on the market was hampered, and it led to the decline in prices of goods and services.

It is just a synthesis of the economic situation of Greece in the years 2009-2015, which should be viewed from a societal perspective, including demography, the age structure and the intellectual potential.

THE GREEK SOCIETY - THE SYNTHESIS OF ANTHROPOGENIC CRISIS FACTORS

One of the areas of the analysis of anthropogenic factors of the crisis in Greece are the demographics characteristics of the society. In order to make their overall assessment, it is appropriate to analyse changes of the Greek population during the crisis, as well as their age structure and the intellectual potential. At the outset of the analysis it is concluded that the crisis has significantly contributed to the decrease of the population. This is confirmed by the statistical data which indicate that the population dropped from 11.18 million in 2011 to the level of 11.12 million people in 2012-2013 and 10.99 million in 2014[3]. [The Central Statistics Office of Greece 2014]. Forecasts for the coming years predict another decrease, namely in 2020 there will probably be about 10.7 million Greeks [Greece – The population 2015]. However, these data raise doubt due to the Greeks' relatively flexible approach to the issue of the registration requirement and the ineffective control system of refugee inflows.

It can be assumed that the population in Greece is at least one million inhabitants higher than the official data of the Central Statistics Office of Greece. *What factors contributed to the decline in population*? The answer is simple, namely the fertility rate in Greece is falling and at the same time more and more Greeks are leaving the country in search for favourable living conditions. It is worth noting that the Greeks' emigration mainly applies to wealthy people who want to protect their assets from the effects of the crisis. There is another phenomenon related to the Greeks, that is the historically shaped emigration which contributed to the fact that their own state is inhabited by only half of the Greek population, and almost 12 million constitutes a diaspora scattered around the world. What is important, this part of the Greeks does not participate in generating GDP and shows no interest in the situation in the country.

The population density indicator is significant from the Greek society analysis point of view as it is very uneven and depending on the years it ranged from 83 to 85 inhabitants per km^2. For

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[2] The extract of the interview conducted in 2013 in Poland with a Polish economic migrant (an anonymous person residing in Athens since 1994 – Świętokrzyskie voivodeship).

[3] In Greece the conversion area to determine the density of population is 132,000 square kilometres.

almost 20 years the highest rate of population density has concerned the geographical region of Attica, where there are more than 900 people per 1 km^2, which means that the average density is more than 10 times greater than in the whole country. Disparities in the population density and its distribution are the most noticeable between insular regions and the mainland part of Greece. Numerous Greek islands are still deserted or inhabited only by a few families. Up to now, people who live on many of these islands "do not exist" for the state administration, do not pay taxes and - what is interesting - they do not seem to identify themselves with the Greek people. In some ways, they live "away" from the crisis, they do not care about it and take an optimistic view into the future. According to one of Polish migrants:

(...) On one of the islands - I don't remember its name - it was observed that 90% of people are blind. It's a sham, because these people being entitled to benefits ran their economic activities, they were even taxi owners. Funny, isn't it? In Greece, it isn't funny at all. There is a social acceptance for that[4].

The mainland distribution of the population is also of very diverse character, because the urban population is of about 57.7%, while rural areas are inhabited by 42.3% of the Greek people. Almost 1/3 of the population - nearly 4 million people - live around Athens and Thessaloniki located in the Attica region [Greece – The population 2015]. Given the Greek population size (about 11 million) and its geographical distribution, it is concluded that almost half of the Greek GDP is the work of people living in the industrially developed region of Attica and the touristically developed island part. This is related to the employment structure in production and services sectors and draws attention to disproportions in the level of life of the Greeks.

What is more the social capital of Greece is shaped by the gender structure which substantially affects the productivity of the society. Statistics show that women make up 50.5% of the population, while men - 49.5%, which means that the distribution is balanced [Demographic distribution, 2015]. Unfortunately, only half of Greek women work, which stems from the traditional model of society. An interviewed respondent stated that before the crisis women hardly ever participated in the economic life of Greece and exhibited the high propensity for comfortable living:

(...) Greek women even if they did not work - what is the rule - they did not look after children, just hired a babysitter, a foreigner as usual. This shows the scale of corruption in the society. Has it changed today? In many homes there aren't women who don't work and at the same time entrust the childcare to employed women (...)[5].

As other reports show, even in the face of the crisis, the basic chores were delegated to migrants and meals were eaten in restaurants. It happened many times that working women were employed in positions artificially created by their husbands in institutions where they were working, but actually they remained at home.

The average life expectancy is similar - in 2014 it was 81.2 years for women and 75.9 years for men. Notably, it is the highest life expectancy rate among European Union countries. Juxtaposing the rate of nearly 15% of the Greeks in pre-productive age - children between 0 to 14 years – against a very high indicator of the life expectancy may lead to the conclusion that the Greek society is ageing, which, given the gradual decline of the population, makes prospects for Greece not very promising. The demographic ageing is also confirmed by the low and still falling fertility rate. While in 2011 it stood at 1.6 child per woman of reproductive age, in 2013-2014 it dropped to 1.4. If one takes into account that the index of 2,11-2,15 children per woman is the guarantee of the generational replacement extension in the period of 100 years, one can see that current trends

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[4] The extract of the interview conducted in 2013 in Poland with a Polish economic migrant (an anonymous person residing in Athens since 1994 – Świętokrzyskie voivodeship).

[5] The extract of the interview conducted in 2013 in Poland with a Polish economic migrant (an anonymous person residing in Athens since 1997 – Podkarpackie voivodeship).

deviate far from the norm. This means that at such a pace of growth of migrants, in half a century the Greek society may constitute a minority in their own country.

Demographic problems in Greece have significantly affected the economy, because they have intensified the high cost of living of pensioners representing almost 18% of the population. In addition, the poor state of the economy is charged to expenditures on social benefits which grow each year despite the fact that up to 67% of the population is of working age (under Greek law, they are people in the age range 15-65 years). It is worth noting that young people learning aged between 15-23 constitute almost 15% of them.

A very important observation is the homogeneous ethnic structure of Greece, which, despite the influx of migrants from Asia, Africa and Central and Eastern Europe, stands at 97% of the whole population. Among legalised minorities there are 1.5% of the Macedonians, 0.9% of the Turks and 0.6% of the Albanians and the Bulgarians. Other nations are illegal economic migrants which include 40 thousand of the Poles [The Poles in Greece, 2013][6] and also the Filipinos, the Egyptians, the Pakistanis, the Russians, the Romanians, representatives of the nations of the former Yugoslavia, as well as the increasing number of the Vietnamese population and other nationalities from the Far East. Migrants are divided into two groups: the so-called "old" illegal migrants coming from Central and Eastern Europe gainfully employed in Greece and "new" ones, originating from the Far and Middle East and Africa, who came to Greece relatively recently, as a result of the socio-political system.

The first group of migrants represents an important - despite the low percentage - element of the Greek society, because it is somewhat assimilated with the Greeks, familiar with the market realities and the specificity of the society and "has found" in this country a chance for living and work. In spite of the crisis, they work in Greece and have adapted well to the functioning in "the economic chaos". This is confirmed in own research results which show that almost half of the 58 respondents of the survey conducted in 2013 among labour migrants living in Athens from 3 to 30 years did not consider returning to Poland despite the crisis and a revenue decrease or even job losses. Although since 2013 the situation has deteriorated markedly, the majority of the surveyed (52 respondents) are still working in Greece, and those who had declared a return to Poland emigrated to western Europe, and most of them were respondents living in Greece for the shortest time[7]. *What made the migrants (probably not only from Poland) do well in the crisis reality*? Undoubtedly, it was a financial factor and the lack of the Greek government control over migrants' income. One of the interviewed respondents residing in Greece since 1994 in response to the question about the reasons for his leaving to Greece gave the following answer:

(...) The unemployment and the lack of prospects led me to leave (...) thanks to my working in Greece I managed to build a house in Poland. It was a golden age, especially that in Greece no one asked about taxes and the Greeks themselves paid any price for work done and appreciated Polish professionals.

I remember when I entered the labour market I accepted orders only at representatives of elites. They paid a lot and did not grumble. In their homes I did such wonders that a Greek simply would not be able to do. I gained recognition and reputation and the business developed.

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[6] According to the data provided by the Polish Embassy in Greece, the numer of the Polish population may be of about 20.000 (estimates), including the majority of representatives of the Polish Greek community. As stated by Leszek Wątróbski, the Polish Greek community is the least known in Europe. It lives mainly in Athens which houses one of the largest Polish schools abroad; Polish pastoral ministry run by the Jesuits; Polish: kindergartens, associations, shops and magazines.

[7] The research was carried out with the use of the correspondence method through contacts established with one of the migrants from the Podkarpackie region having lived in Athens since 1994. Purposeful selection was applied, the criterion of which was the minimum three-year-long period of stay in Greece and the lack of the legal residence permit. This article presents only some results of the study.

Interestingly these important people were aware of social problems in the country, they formulated negative opinions on their compatriots' mentality and culture (...) Investments from the EU gave a lot of opportunities and the society grew rich at the expense of the state (...) everyone made money on everything possible, especially constructions were burdened with three times higher than actual costs. Con men and intermediaries issuing licences and concessions obtained benefits from them. An example can be the Olympic stadium, the construction of which consumed three times as much as it should have. Everyone earned thereon and the Greeks took money practically for nothing. They did not come to work - as is their habit - but when they came, they did not perform their work conscientiously (...) Let me give you another interesting example, after the earthquake in 1998 money flowed into Greece from international organisations and other countries. The Greeks almost immediately used the tragedy for their own account profiting from fictious damages. I repaired the facade of a school that had not been affected by the disaster – just a small crack caused due to natural factors cost so much that I am ashamed even to say. Half of the amount went to the pocket of the man issuing permission for the renovation (...)[8].

Another respondent's statement confirms the high level of the assimilation of the Poles in Greece and their propensity to take advantage of the malfunctioning state:

(...) This country is left especially by those who have worked there for a relatively short time. People like me stay, because despite the crisis I can get money and send it to my family. What would I do in Poland? I would wrangle with the officials - I'm not even able to switch to a new life (...) although this is not what it used to be, however in Poland I may not earn half of this money. In the Podkarpacie region it's difficult to find a well-paid job, so I have stayed here. I know the labour market, have contacts and despite the doldrums I will always earn a little bit[9].

The second group of migrants are victims of smuggling people illegally from the Philippines, Indonesia, Afghanistan, and North African states[10]. Interesting information can be found in a part of the interview with a Pole residing in Greece. The following response was received to the question about the status of the other groups of migrants living in Greece and the possibility of commencing employment:

(...) Unfortunately, they don't work like we do, they are the poor who live in ethnic ghetto areas and live with what they find in dustbins and on the street. Day-to-day they stay behind the fence and are let out on the streets during certain hours. This is a terrible phenomenon - in Poland one can't observe it. I'll say more, such a migrant is usually a victim of criminal groups. Probably the transfer of one man costs around 2 thousand dollars. They come here for bread to the so-called a better world. Regrettably, it turns out to be different. It happens that they do not reach Greece. They pay money to gangs and then end up on the sea left to the mercy of fate or are drowned. This is a nightmarish phenomenon[11].

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[8] The extract of the interview conducted in 2013 in Poland with a Polish economic migrant (an anonymous person residing in Athens since 1997 – Świętokrzyskie voivodeship).

[9] The extract of the interview conducted in 2013 in Poland with a Polish economic migrant (an anonymous person residing in Athens since 1994 – Podkarpackie voivodeship).

[10] The "new" migrants are victims of international mafia criminal activity that draws huge profits from trafficking people to Europe. Most migrants who have paid to come to Greece do not arrive at their destination and are left in rafts on the sea or are thrown out of the ships. Only few reach the land and increase large numbers of "unwanted" visitors. Greece is located on migrants trafficking routes from east to west and the biggest problem is the border with Turkey, where the scale of migration led the Greek authorities to build a ditch with the length of 120 km, the depth of 7 and the width of 30 metres. It is estimated that over the 2009-2013 period more than 400 thousand illegal immigrants came to Greece each year.

[11] The extract of the interview conducted in 2013 in Poland with a Polish economic migrant (an anonymous person residing in Athens since 1995 – Świętokrzyskie voivodeship).

CULTURAL CHARACTERISTICS OF THE GREEKS

Over the centuries, the Greeks have become a kind of a conglomerate of diverse cultural features resulting from the diffusion of different cultures clashing within the Greek territory. The intermingling of different cultures influences permits a brief analysis of their cultural characteristics based on the typology by Edward Hall and the four-dimensional typology by Geert Hofstede. In the light of the Edward Hall's theory the Greeks undoubtedly represent a high-context culture, namely they are multiactive, open and attached to their traditions, the patriarchal family model (Hall, 1984). Whereas, in the typology of the four dimensions by G. Hofstede, the Greeks show moderate collectivist features, masculinity, the high power distance and the low level of uncertainty avoidance [Hofstede 2003]. The high power distance, in a political sense, describes cultures rather characterised by preferences in authoritarian forms of governance. In contrast, cultures of the low power distance postulate the equality of all people and representatives of these cultures cherish their independence and do not expect an obiedence. In spite of democracy the Greeks are people still showing such tendencies. When making the characteristics of the Greeks on the basis of the degree of uncertainty avoidance, one can see a duality. Namely, the research conducted by G. Hofstede took place during the stabilisation system period in this country and does not take into account the current economic and socio – political situation. In the light of circumstances at that time, the author classified the Greeks as a culture with a high degree of uncertainty avoidance, which is currently changing in certain aspects of the Greeks' life.

The Greeks' *masculinity* remains unchangeable as a feature resulting from the traditional patriarchal family model, in which a decisive role is played by a man. He is its head and earns for the maintenance of the house. A woman in the social hierarchy takes the place established in the tradition, that is she is a mother and a wife taking care of the household and ensuring the family warmth. The Greeks' *masculinity* is also determined by social values such as: success, money and material wealth. Whereas *femininity* (womanhood) is the interpretation of the quality of life and the concern for others [Mikułowski Pomorski 2003]. Among male culture characteristics there are items such as male patriarchate in governing and domination both in the family and in the society, the role of children upbringing assigned to women, the life subordinate to work, money has a special role, independence and ambitions are the basis for any action, and the success decides on social respect.

It is obvious that the general characteristic of the Greek culture does not allow an objective assessment of cultural traits, however, it forms the basis for deeper analyses. When synthesising various approaches to the culture and the stereotype of the Greeks in the opinion of other nations, one may be tempted to create the following cultural profile of this nationality:

- positive qualities - hospitable, polite, friendly, open-minded and relatively tolerant, attached to the tradition, respecting the social order and the heritage of generations and ancestors, willing to play and have fun;
- negative qualities - brawlers, noisy, insistent, prone to corruption and nepotism, lazy, carefree, scruffy, not very productive, of a low level of qualifications.

A great number of the aforementioned cultural traits are not identical to those assigned to the Greeks by respondents of research conducted with the use of a survey method (correspondence) on the above mentioned sample of 58 Polish labour migrants living in Athens. However, before they are presented, as a preliminary remark just a few words about the research sample and sociodemographic characteristics of respondents. The study participants were the Poles in three age categories: 32-40 years (32 persons), 23-31 years (16 people) and 41-50 years (10 persons), while 18 respondents were women in the first age category. The equal distribution referred to people with secondary and vocational education - for 24 people, and only 6 persons declared basic and 4 higher education (they were women). Among all of the respondents only 2 women remained unemployed in Greece and bore the responsibility for childrearing. The rest of them worked in different

professions, men mainly in the construction industry and transport, while women in the trade sector. The main criterion for selectinig the sample was the period of the stay in Greece from 3 to 30 years. It is worth noting that only 5 of the respondents declared that they were staying in Greece with their families, whilst the other persons lived and still live there alone. The majority of respondents came from Podkarpackie, Świętokrzyskie, Lubelskie and Małopolskie voivodeships and only 3 of them represented Kujawsko-Pomorskie, Wielkopolskie and Warmińsko-Mazurskie provinces. As a reason for coming to Greece each of them pointed out difficulties in the labour market in Poland or low wages.

At the outset, it is worth to focus on the attitude of the Greeks to economic migrants. The study results show clearly that passive antagonism and indifference, without aggression, exist between the Greeks and the "old" migrants, regardless of their nationality. In addition, no symptoms of the cultural assimilation appear, as evidenced by declared by the respondents limited (except for professional) contacts of the Poles with the Greeks. The study findings indicate that the vast majority of the Poles are treated in Greece as labour force (relatively cheap), but well qualified. Although employers are eager to recruit the Poles, the society treats them as competition on the labour market. Such views were expressed by most respondents - 36 people (62%). Noteworthy are their selected responses justifying the attitude of the Greeks towards the Poles:

(...) they don't like foreigners; they're angry with all foreigners for the crisis which they started themselves; on the one hand they respect our craft, on the other hand they don't want to pay and they deceive; they blame everybody for the crisis; they don't like anyone who isn't a Greek; the Greeks are lazy bones who have no respect for anyone or anything and we are for them too smart and hardworking, so being at the advantage in their own country, they treat us like the stiffs; they cheat always and everywhere – on money, insurance and other matters, yet they know that their professionals cannot be compared with ours; definitely they treat us like machines to work but at every step they point out that we have to go back to Poland since we're guilty for the crisis (...)

The statements indicate a certain dualism, in which both poles seem to be in contradiction. The Greeks show respect to the Poles for their professionalism and as competition on the labour market at the same time. In the Polish-Greek relations there is a feedback loop; in the Poles' perception a Greek is given a negative image as far as the attitude to work is concerned. This is evidenced by responses categorising them in terms of punctuality, competence, productivity, loyalty to an employer, diligence, initiative and integrity. Given the adopted categories, a statistical Greek shows rather negative features and is described as *unpunctual, unproductive, low-skilled, lazy and dishonest* as well as *devoid of creativity.* The analysis of socio - cultural traits of the Greeks in the eyes of respondents allows to classify them as a nation which is characterised by the following positive features: *social solidarity, commitment to tradition and religion* and *respect for relatives and family.* Features as follows*: the relatively low level of personal culture, the low level of intelligence and education, intolerance, clearly outlined belonging to social class and rather negative attitude to authority and the public order* constitute the negative profile of the stereotypical perception of the Greeks in the opinion of the Poles.

The importance of the socio-cultural situation in Greece is indicated by answers to the question (multiple choice format on 4 rank order levels) concerning the causes of the Greek crisis. Alongside improper managing EU fundings (23 responses at the highest - 1st rank order level) respondents pointed to socio-cultural factors as the main reason for the crisis in Greece (18 responses at the highest - 1st rank order level). Among the features that the most considerably influenced the crisis there were indicated: excessive consumption - 43 indications, mentality - 23 indications, the attitude to work and the unfavourable social structure – for 21 responses. Less attention was paid to the level of education - 15 responses, and laziness, corruption and bribery - 12 answers which were

considered as substantial at 2nd rank order level - 45 responses, but in the configuration with the cultural characteristics and mentality.

CONCLUSION

The crisis in Greece is a very interesting and at the same time evaluation research area. The socio-cultural factors included in this article represent only a small part of the whole range of research issues, but the volume of this work does not allow for a comprehensive approach to the problem. For the purposes of the article there were made only generalisations and the synthesis of main findings which, though fragmentary and not allowing their extrapolation to the whole environment of Polish migrants, show the directions of searching for answers to questions about the causes of the crisis. This is evidenced, for example, by the recent events related to the referendum on reforms, or the battle between the European Union and Greece aimed at introducing a guarantee in the form of protecting the state's assests, worth over 50 billion EUR towards the potential embezzlement of further funds earmarked for reforms. As it turns out, even the threat of bankruptcy does not make the Greeks more willing to sacrifices and restrictions. They are still blaming the European Union for the crisis, not seeing its causes in their own mistakes. At the end, in order to confirm the minimal chances of Greece for overcoming the crisis a statement by one of the respondents interviewed will be cited:

(...) It will take centuries to change their mentality. Any attempt to initiate changes will end with the rebellion and the internal conflict. Nothing functions smoothly, but grey market. The Greeks are unhappy after the introduction of the sanctions imposed by the European Union and further austerity measures. They blame the European Union, especially Germany, for the crisis in their country. All this is simply untrue. The money they got should allow them to create the economic power, but everyone knows how it is. The government has successively introduced new burdens to the society, even the reverse tax has been established, and yet they still do not have the will to undergo change. It's still ubiquitous to see restaurants full of the Greeks drinking and eating with a smile on their faces. That says a lot. A great deal could be said about this beautiful country, its culture and heritage. However, it must be stated that the Greeks have put themselves into the crisis and they will not emerge from it for a long time. As well as they will not leave the European Union since Greece has the strategic geographical location for safety and continues to be a good sales market. This also affects the deepening of the crisis (...)[12].

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IMPACT OF POLAND'S ACCESSION TO THE EUROPEAN UNION FOR THE DEVELOPMENT OF ORGANIC FARMING OF THE POMERANIA

Abstract: This paper aims at analyzing the current state of organic farming in Pomerania (Pomeranian and West Pomeranian provinces), as well as its development and diversification in the region. The time range of the evaluation carried out covered the years 2004-2013. The study demonstrates the influence of Polish accession to the European Union, on the dynamics of management system, using the natural processes occurring on afarm. In addition, the attention was drawn to the opportunities and threats of the Pomeranian development of organic agriculture in the upcoming years. The analyses showed that the organic farming development depended on financial support. For the purposes of the analysis, the source material was used - The Central Statistical Office (CSO) data, the reports of The Agricultural and Food Quality Inspection (AFQI) and The Agency for Restructuring and Modernisation of Agriculture (ARMA) data - as well as the literature on research issues taken.

Key words: rural areas, sustainable agriculture, organic farms

INTRODUCTION

The agriculture developing over a long period had a significant degree of conventional character, which led to a number of negative changes in the environment, and as a result to the social costs. At the same time, alternative agricultural production systems continued to grow for many years, adopting different rules for management of land, labor and capital rather than a conventional system - based on the balance with the environment. The immediate goal is not profit maximization, but the connection in a balanced manner of the economic and environmental aims and social functions of agriculture and rural areas [Czapiewska 2008]. One of the fastest growing agricultural sectors currently in the world, in particular in the European Union, is organic farming, which is fully embedded within the concept of sustainable and balanced development. It has a positive impact on the ecosystem, rationally using the natural resources, increases biodiversity and ensure high quality of manufactured products [Janowska-Biernat 2012]. The aim of organic agriculture is to maintain a balance between resources and requirements of the economy [Stawicka i in. 2004]. Its importance grows along with the increase of environmental awareness not only of the consumers but also of the farmers. The organic production method has a dual social function, because on one hand it provides goods for a specific market to a consumer demand for organic products, and on the other, is an action in the public interest because it contributes to environmental protection, animal welfare and rural development [*Rozporządzenie ... 2007*].

This paper aims at analyzing the current state of organic farming in Pomerania, as well as its development and diversification in the region. The time range of the carried out evaluation covered the years 2004-2013. The study demonstrates the influence of Polish accession to the European

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Union, on the dynamics of management system, using the natural processes occurring on a farm. In addition, the attention was drawn to the opportunities and threats of the Pomerania development of organic agriculture in the coming years. The spatial scope of the research includes the Pomeranian and West Pomeranian provinces, occupying a total area of 41,202.82 km2, which represents 13.1% of the country. For the purposes of the analysis, the source material was used - The Central Statistical Office (CSO) data, the reports of The Agricultural and Food Quality Inspection (AFQI) and The Agency for Restructuring and Modernisation of Agriculture (ARMA) data - as well as the literature on research issues taken. The tabular-numerical method was applied along with comparative analysis.

THE DIVERSITY OF DEVELOPMENT CONDITIONS OF ORGANIC AGRICULTURAL PRODUCTION

The agricultural space of the studied area creates very favorable conditions for conducting both the high-productive and ecological agriculture. The natural-soil conditions values as well as economic and social conditions militate in favor of it. The highest agro-ecological potential (ratio of agricultural production area valorisation over 80 points) in Pomorskie hold: Żuławy Wiślane and the Lower Vistula Valley, while high - areas to the north (Równina Słupska, Wysoczyzna Damnicka, Wysoczyzna Żarnowiecka) and the south (Pojezierze Krajeńskie). In West Pomeranian province the most favorable environmental conditions are found in the south-western part of the region (fig.1). The average value of the ratio of agricultural production area valorisation of Pomerania does not differ significantly from the national average (66.6 points) and amounts for the West Pomeranian region 67.5, and for Pomeranian - 66.2 points. The areas with a maximum ratio are mainly characterized by a grouping of soils with the highest and high relevance, a high proportion of agricultural land, as well as developed and established over the years the agricultural function of the agri-food processing. Within the agricultural significance - the best soils and production conditions are in Żuławy and Powiśle where alluvial soils, bog and brown soils predominate.
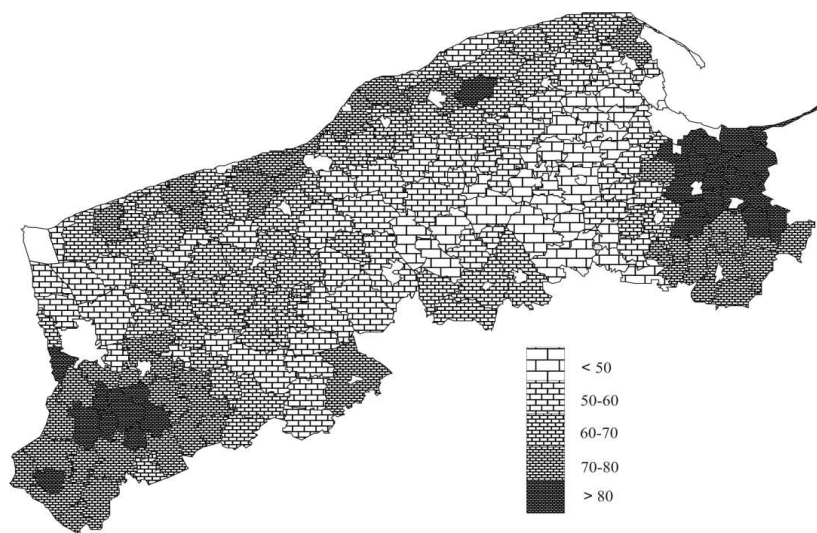

	< 50
	50-60
	60-70
	70-80
	> 80

Figure 1. The valorisation of agricultural production area in Pomerania

Source: Own study based on data IUNG in Puławy

The CSO data shows that at the end of 2013, the areas used for agricultural purposes in the Pomeranian Province occupied 40.0 % of the total (732.3 thousand hectares), while in Western Pomerania - 36.3 % (831.9 thousand hectares) (tab. 1). A largely agricultural areas with the highest percentage of agricultural land include the south-western part of the region (district of Gryfice and Łobez), the north-central (district of Koszalin, Białogard, Słupsk) and the south-eastern parts (district of Malbork, Sztum, Kwidzyń). Particularly noteworthy is district of Malbork where as many as 4 out of 5 municipalities have a high rate, of over 80 % (Miłoradz, Malbork, Nowy Staw, Lichnowy). The share of agricultural land in total area is the factor determining the agricultural character of these areas and simultaneously dictates the direction of economic activity of the rural population from these areas. It is worth noting that in Pomerania, with the decrease in the share of agricultural land, the contribution of forests increased, which are one of the most important resources of the region and occupy 1/3 of the total surface of the test area (tab. 1).

Table 1. The area of agricultural land and forest land in Pomerania in 2004-2014

Years	Pomerania province				West Pomerania province			
	Area land agricultural		Area forest land		Area land agricultural		Area forest land	
	tys. ha	%	tys. ha	%	tys. ha	%	tys. ha	%
2004	803,6	43,9	672,5	35,8	1081,7	47,2	818,1	34,7
2005	773,6	42,2	674,3	35,9	1032,5	45,1	820,4	34,8
2006	785,2	42,9	674,9	36,0	984,8	43,9	822,6	34,9
2007	770,0	42,0	676,6	36,0	975,3	42,0	823,8	34,9
2008	762,3	41,6	677,6	36,1	965,4	43,5	825,2	35,0
2009	772,3	42,2	679,7	36,2	953,3	42,6	826,9	35,1
2010[*]	750,1	40,9	680,4	36,2	909,8	40,6	828,6	35,2
2011	739,3	40,4	681,1	36,2	866,8	38,7	832,3	35,3
2012	747,3	40,8	682,1	36,3	868,5	38,8	833,3	35,4
2013	738,2	40,3	682,9	36,3	836,7	36,5	833,9	35,4
2014	732,3	40,0	683,1	37,0	831,9	36,3	835,7	35,5

[*] since 2010, the area of agricultural land according to the new definition
Source: own study based on data from CSO

In comparison with the country, the Pomeranian agriculture is also characterized by the relatively favorable structure of the farms' size. According to the ARMA at the end of 2013, the average size of a farm with an area exceeding 1 ha in the Pomeranian region was higher than the average in the country (10.42 hectares) and amounted to 30.30 hectares in Western Pomerania and 18.95 ha in Pomeranian province. At the presented area dominate small farms with an area not exceeding 5 hectares. In 2013 in Western Pomerania, their share accounted for 39.4 %, while in Pomerania - 36.1 %. The model of multifunctional and environmentally friendly farm becomes the preference. This trend is particularly important precisely for small farms, where the production of good quality food using traditional regional recipes can be carried out. That allows to preserve the landscape and cultural values and to form an attractive places for recreation and relaxation [Czapiewska 2014].

THE DEVELOPMENT OF ORGANIC FARMS IN POMERANIA

The development of the organic farming sector reflects a constant growth rate of the number of organic farms, the areas used by them, as well as an increase in the number of processing plants or an assortment of organic products available on the market. In Pomerania in recent years, especially

after the accession of Poland to the European Union, a significant increase of interest in the pro-environmental production, both in the sustainable and typically ecological systems is observed. The Common Agricultural Policy (CAP) allowed a substantial financial support of organic farming. On one hand, the subsidies for agricultural producers, on the other - the growing public demand for eco-products, led to intensive development of organic farming in the examined area [Cichocka i Grabiński 2009; Piwowar 2011]. The interviews conducted with the organic producers, lead to the conclusion that in Pomerania the decisive role in this process is played by subsidies, which means that despite the growing pro-environmental awareness the interest of farmers in this particular system of production often comes precisely from the financial conditions. Thus, these organic farms that operate in the region for several years and longer, producing without any support, based their operations on the knowledge and belief of the rightness to undertake this type of production. In contrast, the organic farms emerging after 2004, had been basing their activity to a large extent on the financial aids. According to M. Pradziadowicz [2013] a big impact on the growing interest in organic farming is food security crisis, as well as concern for the health.
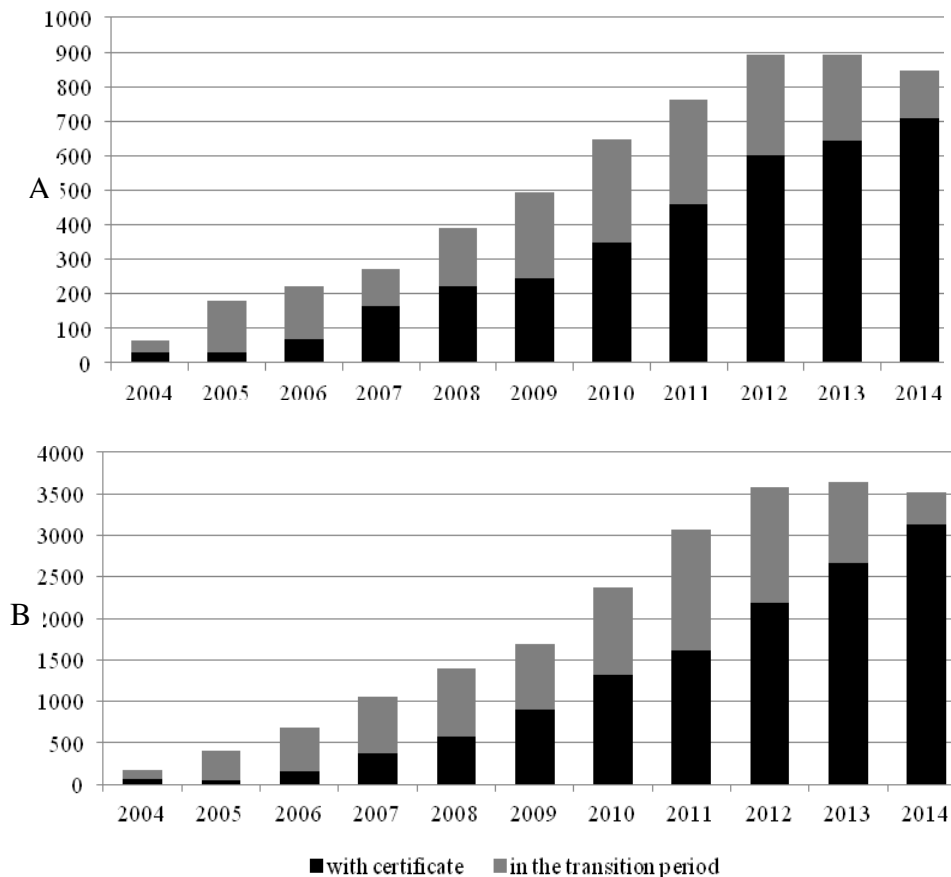

Figure 2. The number of organic farms in Pomeranian (A) and Western Pomeranian province (B) in 2004-2014

Source: own study based on data from CSO

In the period 2004-2014 there was a significant increase in the number of farms producing the certified organic farming and being in a transition period of production (fig. 2; tab. 2). In the analyzed period, the number of organic farms in Pomerania increased eighteenfold (from 242 farms in 2004 to 4373 farms in 2014), with the much more intensified development occurred in Western Pomerania (increase twentyfold). At the end of 2014, it was ranked second in the country in terms of number of organic farms (3526 farms), just behind Warmia and Masuria Region (4234 farms). A total in Pomerania, their share accounted for 17.6 % of the total number of organic farms operating in Poland (14.2 % in Western Pomerania and 3.4 % in Pomeranian).

Threats to the development of organic farming emerged in 2013, when the Minister of Agriculture introduced a new regulation, severely limiting the access to grants in the package 'organic farming' [*Rozporządzenie ...* 2013]. There were more attractive packages of agri-environmental programs, which resulted in an outflow of farmers from ecological farming. This is indicated by the lower number of organic producers in Pomerania at the end of 2014. Compared to 2013, a decrease of 3.2 % in Western Pomerania and 3.9 % in the Pomeranian has been reported.

Table 2. Changes in the number organic farms in Pomerania in 2004-2014

Specification		Pomerania province	West Pomerania province	Poland
Number organic farms	2004	66	176	3705
	2005	180	404	7183
	2006	222	678	9189
	2007	273	1059	11870
	2008	392	1396	14896
	2009	494	1696	17091
	2010	648	2373	20582
	2011	763	3065	23449
	2012	894	3579	25944
	2013	893	3640	26598
	2014	847	3526	24829
The increase in the number of farms in 2004-2014		781	3350	21124
Dynamics of growth in the number of farms in 2004-2014 [%]		1283	2003	670

Source: own study based on data from CSO

In the study area, there is a great diversity of spatial development of organic farming (fig.3), as evidenced by the review of a currently valid environmental certificates (so-called. "Full" and certificates "during the conversion period to organic farming"), granted to farmers by the individual certification bodies. The analysis shows that in West Pomerania province they are heavily concentrated in the municipalities of Połczyn Zdrój (163) and Drawsko Pomorskie (129). In contrast in the Pomeranian Province, with a significantly lower number of organic farmers, the urban-rural commune Miastko (57) occupies a leading position. Taking into account the counties, the share of agricultural producers (including the certification and transition period) ranged from 3, located in the district of Malbork (Pomeranian province) to 528 in Drawsko district (West Pomeranian province), which accounted for 0.07% and 13 0% of the total surveyed agricultural producers. In addition, a clear concentration of organic farms accrue into districts of Szczecin (482), Świdwin (285), Wałcz (270), Koszalin (250) and Goleniów (248). In general it can be said that by far the least interest in organic farming is the area of Żuławy Wiślane, where there are the most fertile soils

in the region, and this in turn affects the development of intensive farming. Organic farms grow most rapidly where there are difficult natural conditions while the competition with the conventional farms is limited or impossible.
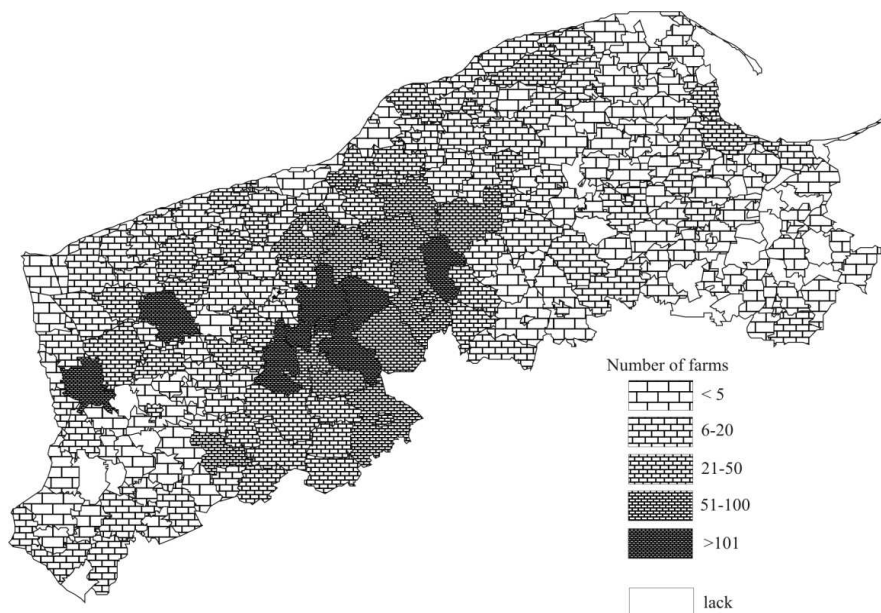
Figure 3. Distribution of organic farms in municipalities of Pomerania

Source: Own study based on analysis of ecological certificates of agricultural producers (as of 30.06.2015)

The share of organic farming in the use of agricultural land is a better measure of its practical significance than the number of organic farms. In 2014 organic farms in Poland have used an average of 4.5 % of agricultural land, while in Pomerania 10.1 % (4.0 % in the Pomeranian province and 15.5 % in the West Pomeranian). It is worth noting that in the examined area in 2014, the average area of agricultural land of a farm was much higher than the average in the country (10.48 ha) and in West Pomeranian province it was of 30.29 hectares and in Pomeranian – 19.0 hectares. While the average size of organic farms in the above mentioned regions amounted to 36.7 hectares and 34.5 hectares, exceeding the national average of 26.5 hectares (4). In the period 2004-2014 the average size of an organic farm in Pomerania decreased by 23.6 hectares (by 65 %).

A marked increase in the number of farms carrying out the organical production in Pomerania and West Pomerania, in the period considered, was associated with the increase in surface area of organic farmland in these provinces (by 27500.3 hectares i 116731.2 hectares) (tab.3). By the end of 2014 in Pomerania they occupied a total of 158737.6 hectares, which constitutes 24.1 % of the total area of organic farmland in Poland (19.68 % in the West Pomeranian province and 4.45 % in the Pomeranian), while in 2004, it was 20.8 % (by 18.50 % and 2.29 %). Therefore, in 2004-2014 there was a 11-fold increase in organic acreage (from 14506.1 hectares in 2004 to 158737.6 hectares in 2014). It is worth emphasizing that West Pomeranian region occupies first place in the country in terms of the areas used ecologically (129456.0 hectares in 2014).

Table 3. The area of organic agricultural land of Pomerania on the background of the country in 2004-2014

Years	Area of organic agricultural land (ha)			Participation in the total area of organic agricultural land in Poland (%)	
	Pomerania province	West Pomerania province	Poland	Pomerania province	West Pomerania province
2004	1781,3	12724,8	82730,0	2,59	18,50
2005	7185,0	28118,1	166299,7	1,11	16,90
2006	8037,2	42430,9	228009,1	3,52	18,60
2007	10967,6	59113,5	287528,4	3,81	20,56
2008	11366,0	54150,8	314921,2	3,61	17,20
2009	18723,3	84588,6	416261,4	4,50	20,32
2010	22554,0	98023,0	519068,4	4,35	18,88
2011	27356,5	119779,9	605519,6	4,52	19,78
2012	30615,7	135366,8	661687,3	4,63	20,46
2013	28720,9	129585,7	669969,3	4,29	19,34
2014	29281,6	129456,0	657902,0	4,45	19,68

Source: own study based on data from CSO

Figure 4. The size of organic farms structure in Pomeranian (A) and Western Pomeranian province (B) in 2007-2014

Source: own study based on (Report … for 2007-2014)

In Pomerania predominate mainly ecological farms in the area groups 10-20 and 20-50 hectares of arable land (fig. 4). At the end of 2014, they accounted for half of the total area of land used organically (51.6 % in the Pomeranian i 49.7 % in the West Pomeranian Province). By far, the smallest share belonged to the greatest surface farms (over 100 hectares). In Pomeran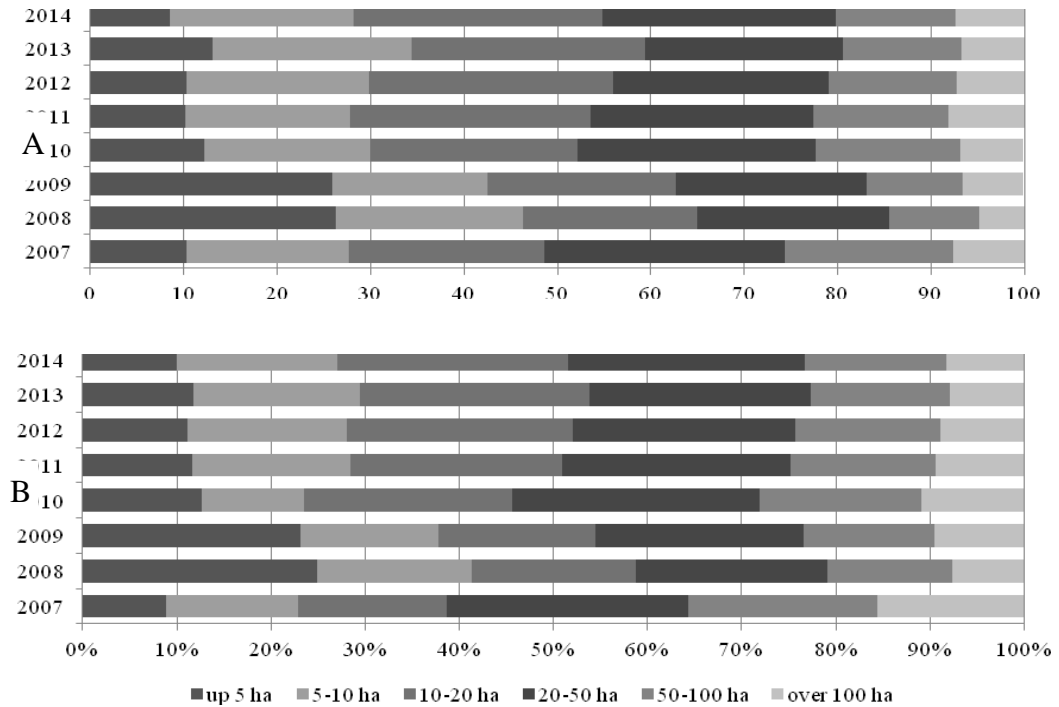ia, the percentage of farms in this group area was much higher than the average in Poland (4.6 %) and accounted for 8.3 % in the West Pomeranian and 7.4 % in Pomeranian. Taking into account the two extreme periods of analysis (2007 and 2014), it can be seen minor alterations in the discussed structure.

The development of the organic farming sector is also reflected in the number of processing plants. In Pomerania in 2004-2014, the number rose almost 10-fold (from 6 in 2004 to 58 in 2014). It should be added that at the beginning of the analyzed period only 6 functioned and only in the area of West Pomeranian province (tab.4). In the region of Pomeranian the first of this kind of processing plant was established in 2005. The data contained in AFQI reports shows that in 2014 31 organic processing plants operated in Western Pomerania, and in Pomeranian it was 27.

Table 4. The number of organic processing plants in Pomerania in 2004-2014

Specification	Years										
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Pomerania province	0	1	5	8	10	12	15	11	17	17	27
West Pomerania province	6	7	12	13	12	25	23	16	24	27	31

Source: own study based on (Report ... for 2004-2014)

Polish accession to the European Union and the participation of farmers in the instruments of the Common Agricultural Policy and the national agri-environmental program led to a particularly dynamic development of organic farms. This program is the most important instrument of financial support of CAP, consisting in granting gratification to farmers that meet basic environmental standards and additionally applying environmentally friendly production methods. This effectively integrate environmental protection with the development of the agricultural economy in such a way as to minimize the negative effects of agriculture and to maximize its positive impact. Agri-environmental program implemented under RDP 2007-2013 (formerly RDP 2004-2006), also has the status of one of the most important actions for sustainable rural development. Packages obliging to implement the principles of sustainable land use are balanced agriculture and organic farming [Brodzińska 2009; Jończyk 2014].

Pomerania is one of the biggest areas where agri-environmental program was implemented. In the province of West Pomerania the largest acreage implementation of agri-environment payments took over the package 2 – Organic farming. On the other hand, in the Pomeranian Province dominated package 1 - Sustainable Agriculture. In the period 2004-2013, and thus in both RDP programming periods, agri-environmental payments in the country reached the amount of over 5.6 billion zł. The greatest amount of completed agri-environment payments may be observed in Western Pomerania - more than 781 million zł, which accounted for nearly 3 thousand zł / ha. In Pomerania, this amount was lower by 43.7 % and amounted to nearly 440 million zł, and 1 ha covered by the payments accounted for 2576.32 zł. It is also important that the West Pomeranian region was ranked first in the country in terms of absorption of funds for the implementation of agri-environment schemes (absorption rate in Western Pomeranian 2.85 in Pomeranian - 1.50).

In the package Organic farming support depended on the cultivation carried out, and all supported versions occurred in two versions, that is, in the transition period and after its completion. In Pomerania in the period considered, the most popular among organic producers, both in terms of number of applications, and of completed amounts of payments, were the variants: agricultural cultivation (with conformity certificate) and agricultural crops (the transition period). In the years 2004-2014 in Pomerania total of 39679 applications were submitted by farms conducting agricultural production organically within the RDP 2004-2006 and RDP 2007-2013 (79.3 % in Western Pomeranian province). The number of applications submitted by beneficiaries increased steadily (tab.5). In the analyzed period, there was noticed a 36-fold increase in Western Pomerania and over 25-fold in the Pomeranian province. This tendency shows that farmers are willing to convert their farms to organic farms. With the increasing number of applications, the amounts paid to holders of farms engaged in organic production also increased (tab.5). In Pomerania in 2014, with this title 93923598,4 zł (17-fold increase since 2004). The RDP for 2014-2020 agri-environmental program adopted the name of the agri-environment-climate program, while organic farming constitutes a separate operation.

Table 5. The number of application and the amounts paid to holders of farms engaged in organic production within the RDP 2004-2006 and RDP 2007-2013 in Pomerania in 2004-2014

Specification	Years	Number of applications		Payments made (PLN)	
		Pomerania province	West Pomerania province	Pomerania province	West Pomerania province
RDP 2004-2006	2004	55	161	752057,94	4771708,09
	2005	131	382	2213453,70	12918989,72
	2006	161	595	2736288,80	21914285,74
	2007	287	1088	5298722,48	41910430,83
	2008	234	990	4886028,21	42013894,67
	2009	190	879	4323601,51	40931926,51
	2010	102	715	2481121,74	31694975,14
	2011	101	816	1692336,01	19169099,97
RDP 2007-2013	2008	158	407	2502470,60	11330097,41
	2009	301	811	5532389,45	17006121,05
	2010	536	1694	11568949,70	44506062,38
	2011	1331	4630	15483938,73	69732722,03
	2012	1644	6290	173859,00	0,00
	2013	1565	6180	18900337,40	87166417,30
	2014	1412	5833	16076127,30	77847471,10

Source: own study based on data from ARMA, (Report ... for 2004-2014)

CONCLUSIONS

Organic production methods in agriculture fit into the concept of sustainable development, which implies coherence between economic, environmental and social objectives [Komorowska 2011]. Polish accession to the European Union resulted in the emergence of new instruments of supporting the development of sustainable agriculture and rural areas. After the introduction of EU subsidies and the entry into force of the EU regulation on organic farming, Pomerania saw a rapid increase in both the number of farms producing organically as well as ecological surface area of the farmland. Ecological processing plants began functioning. In large part this is due to the increasing

demand for organic food, both domestically as well as abroad, as well as the possibility of financial support for farms, which implement environmentally friendly agricultural practices.

By analyzing data on the area structure of the surveyed farms, an increased interest of organic farming system by farmers, with larger family farms, who see the opportunity to increase their income and viability can be seen. Studies have shown that the escalation of organic farms, has been made primarily in areas with poorer habitat conditions and a greater share of the natural areas. In Pomerania, both natural and socio-economic conditions influence beneficially on the development of organic farming. Pomerania is a region occupying a leading place in the country in terms of the number of organic farms and areas used ecologically.

The analysis shows that so far, the main factor motivating farmers to change the traditional system of farming into an ecological were agri-environment payments under RDP (2004-2006, 2007-2013). However, smaller amounts provided for in the RDP 2014-2020 in the coming years may cause a decrease in the number of organic farms, in spite of the global and European trends. It is worth noting the fact that the market for organic foods continues to grow, and consumer interest in high quality products and "healthy" lifestyle continues unabated.

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Jakub Gołaś[14]

LEGAL AND STRUCTURAL ANALYSIS OF EMPLOYMENT IN THE STATE FORESTS

Abstract: The aim of the article is to present structural and legal aspects of employment in both - the Polish forestry in general and in the State Forests National Forest Holding as the biggest participant of the market. In the structural aspect, the analysis concerns such factors and issues as employment levels, employment basis, newly created and closed down jobs and average monthly gross wages and salaries in both forestry sector and its biggest participant. The analysis of the structural aspects was based on data obtained from reports of the Polish Central Statistics Office (CSO). The analysis shows that both employment and remunerations rates in whole forestry industry are relatively stable and that the State Forests National Forest Holding assures most favorable salary conditions. In terms of legal aspects concerning issue of employment in the State Forests, the paper focuses particularly on the Forest Act of 1991 and presents an analysis of the evolution of legal measures regulating legal basis of the State Forests National Forest Holding employees' employment contracts.

Key words: forestry, State Forests National Forest Holding, State Forests, employment, wages, salaries, remuneration, law, Poland

INTRODUCTION

The forestry and timber industry are extremely vital sectors of Polish economy. Legal entities operating within the sector have assets of value estimated at billions of euro, generate billions in revenues and employs thousands of workers. Having regard to abovementioned aspects, the State Forest National Forest Holding should be undoubtedly considered as the biggest market participant. The size and strength of domestic companies operating in the forestry and timber industry are not only translated to higher gross domestic product (GPD), but also have vital impact on international forestry market's conditions.

During discussion about the role and functioning of domestic forestry and timber markets, it is also worthwhile to analyze the internal organization, employment or remuneration in the sector, taking into account particularly position of the State Forests. It should be noted first that results of the Polish Central Statistical Office's (CSO) statistical research prove that employment and remuneration levels in the forestry, especially in the State Forests National Forest Holding, are stable and favorable to employees, compared to average tendencies in national economy. Contrary to the common in last years practice of freezing wages or jobs reduction, the transparent and stable upward trend in the forestry has been sustained.

The main aim of the article is to present thorough structural and legal analysis of employment and remuneration levels in the Polish forestry, with a special focus on dominating position of the State Forest National Forest Holding. The article submits detailed statistical data showing changes and trends in employment and remuneration levels of domestic forestry sector employees. The author also presents an analysis regarding regulations of the Forest Act of 28th September 1991, which should be considered as the legal basis of the State Forests' workers' employment relationships. It is also worth noting in the introduction that in recent years the state legislator has decided to strengthen stability and durability of employment relationship of forestry public sector

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workers by extending usage of classical employment contracts of an indefinite duration instead of appointment acts [Act…1991; Act…2014].

STRUCTURAL CHARACTERSTICS OF EMPLOYMENT IN POLISH FORESTRY

Table 1 presents data regarding number of employed persons in the Polish forestry in the period of 2005, 2010-2014 in terms of their employment status, coming from the report of the Polish Central Statistical Office (CSO) [CSO…2015]. Their analysis shows that the general employment levels in domestic forestry sector in given period were shaped by not strong but relatively stable growth trends. The general number of persons employed in forestry has slowly risen from 46,5 thousands in 2005 to 49,8 thousands in 2014. Considering the distinction between employees on employment contracts and employers or own-account workers, is should be also mentioned that the upward trend is mainly related to the employees on employment contracts (where the employment level has risen from 38,1 thousands in 2005 to 41 thousands in 2014). At the same time, no similar upward trend has been noted in case of the second group (employers and own-account workers), where the employment levels have experienced minor fluctuations and varied between 8,3 and 8,8 thousands.

The stable upward trend related to workers on employment contract should be considered as favorable and positive premise, which may indicate that employment in the forestry is stable, secure and perspective. It is worth mentioning that the abovementioned upward trend has been sustained despite the economic crisis, which has influenced the vast majority of employment market and forced many employers to introduce severe redundancy policies in other economic sectors. As it is indicated by the results of research presented by the CSO, the forestry offers each year increasing number of workplaces, becoming serious and attractive alternative to other, less stable, industry branches [CSO…2015].

It should be stressed here that the specificity of Polish forestry is also reflected in relatively low, yet stable number of forest enterprises (i.e. employers and own-account workers). As it appears from the CSO report, also the employing side of industry seems to be relatively immune to economic crisis, as its number experienced only minor fluctuations despite the general economic decline on the global market (in analyzed period maximum fluctuation hasn't exceeded 0,5 thousands)[CSO…2015].

Table 1. Employed by employment status in the Polish forestry sector in 2005, 2010-2014 (in persons)

Specification	2005	2010	2011	2012	2013	2014
	in thousands					
Total	46,5	46,4	47,8	48,6	49,0	49,8
Employees hired on the basis of an employment contracts	38,1	38,0	39,0	39,6	40,7	41,0
Employers and own-account workers	8,4	8,3	8,8	8,7	8,3	8,8

Source: Forestry 2015, GUS (CSO),

During the analysis of employment structure in the Polish forestry, it is also worth focusing on its structure in terms of gender and ownership sectors. Firstly, the analysis of data shows that work in the Polish forestry is vastly dominated by males. The statistical data presented in the Table 2 directly proves that in the analyzed period female employment levels have been developing at stable and transparently low rate (from 16,4 % in 2005 to 17% in 2014 r.). It may be considered that such

trend results from simple fact that the specificity of work in the forestry, especially its working conditions, favors males.

Secondly, it should be also stressed that vital change has occurred in public and private sectors' market shares. Despite the fact that the State Forests National Forest Holding (i.e. state organizational unit) is the biggest market player, the public sector's total share has decreased from 55,1% in 2005 to 48,8% in 2014. At the same time, the private sector's total share has increased from 44,9% in 2005 to 51,2% in 2014. It should be also noted that the majority of indicated increase was related to the number of employees, as employment level has changed from 26,8% in 2005 to 33,5% in 2014, while the number of employers in given period has even experienced minor decrease (-0,4%). Such trends may indicate that private sector enterprises are in good economic shape, which has allowed sector's participants to use certain resources aimed at employing additional workers. Relatively stable number of private owners and co-owners may also prove that forestry's private sector is strongly consolidated and competitive.

Table 2. Employed in Polish forestry sector by employment status and ownership sectors in 2005, 2010-2014

Specifi-cation	Total	Of which female		Public sector		Private sector					
						Total		of which			
								Owners and co-owners		Employers on employment contracts	
	in persons	*in persons*	*%*	*in persons*	*%*	*in persons*	*%*	*in persons*	*%*	*in persons*	*%*
2005	46 528	7 621	16,4	25 649	55,1	20 879	44,9	8 401	18,1	12 447	26,8
2010	46 351	7 672	16,6	24 066	51,9	22 285	48,1	8 314	17,9	13 942	30,1
2011	47 836	7 997	16,7	23 892	49,9	23 944	50,1	8 804	18,4	15 123	31,6
2012	48 633	8 036	16,5	23 894	49,1	24 739	50,9	8 674	17,8	15 750	32,4
2013	49 039	8 315	17,0	24 346	49,6	24 693	50,4	8 310	16,9	16 373	33,4
2014	49 791	8 204	16,5	24 297	48,8	25 494	51,2	8 816	17,7	16 677	33,5

Source: own calculations based on report Forestry 2015, CSO,

Table 3 presents statistical data related to trends in creating new and liquidating current jobs in the Polish forestry in years 2010-2014. Its analysis shows that the forestry as a whole is characterized by stable, yet slow increase in number of newly created jobs. As it is indicated by CSO's research, the number of new work stands was greater than number of liquidated jobs in each year of analyzed period. However, it also worth mentioning that the vast majority of the growth has been recorded on private sector's side, where annual number of newly created jobs made over 80% of total number for the industry (from 83,37% in 2013 to 87,94% in 2014). In the same period of time, the number of new jobs in public sector has not exceeded more than16,63 % of total number of jobs created in whole industry (in 2013). Similar trends can be observed in terms of liquidating jobs, where private sector also has dominated the market and which accounted for from 83,79% (in 2011) to 90,01% (in 2013) of total yearly jobs' liquidation in forestry. Taking into consideration abovementioned trends, we may state that in the employment policy of the forestry in years 2010-2014, the private sector shall be perceived as more stable because of its lower fluctuation's levels in regard to redundancy practices, while in the public sector the employment structure's restructuring was more common phenomenon.

Table 3. Newly created and closed down jobs in Polish forestry sector by forms of ownership in years 2010-2014 (by the end of year)

Specification	Number of newly created jobs			Number of liquidated jobs		
	total	in sector		total	in sector	
		public	private		public	private
2010	2 040	291 (14,26%)	1 749 (85,74 %)	1 870	294 (15,72%)	1 576 (84,28 %)
2011	1 635	265 (16,21%)	1 370 (83,79%)	1 460	281 (16,21%)	1 179 (83,79%)
2012	1 808	218 (12,06%)	1 590 (87,94 %)	1 490	150 (12,06%)	1 340 (87,94%)
2013	2 056	342 (16,63%)	1 714 (83,37%)	1 342	134 (9,99%)	1 208 (90,01%)
2014	1 998	257 (12,86%)	1 741 (87,14%)	1 427	171 (11,98%)	1 256 (88,02%)

Source: own calculations based on report Forestry 2015, CSO.

Table 4. Average monthly gross wages and salaries a in forestry by ownership sectors in years 2010-2014

Specification	2010	2011	2012	2013	2014
	in zlotys				
Total	4 082,37	4 617,18	5 009,88	4 865,32	5 260,63
Public sector	5 444,93	6 222,48	6 802,51	6 803,70	no data
Private sector	1 843,45	2 000,11	2 162,41	1 843,85	no data

Source: Forestry 2015, CSO.

Table 4 presents average monthly gross wages and salaries in Polish forestry in the period of 2010-2014 in terms of ownership sectors (public and private). The statistical data provided by the CSO proves that in the area of remuneration in the domestic forestry there is apparent and significant disproportion between private and public sectors [CSO…2015]. Firstly, it should be emphasized that the observed total growth of average gross remuneration in the forestry for a period of 2010-2014 (estimated to 1 178,26 zlotys) was exclusively determined by remuneration growth in public sector. At the same time, average monthly gross wages in private sector were subjected to minor fluctuation and remained at relatively stable level.

Evaluating trends in work remunerations in domestic forestry, it is also necessary to take into consideration simple fact that among from the difference in growth rate, there is another significant difference between private and public sector. The data presented in table 4 clearly indicates that average monthly gross remuneration in public sector in each of analyzed year was over 3-times higher than average wages in private sector. This shows that in terms of economic conditions, work in public sector in recent years may be considered as more remunerative and attractive.

STRUCTURAL CHARACTERISTICS OF EMPLOYMENT IN THE STATE FORESTS

Table 5 presents average employment in persons and average monthly gross wages in zlotys in the State Forests National Forests Holding in years 2005, 2010 2014. Firstly, it should be noted that having regard total employment levels in domestic forestry industry (see table 1), the State Forests should be considered as the biggest market participant, which employs over 50% of all workers engaged in the industry. In general, employment levels in the State Forests is relatively stable and yearly fluctuations hasn't exceeded more than 5,19% of current employment level (max. 1355 persons in 2010). Takin into consideration distinguishing between specific job types, the employment levels in the State Forests are shaped in slightly different manner. Since 2015 there have been visible trend to reduce number of manual workers (from 4 314 in 2005 to 2 548 in 2014), while at the same period there is apparent growth in number of non-manual workers (from 21 774 in 2005 to 22 828 in 2014). Such restructuring of employment in form simultaneous reduction of manual work posts and increase in number of non-manual posts may evidence that the State Forests pursue to achieve higher work specialization.

It is also worth mentioning that since 2005, average monthly gross remuneration in the State Forests, irrespectively of post's type, has experienced systematic growth (for average wages in total – from 4126 in 2005 to 7229 in 2014). The least favorable salary conditions are related to manual posts where gross remuneration in 2014 was estimated to 4 971 zlotys. In turn, the most favorable salary conditions are related to non-manual posts (average value in 2014 - 7 481 zlotys), especially in its biggest working group – the Forest Service, where average monthly remuneration in 2014 was estimated to 8 014 zlotys.

Table 5. Employment and remunerations in the State Forests National Forests Holding in years 2005, 2010-2014

Specification	Average employment in persons				Average monthly gross wage in zlotys			
	total	posts			total	posts		
		manual	non-manual			manual	non-manual	
			total	of which Forest service			total	of which Forest service
2005	26 088	4 314	21 774	15 362	4 126	2 538	4 440	4 743
2010	24 733	2 824	21 909	16 294	5 595	3 923	5 811	6 135
2011	24 798	2 711	22 087	16 370	6 390	4 471	6 625	7 025
2012	24 820	2 660	22 160	16 385	6 987	4 831	7 246	7 695
2013	25 103	2 603	22 500	16 564	6 980	4 798	7 232	7 717
2014	25 376	2 548	22 828	16 702	7 229	4 971	7 481	8 014

Source: Forestry 2015, CSO.

LEGAL ASPECTS OF EMPLOYMENT IN THE STATE FORESTS NATIONAL FOREST HOLDING

The Forest Act of 28th September 1991 regulates legal position of the State Forests National Forest Holding in transparent and comprehensive manner [Act…1991]. It has to be stressed that the Act regulates basically all operational and organizational aspects of the State Forests' functioning. It covers such issues like property and resources managing, forests administrations or employment aspects [Act…1991].

The State Forests National Forest Holding is one of state's organizational unit, which was created to represent the Polish State Treasury's rights and obligations related to administration of national forest resources and properties (art. 32(1) of the Act 1991). In fact, the State Forest should be considered not as one unit but as a sort of organizational units' holding consisting of four types of units: the State Forests Directorate-General, the State Forests regional directorates, Forest Inspectorates and other organizational units without legal personality (art. 32(2) of the Act 1991).

Complexity of ownership and organizational structure in the State Forests also results in diversity of legal provisions regulating varied employment structure of the subject. It is necessary to note that legal basis of employment in the State Forests is directly dependent on legal status of given work post – for specified posts employment relationships are based on employment contract, for others - employment relationship are based on the act of appointment. It is also worth mentioning that such conditions like durability and stability of employment relationship are directly affected by specified employment legal basis.

EMPLOYMENT RELATIONSHIPS BASED ON APPOINTMENT

The Act of appointment constitutes legal basis of employment relationship only in limited cases when it is clearly defined by specific special provisions of the Labor Code or separate acts (art. 68(1) of the Code 1974). The Forest Act is perfect example of such regulation, where it is stipulated that:

a) the Director-General,

b) deputies of the Director-General,

c) directors of regional State Forests directorates

d) managers of organizational units operating on national scope,

e) chief foresters and

f) managers of organizational units operating on regional scope are employed on the basis of act of appointment. The Director-General is appointed and dismissed by the Environmental Minister (art. 32(2) of the Act 1991), subjects listed in points b-d are appointed and dismissed by the Director-General of the State Forests (art. 33(3)(9a-d) of the Act 1991) and other subjects (e-g) are appointed and dismissed by directors of regional directorates (art. 34(2b) of the Act 1991).

It is also necessary to stress that employment relationship based on the act of appointment is characterized by relatively low levels of stability and durability. Moreover, the appointment influences such aspects of employment relationship like procedures of hiring and dismissing or changing content of such relationship [Niedbała…2012]. Among basic weaknesses, employee's limited legal prerogatives and claims related to dismissal should be firstly highlighted. As the art. 69 of the Labor Code indicates, regulations related to the procedure of dismissal (e.g. employer's legal obligation to co-operate and consult his plans with the trade unions) or related to judicial examination of ineffectiveness of notice or reinstatement claims are not applied to employment relationships based on appointment. It simply means that appointed workers are deprived of such claims and rights and cannot be reinstated. What is more, appointed employee can be dismissed at any time, even with forthwith cause and regardless of the fact of employee's justified absence during the dismissal (art. 70 and 72 of the Code 1974)[Niedbała…2012]. As it appears, employment relationship based on appointment is connected with serious limitations related to employee's protection and at the same time assures employer's considerable facilitations related to dismissal procedure.

EMPLOYMENT RELATIONSHIPS BASED ON EMPLOYMENT CONTRACT

On 19th August 2014 in the Polish legal system the new amendment to the Forest Act has come into force [Act…1991]. The amendment has introduced significant change to legal position of many employment relationships in the State Forests. Since the given date, the art. 35 of the Forest Act has

been amended, directly depriving chief foresters the right to appoint and dismiss their deputies, forest accounting officers, inspection engineers and foresters (art. 35(1) of the Act 1991 in previous wording assured such right). Since the day of amendment coming into force, employment relationships of listed above employees have been transformed form appointment to employment contracts for indefinite time (art.2 of the Act 2014).

The amendment is significant mainly for two reasons. Firstly, the modification of employment relationships' legal basis is related to vast number of the State Forest's employees. Secondly, this alteration is a turning point, which has strengthened employment's security and durability in the State Forests. It is worth mentioning that the employment contact for indefinite time, contrary to appointment, is characterized with longer notice periods (from 2 weeks to 3 months according to employment period – art. 36 of the Code 1974). Moreover, employer has limited freedom in redundancy policy, for instance by proper justification of dismissal (art. 30 § 4 of the Code 1974) or by legal obligation to cooperate and consult planned dismissals with trade unions (art. 38 of the Code 1974). As it appears, employees on indefinite time contacts are in far more better legal position than appointed ones.

LEGAL POSITION OF THE FOREST SERVICE

Characterizing legal aspects of employment in the State Forests, it is also worth to analyze legal position of the Forest Service, which is its biggest working group (in 2014 – 16 702 thousands and 65,82% of total employment). The Forest Act has relatively complex provisions governing legal position of the Forest Service, defining such aspects like scope of executed functions, required working qualifications or scope of privileges and rights of the Forest Service's employees [Act…1991].

According to art. 45(1) of the Forest Act, the Forest Service consists of the State Forests' employees responsible for forest management, protection and administration, fighting forest crimes and misdemeanors and inspecting forest administration (art. 48(1) of the Act 1991). As it appears, the Forest Service consists of many functionaries, who perform varied functions related to organization, administration and protection of the State Forests.

The Forest Act clearly defines working qualifications for candidates to the Forest Service. As the art. 45(2) of the Act provides, any functionary of the Forest Service is required to be at least 21, enjoy full civil rights, have proper qualifications, enjoy irreproachable reputation, be employed in full-time, be healthy and not convicted for crimes for base or profit motives [Act…1991]. As it can be easily noted, the Forest Act stipulates relatively clear and complex requirements related to employment in the Forest Service. Taking into consideration gravity and authority of work in the State Forests, such complexity of provisions should be considered as rational solution, which can assure desirable specialization and professionalism of the State Forests employees.

It is worth highlighting that working in the Forest Service, among from favorable remuneration (see table 5), is also characterized by several working privileges and enhanced legal protection. Firstly, it should be noted that the Forest Service's functionaries during their service are covered with legal protection provided for public officials (art. 41(1) of the Act 1991). It means that during their work, the Forest Service functionaries enjoy enhanced legal protection, for instance by qualified and strengthened criminal liability for assault on such functionary. The Forest Service enjoys also other privileges, such as free uniforms and accommodation, paid health leave up to 6 months or redundancy payments (in value equal to last three or six monthly remunerations in case of retirement or pension)(art. 46(1) of the Act 1991). As it appears, work in the Forest Service is connected with several profitable privileges, which are not guaranteed within ordinary employment relationship.

CONCLUDING REMARKS

Employment levels in both total domestic forestry and the State Forests National Forest Holding have been shaped by relatively stable and positive trends. The mild trend was common not only for employment levels but also for average gross monthly remuneration in the industry. Taking into consideration fact that global economy has experienced serious crisis in last years, such levels of employment and wages in domestic forestry should be undoubtedly considered as positive and prospective phenomenon proving that the polish forestry is in good health. Especially, positive employment trends are connected with the State Forests where among from increased working specialization, the average monthly gross wages has experienced almost 100% growth in considered period.

However, it should be concurrently highlighted that in the Polish forestry there is apparent disproportion between private and public sectors in terms of average remuneration. Each year, average monthly gross wages and salaries in private sector was close to domestic minimal wages (minimal gross wage in Poland in 2013 was 1 600 zlotys), when at the same time, average gross remunerations in public sector, especially in the State Forest were dramatically higher. In addition, it should be also noted that private sector is characterized with more common annual employment restructuring, which results in weaker work stability and durability.

Evaluating legal measures shaping legal position of the State Forests' employees it should be mostly highlighted that their situation is governed in duality. The most important posts are filled with appointed candidates and are characterized by weaker employment stability and durability. At the same time, other posts, which number has increased significantly in 2014, are based on employment contracts for indefinite period, guaranteeing stronger work stability and durability. National legislator also intends to protect the State Forests' biggest working group – the Forest Service, by guaranteeing extended catalogue of privileges and powers.

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Post natural disaster loan as an instrument of ensuring security of agricultural activity

Abstract: The climate changes that have been observed recently increase the occurrence of unfavourable atmospheric phenomena, thereby causing more frequent losses in the process of agricultural production. An alleviation of the effects of these phenomena very frequently requires an involvement on the part of the government as well as financial aid from both national and foreign public institutions. Instruments offered within public aid that enable an elimination of the effects of natural disasters and resumption of production on farms include post natural disaster loans. The purpose of the study is to define the significance of disaster loans for the purpose of ensuring security of running and maintaining agricultural activity in Poland. The analysis covered the numbers and values of disaster loans granted per credit lines in the years 2007-2014. The structure of loans granted was also the subject of the analysis. The data obtained from the reports of the Agency for Restructuring and Modernization of Agriculture constituted the source of empirical materials.

Key words: agricultural activity, losses, public aid, disaster credit, security of agricultural activity

INTRODUCTION

An agricultural activity is an activity in the scope of plant and animal production including garden, fruit, apiarian, fish and forest production[17]. This is an activity which is characterized by a specific production process which distinguishes it from other activity types. Considering the specificity of this activity, it is nature which cannot be controlled by the farmer that constitutes the key risk factor, one which may cause potential losses [Wawrzynowicz, Wajszczuk, Baum].

The climate changes that have been observed recently increase the occurrence of unfavourable atmospheric phenomena (such as droughts, hailstones, floods, gales, land sliding etc.), and they bring about more and more frequently losses in the process of agricultural production [Sadowski, Wilkin, Kołomyjska, Karczun, Witeska, 2008; Soliwoda 2013], which may reduce the ability of an entity to continue its operations. They contribute to the loss of an ability to cover ongoing expenses which are required to run basic operating activities and to repay financial liabilities. This may ultimately lead one to abandon their business activities or to substantially limit their scope. According to the data from the Ministry of Rural Development and Agriculture, in the years 2007-2013, mainly as a result of floods, hailstones, gales, droughts, excessive atmospheric precipitations, torrential rains, lightning, spring slight frosts and negative effects of wintering, 653,632 farms and entities that ran special branches of agricultural production suffered damage. Natural disasters occurred on the area of 7446.8 thousand hectares, and the losses incurred were calculated in the amount of PLN 14,087,241.89 thousand [http://www.arimr.gov.pl]

Alleviation the effects of the occurring natural phenomena frequently requires an involvement of government and financial aid both on the part of national and foreign public institutions. Instruments offered within public aid that enable an elimination of the effects of natural disasters

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[17]Act of 20 Dec. 1990 on social insurances for farmers, Journal of Laws from the year 1991, No. 7 Item 24 Art. 6 Para. 3 as amended

and resumption of production on farms include preferential disaster loans. In Poland, financial aid in the form of disaster loans was realized on the grounds of the Ordinance by the Council of Ministers of 30 January 1996 on detailed directions of the activities of the Agency for Restructuring and Modernization of Agriculture and ways of their realization[18]. Starting from 26 February 2009, these loans can be granted on the basis of the Ordinance by the Council of Ministers of 22 January 2009 on the execution of some tasks of the Agency for Restructuring and Modernization of Agriculture[19] and taking into consideration the Community Guidelines on governmental aid in the agricultural and forest sector for the years of 2007-2013 (2006/C 319/01).

Disaster loans are included in the instruments of national aid offered by the Agency for Restructuring and Modernization of Agriculture[20]. The aid consists in offering subsidies by the Agency for Restructuring and Modernization of Agriculture to the interest on a loan granted to the bank's risk from its financial resources, owing to which the costs of the loan incurred by the borrower are lower as compared to the handling costs of commercial credits [Rosa 2011].

Interest on disaster loans is variable but it cannot be higher than 1.5 of the rediscount rate on bills of exchange accepted from banks for rediscount by the National Polish Bank per annum. Interest owed to the bank is paid by the borrower in the amount of 1.5% of the interest if on the day of the occurrence of damages at least 50% of the acreage excluding meadows and pastures, or at least 50% of the number of farm animals in a farm or a special branch of agricultural production were insured against at least one of risks, covering risks connected with unfavourable climate phenomena, whereas the remaining part is paid by the Agency for Restructuring and Modernization of Agriculture. The farmers have access to loans in the chains of those banks on the whole territory of Poland which cooperate with the Agency for Restructuring and Modernization of Agriculture.

The purpose of the present study is to define the significance of disaster loans for ensuring the security of running and maintaining agricultural activities in Poland. The analysis covered the numbers and the values of disaster loans granted per credit lines in the years 2007-2014. The analysis also covered the structure of loans granted. The data obtained from the reports of the Agency for Restructuring and Modernization of Agriculture constituted the source of empirical materials.

CONDITIONS FOR QUALIFYING FOR PREFERANTIAL DIASTER LOAN

Preferential disaster loans are aimed at the provision of aid in resuming production on farms and in special branches of agricultural production, where damages occurred caused by droughts, hailstones, torrential rains, negative effects of wintering, spring slight frosts, floods, gales, lightning, land sliding or avalanches. These loans are offered in two credit lines: investment (KL/01) and working capital (KL/02) credit lines [Kurdyś-Kujawska, Rosa 2015]. In the case of disaster investment loans, resuming production involves incurring investment expenditures which are essential to replace fixed assets after disasters through the following:

- restoration of the functioning of destroyed or damaged livestock buildings, storage and warehouse buildings, greenhouses and other buildings, structures, machinery and facilities used in production, damaged tractors, machines, agricultural machinery and production process management facilities by carrying out major renovations and repairs of those elements of technical infrastructure that have a direct influence on the conditions of running an agricultural activity,

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[18] Ordinance by the Council of Ministers of 30 January 1996 on the detailed directions of the activities of the Agency for Restructuring and Modernization of Agriculture and ways of their realization [Journal of Laws, No. 16 Item 82 as amended]
[19] Ordinance by the Council of Ministers of 22 January 2009 on the realization of some tasks of the Agency for Restructuring and Modernization of Agriculture [Journal of Laws, No. 22 Item 121 as amended]
[20] It was appointed on the grounds of the Act of 29 December 1993 concerning the formation of the Agency for Restructuring and Modernization of Agriculture, while currently it functions under the Act of 9 May 2008 on the Agency for Restructuring and Modernization of Agriculture [Journal of Laws from the year 2008, No. 98 Item 634].

- purchase of qualified nursery stock to reconstruct an orchard or another plantation of perennial plants whose useful life exceeds 5 years with the exclusion of plants for energy purposes and the purchase of a basic livestock herd,

- purchases to replace damaged tractors, machines, agricultural machinery, hardware and software to manage the production process, and also trucks, delivery trucks or specialist trucks solely for needs connected with production in the special branches of agricultural production.

Production resumption with the use of a disaster working capital loan involves expenditures on tangible assets which are required to restore productivity through the purchase of inventories for agricultural production, i.e. qualified seed and nursery stock, mineral fertilizers, pesticides, fuels for agricultural purposes, fodder for farm animals etc.

The essential condition required when applying for a disaster loan is to assess the damages caused by a given force majeure event. These losses are assessed by a committee that is specially appointed for this purpose by the competent Provincial Governor. On these grounds, an opinion concerning the scope and amount of damages caused by a disaster is prepared. This is considered as a formal document to confirm the occurrence of damage, and obtaining it is the required condition for the aggrieved party to apply for a loan. The provision of aid within the framework of preferential disaster loan lines may commence only upon a consent of the Minister of Agriculture and Rural Development.

Granting a disaster loan is dependent on the amount of the losses incurred by a farm. A loan can be granted in two cases. Firstly, this is when the amount of the damage incurred exceeds 30% of the average annual agricultural production in a farm or a special branch for a three-year period that precedes the year when damages occurred, or the average for three years in the five-year period that precedes the year when damages occurred excluding the year with the highest and the lowest quantity of production in the case of damages to agricultural crops and farm animals. Secondly, this is when the amount of the damage incurred exceeds the amount of PLN 1,050.00: in the case of damages to a fixed asset that is different from agricultural crops or farm animals. Additionally, those farmers who are applying for disaster investment loans are obliged to submit an investment plan which, apart from the information required by the bank to assess the creditworthiness, is to include among others the purpose of the investment, the financing structure of the investment, the foreseen completion period of the investment, the course of production in the term of the loan and the grace period. Disaster loans can be granted by banks within a period of up to 12 months starting from the assessment date of the damages.

The amount of a disaster loan is dependent on its purpose. The amount of a disaster investment loan cannot exceed the value of the fixed assets destroyed, and in the case of a working capital loan, this cannot exceed PLN 4 million for farms and PLN 8 million for the special branches of agricultural production. The borrower is not required to make their own contribution. However, they have to document the use of a disaster investment loan and to account for at least 50% of the expenses in the case of a disaster working capital loan within a period of 3 months starting from the day they received funds from the bank.

USE OF DISASTER LOANS BY FARMERS IN POLAND

According to the empirical research carried out in the years 2007-2014, banks that cooperate with the Agency for Restructuring and Modernization of Agriculture granted 316,211 loans with subsidies to the interest, while 211,256 (66.81%) were loans whose purpose was to cover losses that occurred as a result of natural disasters on farms and in special branches of agricultural production. Disaster working capital loans for the purchase of tangible assets for agricultural production were relatively more frequently granted by banks (210,712 loans) as compared to disaster investment loans (544 loans) connected with the reconstruction of destroyed fixed assets (Table 1).

Table 1. Number and structure of preferential disaster loans granted in relation to agriculture in Poland in the years 2007-2014

Credit line	Years							
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
	Number of loans granted							
Total preferential loans	107,248	54,092	51,316	20,700	33,922	20,731	17,528	10,674
nKL/01	167	162	36	29	42	60	32	16
nKL/02	84,375	39,903	40,581	8,512	18,957	8,241	4,945	5,198
	Structure (in %)							
nKL/01	0.16	0.30	0.07	0.14	0.12	0.29	0.18	0.15
nKL/02	78.67	73.77	79.08	41.12	55.88	39.75	28.21	48.70

Source: author's own study based on data from the Agency for Restructuring and Modernization of Agriculture

Strong interest on the part of farmers in disaster loans is first of all the result of the necessity to quickly restore productivity, which is connected with the possibility of the continuation of work on a farm, which on many occasions constitutes the only source of income for the farmer and their family [Kurdyś-Kujawska 2012]. Furthermore, unfavourable natural phenomena cause losses chiefly to crops rather than to fixed assets that are at the disposal of the farm. In the years 2007-2013, losses to crops were assessed to be PLN 9,778,631.99 thousand, while losses to fixed assets were on the level of PLN 85,794.26 thousand. The number of hectares of those crops which were affected by natural disasters was 7,446.8 thousand. The greatest losses to fixed assets were observed in the year 2008, and in the year 2011 there were the largest losses to fixed assets (cf. Table 2). The number of disaster loans granted successively diminished starting from the year 2009. In the year 2014, as compared to the year 2009, the number of investment and working capital loans decreased by 91.41% and 94% respectively, with a decrease in the number of all the types of preferential loans granted by 90.04%.

In the period analyzed, an average 38.64% of those farmers that suffered losses and were entitled to apply for disaster loans received government aid in the form of subsidies to the interest on loans. The greatest numbers of those farmers that suffered losses received disaster loans in the year 2007 (85.23%) and in the year 2009 (75.18%). As it is indicated by the research results, the largest area of crops was destroyed in the year 2008, and farmers sustained the largest losses in connection with the occurrence of natural disasters. In that year, every tenth entitled farmer received a disaster loan. The smallest amount of farmers entitled to receive a disaster loan were granted loans in the year 2010 (7.05%).

In the period analyzed, the amount of preferential loans granted was PLN 25,300.49 million, with the amount of disaster investment loans of 21.67 million, and the amount of PLN 4,889.20 million of working capital loans. The value of disaster loans paid out in the years 2007-2014 decreased, just as their number did, by 81.82%: disaster investment loans, and by 79.10%: disaster working capital loans, with a decrease of the values of the amounts of all preferential loans by 59.38%. The highest amounts of funds within the framework of national aid in the form of disaster loans were paid out in the years 2007-2008 (cf. Table 3). It is to be noted that in the year 2008 ca.

14% of those farmers who suffered losses received disaster loans, whereas their value was one of the highest in the period analyzed.

Table 2. Number of farms that suffered damages and amount of damages assessed on farms and in special branches of agricultural production in Poland in the years 2007-2013

Description	Years						
	2007 (V-XII)	2008	2009	2010	2011	2012	2013
losses to crops (in thousand PLN)	no data available	3,750 869.04	623 680.13	1,938 062.91	1,134 794.12	1,414 248.49	916 977.30
losses to fixed assets (in thousand PLN)	no data available	69,810.09	9,817.07	247,993.32	273,690.60	178,692.62	72,790.56
total losses (in thousand PLN)	3,455 815.63	3,820 679.13	633 497.20	2,186 056.23	1,408 484.72	1,592 941.12	989 767,86
number of hectares (in thousand PLN)	490.53	4,247.40	288.75	926.29	586.53	710.60	196.70
Number of farmers that suffered damages and were entitled to apply for loans	99,194	271,759	54,028	121,100	37,335	41,855	28,361

Source: author's own study based on data from the Agency for Restructuring and Modernization of Agriculture

Table 3. Value and structure of preferential disaster loans for agriculture in Poland in the years 2007-2014

Credit line	Years							
	2007	2008	2009	2010	2011	2012	2013	2014
	Value of loans (in million PLN)							
Total preferential loans	4,429.5	3,317.28	2,591.33	2,626.03	3,833.60	3,463.15	3,240.40	1,799.20
nKL/01	3.3	3.07	0.8	2.3	2.2	7.8	1.6	0.6
nKL/02	1,164.7	1,043.70	792.6	244.1	677.5	456.9	266.3	243.4
	Structure (in %)							
nKL/01	0.07	0.09	0.03	0.09	0.06	0.23	0.05	0.03
nKL/02	26.29	31.46	30.59	9.30	17.67	13.19	8.22	13.53

Source: author's own study based on data from the Agency for Restructuring and Modernization of Agriculture

Use of disaster loans in Poland is diversified not only considering their numbers and the amounts of loans granted but also regarding regions. This is confirmed with a wide analysis of the regional diversification of disaster loans that was carried out by A. Gawrońska [2013]. The author points out that individual provinces were characterized by a very high variability of disaster investment loans obtained (vp = 82-134%). The highest numbers of disaster investment loans were obtained by farmers from Śląskie and Lubelskie Provinces, farmers from Pomorskie, Warmińsko-Mazurskie and Zachodniopomorskie Provinces obtained the lowest numbers of these. There was also a very high diversification between provinces as regards disaster working capital loans granted (vp = 88%). The greatest numbers of loans were granted to farmers in Wielkopolskie, Mazowieckie and Kujawsko-Pomorskie Provinces, while the smallest numbers in Śląskie Province.

CONCLUSIONS

The analysis carried out permitted the authors to formulate the following general conclusions:

a) for farms which were affected by natural disasters, public aid in the form of preferential disaster loans constitutes an opportunity for them to restore their original production ability;

c) in the years 2007-2014, those banks that cooperate with the Agency for Restructuring and Modernization of Agriculture granted 211,256 loans to cover losses that occurred as a result of natural disasters on farms and in special branches of agricultural production, while the number of those farmers who suffered losses and were entitled to obtain disaster loans was 653,632;

b) disaster working capital loans for the purchase of tangible assets for agricultural production were relatively more frequently used than investment loans connected with the reconstruction of destroyed fixed assets;

c) in spite of the fact that disaster loans constitute an important instrument to ensure the security of running agricultural activity, their number and values successively diminished starting from the year 2009. In the year 2014, the number and values of disaster loans granted as compared to those in the year 2009 decreased by 90.42% and 81.81% respectively.

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IMPROVEMENT OF ORGANIZATION OF WORK AT THE CROSS-CUT AND MESH CIRCULAR SAW STATION WITH AN APPLICATION OF 6S METHOD

Abstract: The paper presents pilot implementation of 6S method at the cross-cut and mesh circular saw stationin one of the Sub-Carpathian enterprises producing furniture. The company within the strategy focuses on key clients and specializes currently in kitchen furniture production. The increasing demands of customers necessitate a continuous improvement. Within the works the 6S method was implemented. The presented implementation can also be used as a teaching deployments in other jobs in the industry.

INTRODUCTION

Nowadays, companies wishing to succeed more willingly use effects that deliver process improvements they run. [3] To improve the process one needs, first of all, to get to know and analyze it. Sometimes it is very difficult, and sometimes impossible because of the mess, the excess of unnecessary tools, parts or poorly organized work station. For this reason, in order to improve firstly one should take care of order and good organization of work.

A tool to help solve the problem of improper organization of the workstation is the philosophy of 5S (5S principles 5S practices, techniques of 5S, 5S method, the movement of 5S, 5S system). Regardless of the adopted name it is important to know that its creators are the Japanese, defining it as "the pursuit of excellence through law and order" [1, 2, 4] 5S acronym is derived from the initials of five Japanese words: Seiri - seiton - seiso - seiketsu - Shitsuke (called .: sort - systematize - sweep - sanitize - or self-discipline: sweep away - sort - spotless - standardize - step-by-step). It should be noted that the translation of these five words is ambiguous and difficult to find as Polish equivalents. Władysław Pawlak proposes the following Polish words that also begin with the letter S (in Polish language): selection - taxonomy - keeping - cleanliness - self-discipline. You can also meet other Polish translation 5S, namely: selection - sorting - cleaning - standardization - self-discipline [1].

Sometimes in the literature 5S method is known under the name of 6S and 5S + 1. The sixth S – stands for safety - means elimination of the danger, or creation of secure jobs [1]. An application in practice 6S principles generally does not require financial outlays, but the correct implementation of the principles 6S gives a lot of benefits. Thanks to them, you get a clean, orderly and efficiently organized workplace. Loss of time associated with finding the necessary tools to perform work or emergency repairs are eliminated thereby the production cycle shortens and productivity raises. The production quality and communication improve, as well as safety and working conditions. Thanks to the 6S rules the way of thinking of employees changes and the openness to make changes increases. The 6S rules is a tool from which everyone should begin the process of change within the company. After their introduction the ways for subsequent improvements open as they develop a good habit among employees, as well as the need and desire of improvements.

It seems reasonable to analyze the implementation of 6S philosophy of the company producing furniture, because the results of the analysis of the implementation may translate to the ability of 6S implementation in other areas of the company and the companies like this. What's more a practical approach can be used by other companies to improve the organization of work and thus production management. The study shows some major actions leading to this goal.

THE IMPLEMENTATION OF 6S METHOD AT THE CROSS-CUT AND MESH CIRCULAR SAW STATION.

The analyzed implementation took place in Podkarpackie kitchen furniture manufacturing company - PPH Więcpol. The company was founded in October 1989 as The Carpenter Service. From the beginning the company was engaged in production of kitchen furniture. Production is directed towards the needs of the local market. Continuous improvement of the production was the motto of the company. It was also probably the competitive element of the game that this fight has led with great success. The company has been supplying goods to the Russian, Moldovan, Ukrainian, but also Lithuanian market. Currently, the company's strategy foresees the implementation of smaller quantities of products, but for very demanding clients. This forces the company a consistent application of methods of improvement. One such method is the use of formalized teamwork. The result of this work was the brainstorm. The conclusions of the brainstorming pointed to the need to implement this method at the cross-cut and mesh circular saw station. It was decided that this is a place of currently the biggest organizational and quality problems.

The first step in 6S was to conduct a 6S pre-audit (tab.1) for a circular saw station.

Fig. 1. General look of the cross-cut and mesh circular saw. [3]

Audited area: The cross- cut and mesh circular saw station
Date: 12.12.2014 r.
Auditor: Jakub Więcek
INITIAL 6S AUDIT CARD

	Station: Cross- cut and mesh circular saw		
Item no. and description	**6S assessment and scoring criteria Assessment scale 0 – 5 (poor=0; perfect=5)**	**No. of points**	**The results Priorities to do**
1. Boards	There are no overdue, torn or dirty boards. All messages are organized in a simple and careful way.	2	Lack of work instructions and information from OHS
2. Items on the floor	Equipment, tools and other materials are not located directly on the floor. Larger items are located exactly in the areas designated for the.	3	The guide is placed on the floor
3. Table- tools storage	On the table thereare only tools needed for the position.	2	The presence of unnecessary things on the table: bar clamp, cutter, paint spray, knife, wrench, grease graphite, hammer, screwdriver, grease gun, lithium grease, grease in spray
4.Cleaning	Eradicating of all dust anddirt. The removal of foreign material from the work. Maintaining of clean station which is easy to verify	2	Lack of maintenance of good order and the general mess and confusion reigning at the station.
5. Walkways – maintenance	Walkways are always free of obstacles. Convenient and easy access to the workstation.	3	Scattered pieces of plates preventing an access to the after-production waste bin
6. Availability of safety measures	Extinguishing and rescue equipment is not obstructed and are easy to locate. Stop and brake buttons are marked for easy location.	3	Difficult access to a fire extinguisher
Total result	15	Rate scale 0 - 30	
Average result (total result/6)	15/6 = 2,5	Rate scale 0 - 5	

One of the irregularities noticed during the audit there was a lack of proper organization of the station. In the table (fig. 17) there was visible mess and chaos that affected the transparency of the station. In addition to the necessary equipment, there were a lot of unnecessary tools, devices and objects. Equipment used during the process was in many cases left in random places, affecting in

this way to an extend the performance of specific tasks. Inappropriate storage of important tools and parts resulted in their rapid destruction. Another anomaly were scattered production waste that hindered access to trash cans and fire extinguisher.

Table 2. List and analysis of items that are at the station. [3]

No.	Tools at the station	Always necessary	Used occasionally	Unnecessary
1.	Set of wrenches	X		
2.	Set of allen keys	X		
3.	Circular saws	X		
4.	Anvil chisers	X		
5.	Anvil chiser wahers	X		
6.	Pusher	X		
7.	Blast gun	X		
8.	Expansion wedge	X		
9.	Mounting rail	X		
10.	Guide	X		
11.	Meter	X		
12.	Glasses	X		
13.	Earcuffs	X		
14.	Screwdrived		X	
15.	Container of the paint in spray			X
16.	Bar clamp			X
17.	Hammer		X	
18.	Lubricator		X	
19.	Carpenter's knife			X
20.	The monkey wrench			X
21.	Lubricant in spray			X
22.	Lithium grease		X	
23.	Graphite grease			X
24.	Chisel			X

Before the implementation of 6S methods the number of points obtained during the audit was 15, while the average score in the audit card is 2.5 (15/6 = 2.5).

After the audit the following inconsistencies that hinder the proper functioning of the position of the circular saw were noticed:
• there are unnecessary items on the station,

• tools are not in the right place,
• no established standard of cleaning,
• workplace is polluted,
• difficult access to the fire extinguisher and buckets of waste,
• lack of work instructions and information from OHS. [3]

The first activity used to eliminate inconsistencies was the selection (1S) of tools in the workplace. A list of all the tools in the workplace was made (Table 2). After an application of such a list of tools one could easily determine what tools are needed for everyday use, which are used occasionally, and which are unnecessary.

For the selection the Red Label method was used which involves eliminating unnecessary things in the workplace by placing red labels on them. In addition to the red labels, the yellow ones were also used which are responsible for the tools applied occasionally. The carried out analysis on the tools in the workplace indicated the tools that are unnecessary and those which are used periodically. The tools marked with a red label had been removed from the station and the tools used periodically were moved to the warehouse. The next step was to implement the scheme of (2S). The tools were structured in such a way that each was in its place, all the flat wrenches and allen keys were arranged and hung on the board. They are used by the employees to prepare saw. It was developed a board of shadows (Fig. 2), which the most necessary tools were placed. Thanks to it the time to seek the necessary tools was minimized.
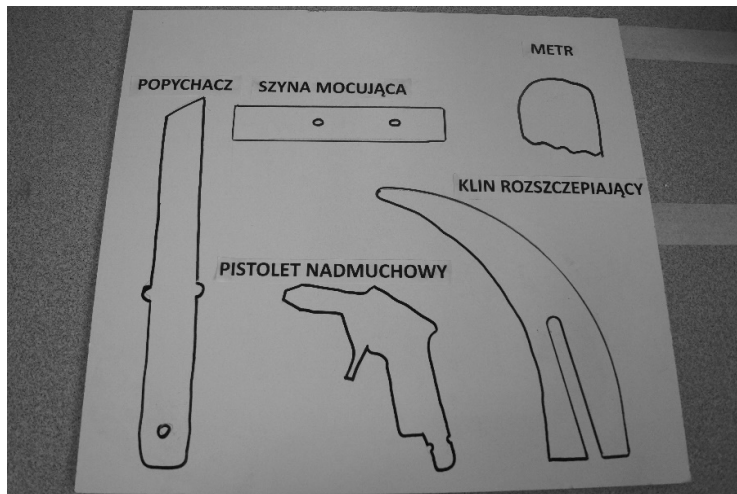
Fig. 2. Board of shadows. [3]

The next step in the implementation of 6S at the circular saw station is cleaning (3S). The pieces of plates impeding access to the extinguisher and trash bins were removed and in order to maintain the proper state of cleanliness at the station the cleaning board was prepared.

Another irregularity noticed during the audit is the lack of work instructions and information on health and safety necessary for each employee. The board containing the work instructions was hung as well as health and safety information and fire safety guidelines which were a response to the 4S and 4S, i.e. standardization of work and safety.

Table 1. 6S audit card after the application of 6S method on the cross- cut and mesh circular saw station [3].

Audited area: The cross- cut and mesh circular saw station

Date: 12.12.2014 r.

Auditor: Jakub Więcek

AUDIT CARD AFTER IMPLEMENATION OF 6S

Station: Cross- cut and mesh circular saw

Item no. and description	6S assessment and scoring criteria Assessment scale 0 – 5 (poor=0; perfect=5)	No. of points	The results Priorities to do
1. Boards	There are no overdue, torn or dirty boards. All messages are organized in a simple and careful way.	4	Lack of work instructions and information from OHS
2. Items on the floor	Equipment, tools and other materials are not located directly on the floor. Larger items are located in exactly the designated areas.	4	The guide is placed on the floor
3. Table- tools storage	On the table there are only tools needed for the position.	4	The presence of unnecessary things on the table: bar clamp, cutter, paint spray, knife, wrench, grease graphite, hammer, screwdriver, grease gun, lithium grease, grease in spray
4.Cleaning	Eradicating of all dust, dirt. The removal of foreign material from the workstation. Maintaining of clean station which is easy to verify	3	Lack of maintenance of good order and the general mess and confusion reigning at the station.
5. Walkways – maintenance	Walkways are always free of obstacles. Convenient and easy access to the workstation.	4	Scattered pieces of plates preventing an access to the after-production waste bin
6. Availability of safety measures	Extinguishing and rescue equipment is not obstructed and is easy to locate. Stop and brake buttons are marked for easy location.	4	Difficult access to a fire extinguisher
Total result	23		Rate scale 0 - 30
Average result (total result/6)	23/6 = 3,8		Rate scale 0 - 5

5S or self-discipline was assured by a reminder that after the implementation of this method at every stage employees should follow the established rules, have to be disciplined enough to adhere to these principles in their daily work.

After the implementation of 6S methods in the Więcpol company again 6S audit was carried out (table 2).

The total number of points has risen to 23, while the average score was 3.8. The result improved, therefore the implementation of 6S methods have a positive impact on the organization of the circular saw station, but it did not eliminate all discrepancies which had been detected during an audit and the highest number of points was not achieved. The look of the station after the implementation of 6S was shown in Fig. 3.

Fig. 3. The cross- cut and mesh circular saw station after the implementation of 6S. [3]

FINDINGS

The implementation of 6S method the cross- cut and mesh circular saw station brought a lot of benefits:
- order at the workplace,
- eas of quick relocation of the necessary tools,
- segregation of tools, for those used occasionally and those which are needed every day,
- development of a standard cleaning.
- easier access to the extinguisher and dustbin,
- the table has been posted containing information on health and safety, fire safety guidelines and work instructions.

After applying the principles of 6S the work at the circular saw station has become less tiring and more effective for employees . Getting rid of unnecessary things improved work at this station.

In the Więcpol company there are many workstations on which it would be advisable to introduce the 6S method, that is why it was appropriate to realize a pilot project to implement the 6S method at the cross- cut and mesh circular saw station.

CONCLUSIONS

6S method is a useful and frequently used tool to improve the organization of production. Any process of improvement and implementation of modern methods of production management should begin with this method. An application of the 6S principles gives the same results as the effective organization of jobs, the elimination of losses that are related to the deficiencies and failures, simplification and organization of the work environment, improvement of quality and safety.

Based on the analysis of complaints about furniture production processes in the company the 6S method was introduced in Więcpol company at the cross- cut and mesh circular saw station. It was recognized that the implementation of this method at the workplace in a meaningful way will raise customer satisfaction with the produced furniture and will inspire the rational implementation of this method in other workplaces.

After the implementation of 6S methods the workflow improved, the number of errors and complaints decreased and health and safety increased.

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Elżbieta Mikołajczak[21]

POSSIBILITIES OF USING STUMP WOOD FOR ENERGY GENERATION PURPOSES

Abstract: The forecasted increase in the usage of energy generated from biomass entails the necessity for securing it's adequate supply. The most accessible type of biomass is forest biomass. The chance for increase in its volume lies in the utilization of stump wood, that is the underground part of trees which is not currently being used. Harvesting and processing stump wood is very complex due to its technological difficulties as well as the profitability of such ventures. The article presents development of energy sector based on forest biomass and provides the analysis of the volume of both electric and heat energy generated from solid biomass between 2004 and 2014. The potential components of forest biomass that have been assigned for generating energy have been indicated with a special emphasis on stump wood. It's volume has been estimated based on the long-term forecast for wood supply for energy sector. Technological, ecological, economic aspects of utilizing stump wood have been analysed. A method for evaluating the profitability of processing stump wood into chips and directly into energy has been proposed.

Key words: forest biomass, stump wood, material and energy usage, profitability

INTRODUCTION

The main source of renewable energy in the EU is currently biomass, especially wood and wooden residue. In 2010 the share of this type of biomass in possessing energy from renewable energy sources (RES) constituted 49% [Commission staff working document 2014]. It has been forecast that up to year 2020 wooden biomass will keep its domineering role, however a rapid development of wind and solar energy sectors will gradually decrease its share in the overall production of energy from RES. Still despite the gradual decrease in the significance of biomass in the overall balance of energy from RES its usage in the sector of electro energy and heat energy in absolute numbers will be systematically growing. It has been estimated that between 2012 and 2020 that increase will reach 24 Mtoe, from 86,5 Mtoe (2012) to 110,5 Mtoe (2020) [Czopek 2015].

Forecast increase in the usage of energy from biomass is linked to the need of guaranteeing its adequate supply. It'll be possible due to a more effective utilization of agricultural biomass and residual biomass and thanks to the growth in possessing forest biomass out of which the only part still not used are stumps. According to the assumptions of individual EU countries indicated in their national plans related to energy from renewable resources the increase in the demand for wood for generating energy between 2006 and 2020 will reach 95m m3 (from 336m m3 to 431m m3) [Czopek 2015].

USAGE OF BIOMASS IN POLAND FOR ENERGY GENERATION
ELECTRICITY

The system introduced in 2005 which supported generating energy from renewable energy resulted in an intensive growth of energy sector based on biomass. It was possible due to a fast and low-cost adaptation of contemporary infrastructure for the needs of generating energy from biomass in the so-called technology of multifuel combustion (co-burning of biomass and fossil fuels), that has been confirmed by an increase in the number of units generating electric energy from biomass,

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as well as the increase in the power plants installed between 2006 and 2014 (table 1). The data presented there indicates high dynamics of growth of both parameters, with simultaneous slight decrease in the production of electric energy from solid fuels over the last two years under analysis. (Figure 1).

Table 1. The number of production units and the power installed in power plants using biomass between 2006 and 2014

Parametres	2006	2007	2008	2009	2010	2011	2012	2013	2014	2006=100%
Power plant [unit]	6	7	11	15	18	19	27	33	36	600
Moc [MW]	239	255	232	252	356	410	821	987	1008	422

Sources: own elaboration based on Czopek [2015] and Urząd Regulacji Energetyki (Energy Regulatory Office)

Figure1. Electric energy production using solid biofuels between 2004 and 2014 [GWh]

Source: Own elaboration based on [Energia ze źródeł odnawialnych w 2013], [Energia ze źródeł odnawialnych w 2014 r.]

Heat

　　Heat from biomass, mainly wooden biomass is mainly generated at households, which is the result of its accessibility and price. According to GUS data fuelwood is used by approximately 40% of households. Fuelwood is mainly burnt in the same installations as coal along with it or as a its substitute. [Zużycie energii w gospodarstwach domowych w 2012 r.]. Data provided by GUS also indicates that annual usage of fuelwood at a household on average amounts to 7 m^3, which means that annual cost of heating is at the level of 630 zł. In the following years we'll observe an increase in the demand for forest biomass because there is a dynamic growth in the sales of installations designed for its combustion by both individual and industrial users. According to the information provided by Instytut Energetyki Odnawialnej in 2013 sales of boilers using biomass in Poland amounted to 16 000, which means that the power generated by those sources grew by more than 640 MW. In comparison with year 2012 when the sales amounted to more than 307 MW the increase was over twofold [Rynek kotłów na biomasę w Polsce 2014 r.]

Also usage of biomass at heat and power plants gradually increases (Figure 2). Following a small decrease over the last two years a subsequent increase might be expected, which will be favoured by new regulations within the system of support [Act 2015], promoting the most cost-efficient installations that is those using for generating electric energy wind and biomass.
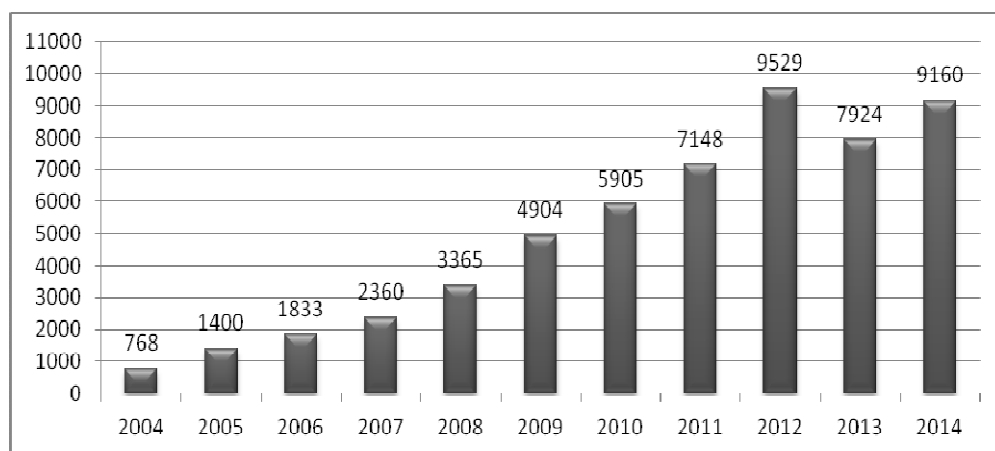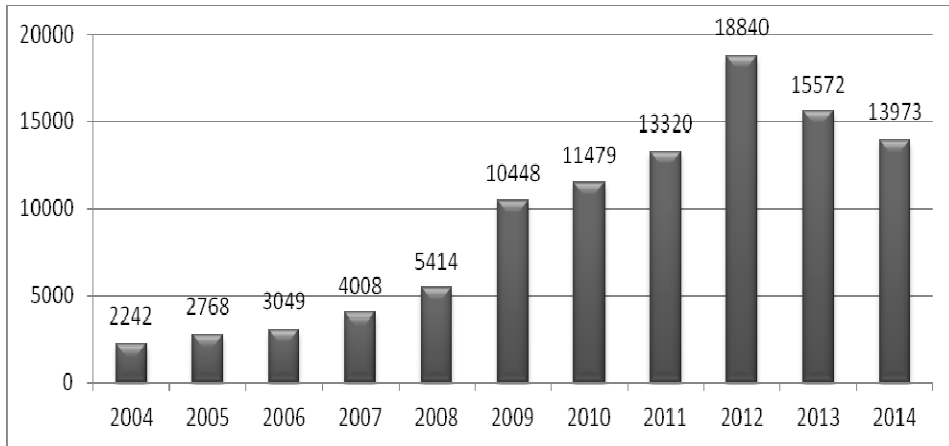

Figure 2. Heat production from solid biofuels between 2004 and 2014 [TJ]

Source: own elaboration based on [Energia ze źródeł odnawialnych w 2013], [Energia ze źródeł odnawialnych w 2014 r.]

ROOT STUMPS AS A COMPONENT OF FOREST BIOMASS

Act of the Minister of Economy from 18 October 2012 regarding the precise obligations related to the need for possessing and producing the certificates of origin, the payment of substitute fee, purchase of electric energy and heat generated from RES, as well as the obligation to confirm the data on the volume of energy generated from renewable energy resources [Rozporządzenie 2012] excludes using wood of full value for generating energy. The material that might be potentially assigned for the production of electric energy and heat is fuelwood, slash as well as stump and post felling wood for example in the form of chips and bales.

It is estimated that theoretically the base of wood for energy generation will be systematically growing from 6,90m m^3 in 2011 to 7,94m m^3 in 2021 and 8,91m m^3 in 2031 [Zajączkowski 2013]. These forecasts embrace both forests being the property of State Treasury and private forests however they do not take into account the timber and slash left in forests due to the need for the preservation of forest ecosystems, so called post disaster wood as well as stump wood.

Additionally having assumed that:

Fuelwood will be assigned to individual recipients,

Industrial slash will be sold to the producers of wood-based panels,

Only a part (for example half of fuel slash will be assigned for generating purposes,

wood base indicated for generating energy even taking into consideration post felling biomass will significantly decrease to 2,6m m^3 – 3,3m m^3 (in 2031). Those numbers will be higher only in case of the possibility for assigning for energy purposes the so-called post disaster wood (in the part not accounted for full-value wood), what would however require adequate arrangements with the minister of economy.

For the reasons indicated above, the deliberations on the accessibility of wooden biomass should also embrace the utilization of underground wood that is root stumps.

Following tree felling process a significant volume of branches, needle-cover, leaves and cut-of tree tops remains on the surface. Those are so called post-felling leftovers among which there are often included boles up to 1 m in length with defects excluding them from industrial utilization as well as stumps[22]. This material is characterized by a high level of contamination (mainly with sand) up to 10% and chlorine, it's calorific value equals 7 – 14 GJ/t, stumps –up to 16 GJ/t (Warchoł 2012). Stumps are the source of stump wood.

Often the underground part of wood including the tree stump remaining in place after felling is referred to as stump wood. Pine stump wood that stayed in the ground for at least 7 years may be used for extracting resin or dry wood distillation. It's called industrial stump wood and constitutes the basic raw material for possessing colophony and wood turpentine. Resin products are being derived from stump wood via solvent extraction (using petrol, benzene, turpentine). Unfortunately, due to the lack of raw material in Poland this type of stump wood utilization is not practiced in Poland. Still in 1960-ies There were five plants in Poland that used extraction process of industrial stump wood in Rudnik, Szczebrzeszyn, Kozienice, Spychów and Czarna Woda. Those plants processed annually about 200 000 mp of pine stump wood. Following 1977, due to the lack of raw material, industrial stump wood was extracted in just two plants in Czarna Woda and Spychów. In the subsequent years when annual acquisition of industrial stump wood at National Forests amounted to just 1 thousand m3 also the plant in Spychów was closed down. Currently, stump wood may be used as the source of green energy. However, the preclude for this type of utilization of the part of tree that has been left following its felling are technological, ecological and economic concerns which up to year 2012 had been successfully preventing the growth in stump wood acquisition (table 2). Data from the recent years 2013-2014 shows some increase in the general interest in this element of biomass. In 2014 compared with 2000 there has been 7-fold increase in stump wood acquisition.

Table 2. Acquisition of wood by assortment between 2000 and 2014 compared with 2000 [thous. m^3]

Itemization	2000	2005	2007	2008	2009	2010	2011	2012	2013	2014	2000 =100%
total	27 659	31 945	35 935	34 273	34 629	35 467	37 180	37 045	37 946	39 742	144
timber including:	26 025	29 725	34 146	32 407	32 701	33 568	34 877	34 978	35 796	37 661	145
fuelwood	*1 536*	*2 100*	*2 316*	*2 537*	*2 766*	*2 716*	*3 195*	*3 425*	*3 451*	*3 528*	*230*
slash including:	1634	2 200	1 789	1 866	1 928	1 899	2 303	2 067	2 148	2079	127
fuelwood	*928*	*1 313*	*1 118*	*1 266*	*1 388*	*1 408*	*1 785*	*1 619*	*1 693*	*1 655*	*178*
fuel wood in total	2 464	3 413	3 434	3 803	4 154	4 124	4 980	5 044	5 144	5 183	210
Stump wood	0,3	0,2	0,1	0,1	0,2	0,1	0,0	0,1	1,6	2,2	733

Source: own elaboration based on: Leśnictwo 2012, Leśnictwo 2015. GUS Warszawa.

Volume of the obtained tree consistst of timber, slash and stump wood. Average weight of fresh stump is estimated at 10-15% of the total mass of merchantable bole and approximately 10%

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[22] Root system of growing tree and following tree felling – trunk with attached woody roots

of sawmill raw material [Encyklopedia. Lasy polskie 2013]. Such estimates are supported by research which proved that stumpwood constitutes the second largest share of biomass from trees fell during thinning and fellings which amounts to 16% [Gornowicz 2008].It show high potential of that source of energy which unfortunately in Poland remains unused [Sadowski J., Moskalik T., Zastocki, D., Wrona T. 2012].

Taking into consideration annual tree harvesting (37 661 m3), resources of stump wood may be from 3,8 mln m3 to 6,0 mln m3 (10% - 16% of the overall tree felling). This estimates are comparable with Zajączkowski forecast [2013] on the wood accessible for energy purposes (depending on adopted assumptions: 2,6 mln m^3 to 7,94 mln m^3 in 2031).

TECHNOLOGICAL ASPECTS OF HARVESTING STUMP WOOD

Stump wood is the material difficult to both process utilize (problems in harvesting, large content of mineral contamination, problems exploiting boilers). Yet it constitutes a significant amount of forest biomass which may be converted into energy.

Technological problems may be eliminated using adequate means of harvesting and processing of underground wood which requires the implementation of the following chain of procedures [Stachowicz 2013]:

- extracting roots using special head,
- seasoning of extracted stumps,
- primary chipping on a recycler,
- letting the material through a set of sieves,
- final chipping on a recycler,

what limits the share of sand in raw material to 8-10 %.

In case of tree felling for investment stump wood is the property of the person who removes stump wood and is obliged to remove it from the area assigned for further investment and utilize. Then the following means of removing the remaining parts of wood are used:

1. Excavation and removal of the complete stump using manual tools (spade, axe, saw).
   Advantages – it may be done at any place (precision of procedures).
   Drawbacks- labour intensive, hence a more expensive method, especially in case of large size stumps. Manual excavation of a large stump may take a long time even the whole day.
2. Excavation and removal of the whole stump using excavator.
   Advantages – fast and easy method for the excavation of even very big stumps.
   Drawbacks – excavator may not be able to access some places and will destroy the surrounding are within the radius of a few metres. One has to add the cost of excavator's work.
3. Stump milling consists of a gradual „carving" of stump and root using a special stump milling cutter. Following the process of milling there is sawdust and small parts of stumps that may be removed. The hollow spaces are being filled with soil and levelled. Milling of a large stump (<100 cm in diameter) makes up a cost of a few hundred zł.

ECOLOGICAL ASPECTS OF HARVESTING STUMP WOOD

One of the reasons for National Forests lack of interest in harvesting stumps is the fear of extensive damage and natural environment loss during root excavation from the ground. It's the result of the fact that according to binding legal regulations National Forests administrating the property of State Treasury are obliged to include issues of sustainable environment in their operations.

Other factor limiting the availability of forest resources for energy purposes is the necessity to keep deadwood in the forests and in consequence preference for the usage of only these parts of trees that grow above the ground. The argument of a potential impoverishment of forest areas as the result of withdrawing nutrients along with the transported raw material is mainly used by ecologists. Also foresters are of an opinion that stumps should stay in forests.

It seems however that these objections are not fully eligible because during mechanical wood processing a large volume of post-felling leftovers that is twigs and assimilation apparatus gets disconnected and remains in the forest. Detailed research on the optimization of the volume of deadwood on individual areas are currently carried out by the scientists from Poznan University of Life Sciences.

ECONOMIC ASPECTS OF HARVERSITNG STUMP WOOD.

Harvesting stumps following tree felling in forests is not an easy operation. Difficulty in accessing the resources may result in the necessity to incur high costs, making such project unprofitable.

Apart from economic stands the other potential and easily accessible source of stumps for energy purposes would be tree-felling to obtain investment areas: airports, roads, communication hubs, housing and so on, as well as the remains left following cleaning of post-disaster areas. In each case however taking the decision concerning harvesting also an underground part of tree should be preceded by a thorough financial analysis.

The evaluation of the profitability of harvesting stump wood may be carried out determining its value if processed into chips, adopting for this purpose a method developed by E. Mikołajczak (2012). Chips will constitute the most universal resource for further processing: production of wooden boards, pellet and wooden briquettes (formula 1).

$$W_{kp} = \frac{1}{a}\left[c_j\left(1 - \frac{m_j}{1-p}\right) - k_{jp} - k_{jt} \right] \qquad \text{[PLN/mp]} \qquad (1)$$

where:
W_{kp} – Vualue of stump wood processed into chips [PLN/mp],
a – Amount of stump wood vital for the production of 1mp of chips (ratio of raw material intensiveness) [mp/mp].
c_j – Unit sales price of chips [PLN/mp],
m_j – Assumed net margin level satisfactory for an entrepreneur
  m_j: {0,01; 0,05; ... 0,15},
p – Level of income tax (CIT), dla 2015 r. = 0,19,
k_{jp} – Unit cost of harvesting and processing stump wood into chips along with the remaining unitary operational costs [PLN/mp],
k_{jt} – Unit cost of transporting stump wood to the place of conversion, whenever processing is carried out outside of the place where it has grown [PLN/mp],

Assuming that the value of stump wood being processed into chips equals the price one may obtain while selling it unprocessed ($W_{kp} = c_{kp}$) and assuming the level of margin at $m_j = 0$, following adequate calculations one may determine border level of profitability of processing stump wood into chips as *maximum unit costs of its conversion* into chips, *including the costs of transport.* (9):

$$k_{p\max} + k_{t\max} = c_j - ac_{kp} \tag{2}$$

where:

c_{kp} — Unit price of purchasing unprocessed stump wood with an intention of processing it into chips[PLN/mp]

Analogically using correctly modified formula (3) [Mikołajczak 2012], one may make analysis of profitability of burning of harvested stumps in order to recycle energy.

Evaluation includes determining the value of stumps being directly converted into energy.

$$W_{ei} = c_{je} g \frac{19,5 - 2,5w_o}{1 + w_o}\left(1 - \frac{m_j}{1-p}\right) - k_{pi} - k_{ti} \qquad [\text{PLN/m3}] \tag{3}$$

where:

W_{ei} — Value of stump wood being converted into energy [PLN/mp],

c_{je} — Unit price of sales of energy generated by burning stump wood [PLN/GJ],

G — Bulk density of the type of by-products being burnt [t/mp],

w_o — Absolute moisture content of burned stump

m_j — Assumed net margin level satisfactory for an entrepreneur , m_j: {0,01; 0,05; ... 0,15},

P — Level of income tax (CIT) in 2015 = 0,19,

k_{pi} — Unit cost of harvesting and processing stump wood along with the remaining unitary operational costs [PLN/mp],

k_{ti} — Unit cost of transporting stump wood to the place of its conversion into energy [PLN/mp],

and subsequently comparing the determined value with the price of unprocessed stump wood.

CONCLUSIONS

1. Main source of unused forest biomass is stump wood.
2. Between 2006 and 2014 took place an intensive development of energy sector based on biomass. The number of plants generating it increased six times and their power capacity grew 4 times.
3. Between 2004 and 2014 production of energy from solid biofuels increased almost 12 times. While the production of heat generated from solid biofuels grew 8,5 times from 2004 till 2012, then in the subsequent two years it decreased in total by 26%.
4. Heat from biomass is mainly generated in households which is the result of its accessibility and price. Fuelwood is used by about 40% of households. It has been forecast that the demand for forest biomass will grow, which is indicated by a dynamic increase in the sales of installations designed for its combustion.
5. It has been estimated that a theoretical wood base for energy purposes will systematically grow and depending on the adopted assumptions it'll reach in 2031 the level of 2,6m m^3 up to 8,91m m^3.
6. Stump wood resources (estimating the annual harvesting at 37 661 m^3) may reach 3,8m m^3 – 6,0m m^3, which equals the volume of wood designated for energy purposes in 2031.

7. Stump wood is difficult to process and utilize. It however constitutes a large part of forest biomass that can be converted into fuel. Technological problems may be eliminated adequate means of harvesting and processing.
8. From ecological perspective the main obstacle in harvesting stump wood would be the fear of contamination and environmental loss created during excavation of roots as well as the need to leave deadwood in forests.
9. Due to the difficulties in accessing that raw material which may result in the need for incurring high costs taking decision concerning the excavation of underground part of tree should be preceded by a thorough financial analysis. Typically local character of this fuel indicates that most adequate both in terms of economy and logistics would be its utilization in the vicinity of the place of its growth.

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PROPERTIES OF OSB GLUED WITH PMDI-MODIFIED PF RESIN

Abstract: The aim of this study was to investigate the applicability of PF-pMDI hybrid resins for the manufacture of OSBs.

A three-layer OSBs were manufactured with the adhesive solution (PF-pMDI mixture), pMDI share in the adhesive solution was 0, 10, 25, 50, 75, 90 or 100%.

The assessed properties of OSBs were: modulus of rigidity, modulus of elasticity (EN 310), internal bond (EN 319), tensile strength perpendicular to the plane of the board (EN 319), water resistance as per V-100 test (EN-1087-1), swelling after 24 hours (EN 317), as well the authors took into account the relation between the mixture price and resulting bending strength.

On the basis of data the fallowing conclusions were drown: the partial substitution of PF resin with pMDI allows for manufacturing OSBs with better mechanical properties and changing their class from OSB/3 to OSB/4, the use of hybrid resin PF/pMDI significantly increases water resistance of the boards determined by the boiling test, addition of pMDI to PF resin does not markedly change physical and mechanical properties of OSBs but allows for reducing the cost of the adhesive mixture.

Keywords: OSB, PF, pMDI, hybrid resin

INTRODUCTION

According to the Wood-Based Panels Producers Association of Poland (**www.sppd.pl**), oriented strand boards (OSB) accounted for only 7% of 8.4 million m^3 wood-based panels manufactured in Poland in 2012. In recent years, OSB manufacturing has been on the increase, as indicated by growing demand for this material (Fig. 1). OSBs are used for roof sheathing and as construction materials in combination with other materials. OSBs are also relatively cheap and useful for performing formworks, fences or for sealing windows and door openings. Oriented strand boards have effectively replaced plywood as they are about three times less expensive. However, in basic applications they have to compete with solid planks and MFP boards. Prices of these three materials are very similar and differences amount to a few dozen euro cents per square meter[24], depending on a region or a wholesale. Oriented strand boards are the most demanding in material and technological terms. Achieving good mechanical properties of the OSB depends mainly on using high quality strands characterized by proper geometry (Mayers 2001). The most commonly used strands are 75-120 mm long, 20-30 mm wide and 0.3-0.7 mm thick (Chen et al. 2008 b). Production of such strands requires raw material with relatively large linear dimensions, most usually pulpwood. The strands used for OSB manufacture can be glued with any type of adhesives and their mixtures used in the production of particleboards (Alexandropoulos et. al. 2005). However, the most commonly used adhesives are phenol-formaldehyde resin (PF) (Gündüz et al. 2011) and isocyanate adhesives (e.g. pMDI) (Smith 2005). Both these methods of OSB gluing are perfectly integrated with the production process. Phenolic resins are characterized by relatively low reactivity and numerous studies on their modification to improve this property have been conducted (Sellers et al. 1994, Mirski et al. 2008). Moreover, the use of isocyanates in other fields of industry means the woodworking industry needs to compete for their stable supply and this makes accurate

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[24] Prices provided on the basis of information published in the Internet as of February 2015.

planning of production a challenging task. Therefore, the use of hybrid resins, i.e. resins formed by mixing pMDI and PF is an interesting solution (Miller et al. 2002). The use of PF-pMDI hybrid resins improves PF reactivity and makes the application of pMDI much cheaper. Previous studies concerned mostly the reactivity of PF-pMDI mixture or its applicability for the production of particleboards. A significant difference in the size of strands used for particleboard and OSB manufacture and consequently different gluing methods made the authors investigate the applicability of PF-pMDI hybrid resins for the manufacture of OSBs.
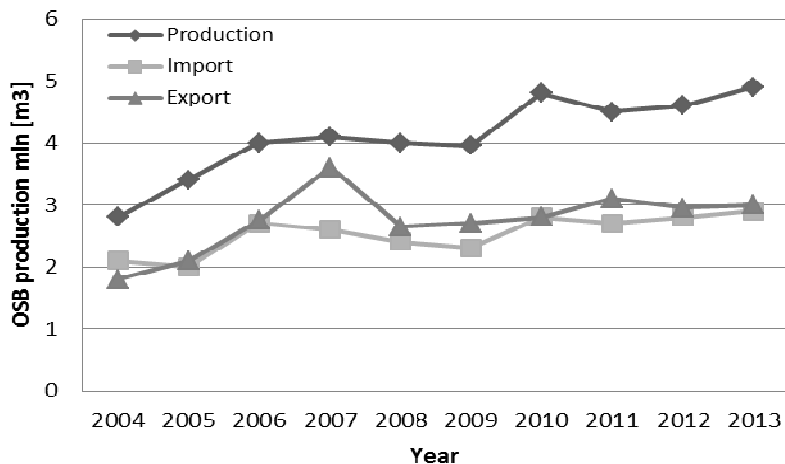
Figure 1. OSB production in Europe in 2004-2013 (prepared **on the basis of**: UNECE Timber Committee, October 2012, Geneva)

MATERIALS AND METHODS

The study material included industrial pine strands intended for outer layers of oriented strand boards. The strands with moisture content of 6.6% were covered with the adhesive solution (PF-pMDI mixture) in the proportion of 6% of dry wood weight. pMDI share in the adhesive solution was 0, 10, 25, 50, 75, 90 or 100%. The properties of both adhesives are presented in Table 1. They were typical for commonly used wood adhesives.

Table 1. Properties of adhesives

Parameter	Unit	Numerical value	
		PF	pMDI
Dry mass	%	45.8	100
Viscosity	mPas	635	215
Density	g/cm^3	1.208	-
pH	-	12.47	-
Miscibility with water	-	0.8	-
NCO content	%	-	30.9
Chlorine hydrolytic	mg/kg	-	96

Strand-adhesive mass was used to form a three-layer OSB with a nominal thickness (t) of 15 mm and a density of 590 kg/m^3. The prepared sheets were pressed for 345 seconds at 200°C. After

conditioning at 20±2°C and relative air humidity of 60±5%, the following physical and mechanical properties of the OSBs were assessed:
- modulus of rigidity (MOR) and modulus of elasticity (MOE) according to EN 310,
- internal bond (IB) according to EN 319,
- water resistance as per V-100 test, according to EN-1087-1,
- thickness swelling (TS) after 24 hours according to EN 317.

RESULTS AND DISCUSSION

Table 2. presents the results for modulus of rigidity and modulus of elasticity and it also provides density of the samples used for determination of these properties. Highly homogeneous density of the resulting OSBs was probably due to using strands intended for outer layers that include much less fine fractions than the strands intended for inner layers. The boards glued with PF alone showed very good mechanical properties, much better than those required for OSB/3 (according to EN 300:2004) and only slightly worse than those required for OSB/4. The requirements for OSB/4 were met by the boards glued with PF, in which 10% of dry weight of the resin were replaced by pMDI. In general, the data presented in Table 2 indicate that increasing content of pMDI was accompanied by increasing modulus of rigidity and modulus of elasticity in the resulting OSBs.

Table 2. MOR and MOE depending on pMDI share in PF/pMDI mixture

Parameter	Unit	Numerical value						
		0*	10	25	50	75	90	100
ρ	kg/m^3	613 (6.3**)	603 (3.3)	600 (5.7)	604 (5.8)	614 (4.4)	608 (4.5)	588 (4.5)
MOR II	MPa	27.5 (7.9)	30.0 (12.0)	31.0 (11.3)	31.0 (14.4)	33.1 (4.6)	35.6 (11.8)	35.7 (9.7)
MOR ⊥	MPa	17.6 (9.34	20.2 (9.2)	20.8 (7.2)	21.6 (11.7)	21.8 (6.5)	22.1 (8.3)	22.3 (5.7)
MOE II	MPa	4670 (5.2)	5180 (5.7)	5370 (10.1)	5320 (8.3)	5610 (3.9)	6150 (9.2)	6190 (4.9)
MOE ⊥	MPa	2120 (7.1)	2400 (8.4)	2580 (10.0)	2600 (5.9)	2630 (5.4)	2560 (8.0)	2670 (5.3)

* - pMDI content (%), ** - coefficient of variation

Similar relationships were also observed for the other mechanical properties, i.e. IB, V100, TS (Table 3). However, the boards glued with PF alone did not meet the standard requirements for internal bond either before or after the boiling test. To meet the requirements concerning IB for OSB/3 and OSB/4 after the boiling test, the boards had to contain at least 25% of pMDI in PF/pMDI mixture. Standard requirements regarding IB and V100 for OSB/4 were exceeded over two times in the boards glued with pure pMDI, probably due to very high gluing degree. Considerable swelling of the resulting boards was probably caused by not using any hydrophobic agents during their manufacture. Nevertheless, our previous studies (Mirski and Dziurka 2011) suggested that thickness swelling of OSB was reduced from 33.6% to 16.8% after supplementing the adhesive with paraffin emulsion. It can be therefore assumed that the boards glued with PF containing 10% of pMDI would meet the standard requirements for at least OSB/3.

Table 3. IB, V100 an TS depending on pMDI share in PF/pMDI mixture

Property	Unit	Numerical value						
		0*	10	25	50	75	90	100
IB	N/mm^2	0.24 (9.8)	0.40 (12.0)	0.56 (18.7)	0.70 (17.2)	0.72 (15.3)	0.85 (11.1)	0.91 (9.7)
V100	N/mm^2	0.06 (14.4)	0.11 (18.0)	0.15 (24.6)	0.19 (19.7)	0.24 (12.9)	0.26 (17.7)	0.33 (18.8)
TS	%	37.0 (6.5)	32.3 (12.1)	30.9 (13.3)	30.2 (37.7)	30.4 (11.4)	27.0 (11.4)	23.0 (9.5)

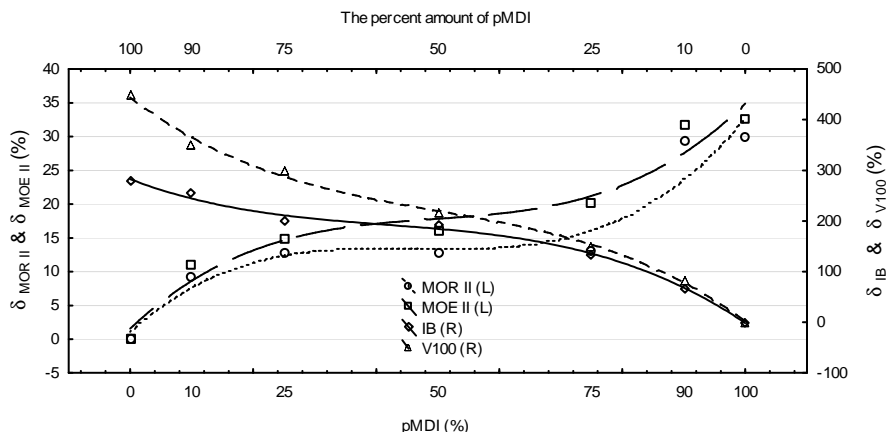* - pMDI content (%), ** - coefficient of variation

Figure 2. Relative changes in MOR, MOE, IB and V100

The changes were very similar for all the investigated parameters. They could all be characterized by a third-degree polynomial. Therefore, Fig2. presents relative changes for only selected parameters. The study results clearly indicated that 25% substitution of PF resin with pMDI significantly improved all the assessed parameters. Addition of greater amounts of pMDI did not cause such pronounced changes in OSB properties. Further increase in the mechanical properties of the boards glued with PF mixed with 25 to 75% of pMDI ranged from 0 to 10% for modulus of rigidity and modulus of elasticity to about 70% for internal bond. When pMDI accounted for 75-100% of the adhesive mixture, a significant increase in the investigated properties was observed again. However, no statistically significant differences between mean results for boards glued with 10%PF/90%pMDI and 100% pMDI were found. On the contrary, steady and significant improvement in IB after the boiling test was noticed alongside with increasing pMDI content. A significant improvement in water resistance is characteristic for boards glued with hybrid resins PF/pMDI as reported by Pizzi et al. 1993 or Chelak and Newman 1991.

Based on the information from the manufacturers of adhesives for wood-based panels and average Euro exchange rate between December 2014 and February 2015, the price of dry weight of PF resin is 1196 EUR, and pMDI 1650 EUR per ton. The cost of adhesive necessary for manufacturing 1 m^3 of OSB with a density assumed for this study amounted to 39,96 EUR for PF resin and 55,12 EUR for pMDI. Therefore, replacing 1% of one resin with another, changes the price by about 0.156 EUR per 1 m^3. Considering the fact that boards glued with adhesive mixtures

differing in PF/pMDI content have variable mechanical properties, the authors decided to determine the relation between the mixture price and resulting bending strength. This parameter is the most representative, as modulus of elasticity shows a linear correlation with bending strength and tensile strength clearly increases alongside with growing share of pMDI in the mixture. Figure 3 presents price index calculated for MOR using the following equation (1):

$$W_{cw} = \frac{k_{kII} \cdot f_{MORII} + k_{k^\wedge} \cdot f_{MOR^\wedge}}{f_{MORII} + f_{MOR^\wedge}} \tag{1}$$

where:
- k_k - cost of obtaining 1MPa modulus of rigidity for a specific direction,
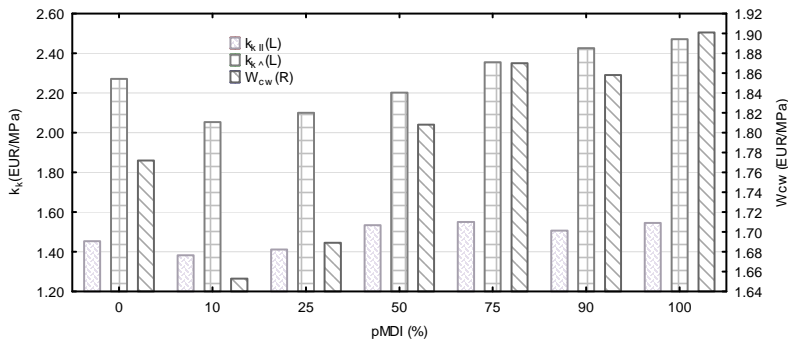- f_{MOR} - modulus of rigidity for a specific direction.

Figure 3. Price index calculated for MOR

The Fig3. clearly shows the final price depends mainly on the board strength in its longer axis. Differences in obtaining calculated strength ranged within 10% for the shorter axis and up to 17% for the longer one. The most favorable price-bending strength rate was achieved for the mixture containing 90% PF and 10% pMDI. However, due to low resistance after the boiling test, these boards did not meet the standards even for OSB/3. The price-bending strength rate was only slightly higher in the boards glued with 75% PF / 25% pMDI mixture. Moreover, these boards met the requirements even for OSB/4. The lowest price-bending strength rate for the boards glued with mixtures with high share of pMDI was observed for the ones glued with 90% pMDI and 10% PF. It is worth mentioning that both systems yielded boards of OSB/4 type and the difference in the price of adhesives needed for 1m[3] was as much as 9,85 EUR.

SUMMARY AND CONCLUSIONS

The study investigating the effects of increasing share of pMDI in PF/pMDI mixture showed that growing content of pMDI was accompanied by an improvement in mechanical properties of the resulting boards. Nevertheless, replacing up to 30% of dry weight of phenol-formaldehyde resin with pMDI caused maximum 15% increase in modulus of rigidity and modulus of elasticity. Higher increase was achieved for the longer axis. Over 70% share of pMDI in the adhesive mixture caused a significant, about 30%-35%, improvement in these properties. The effect of PF resin supplementation with even small amounts of pMDI was much more pronounced for internal bond, both before and after the boiling test. This is a very important result, particularly regarding the

board resistance after the boiling test. The V100 test is one of very powerful assessment, as indicated by OSB manufacturers.

Summing up the study results, the following conclusions were drawn:

- partial substitution of PF resin with pMDI allows for manufacturing OSBs with better mechanical properties and changing their class from OSB/3 to OSB/4,
- the use of hybrid resin PF/pMDI significantly increases water resistance of the boards determined by the boiling test,
- addition of pMDI to PF resin does not markedly change physical and mechanical properties of OSBs but allows for reducing the cost of the adhesive mixture.

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INCOME SECURITY OF THE EUROPEAN COUNTRIES

Abstract: The aim of this study is to identify the relationship of the level of income security in the 28 EU member states and Norway with income inequalities and social transfers. The analysis of different relationships of Gini coefficients, i.e. Gini ex ante, Gini ex post and Gini net with GDP per capita has been provided using descriptive statistics methods and Pearson linear correlation coefficient. This study confirms the thesis that the income security strongly depends on income distribution and social transfers as well as on the level of GDP per capita. These are important factors of differentiating the level of income security across the European countries.

Keywords: Income security, income distribution, income inequality, European Union.

INTRODUCTION

Nowadays the main problems of economic growth are income inequalities among highly developed and developing countries all over the world. The income inequalities have risen moderately but significantly over the past two decades since mid-1980s. There are different reasons of widening the income distribution, like: significant shifts in the relative income of various groups, wage disparities, the increase of concentration of capital and self-employment income, changes in demographic structures mainly the age structure, lower household sizes, increased importance of people living alone, couples without children and of lone parents [OECD 2008]. Income inequalities are one of the most important issues for economic security policies aimed at reconciling basic social security, defined by access to basic health services, education services, dwelling services and social protection with work-related income security defined by secure level of income during working life and in old age or disability retirement [Engerer 2009]. Modern market economies aim at providing with income security of nations by balancing private responsibility of individual person with public responsibility of state. The effect of sustainable development is nation reaching certain income stability and social security [Woźniak 1999, p. 302].

Critics of capitalism consider that social alienation and inequalities occur concurrently and are a by-product of the market economy. Material status is a necessary preliminary condition of realizing personal values which are important to wider social stability. Income inequalities exist within a certain social systems also properly organized and institutionally developed. It is an artificially established cultural phenomenon. It could therefore be limited or even eliminated, if the system is appropriately reorganized. However, the term of inequality is not unequivocal, since it could pertain to both issues, i.e. possessing a feature or to a relation between people. In the former case inequality is tantamount to difference, and in the latter case it is a relation based on a difference between people [Sosenko, Węgrzecki, 2005, pp. 102-103, p. 106]. Social issues become more and more important determinant and fundamental condition of economic changes [Orczyk 2000, p.195]. In the system of social security it is important to consider appropriately risk taking and guarantee of free choice. Changes in social security are linking with two challenges, on the one hand it is too narrow scope and too low rate of market system development, on the other hand rejection of the state role in favor of the market [Żukowski, 1997, p.174]. The economic growth is possible in parallel with maintaining the natural social security and personal freedom [Lenart, Nowak 2010, p.

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283]. The social security system is one of the condition of stability of income sources and the proper functioning of the law state [Kalinowski, 2014, pp.390-391].

In most of OECD countries income security protection mechanisms aim to narrow income inequalities. It includes mostly progressive transfer spending and progressive taxation as well. The income security system comprises of different intervention machinery like: minimum wage, wage indexation and comprehensive social welfare expenditures. In the EU countries the strongly developed income security net measured by share of social transfers in GDP is around 20%-30%, while in the USA, Japan and Switzerland it accordingly shares only 10%-15%. In the welfare state theory it is considered that the income security assurance by state may lead to the so called 'welfare trap' in which workers prefer to stay professionally passive and in this way decreasing the production possibilities of the economy and reducing income security [Burda, Wypłosz, 2013, pp. 735-736].

The welfare state institutional arrangements distinguish with longevity [Inglot, 2010, p.17]. However, income security claiming towards state intervention has to consider the changes of the level of state financial security and stability determined by the relationship of state expenditure and public debt to the GDP as well as the level of security of financial, money and capital markets. Therefore the income security should always be considered in the context of economic growth which depends mostly on endogenous factor, i.e. human capital development [Szopa et al 2007].

The budgetary deficits of the most of the EU countries and out of it as well as changes in income distribution call for re-orientation of redistributive welfare state activity. It is aimed at improvement of labor-market conditions, reduction joblessness and ensuring such conditions of development in which earnings inequality does not become larger [Stiglitz 1998].

OBJECTIVE AND RESEARCH METHODS

In this study the macroeconomic aspects of income security have been considered. The aim of the provided analysis is to investigate the influence of welfare state policy on income distribution changes and the relationship of the relative size of the economy and economic growth with the level of income inequalities in the 28 member countries of the EU and Norway.

In the provided study the main macroeconomic measures of the level of production, income dispersions and economic growth in 2013 have been used. Data from Eurostat's statistical database have been developed into measures of relative income distribution related to the relative level of national income. The income dispersion level before and after the welfare state intervention has been discussed. The relationships of GDP per capita and *ex ante* Gini coefficient, i.e. without social transfers and *ex post* Gini coefficient, i.e. with social transfers and *net* Gini coefficient, i.e. difference between *ex ante* Gini coefficient and *ex post* Gini coefficient have been studied.

In the research of the relationship between the level of national income, level of social transfers and the level of income disparities essential descriptive statistics as well as the correlation analysis have been used. Gini coefficient is an absolute measure of concentration of incomes [Wysocki, Lira 2003, p. 54]. It measures the level income inequality. It ranges from 0% to 100%. The correlation coefficient indicates the „closeness" of the scatter about the fitted regression line. This is known as the *Pearsonian* coefficient of correlation. If one has a positive relationship, the correlation coefficient is a plus value. Conversely, if we have a negative relationship the correlation coefficient is a negative number [Johnston 1991, pp. 23-24].

INCOME DISTRIBUTION

The comparison of the level of national income shows noticeable differences across European countries EU28 and Norway. In year 2013 the lowest level GDP per capita was noted in Bulgaria i.e. 5,800 euro and the highest in Luxemburg i.e. 85,300 euro (tab.1). The distance of the income measured as a difference between the highest value of income per capita and the lowest value is

significant, i.e. 79,500 euro (tab.2). The income differences across countries show that they strongly differ by the level of production and economic development. The income inequalities are even wider considering income distribution within each country. In year 2013 the lowest Gini ex ante is observed in Norway i.e. 40.4% and the highest in Greece i.e. 61.6%. The range of income inequalities in the analyzed countries measured as a difference between the maximum and its minimum value of Gini ex ante is also wide, i.e. 21.2%. It means that income inequalities among Greeks are almost three times higher than among Norwegians. European countries are sharply differentiated not only by the level of national income, but also by the level of income inequalities.

The income support measured by the share of social transfers in income redistribution has changed the average level of income concentration in the analyzed 29 European countries. The average ex ante and ex post Gini coefficient reached accordingly 49.4% and 29.6% (tab.3). In year 2013 the average differentiation of incomes measured after social transfers was much lower than before social transfers. The lowest ex post Gini coefficient was noted in Norway i.e. 22.7% and the highest in Bulgaria i.e. 35.4%. The range of income inequalities measured as a difference between the highest Gini ex post and its smallest value equals to 12.7% and is lower in comparison to the range measured by the Gini ex ante. European countries equalize income level by social transfers which main aim is to support residents' incomes. But still after social transfer income differences among Bulgarians are almost three times wider than among Norwegians.

The level of income support differs across countries. The highest share of social transfers in the average income measured by the relation of net Gini coefficient to GDP per capita is noted in Bulgaria, i.e. 2.362 and accordingly the lowest in Luxembourg, i.e. 0.224 (tab.1). It means that the country with the lowest average income level has the highest share in income redistribution and the country with the highest level of average income level has the lowest share in income redistribution. However the absolute level of redistributed income in order to equalize income level in the country is lower in Bulgaria, i.e. the relation of GDP per capita to Gini net equals to 423 euro, while in Luxembourg it is 4,466 euro. The income equalization costs are higher in the high income economy than in the low income economy.

Differentiated income support in the analyzed countries is confirmed by the differences in variation coefficients of net Gini (21%), which is much higher in comparison to ex ante Gini (9.7%) and ex post Gini (12.1%) (tab.2). The range of Gini net value (15.8%) is higher in comparison to the Gini ex post value (12.7%). The analyze of measures of dispersion of net Gini in comparison to the Gini ex ante and Gini ex post brings the conclusion that income inequality reduction by social transfers strongly differs from country to country. To reach the average level of ex post Gini needs different levels of social transfers in each country, because they start reducing the income inequalities from different levels of Gini ex ante.

The income support is strongly correlated with the average level of income as well as with the level of income concentration. The positive coefficient correlation between Gini ex post and Gini ex ante equals to 0.56030 as well as Gini net and Gini ex post equals to 0.63242 shows that the income support depends on the income distribution (tab 3.). Accordingly, the strong positive dependence of GDP per capita to Gini net/GDP per capita with coefficient correlation equal to 0.95891 shows strong correlation between the share of the social transfers and the level of GDP per capita. It is assumed that the higher level of development of economy the more GDP per capita falls on the net Gini unit. Therefore, reduction of income inequalities in the richer countries requires relatively higher social transfers. As the example in Bulgaria relatively ten times lower social transfers are sufficient enough to reduce the relative income inequalities in comparison to Luxembourg. It is the result of a lower average standard of living in Bulgaria comparing to Luxembourg (Fig. 1).

Table 1. The Gini coefficients in the EU28 and Norway ordering by GDP per capita in 2013
(in euro)

Countries	GDP *per capita*	Gini *ex ante*	Gini *ex post*	Gini *net*	Gini *net*/GDP *per capita*	GDP *per capita*/Gini *net*
BG	5,800	49.1	35.4	13.7	2.362	423
RO	7,200	50.8	34.0	16.8	2.333	429
HR	10,200	49.3	30.9	18.4	1.804	554
HU	10,200	51.9	28.0	23.9	2.343	427
PL	10,200	47.7	30.7	17.0	1.667	600
LV	11,300	50.8	35.2	15.6	1.381	724
LT	11,800	53.2	34.6	18.6	1.576	634
SK	13,600	41.3	24.2	17.1	1.257	795
EE	14,400	48.0	32.9	15.1	1.049	954
CZ	14,900	44.1	24.6	19.5	1.309	764
PT	16,300	55.9	34.2	21.7	1.331	751
EL	16,500	61.6	34.4	27.2	1.648	607
SI	17,400	44.1	24.4	19.7	1.132	883
MT	17,800	43.8	27.9	15.9	0.893	1,119
CY	21,000	45.1	32.4	12.7	0.605	1,654
ES	22,100	49.3	33.7	15.6	0.706	1,417
IT	26,500	48.9	32.5	16.4	0.619	1,616
UK	31,900	54.5	30.2	24.3	0.762	1,313
FR	32,100	50.0	30.1	19.9	0.620	1,613
DE	34,400	56.4	29.7	26.7	0.776	1,288
BE	35,400	47.1	25.9	21.2	0.599	1,670
FI	37,300	46.5	25.4	21.1	0.566	1,768
AT	38,100	47.0	27.0	20.0	0.525	1,905
NL	38,700	44.9	25.1	19.8	0.512	1,955
IE	39,000	54.5	30.0	24.5	0.628	1,592
DK	45,100	53.0	27.5	25.5	0.565	1,769
SE	45,400	53.4	24.9	28.5	0.628	1,593
NO	77,400	40.4	22.7	17.7	0.229	4,373
LU	85,300	49.5	30.4	19.1	0.224	4,466

Notes: BG-Bulgaria, RO-Romania, HR- Croatia, PL-Poland, LV-Latvia, LT-Lithuania, SK-Slovakia, EE-Estonia, CZ –Czech Republic, PT-Portugal, EL-Greece, SI-Slovenia, MT-Malta, CY-Cyprus, ES-Spain, IT-Italy, UK-United Kingdom, FR-France, DE-Germany, BE-Belgium, FI-Finland, AT-Austria, NL-Holland, IE-Ireland, DK-Denmark, SE-Sweden, NO-Norway, LU-Luxemburg.

Source: *The Authors' own calculations based on: EUROSTAT, Database, available on September 2015.*

Table 2. The statistical characteristics of Gini coefficients in the EU28 and Norway

No	The measure	GDP *per capita*	Gini *ex ante*	Gini *ex post*	Gini *net*	Gini *net* /GDP *per capita*	GDP *per capita*/Gini *net*
1.	Standard Deviation	19,274.7	4.8	3.9	4.1	0.6	981.5
2.	Mean	27,148.3	49.4	29.6	19.8	1.1	1,367.4
3.	Variation coefficient	71.0	9.7	13.1	21.0	58.6	71.8
4.	Maximum	85,300.0	61.6	35.4	28.5	2.4	4,466.0
5.	Minimum	5,800.0	40.4	22.7	12.7	0.2	423.4
6.	Range	79,500.0	21.2	12.7	15.8	2.1	4,042.6

Source: The Authors' own calculations based on table 1.

Table 3. The correlation matrix of Gini coefficients in the EU28 and Norway

2013	Gini *ex ante*	Gini *ex post*	Gini *net*	GDP *per capita*	Gini *net* /PKB *per capita*	PKB *per capita*/Gini *net*
Gini *ex ante*	1					
Gini *ex post*	0.56030	1				
Gini *net*	0.63242	-0.28726	1			
GDP *per capita*	-0.11116	-0.44877	0.29115	1		
Gini *net*/GDP *per capita*	0.22687	-0.15379	-0.15363	-0.77406	1	
GDP *per capita*/Gini *net*	-0.28603	-0.38650	0.03069	0.95891	-0.75811	1

Source: The Authors' own calculations based on table 1.

Among countries with GDP per capita lower than the average for the 29 analyzed countries only three of them noted the Gini net above the average for all the analyzed countries (19.8%), i.e. Hungary (23.9%), Portugal (21.7%) and Greece (27.2%). Most of the countries with GDP per capita higher than the average have the Gini net over the average, except countries with the highest GDP per capita among analyzed countries, i.e. Norway (17.7%) and Luxembourg (19.1%).
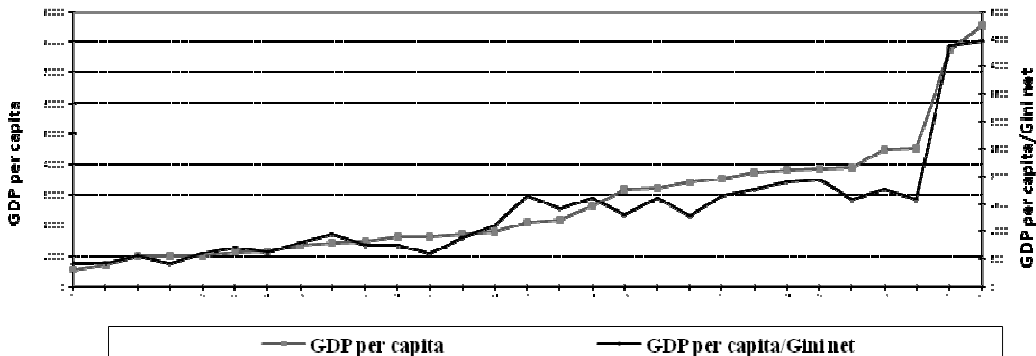

Fig.1. GDP per capita/Gini net and GDP per capita in the EU28 and Norway in 2013

Source: The Authors' own elaboration based on table 1.

The high level of state redistribution in Hungary, Greece and Portugal is also linked with high income disparities – the Gini net in Greece reached the maximum level for the 29 analyzed countries, i.e. 61.6%. It is also very high in Portugal and Hungary, accordingly 55.9% and 51.9%, while in Norway the level of income disparities is the lowest for the analyzed countries, i.e. 40.4%. Among the rich European countries (GDP per capita above the average) the highest income inequalities are found in Germany (56.4%).
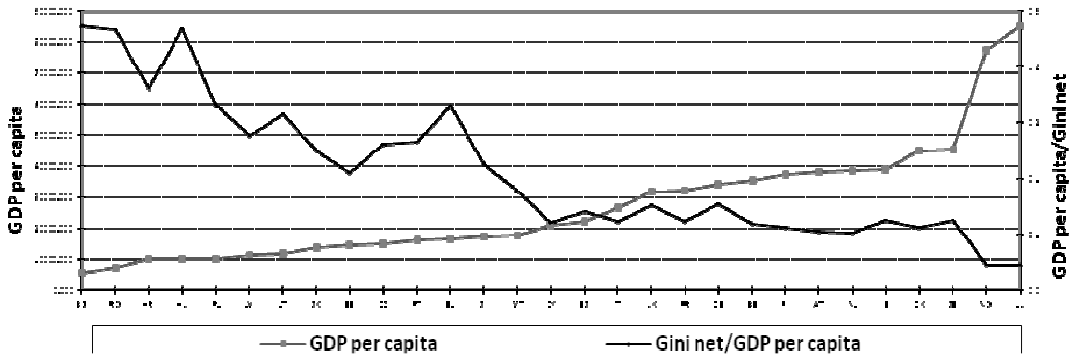

Fig.2. Gini net/GDP per capita and GDP per capita in the EU28 and Norway in 2013

Source: The Authors' own elaboration based on table 1.

The countries with high income inequalities and high level of social transfers may not reach the average level of income inequalities in the group of the considered 29 countries. On one hand, the example of Greece and Portugal with relatively high income inequalities before social transfers as well as after social transfers indicates that the income policy is ineffective in mentioned countries. On the other hand, Hungary where the income inequalities has been reduced after social transfers to the level below the average for the analyzed countries is the example of redistributive effectiveness of state. Germany is also a good example of redistributive effectiveness of the income policy, where initially high income disparities after social transfers reach the average for all European countries, i.e. Gini ex post in Germany is 29.7%.

The study proves another interesting phenomenon of income distribution among the European countries. Low level of GDP per capita is correlated with unequal income distribution while high level of GDP per capita is correlated with smooth income distribution (Fig.2). Strong negative correlation of GDP per capita and Gini net/GDP per capita (-0.77406) verifies that increase of GDP per capita decreases the relative share of income transfers in GDP per capita. In Luxemburg the highest level of GDP per capita decreases ten times the Gini net in comparison to Bulgarian lowest level of GDP.

SUMMARY AND CONCLUSIONS

At the entry of the third millennium income inequality has become an increasingly important public policy issue in European countries. Although, in recent years macroeconomic conditions have been favorable in many of these countries, the distribution of income within and across countries has remained uneven. In fact income inequality has risen. As a result large segments of the population are not reaping the benefits of economic growth. This analysis of macroeconomic aspects of income security in the member states of EU28 and Norway confirms high income

inequalities across European countries as well as differences in the income support polices. It proves the relationship between income inequalities and relative size of economy across and within the European countries. For macroeconomic policy income inequalities are the main issues of income security across and within the European countries. The research brings to some interesting conclusions on relationship of the economic growth and income security in European countries as follows:

1. Income security can be considered as the public good since the role of state in delivering the nation with the income transfers measured by Gini net is quite high. The average share of the state in income distribution in the analyzed 29 European countries equals to around 20%. Social transfers play important role in reducing income disparities in each of the analyzed country.

2. The member states of EU28 and Norway strongly participate in the income redistribution within the country. The result is the lower income inequality after social transfers than the income inequality before social transfers. Therefore, the social transfers play an important role in providing with income security of the European countries.

3. The measurement of the redistribution has been proved by analyze of the three different Gini coefficients. The assessment the influence of the social transfers on the reduction of inequalities in income redistribution across the European countries is ambiguous. The reduction of income inequalities by social transfers is strongly dependent on the level of national income and income inequalities. To reach the average level of ex post Gini the states need to spend different amounts of transfers, because they begin to reduce the income inequalities from different levels of ex ante Gini and different level of GDP per capita.

4. However, the income disparities before social transfers are higher in the rich countries (defined by the GDP per capita higher than the average for the member states of the EU28 and Norway) and lower in the poor countries (defined by the GDP per capita lower than the average for the analyzed countries). The highest reduction of income inequalities take place in the richest the EU28 countries together with Norway and the lowest reduction of income inequalities take place in the poorest the EU28 countries. Amongst the richest countries the highest reductions of income disparities take place in Sweden and Germany. Greece, Hungary and Portugal are the countries with the highest reduction of income disparities between the poorest countries.

5. Among the analyzed European countries one can find countries with the highest GDP per capita and limited state redistribution i.e. Norway and Luxemburg where the income security is a result of high rate of development and countries with relatively low GDP per capita and high level of state redistribution i.e. Portugal, Hungary and Greece where the providing with income security of nation endanger financial security of the state.

6. The policy of income security in countries with the highest income inequalities i.e. Portugal and Greece is not effectively reducing the level of inequalities, since they are still above the average level of income inequalities for the analyzed countries. Hungary is the exception among countries with high income inequalities and a good example of effective income redistribution, since the income inequalities after social transfers reach the level below the average for all 29 European countries.

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Taccp, vaccp and allergen management in meat manufacturing in england

Abstract: Applied TACCP system (Threat Assessment and Critical Control Point System), VACCP (Vulnerability Assessment and Critical Control Point System) and allergen management in the meat industry allows the production of safe food. Correctly implemented systems allow for quick and effective examinations in the event of a complaint and it protects the good name of the company. The article refers to the stages of the implementation of the new standards into the industry. The aim of the article is to present the stages of implementation and the development of the new requirements of the voluntary standards or procedures imposed to the audience. These stages are illustrated by an example of a meat company in the UK.

Key words: meat manufacturing, TACCP, VACCP, allergen management, food allergy

INTRODUCTION

TACCP (Threat Assessment and Critical Control Point System), a concept which was presented by the British Standards institute's Public Available Standard 96 Food Defence (PAS 96) [Spink 2014]. PAS96: 2014 and describes Threat Assessment Critical Control Points and methodology of risk analysis with respect to HACCP in another view. The guide presents the TACCP as a process, which implies and is based on the businesses effectively existing and functioning system of HACCP. The purpose of this system is to take preventive action through the implementation of specific activities against deliberate attacks. It also complements existing risk management systems and incidents.

VACCP (Vulnerability Assessment and Critical Control Point System) is a requirement placed and reflected in BRC Global Standard for Food Safety issue 7. Point 2.7.2 of the above standard specifies that the HACCP food safety team shall conduct a hazard analysis to identify hazards which need to be prevented, eliminated or reduced to acceptable levels. Consider the following issues: Section three – "vulnerability of those exposed". This means that special attention must be paid to consumer groups, which have the potential to purchase food that does not correspond to the declared content on the packaging. Another reference is point 5.4.2, which states that the documented "vulnerability assessment" shall be carried out on all food raw materials or groups of raw material to assess the potential risk of adulteration or substitution. This shall take into account: historical evidence of substitution or adulteration, economic factors which may adulterate or substitute, more attractive ease of access to raw materials through the supply chain, sophistication of routine testing to identify adulterants and nature of the raw materials.

Food allergies (food allergy) are conditions in which diseases are conditioned by the human immunological system, unlike food intolerance, in which diseases arise as a result of non-immunologic mechanisms. In regards to the development of the allergic process, these fall into the following categories: genetic predisposition, environmental factors (the allergen) and supportive factors. The first stage is the sensitisation of the body, and the next is the development of an allergic disease and/or abnormal function of specific organs (digestive tract, respiratory system, skin, etc.) [Socha 2012].

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In accordance with regulations from the European Parliament and of the Council (EU) no. 1169/2011 of 21.10.2011 annex II: the "substances or products causing allergies or intolerances" include:

1. Cereals containing gluten, namely: wheat, rye, barley, oats, spelt, kamut or their hybridised strains, and products thereof, except:

(a) wheat based glucose syrups including dextrose

(b) wheat based maltodextrins

(c) glucose syrups based on barley

(d) cereals used for making alcoholic distillates including ethyl alcohol of agricultural origin

2. Crustaceans and products thereof

3. Eggs and products thereof

4. Fish and products thereof, except

(a) fish gelatine used as a carrier for vitamin or carotenoid preparations

(b) fish gelatine or Isinglass used as fining agents in beer and wine

5. Peanuts and products thereof

6. Soybeans and products thereof, except

(a) fully refined soybean oil and fat

(b) natural mixed tocopherols (E306), natural D-alpha tocopherol, natural D-alpha tocopherol acetate, and natural D-alpha tocopherol succinate from soybean sources

(c) vegetable oils derived phytosterols and phytosterol esters from soybean sources

(d) plant stanol ester produced from vegetable oil sterols from soybean sources

7. Milk and products thereof (including lactose), except

(a) whey used for making alcoholic distillates including ethyl alcohol of agricultural origin

(b) lactitol

8. Nuts, namely: almonds (Amygdalus communis L.), hazelnuts (Corylus avellana), walnuts (Juglans regia), cashews (Anacardium occidentale), pecan nuts (Carya illinoinensis (Wangenh.) K. Koch), Brazil nuts (Bertholletia excelsa), pistachio nuts (Pistacia vera), macadamia or Queensland nuts (Macadamia ternifolia), and products thereof, except for nuts used for making alcoholic distillates including ethyl alcohol of agricultural origin;

9. Celery and products thereof

10. Mustard and products thereof

11. Sesame seeds and products thereof

12. Sulphur dioxide and sulphites at concentrations of more than 10 mg/kg or 10 mg/litre in terms of the total SO 2 which are to be calculated for products as proposed ready for consumption or as reconstituted according to the instructions of the manufacturers

13. Lupin and products thereof

14. Molluscs and products thereof

From July 2, 2015 food plants in the UK have been audited in accordance with the BRC Global Standard for Food Safety issue 7 in mind, which states that "there must be a system in place for estimating the sensitivity/weaknesses/gaps", but which are often interpreted as VACCP. However, establishments producing under the brand name of a retailer must implement TACCP in their factories, whilst the requirement arising from EU legislation is the use of "an efficient system for the management of food allergens". All three requirements are closely related to HACCP being elaborated or complemented.

MATERIALS AND METHODS

The implementation of TACCP, and VACCP with allergens will be presented by the example of a selected company for breeding, slaughtering and processing of poultry in the United Kingdom,

which, for the purposes of this article, I name "Company X". The Company is one of the leading producers of meat and poultry products in the UK, supplying their products to well-known retailers such as, for example: Marks and Spencer, Tesco, Sainsbury's, Aldi and Lidl. Company X produces products under its own brand and through branded retails. It is also the holders of the BRC Global Standard for Food Safety and the BRC Storage and Distribution Standard. Company X is at the stage of implementing of TACCP/VACCP. An allergenic management system was introduced many years ago and this is constantly being improved upon.

Table 1. Number of establishments with BRC Global Standard for Food Safety

Field of audit	Category no.	Category description	Numbers of sites in United Kingdom	Number of sites in Poland
Raw products of animal or vegetable origin that require cooking prior to consumption	01	Raw red meat	150	79
	02	Raw poultry	134	66
	03	Raw prepared products (meat, fish and vegetarian)	394	96
Processed foods	08	Cooked meat/fish products	148	93
	09	Raw cured and/or fermented meat and fish	32	39

Source: a study based on http://www.brcdirectory.com/[[30/08/2015access]

On December the 13th, 2014 a revision was introduced by the Regulation Parliament of the European Parliament and of the Council (EU) no 1169/2011 on 10/21/2011. This regulation specifies how to mark the presence of food additives, excipients in processing and other substances or products which has been scientifically proven to potentially cause allergies or intolerances. Article 21 of the said regulation specifies how to label substances or products causing allergies or intolerances. A list of ingredients begins or is preceded by an appropriate heading, which consists of the word "ingredients" or at least contains the word. It must list all the ingredients of the foodstuff, in descending order of weight at the time of use of the ingredient/s in the manufacture of the foodstuff. Another requirement is the name of the substance or product containing the 14 allergens listed in regulations, emphasised through a typeset that clearly distinguishes it from the rest of the list of ingredients: for example by means of the font, style or background colour

BRC, The British Retail Consortium, (the Association of British Retailers) Global Standard for Food Safety, is a voluntary standard that certifies companies in the food industry that implements its standards. These are to meet the requirements of customers, to reduce the number of customer audits and to maintain an adequate level of GMP/GHP (Good Manufacturing Practice/Good Hygienic Practice). Numbers of establishments certified in compliance with the standard BRC in the UK and Poland has been presented in Table 1 (30/08/2015).

From 01.07.2015 plants in the UK are certified in accordance with the release of the seventh of the BRC Global Standard for Food Safety, which is a primary requirement for Allergen Control. VACCP is part of the point 2 food safety HACCP-Plan and 5.4, authenticity and statement and control of origin [BRC Edition 7 2015].

RESULTS AND DISCUSSION

In Company X, implementation of TACCP/VACCP was initiated by the Head of Technical. To begin with Company X collected all accessible materials, standards, procedures, and instructions on

the topic. During the initial phase, the Quality Manager analysed existing HACCP systems and the management of allergens for TACCP/VACCP. After the analysis, vulnerabilities were found in the system which has been introduced during the life of the project. This strictly defines time-frames for the individual stages in order to implement and oversee the new system.

The next step was to carry out a detailed audit in accordance with the requirements of the BRC Global Standard for Food Safety and Code of Practice which is a requirement from the retailers. Detailed documentation and control during production, storage and displays showed a list of points that needed to be deployed. In order to accede to the implementation of the individual points, there have been a multi-disciplinary team was set up, consisting of departmental Heads: Production, Purchase accessories, Packaging technologists, Quality engineers, Legal requirements and Product claims. The appointed team was the third team set up within the undertaking with a view to the supervision of food safety. The plant also has a group of HACCP and an Allergen Management Team. Some people enter into the composition of all or only selected teams. Each team has a different team leader, which ensures the greatest knowledge from the fields of their own team. All members must undergo specific training in order to self-improve. In the case of HACCP, training sessions are carried out at intervals of 3 years for team members at level 3 FDQ (Food and Drink Qualifications (a Nationally recognised qualification in food processing, level 3-intermediate), assuming that the leader of the team has a level 4 (Advanced). Group management of allergens must fall within the tests online in a special program supervised by the leader of the group. TACCP/VACCP team is trained by the leader of the group as the system is new and currently the courses are in the development stage in the UK. Company X places great emphasis on the training of workers and to expanding their knowledge. All persons involved in the use of ingredients, equipment, vessels, and containers are trained in the prevention of mutual contamination of food allergens. The Plant X applies the practice that, before taking on of production workers, it is necessary for potential candidates to go through transition training and to pass a test which includes the basic rules of hygiene. Employees are also informed of allergenic risks by the use of graphic symbols on the production lines.

The next process in the management of the TACCP/VACCP was to gather information from suppliers of additives used in the manufacture of food products. The partially used an existing system which was based on questionnaires and audits from third party suppliers. Company X has allergenic substances, which may be delivered to the plant, along with supplies of additives or packaging from suppliers. To that end, the Manufacturer has made an evaluation of all of its suppliers. Answers to questionnaires are evaluated in order to determine the need to carry out an audit at the supplier. The Manufacturer is not required to audit all suppliers. In order to meet the requirements of TACCP/VACCP questionnaires were fortified with questions on suppliers and the possibility of cross-contamination. Auditors, working with suppliers and subcontractors on materials safety, asked about ways to ensure confirmation of authenticity. As an example, in the UK, if you claim to be free range, then the supplier must prove the authenticity of the free range production. The provider must prove that it has a system for controlling and guaranteeing the raw material without distortion from the farm to produce the finished product.

The Company has then conducted an analysis of all the products that it produces in terms of the declarations on the packages. The statements appearing on the label included: The UK origin, gluten-free, and/or a product derived from specially selected farms. Company X is in a favourable situation because all the raw material comes from its own farm, which minimises the risk of adulteration of raw materials for economic reasons. For example, the sale of products with non-free range under the brand name free range. The mapping process however, does show the potential misbrand of the product during the process of cooling. This problem was solved by changing the slaughter order. The first change was to slaughter the free range birds first and to extend the gap

between the slaughtering of non-free ranges a free range. It also used a similar solution in the production of products which are gluten free. Company X then carries out a check of the production line for the presence of gluten by doing a "rapid test" before any production of products for people suffering from celiac disease. In addition, the first product from each batch is tested for the presence of gluten. Some of the products produced under the brand "gluten free" have components that the factory is enable to produce themselves. A supplier for the aforesaid products are audited in detail. It must prove that it is able to provide raw materials without gluten, especially if its production plant also produces the raw materials with gluten in its composition. The provider must be certified in BRC Global Standard for Food Safety at level A, and it is checked during unannounced inspections by the auditor of the company. In spite of the fulfilment of these requirements the Company X in addition, performs tests for the presence of gluten to each newly delivered batch of raw material to the plant. The above mentioned activities are designed to prove to the manufacturer that food produced can be labelled as gluten-free. This statement also reassures the consumer, that eating this product will not make him ill.

The discussed Company attaches great importance to the management of food allergens. The first procedures for separating food additives were introduced in 2005. Currently, the system is continuously improved and is subjected to verification by internal auditors, customers and consumers. Managing allergens started from the separation of food additives under the terms of the type of allergen contained therein. Later stages introduced the marking of products during the process and finished products. In order to facilitate the process in the factory, Company X introduced special labels which are glued to each pallet during the delivery of raw materials to the warehouse. They bear the name of allergens present in processing. The person responsible for acceptance of raw materials uses the symbol X on the label to show that the allergen is present in the raw material. The warehouse stores raw materials in conditions which preclude any possibility of cross contamination. The raw materials are stored on shelves while adhering to the rule that raw materials with one type of allergen may not be stored above raw materials with other allergens.

Checking the cleaning process ensures that the defined procedure for cleaning is efficient and guarantees the removal of allergens from the production line or equipment. The schedule for the washing of the machinery and equipment is developed and approved before the start of the manufacturing process, the products containing a specific allergen. The analytical methods used are based on studies of the ELISA (Enzyme Linked Immuno-Sorbent Tests) [Food Drink Europe 2013]. Company X carry out an annual validation of the effectiveness of the washing system to remove allergens. In the first instance will be the hardest places to wash. This assessment is made by means of a risk analysis, with scores for all machines, devices and equipment. Places that have obtained the highest score in the risk analysis shall be tested. The validation is carried out in accordance with the guidelines of the Campden BRI Food and Drink Innovation – Validation of cleaning to remove food allergens Guideline No. 59-2009. Pursuant to this rule will be the collecting of swabs before washing, cleaning and disinfection, which are sent to an independent laboratory with UKAS accreditation. In addition, the laboratory sends some recent product packaging before the washing process as well as the first few products after the process in order to examine the level of allergens. This process is repeated three times in order to compare the results.

In the United Kingdom in order to meet TACCP/VACCP requirements, scientists are now building a database containing information about raw materials based on the research of isotopes. This process is currently still in the research phase and Company X has not yet received the complete information concerning its use. TACCP is intending to reduce the likelihood of (opportunities), of a deliberate attack, limitation of the effects of (the impact) of an attack, to protect the reputation of the organisation, to reassure customers, the press and the public that steps to protect food, demonstrate that safety precautions are taken in due diligence [PAS 96:2014].

Company X will make every effort in order to meet the above requirements. All decisions are taken during the regular meetings of the individual teams. Every new product goes through a long process of trial before deciding on production capacity. This process begins by checking the suppliers of raw materials to be added to the product and their credibility, then the process of production in factories and the potential for cross-contamination and safe delivery to the retailers. Each factor "from farm to table" must be analysed by the team.

CONCLUSIONS

TACCP systems/VACCP have now been implemented for a few months and are still in the development phase. The Company does not yet see the possibility of their use, although it has already been noted in the process of vulnerability (HACCP), which of the above-mentioned systems try to complement it. TACCP ushered in a completely new look to Company X on food safety. The analysis and procedures before, targeted the possibility of deliberate contamination of food by workers. It is anticipated that each employee working on the production line is obliged to protect food against dangerous factors for the consumer. The new system forced on the TACCP analysis was the possibility of non-deliberate contamination, during production. By adding Salmonella into the water, which would cause an immediate emergence of contamination throughout the production as a major factor in cooling the intermediates is water. VACCP forced the team to analyse the specific suppliers of components for the production. Thus far, the Company believes each response contained in the questionnaires and discounts any possible doubt in its accuracy. Sensitivity analysis/vulnerabilities and the critical control points has forced the Company to transform its questions so that suppliers of raw materials have to prove that they contain all of the components declared. By declaring the origin of the raw materials to be British. They must prove via full documentation, underpins the process that reveals there is no possibility of adulteration of raw ingredients coming from outside the UK. Company X has met with many problems with suppliers, claiming authenticity of origin, an example being spices, most of which are imported from third-world countries and their origin often boils down to determining the country of origin, without being able to verify all the intermediaries or their processes.

As long as mankind will consume food, opportunities to commit fraud are virtually limitless. Processes can stop the abuse of food, for example, of black pepper bleached sold as white, but these require interdisciplinary research, which combines Criminology with other areas such as food safety, public health, food science, food law, supply chain management, consumer behaviour, social anthropology and political science. Motivation to abuse food because of economic or financial considerations is rife, but their score affects the sensitivity of the public health in the sense that it creates a potential risk. Food fraud risk may be considered more risky than traditional food safety threats [Spink, Moyer 2011].

TACCP cannot prevent consumers claiming that food has been contaminated with additives but it can help assess whether the claim is likely to be true. Any complaint considered to be credible, must be treated as a case on the scale of a crisis for the company. This means letting the media know and reaching out to all potential customers and consumers. The establishment must take steps to keep their business after any such crisis.

Another potential threat to the products which can be analysed is the risk of non-declared allergens on the packaging. As a result of the increase in allergic diseases during the past 60 years, allergies have an impact on the lives of over a billion people around the world, and their incidence is expected to rise to 4 billion in 2050 [Akdis 2014]. Companies must take all possible steps to eliminate the possibility of cross-contamination of allergens during production. This is connected with a huge amount of resources and time, which are reflected in research concepts, employee

training, verification and effective exercise of control over factors affecting the management of food allergens.

Chemical and microbiological analysis, which are increasingly used in forensics, means that more and more incidents of food contamination will be disclosed. Some of these incidents may be a threat to public health, while others may only be a technical breach of the rules. Between these two extremes there is a spectrum of events that require different methods of risk management. [Cnossen et al. 2009].

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FACTORS DETERMINING THE LEVEL OF BANKING EXCLUSION OF RURAL YOUTH

Abstract: The aim of the article is determining the level of banking exclusion of rural youth and identifying the factors determining the phenomenon in the non-urbanized areas. The main source of data used for the analysis was information gathered through the authors' own studies conducted on a group of 350 randomly chosen respondnets (young people aged 18-26 years). Statistical analysis of the researched material comprised summary statistical measurements and non-parametric χ^2 test. As results from conducted analysis, a majority of young people was using the basic banking services. The level of the use of banking services was 75%. Unbanked persons excluded made up 25% of the respondents. These persons were not using any banking services. The highest percentage of unbanked persons was noted in the group of young women, people with lower secondary education, respondents who have unstable situation on the labour market. The barriers to banking inclusion comprise such psychological factors as high "cult of cash".

Key words: bank account, financial exclusion, banking exclusion, rural youth

INTRODUCTION

It is currently difficult to imagine the functioning on the financial market without a personal account. Contemporary banks offer a variety of financial services providing access to the bank 24 hours a day, from any location, without the need to use cash. Some of these services are offered free of charge. Despite this, still 23% of Poles are people excluded from the banking market [Koźliński, 2013].

Banking exclusion may lead to social exclusion and indicates lack of access to basic financial services such as bank accounts, payment services, loans and savings products. The problem of banking exclusion is so important that it entails serious consequences not only for the consumers but also for the economy and the financial sector. In order to limit the phenomenon of banking exclusion it is necessary to undertake educational activities on a mass scale, especially for those most exposed to banking exclusion. The aim is to develop in a customer the ability to take appropriate decisions on personal finance from an early age, providing consumers with the access to information and counseling during the selection of banking products and above all to protect their interests.

Research conducted by numerous research centers and institutions indicate that the groups most exposed to banking exclusion are those with low education, low incomes, retirees, pensioners, residents of rural areas and school and university students [Maison 2001, Horska, Szafrańska, Matysik-Pejas 2011, Koźliński 2013]. For the educational initiatives in the field of financial education of the society to be effective they have to be adapted to the needs and requirements of the beneficiaries in this area. Therefore, it is important to know the factors determining the process of banking exclusion of each group of recipients.

The aim of the paper is to examine the level of banking exclusion of rural youth and to identify selected factors that determine the phenomenon of banking exclusion among young people. These issues are particularly important and current in the context of globalization of modern financial markets, which brings not only opportunities but also risks with it.

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METHODOLOGY

The presented aim of the study determined the choice of data sources and research methods. To achieve the objective of the study primary and secondary sources were used. The main source of the primary data was a questionnaire designed to conduct the interview, both with people who use bank services and with the persons who do not use them. The study was conducted in 2014 on a group of 350 randomly selected respondents. The survey subjects were people aged 18-26 years, living in rural areas. The spatial extent of the research encompassed the area of Malopolska province. Due to the number of surveys conducted, the results obtained cannot be considered representative for the whole country, but are only an initial diagnosis of the issues presented. In addition to the primary sources, in the paper studies of other authors addressing the problems of exclusion on the financial market were also used. In this study, banking exclusion is identified as the exclusion from the regulated banking market.

In the elaboration of the empirical material structure indicators and *nonparametric test "chi square" ($\chi2$)* were used. In the $\chi2$ test the level of significance $\alpha = 0.05$ was adapted. To assess the strength of the relation Pearson's C contingency factor and Cramer's V factor were used. The results of the analysis were presented in descriptive and graphic form.

BANKING EXCLUSION AS A TYPE OF FINANCIAL EXCLUSION

In the literature of the subject one can encounter many different definitions regarding the issue of financial exclusion. It is often equated with the term of banking exclusion. The concept of financial exclusion, however, is a broader category that includes banking, insurance, investment and pension exclusion [Bandurka 2012].

According to A. Leyshon and N. Thrift who were the first to use this term (1995), financial exclusion includes processes aimed at reducing access to the financial system for certain social groups (usually of limited incomes) [Iwanicz-Drozdowska 2011]. On the other hand, G. Ancyparowicz [2011] defines financial exclusion as a situation in which individuals cannot participate in the financial market, or face objective or subjective obstacles in the access to the market concerned. Similarly, financial exclusion as defined by the European Union assumes that this is a situation in which a person encounters difficulties in accessing and/or using the services and financial products to the extent of their needs and allowing them to lead a normal social life [Financial Services Provision and Prevention of Financial Exclusion, European Commission, 2008]. J. Buko [2011] further believes that financial exclusion is also understood as a gradual disconnection from a financial market of an individual due to, among other things, maladjustment of the offer or financial problems.

As it was already mentioned, the banking exclusion constitutes a narrower concept compared to the aforementioned concept of financial exclusion and involves limited access to banking products and services. In particular, it includes payment, credit and savings exclusion. Due to the degree of utilization of banking services, three levels of banking exclusion can be distinguished [Olit 2012]:

- persons not having an account in a bank or in a credit union,
- persons having a bank account but with limited functionality,
- persons having an account but not using it.

The problem of banking exclusion was already known for a long time. Initially it concerned the poorest countries, where entire societies did not made use of basic banking services. From the twenty-first century, this problem also began to affect the citizens of developed countries. Depending on the causes of banking exclusion 6 types can be enumerated [In or out? , 2000]:

- exclusion due to geographical accessibility (*geographical access*), which is subject to the availability of bank branches for the customers,

- exclusion due to conditions (*condition exclusion*), which is associated with failure to meet the conditions imposed by banking institutions by a certain group of people when using banking services,
- exclusion due to availability (*access exclusion*) - is associated with a lack of access to banking services because of the risk taking scale established by the bank,
- exclusion due to price (*price exclusion*), which is caused by too high prices of banking services for individuals with a given level of income,
- *marketing exclusion*, which is due to a lack of interest on the part of the bank concerning a given social group,
- *self-exclusion*, which derives from the fact that some of the people resign from the use of banking services, believing that they will be denied access to the services or will not be able to afford them.

Factors determining banking exclusion in terms of detail can be divided into:
- social determinants (demographic changes, technological gap, changes in the labor market, varying levels of salary),
- supply determinants (creditworthiness assessment and risk management, marketing, geographic access, price of the product, distribution channels, the complexity of the choice),
- determinants of demand (awareness of the costs, low self-esteem of the consumer, mistrust, fear of loss of liquidity).

Supply factors favor banking exclusion primarily due to the geographical constraints and they concern mainly less urbanized areas, such as small towns and rural areas. Determinants of demand on the other hand, comprise of largely unfavorable or confusing terms of the products offered by banks and also self-exclusion. An important group of factors determining banking exclusion are also social factors. They include restrictions mostly due to the level of income, employment status, education or place of residence [Liszewska 2014].

The main indicator of banking exclusion is the proportion of people without access to a bank account. According to NBP data, the level of banking exclusion in Poland is 23% and remains relatively stable since 2009. On the background of the European Union, Poland stands out with significantly higher rates of banking exclusion, belonging to a group of three countries with the lowest rate of banking services usage, together with Bulgaria and Romania. In countries such as Finland and Denmark only 1% of the population does not have a bank account [Koźliński 2013].

The level of banking exclusion of Poles depends on many factors, inter alia: age, place of residence, level of education, income and occupational status. Most people exposed to banking exclusion are the oldest and the youngest of age groups. As many as 57% of people over 65 years of age in Poland do not have personal savings accounts, and in the age group of 18-25 years it is 30%. In comparison, among people aged 35-44 years banking exclusion is only 4%. Taking into account the place of residence, most at risk of banking exclusion are rural residents (28% of people without an account). An important factor determining the level of exclusion is also the level of education. According to data from National Bank of Poland together with increasing level of education, the level of exclusion decreases. The highest rate of exclusion is amongst those with primary education. Nearly 70% of the members of this group do not have an account. In the case of people with higher education, the level of banking exclusion is 1%. Analyzing the occupational status of Poles, the groups most vulnerable to banking exclusion are senior citizens and pensioners (50% and 46% excluded) as well as school and university students (41% of people who do not have an account) [Koźliński 2013].

The main effects of the banking exclusion, taking into account both the interests of the individual, of the financial sector and of the economy include [Penczar 2014]:

- adverse development of the economic situation of the consumers,
- a potential opportunity of escalation of the banking exclusion problem that is social exclusion,
- the possibility of excessive household debt,
- the possibility of disturbances of the structure of financial market.

From the point of view of an individual banking exclusion associated with low levels of financial education does not allow to make rational choices of financial products tailored to the needs and economic opportunities of the consumers. Lack of access to a bank account prevents the consumers from benefiting from the basic financial services market. Very often socially excluded people choose products from the unregulated non-bank market, which characterize by a higher cost of financial services and greater risks which can further aggravate the economic situation of the individual. As a result of this behavior the individual might be threatened by a risk of excessive indebtedness. In addition, excluded people cannot as well benefit from the possibilities and facilities that are associated with openness to new financial products, e.g. purchase of real estate (preferential loans, mortgages), funding of education, investments in the financial market and financial security after retirement.

Looking through the prism of the financial sector and the economy, banking exclusion limits the potential for financial market development, adversely affects the level of consumer demand and is associated with an increase of the scale of budgetary burden in the form of a growing level of payments of social benefits [Penczar 2014].

THE LEVEL OF BANKING EXCLUSION OF RURAL YOUTH IN MALOPOLSKA

In order to determine the level of banking exclusion among young people from rural areas a study on a group of 350 respondents has been carried out. The studies involved people aged 18 - 26 years. Among those who participated in the study, 59% were women and 41% men. The most numerous group of respondents had higher education (38%). People with secondary education accounted for 32% of all the respondents. Remaining respondents declared lower secondary education (16%) and vocational education (14%). The high rate of participation in the research of the people with higher education derives from the fact that they were more willing to take part in the research. The dominant group of the respondents was working people (46% of the respondents). Every third respondent was dependent on their parents. Almost 20% of the surveyed were receiving a scholarship, and 3% a pension.

To determine the level of banking exclusion of the society the indicator of banking services usage is being employed. People who do not have a basic bank account in a bank or a credit union are excluded individuals. As is apparent from the study, one in four respondents belonged to a group of excluded people (n = 88). The remaining respondents owned a bank account (75%). The results concerning the level of banking services usage of rural youth are slightly higher than the results obtained by other authors [Koźliński 2013]. The difference stems from the fact that the study conducted by the NBP were carried out earlier (at the turn of 2011 and 2012), and the value of the indicator of banking services usage in Poland improves the fastest among young people.

The level of banking exclusion of young people from rural areas depends on gender (χ^2=4,58; df=1; C=0,11;V=0,11). In the studied group it was men, who owned current savings account twice as often, compared to women. This was due to the fact that the main source of income for men was a permanent or temporary work, whereas young women often indicated an answer that they are dependent on their parents, and at this point they do not need the account. In addition, the excluded people are those with the lowest education (χ^2=4,58; df=1; C=0,11;V=0,11). In the group of

respondents with higher education there was the smallest number of those excluded (5%). Taking into account the main source of income of the surveyed young people, most of excluded individuals were in the group of respondents who are dependent on their parents. The group with the highest indicator of banking services usage consisted of people with a permanent job (93%) and young people receiving a scholarship (92%). In this case there have been no χ^2 test procedure, since the number of indications in the cells of the contingency table was less than 8 [Kukuła 2003].

According to the declaration of the respondents using banking services (n = 262), the main reason why the respondents established a bank account was the recommendation of the employer (40% of the surveyed who have an account). Every third person pointed to the possibility of using products such as online or mobile banking. One in ten respondents claimed that the main reason to set up an account was to protect their funds from theft. The remaining individuals were not able to specify the motive, which guided them to create their account.

Respondents mainly used the services of commercial banks (75%). Every fourth respondent owned an account in a cooperative bank. No person has used the services of credit unions. Almost 55% of the respondents possessed an account for more than 3 years, 26% - used an account of one to three years. Less than 20% of young people were the owners of an account for less than 12 months. The vast majority of the respondents were satisfied with the cooperation with the bank, in which they had employed their account (95%). The remaining individuals declared their dissatisfaction, the source of which were the high prices of banking services.

The price of basic financial services can also be an important factor in determining the level of banking exclusion, therefore the respondents were asked about the amount of monthly fees for bank accounts. As is clear from the research, slightly more than 70% the people owned a free account. The banks, aiming to win the clients precisely from this age group for the future, offer free accounts for young people. Fees up to PLN 3 were incurred by 5% of the respondents; the same is the participation of people whose monthly fee for an account ranged from PLN 3.01 to PLN 5. Disturbing is the fact that almost one in ten young people did not know the amount of account maintenance fees in their bank.
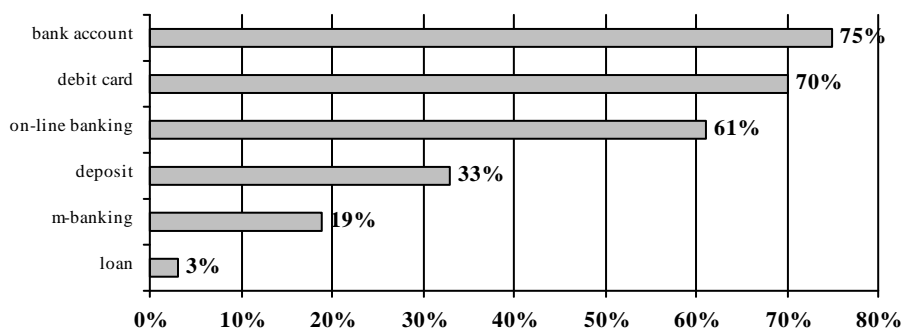

Figure 1. Banking services, which were used by respondents

Source: own studies, n= 350

Current savings account, as a basic banking product determines the possibility of using other bank products, such as debit cards, savings and credit products (Figure 1). Results of the research indicate that almost 95% of the people using bank products owned a debit card to the account. The

analyzed group of respondents (n = 249), most commonly used the card for cashless payments for purchases (64% of those who own the card). Withdrawal of money from an ATM was indicated by 35% of the respondents. Relatively few people indicated that they mainly use the card to pay for purchases at online stores (1%). Respondents owning the card most frequently used it a few times a month (37%). Nearly every third young person used the card once a month or less, and every fourth a few times a week. Less than 6% of the respondents used the card almost every day.

The vast majority of cards issued to an account for young people (92%) are cards which young people enjoyed free of charge. The remaining persons have indicated an answer that they pay a monthly fee ranging from PLN 3.01 to 10.00 for the card.

Other products used by the respondents were online banking (81% of the people using bank products) and mobile banking (25% of the surveyed who own an account). Compared to the results of other studies [Koźliński 2013] lower values were obtained. The use of e-banking services is indeed subject to the place of residence. People living in the city benefit from those products much more frequently. This may be due to a worse access to the Internet in non-urban areas and lower equipment of the respondents with personal computers (stationary computers, laptops and other portable devices like smart phones, PDAs) [Społeczeństwo informacyjne w Polsce 2013].

As can be seen from the conducted research, online banking was more often used by young women (75%). In the case of men almost every other did not have access to online banking, but they more frequently used mobile banking. Access to online banking services or the use of m-banking is subject to the level of education of young people. Only 14% of the surveyed who had vocational education made use of online banking. In this group there was no respondent who possessed mobile access to the account. Most often these products were used by people with higher education, nearly 85% of which had access to the account via the Internet, and 35% used mobile banking.

Saving time (36%), convenience (21%), no fees for transfers (20%), access to the bank from any location (19%) are the main reasons cited by the respondents which convinced them to use e-banking services. Less relevant for the respondents were factors such as trend and lack of queues.

An important area of banking exclusion is also saving. As is apparent from the conducted research, almost every second respondent owned a certain amount of money saved. Nearly 45% of those people have located the accumulated amount in the bank, while others did not use any financial products and they kept their savings "under their mattress". The research results indicate on two areas for financial education actions. At first, drawing the attention of young people to the issue of changes in the value of money over time due to inflation processes. Secondly, forming or affirming in young individuals the habit of saving, especially in the long term.

Saving means postponing consumption in time, while in the meantime a significant part of modern society is characterized by excessive consumerism that has become a sign of our times [Swacha-Lech 2014]. The problem is of particular importance with regard to saving for retirement. As appears from various studies in this field, only a small percentage of individuals collect savings intended for retirement, whereas the least of such people are in the age groups 18-24 years and 35-49 years (8%) [Iwanicz-Drozdowska 2014]. Given the structure of the pension system in Poland and the aging of the population, lack of provision for the period of retirement may serious consequences in the future have both at the microeconomic level (deterioration of the quality of life of individuals) and for the whole economy (growth of public expenditure concerning the increasing liabilities of pensions, increasing demand for the support from the state for budget institutions dealing with health care or social care of the elderly) [Korenik 2009].

As it is evident from the study, only 3% of the respondents were paying off a credit or a bank loan. All of these people had vocational education and worked. Low activity of the respondents in the credit market derives from the fact that in this group a significant proportion of the respondents were people learning/studying, being dependent on their parents. A large proportion of the

respondents also had an unstable position on the labor market (temporary work). None of the people had a credit card, what except for profitable factors, could as well be related to the fact that part of the cooperative banks providing services to the respondents, do not have credit cards in their offer.

Understanding the reasons for banking exclusion allows taking action to limit or mitigate its effects. Analysis of the responses of the excluded group of the respondents (n= 88) indicated that the main reason for not having an account was the lack of permanent income (36%). Every third respondent did not feel the need to own a bank account. Disturbing is the fact that almost every fifth young person not holding an account stated that the finances are not of interest for him/her, and yet in adult life one cannot function without deciding on financial issues. The remaining persons marked an answer that they like to have their money in cash. Almost 35% of the excluded group has no plans to open an account in the nearest future.

Financial education plays a crucial role in limiting the phenomenon of banking exclusion as well as in shaping the elementary financial skills of the society. Such activities may be conducted by various public institutions, NGOs and the banking sector. They may appear at the stage of education, but due to the rapidly changing market of financial services it is necessary to expand our knowledge of finance in the society in the period after the end of education [Górski 2014]. In the studies young people were asked the question "Would you participate in trainings/courses in the field of financial education?" Only every fifth person who participated in the interview was interested in deepening their knowledge of the subject.

CONCLUSIONS

The conducted research allowed determining the level of banking exclusion of rural youth. Most young individuals benefited from the services offered by banks. The level of the respondents using banking services was 75%. Persons excluded (not having access to a bank account) accounted for 25% of the respondents. At the same time these people did not used any other banking services. The payment exclusion was 5%.

The research shows that the level of banking exclusion of young people from rural areas is determined by: gender, level of education and professional status. The highest percentage of people excluded was in a group of young women, people with lower secondary education, people dependent on their parents or working temporarily.

Considering the fact that banking exclusion entails negative consequences for the individual, the economy and the society, financial education of young people should be directed in the first place to the excluded individuals to encourage them to use basic banking products. At the same time educational activities should also be directed to the group of young people already using bank services, who may in the future want to use the more complex financial products.

Almost every second young person does not have any savings. On the other hand, in the group of saving respondents, only 45% of people made use of bank deposits (savings exclusion level is 55%). Given the current market, in educational activities aimed at young people particular attention should be given to formation or affirmation of the habit to voluntarily build savings, particularly retirement savings due to low expected rate of replacement.

In the struggle against banking exclusion of rural youth an important issue is the problem of breaking the psychological barriers associated with high levels of "cash cult". More than half of young people who have savings store them at home, and 11% of the excluded does not plan to open an account because they prefer to have money in cash.

Due to the high volatility of the financial behavior of the consumers in the market, it is necessary to carry out research in this area in future periods to determine the dynamics of changes in the phenomenon studied.

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IMPROVING SAFETY AND QUALITY OF LIFE
IN KAZIMIERZA WIELKA

Abstract: The paper is aimed at presenting of actions taken in Kazimierza Wielka affecting the improvement of the inhabitant's safety and quality of life.

One presented the selected examples of the investments co-financed under the Regional Operational Programme for the Świętokrzyskie Region 2007-2013. Particular attention was drawn to the construction of the storage reservoir in the Małoszówka River Basin, the investment undertaken to secure the town and its surrounding against floods. The completion of the investment increased flood safety creating new recreational areas at the same time. The second investment affecting the quality of life in the town was the revitalization of the Town Park. It significantly improved the attractiveness of the part of the town the park is located.

The implemented investments were in 60% co-financed from the European Regional Development Fund.

Keywords: Improvement of the quality of life, flood prevention, Kazimierza Wielka

INTRODUCTION

The paper concentrates on the selected investments in Kazimierza Wielka, co-financed under the Regional Operational Programme for the Świętokrzyskie Region 2007-2013.

Its purpose was to present actions undertaken in Kazimierza Wielka affecting the improvement of the inhabitant's safety and quality of life.

Kazimierza Wielka is the southernmost poviat town of the Świętokrzyskie Region inhabited by 5.5 thou. people. The 140 sq.m. municipality with just over 16 thou. inhabitants is located within the Nida Basin.

The municipality is divided into 42 villages. It is a typical agricultural area with long traditions of cultivation of industrial crops and cereals due to favourable conditions i.e. excellent soils: humus on loess and alluvial soils, moderate climate, and sufficiently long growing season. Usable agricultural land covers 89.6% of the municipal area, whereas forest area is minimum, only 3% of the municipal area. Two rivers flow across the municipality: the Nidzica and its tributary, the Małoszówka, classified as an upland stream. Moreover, the Jawornik and other numerous watercourses flow into the Nidzica [Przybyszewski 2005].

Two major social problems faced by Kazimierza Wielka are: high unemployment and poverty. According to the research of the Regional Centre of Social Policy (RCSP), the level of poverty risk is very high in Kazimierza Poviat. Over 26% of households in the Świętokrzyskie Region subject to the RCSP's research have net revenues per capita below the poverty line, whereas the rate in Kazimierza Poviat is the lowest, equal to 62% in 2012 [Problem ubóstwa… 2012]. According to the data provided by the Poviat Employment Agency in Kazimierza Wielka the poviat's unemployment rate exceeded 12% in 2014 [http://pupkazimierzawielka.pl /publikacje_blind/artykuly/ dane_ogolne_2014.html (access on: 30.07.15)]. After the closure of the sugar factory and privatization processes in the Odonów brick factory, business activity is based mostly on trade and services. The town's proximity to Cracow (50 km) led to the situation that Kazimierza Wielka is to a large extent under the economic influence of the Cracow agglomeration. The town's own revenues are low. In the 2014 ranking published in "Wspólnota", the magazine for local authorities,

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Kazimierza Wielka took the last place among poviat towns with respect to the revenue per capita equal to 1829.70 PLN [http://www.wspolnota.org.pl /index.php?id=812]. In 2008 the Local Revitalization Programme for the town was developed. Its major purpose was to trigger the process of spatial, social, and economic changes in the degraded parts of the town. Revitalization activities were to improve the quality of life of the inhabitants, develop culture, boost economic growth, rebuild social bonds, and restore spatial order. After the critical analysis of the town's problems was carried out by the programme's authors, the area of revitalization was selected. One stated that the condition of public place development needed significant changes. The restoration was to cover, in particular, the central part of the town, i.e. the Market with its surroundings, green areas around the lakes and the valley of the Małoszówka River, as well as the Town Park. Another essential problem Kazimierza Wielka faced was the lack of properly developed areas of the development of tourism, recreation, and sports, in particular the insufficient number of places offering accommodation and small catering outlets or the lack of professional tourist information office network. By improving of the recreation, sports, and tourism facilities and making them available to the inhabitants, one would offer children and youth excellent opportunities of extracurricular activities, and would encourage adults to spend their leisure time in an active way. The improvement of such social places and facilities would increase the town's tourist attractiveness and improve its image resulting in the increase of the number of tourists and investors. The low tourist attractiveness of the town is closely related to the insufficient use of its cultural and tourist assets and advantages [Lokalny program… 2008].

The North-East part of the town, i.e. the Nidzica valley, is at risk of seasonal floods which afflicted this area many times – the last one stroke in June 2013. At that time, the waters of the Małoszówka River posed a serious threat to the town. Many families had to be evacuated.

Municipal finances

The financial situation of the municipality has been subject to visible changes over the years. The Local Government Act of 1990 did not foresee the opportunity to acquire the European funds: the pre-accession funds, and then, the so-called Structural Funds since 1st May 2004. Therefore, some problems occurred in planning and implementing of the funds. Not all financial decisions made by municipal authorities were good. In 2013 the municipality came close to bankruptcy, and at the end of the 2014 budget year the municipal liabilities amounted to 22 524 829 PLN. The municipal debt was at the level of 55.39% of its actual revenues [http://www.biuletyn.net/nt-bin/_private/kazimierzawielka/10139.pdf]. The low increase in the municipal own revenues is still alarming.

The budget revenue plan of Kazimierza Wielka for 2013 was equal to 43 811 511.09 PLN. The budget was realised in 95.33%, i.e. in the amount of 41 767 625.82 PLN (table 1).

Table 1. Municipal budget revenues in 2013

Sources of revenues	Plan [PLN]	Realisation [PLN]
Own revenues	14 134 174.81	13 215 538.55
Designated subsidies from budgetary sources	8 291 841.28	8 057 653.56
Subventions	16 567 508.00	16 567 508.00
Financial resources for the municipal own investments acquired from other sources	4 817 937.00	3 926 925.71

Source: own elaboration on the basis of: the Annual Financial Statement of the Kazimierza Wielka Municipality and the implementation of economic tasks in 2013

The largest source of the municipality revenues constituted subventions (39.67 %) – educational subvention (9.2 mln PLN), compensatory subvention, and resources for balancing of the municipality revenues.

The municipal own revenues amounted to 31.64 % of the revenues in total, and their largest part included: revenues from the personal income tax equal to over 4.5 mln PLN, property tax exceeding 3 mln PLN, and farm tax at the level of approx. 2.2 mln PLN. Other types of the municipal own revenues covered, e.g., stamp duties, motor vehicles taxes, local fees, revenues from tenancy and lease of assets, and many others.

Designated subsidies from budgetary sources amounted to 19.29 % of the municipal budget. The revenue plan in the amount of 5.5 mln PLN covered subsidies from budgetary sources designated for the tasks delegated to local authorities. Other larger revenues included subsidies from budgetary sources designated for the municipality's own tasks (almost 1.5 mln PLN) and subsidies from budgetary sources designated to municipal investments (900 thou. PLN).

Financial resources for the municipality's own investments acquired from other sources were allocated mostly to the construction of the storage reservoir in the Małoszówka River Basin (3 484 677.71 PLN).

According to the data of the Kazimierza Wielka Municipal Office for 2013, the budget expenditures amounted to 44 850 275.09 PLN, 92.87% of the actual expenditures. The largest percentage of expenditures in the municipal budget were allocated to education and schooling - 15 240 212.05 PLN out of planned 16 357 543 PLN, 93.17 % of the budget implementation for this purpose (table 2).

Table 2. Expenditures from the municipal budget in 2013

Division	Name	Plan (PLN)	Actual expenditures (PLN)	% of the plan implementation
010	Agriculture and hunting	10 429 269.09	9 462 142.15	90.73
600	Transport and communication	2 249 295.00	2 171 410.61	96.54
750	Public administration	4 305 956.00	4 184 191.89	97.17
801	Schooling and education	16 357 543.00	15 240 212.05	93.17
852	Social welfare	7 595 958.00	7 288 889.69	95.96
900	Municipal services management and environmental protection	2 207 633.00	1 923 878.08	87.15
	Others	5 150 015.00	4 579 550.62	88.92
Total		48 295 669.09	44 850 275.09	92.87

Source: own elaboration on the basis of: the Annual Financial Statement of the Kazimierza Wielka Municipality and the implementation of economic tasks in 2013.

For the division 010 "Agriculture and hunting" the plan foresaw expenditures at the level of 10 429 269.09 PLN with the actual expenditures at the level of 9 462 142.15 PLN. The largest expenditures in the division triggered the construction of the storage reservoir in the Małoszówka River Basin, co-financed from the Regional Operational Programme for the Świętokrzyskie Region 2007-2013. 6 386 173.20 PLN were allocated in 2013 for construction and assembly works, archaeological supervision, investor's supervision, and project architect's supervision.

The municipal budget of Kazimierza Wielka for 2015 included 42.5 mln PLN of revenues, and 44.2 mln PLN of expenditures. It means the deficit in the amount exceeding 1.6 mln PLN. As usual,

large amounts will be allocated for education and schooling, approx. 16 mln PLN, whereas the municipality plans to allocate almost 8 mln PLN, i.e. 18%, for investments.

CONSTRUCTION OF THE STORAGE RESERVOIR IN THE MAŁOSZÓWKA RIVER BASIN

Under the Regional Operational Programme for the Świętokrzyskie Region 2007-2013, the storage reservoir in the Małoszówka River Basin was constructed. The investment was covered by the Priority Axis 4 "Development of the environmental and energy infrastructure", Measure 4.1 "Development of the regional environmental and energy infrastructure" [Janowska 2005].

The Małoszówka River Valley is surrounded by steep banks both on the left and right side. The valley is composed of usable agricultural land: arable land and grassland. During heavy rains these areas were flooded. The Małoszówka River in its lower course goes across the town building area for approx. 1 km, and the riverbed capacity is largely limited here. The terrains with local depressions often faced freshets, and several dozen homesteads were flooded. The major purpose of the reservoir is, therefore, retention, i.e. storage of the excess of waters during intense rainfalls, and protection against flooding of areas located in the Małoszówka River valley – municipal, transport, and industrial infrastructure of Kazimierza Wielka. Moreover, retention is also aimed at providing of water supply for fields when drought occurs.

One planned the construction of a reservoir with partial excavation and backwater, overflow and drain constructions, and others, including: a sandy beach, a canoe marina, a pier, a suspension catcher upstream of the reservoir inlet, a fish ladder, embankments of access road to the reservoir, corrections of the Małoszówka River flow, and a front earth-filled dam.

The local authorities decided to construct the storage reservoir in 2000, and ordered the preparation of project documents. At the same time, the process of parcel purchase started; they were building area according to the project. After the project update, 26th May 2011 the Kazimierza Wielka Municipality was granted the permission to realise the flood protection investment issued by the Voivode of the Świętokrzyskie voivodeship.

The agreement with the constructor was signed in February 2012. According to the timetable, the works were to be finished till 30th June 2013; however, the investment was prolonged due to heavy snowfalls and rainfalls at the beginning of 2013 resulting in the increase in ground water level, and due to heavy rainfalls in May 2013 resulting in severe surface runoff. As a consequence, the construction deadline was moved to 31st October 2013 [http://www.kazimierzawielka.pl/asp/pl_start.asp?typ=14&menu=225&strona=1]

The storage reservoir construction was co-financed under the Regional Operational Programme for the Świętokrzyskie Region 2007-2013 (ROP ŚR), Measure 4.1 "Development of the regional environmental and energy infrastructure". The investment value was estimated at the level of 10 mln PLN, 60% provided by the EU subsidies. The exact value of the investment was calculated when the general contractor was selected, Przedsiębiorstwo Budownictwa Wodnego "PBW" from Sandomierz, and it was equal to 9 237 496.68 PLN, where 5 678 908.01 PLN was covered by the ROP ŚR resources. The Kazimierza Wielka Municipality received a loan in the amount of 2 814 215 PLN from the Voivodeship Fund for Environmental Protection and Water Management in Kielce for this purpose [http://www.kazimierzawielka.pl].

TECHNICAL SPECIFICATION

The storage reservoir covers over 20 ha with the capacity at the level of 400 000 m^3. The reservoir's length is equal to 770 m, and it is the widest by the dam - 400 m. The average depth is 1.9 m, and the largest depth in normal conditions is 2.5 m.

By the reservoir's banks one created a wide 230 m-long beach covered with the layer of coarse sand. The remaining area surrounding the reservoir was covered with green areas, and along the

dam one constructed a walking promenade. Moreover, a canoe marina was constructed. In December 2014 the footbridge over the Małoszówka River was commissioned; as a result, one created the recreational continuation of the walking and bicycle route around the reservoir. The task was completed in the form of small projects implemented under the local development strategies, co-financed under RDP 2007-2013.

Two access road lead to the storage reservoir: one from the voivodeship road Kazimierza Wielka – Kraków, and the second from the northern side of the reservoir – the prolongation of Kościuszki Street. There is a car park for almost 150 cars by the reservoir. After the land development over the reservoir, new, attractive development areas will be prepared[31].

TOWN PARK REVITALIZATION

In the town centre, on the southern slope of the Małoszówka River valley, there is the Town Park, the ex-manorial park, currently the Grade listed property registered in the register of nature monuments of the Świętokrzyskie Region due to yews, oaks, and larches. The oldest part of the park covers approx. 2.5 ha. Its aesthetically pleasing appearance is highlighted due to interesting slope topography.

The renovation of the Town Park was implemented as the first stage of the project titled: "The Revitalization of the degraded parts of Kazimierza Wielka" co-financed from the Regional Operational Programme for the Świętokrzyskie Region 2007-2013 under the Priority Axis 6 Urban settlement strengthening and town revitalization, Measure 6.1 Strengthening of regional and sub-regional growth centres. The total investment costs were equal to 8 318 082.67 PLN, with 4 990 849 PLN from the European Regional Development Fund.

The major purpose of the project, according to the Measure 6.1, was to improve the functional aesthetics of public area and strengthen and increase the town's attractiveness. One also assumed the improvement of recreation and sports infrastructure and adequate use of natural assets of the municipality. The general purposes of the project assumed the development of social infrastructure affecting the investment attractiveness of the town and municipality and the spatial, economic, and social regeneration of the revitalized area leading to the improved quality of life of the inhabitants. The detailed purposes included creating of an access to the infrastructure for sports, recreation, and cultural purposes for the inhabitants of the town and the municipality, the increased tourist attractiveness of the municipality by organization of cultural events in the revitalized park, the increased aesthetics and quality of public area, the development of sports and recreation infrastructure, the protection against social exclusion of the inhabitants of the town and the municipality by renovation and creation of recreation infrastructure for various forms of active leisure and social development.

The Town Park renovation started with the demolition of the most degraded elements, in particular the amphitheatre and fence. Architectural works for the amphitheatre included construction of reinforced-concrete walls instead of stone walls, covered with sandstone tiles for the aesthetic purposes. Stone retaining walls were reinforced. One prepared the surface of a scene and stairs. Wooden benches were assembled. Moreover, one purchased remote, folded roofing. The important part of the park renovation was the fountain construction. New footpaths and bicycle routes were created. Trees, shrubs, perennials, and lawns were planted. What is more, one assembled the so-called landscape architecture, i.e. benches, bicycle racks, street lamps, and a safety rail along the Małoszówka River. Another important element was the construction of the fence.

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[31] *http://pupkazimierzawielka.pl/publikacje_blind/artykuly/dane_ogolne_2014.html*

One of the sports and recreation elements mounted in the park is a fitness trail with various gym devices. Moreover, a skate park with many ramps, platforms, and a climbing wall is an attraction for younger inhabitants. One also constructed a modern playground and the so-called green beach with enclosures and places for barbeque. Didactic paths concerning the town's history and the park's flora and fauna were created. To improve the safety of the park's visitor and reduce the acts of vandalism, one mounted the monitoring system in the park.

CONCLUSIONS

Regional Operational Programmes 2007 – 2013 were implemented in all Polish regions, and their allocation exceeded over 23 billion EUR. The Regional Operational Programme for the Świętokrzyskie Region 2007-2013 covered 7 Priority Axes.

The investments implemented in Kazimierza Wielka under ROP ŚR 2007 – 2013 had significant influence on the development of the town. As a result of the Town Park's revitalization, the town's aesthetics improved together with its recreation and sport offer. One created a new, attractive place of mass events. The investment was of high importance, as far as the improvement of the inhabitant's quality of life is concerned.

Due to the construction of the storage reservoir in the Małoszówka River Basin, one implemented the task aimed at the protection of the town and its surroundings against flood. Apart from the major purpose, i.e. water retention, one also achieved a secondary goal, i.e. the increase of attractiveness of the town. The beach and the reservoir's surroundings are new and safe areas for recreation and sports.

The investments were co-financed from the European Regional Development Fund (ERDF) in 60%. The total investment expenditures were: 8.3 mln PLN for the Town Park, and 9.2 mln PLN for the storage reservoir. The co-financing from the ERDF is 4.9 mln PLN and 5.6 mln PLN respectively.

Kazimierza Wielka started to develop with increased intensity, and despite its small area and population, it can pride oneself on the implementation of many strategic investments. Using the town's assets the local authorities strengthen its tourist, recreation, and economic sphere promoting Kazimierza Wielka in the Świętokrzyskie region.

The identified social and economic problems motivate for further efforts and investments. In the new programming period one plans to continue revitalization works around the Town Park to improve the comfort and safety of people using sports facilities. Moreover, one also intends to renovate the Market, its arrangement and development. These works will not only affect the quality of life of the town's inhabitants, but will also improve the image of the town. Services in Kazimierza Wielka evolve into the direction of tourism-related services.

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ADJUSTING SOUTH-EASTERN SIBERIA UNIVERSITY PROGRAMMES TO A MAJOR CHALLENGE FOR THE REGION

Abstract: Peoples' attitudes to nature, the environment and development in Russia are still rather bifurcated. On one hand, many people retain aspects of the previous communist regime, which treated nature as something to be fought and overcome, on the other, more environmentally-friendly development concepts and principles are becoming more common. The conservation of biodiversity in conjunction with economic development is a major challenge for South-Eastern Siberia (S-ES). Hence a serious pedagogic approach to change these perceptions and behaviour is needed. Universities of S-ES are responsible for proper diffusion of the pedagogic approach to the dwellers of S-ES. Hence the 'greening' of University education in S-ES is needed. Cloud computing technology creates great chance for collaboration between S-ES and EU Universities. Voluntary, international consortium called CLOUDSI pushed the idea of greening courses among SES Universities.

Keywords: Biodeversity, Bologna Process, Bratsk, Chita, economic development, Irkutsk, Lake Baikal, South East Siberia, Ulan Ude, University Programme.

SOUTH EASTERN SIBERIA - PEOPLE, NATURE, ECONOMY

South-Eastern Siberia consists of three Russian Federation administrative units: Irkutsk Oblast; Buryat Republic; and Transbaikalsky Krai - known as Zabaikalsky Krai with the area of 1 550 000 km^2, population of 4,6 m and density 2,97 person per km^2. Chita is the capital of Transbaikalsky Krai, Ulan-Ude the capital of Buryat Republic and Irkutsk the capital of Irkutsk Oblast'.
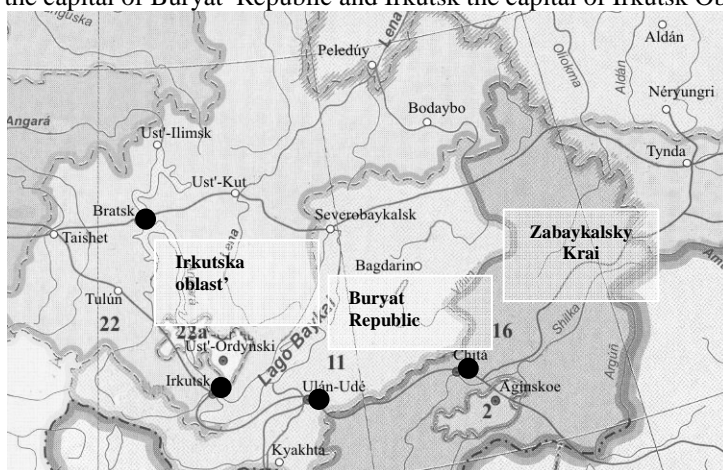
Map 1. South-Eastern Siberia

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South-Eastern Siberia is a mountainous country with varying ranges and intermountain valleys, stretching more than 3 thousand miles from west to east across West Siberia to the Zeya-Bureya plain. In general area has high seismic activity.

Population. South East Siberia is sparsely populated, but historically there are representatives of many language groups. According to the 2010 all Russian census, the region is home to 710,000 indigenous people, with native composition as follows: Mongol (Buryats) ≈ 460,000; Turkic: Yakuts ≈ 180 000, Tuva ≈ 64,000, Altai ≈ 15 000, Siberian Tatars ≈ 7000, Tofalars less than 1 thousand; Tungusic (Evenki) ≈ 38 000. A very small group of natives of South Siberia are descendants of the ancient population of the region – speaking early Palaeoasiatic languages. The closely related Soyots number about 800 people. Irkutsk Oblast is the home to about 2.5 million people of which 80% live on urban areas. The average population density is 3.6 person per km^2. 90% of the population is Russian, 3% are Buryats. Buryatia - a multinational republic - is home to almost 1,000,000 people. The original inhabitants of the Republic of Buryatia are Russian, Buryat and Evenk. The most numerous ethnic groups are: Russian (726,165 people); then Buryats (249,525 people), with a small proportion of Belarusians, Jews, Evenki. The population density is 2.8 person per km^2, with 58% living in urban areas. TransBaikal Krai has 1227.5 thousand people, with 62% in urban areas. Most are Russian - 90%, with the rest being predominantly Buryat - 6%. The population density is 2.6/km^2 South-Eastern Siberia is home of large number of Ukrainians, Tatars, and Belarusians. Over the past 20 years has increased the number of temporary and permanent immigrants from China.

The climate is continental. Winter is cold - 32 °C in valleys - 48 °C. Summers are warm +16 °C. in hollows up to +24 °C. Precipitation decreases from east to west - from 600 mm to 400 mm. Harsh winter widespread permafrost and relatively warm summers defines the upper boundary of landscape zones for this latitude position. Irkutsk Oblast has a milder and more moderately humid climate. Transbaikal Krai and Buryatya and the southern parts of the region have the most harsh and arid climate.

The Steppe foothills of Altai are like the steppes of Western Siberia, in the northern part of the South Siberian taiga, which stretches up to the tundra in the north. The steppe landscapes of Tuva and the intermountain basins of East Transbaikalia are similar to the steppes of Mongolia. Barrens Valley Sheds are very similar to those in Western Siberia. At the same time, the mountain belt of southern Siberia insulate Central Asia from the penetration of air masses from the west and north, and hampers distribution of Siberian plants and animals in Mongolia and Central Asia into Siberia.

Lake Baikal. Another important factor is climate regulation through the Lake Baikal. Lakes and coastal areas have a unique variety of flora and fauna, most species are endemic. The lake is 25-35 million years old, which makes Baikal a unique natural site. According to the Limnological Institute of the Siberian Branch of the Russian Academy of Sciences, in the lake inhabited by 2,630 species and varieties of plants and animals, two thirds of which are endemic and specific to the lake. They include about 1,000 endemic species, while 96 genera, 11 families and subfamilies are endemic. 27 species of fish in Lake are not found anywhere else. Lake Baikal is a unique ecological system, the legal basis for the protection of which is regulated by the 1999 Federal Law "On Protection of Lake Baikal". **Land relief**. Most of the land area is typical mountain taiga and deciduous conifers (about 3/4 of the territory), above 2000-2500 m - mountain tundra.

The fauna. The fauna is represented:
— Mountain views - about 90 species of mammals and over 400 species of birds.
— Steppe species - animals: Antelope dzeren, Tolai hare, jerboa-jumper, Transbaikalia groundhog, gopher Daurian, Mongolian mouse, ferret, weasel, wolf, fox, cat, manul,

Solongo, red wolf. Birds: red duck, mountain goose, demoiselle, Mongolian Lark, stone sparrow, Mongolian finch.
— Mountain taiga species - animals: deer, red deer, musk deer, moose, mountain goats, chipmunks, shrews, voles, squirrels, pika-senostavka, bear, lynx, wolverine, sable, weasel, stoat, ferret. Birds: capercaillie, black grouse, hazel grouse are found, the woodpecker, thrush, nutcracker.
— Alpine species - animals: roe deer, ibex, argali, musk deer, red deer, marmots and pikas, and mountain tundra - herds of wild reindeer. Birds: Quail, Altai snow cock, alpine and krasnoklyuvaya daw.
— Game animals: Siberian weasel, ermine, fox, marmots, grouse, grouse, partridge.
— Aklimatizavalis: Far deer and siberian ibex.

The flora of southern Siberia is very diverse. In Sayan and Baikal, which occupy a relatively small area, there are about 1850 species of plants, ie about 2.5 times more than in all the areas of the West Siberian Plain. Along with the typical Siberian variety is a lot of representatives from the Mongolian steppes dominated by Mongolian xerophytes and cereals. The Sayan mountains are especially characterised by subalpine and alpine meadows. In the more continental regions at the same heights, moss-lichen and shrub mountain tundra dominates. **Meadows** are rare, and the ground-cover is mostly subalpine shrubs typical of the mountains of southern Siberia: rotundifolia birch (Betula rotundifolia), shrub alder (Alnaster fruticosus) and various willow thickets tending towards ordinary stone pine (Pinus pumila).

The economicscs The economics of these regions is not uniform and is related to both macro-economic and natural conditions. The mountains of southern Siberia are rich in natural resources, especially in various minerals, and particularly non-ferrous metal ores - copper, zinc, lead, there are also deposits of gold, silver, tin, mercury, tungsten, molybdenum, precious and semi-precious stones and minerals. There are also significant water resources. Numerous fast mountain rivers flowing in the rocky canyons with steep falls, which can be used as a source of hydroelectric power. Woodland slopes are of high quality wood. Livestock have an important role in maintaining alpine meadows and mountain taiga. Over the recent past, most major indicators of economic development of southern Siberia have a positive trend. From 2000 to 2005, the gross regional product of the region has increased by and estimated 2.5 times, with services increasing their share of the total. The Irkutsk region dominates, in terms of volume of industrial output per capita, well above the Buryatia and Transbaikal regions. The strong growth of industrial production in the Irkutsk region is based on the development in the fuel, ferrous metallurgy and power sectors. Food production and mining have increased significantly in all these regions. Southern Siberia is more favorably situated than northern and southern neighbors due to the well developed transport infrastructure - rail, road, air and water, as there are a large network of developed roads, including federal highways. Statistics show, an increase in transportation of goods by all modes of transport in recent times in the region.

In Buryatia Baikal Territory the major industry is agriculture. The current trend in the development of agriculture aims to acclimatize traditional breeds of livestock and increase livestock products, which will better meet the needs of the population for food and agricultural raw materials to create resources for the development of light industry and food industry. Small businesses in the region are an integral part of market relations, the foundation of the middle class, the social base of the stabilization of society. Some of the dominant sectors of the private economy are composed of small enterprises and trading enterprises. Housing is the most sluggish of the region's sectors, although housing needs of the local population are still high. The slow growth reflects the development of mortgage lending. There is a significant number of social problems. Despite the fact that the region has significant capacity for employment and natural resource development, the region's economy is still characterized by low productivity compared to the western regions.

THE SOUTH-EASTERN SIBERIA MAJOR CHALLENGE

South-Eastern Siberia consists has a distinct continental climate and an exceptional geography: alpine mountains, valleys, rivers, semi-deserts and lake Baikal itself. The region is on the WWF list "Global 200" as critical to the conservation of global biodiversity. The variety of natural resources is unique in the world. However species extinction occurring at a higher rate than at any time in history, primarily as a result of human activity. South-Eastern Siberia is abundant in mineral resources (oil, zinc, molybdenum, gold, lead, wolfram, uranium) but rapid development of mining, energy, transport, and timber industries has strongly negative impacts on this unique and globally important environment. ***The conservation of biodiversity in conjunction with economic development as a major challenge for South-Eastern Siberia.*** Cities like Chita, Bratsk, Irkutsk and Ulan Ude are the significant university centres with Bratsk State University, Buryat State University, Irkutsk State Agricultural Academy and Transbaikalsky State University in Chita as the leading universities. The region comprises huge natural resources of forests, steppes, semi deserts, rivers, reservoirs, lakes and mountains. It includes wildlife and wild environments as well as substantial human activity. Water reservoirs and dams for electricity production have been built in two locations; Bratsk 5300 km^2 and Irkutsk 154 km^2, which raised the level of Lake Baikal. BAM rail track crosses the region (over 1500 km). Several mines and large heavy metal plants have been constructed. Intensive agriculture, animal husbandry, forestry and fishery enterprises are developing. South-Eastern Siberia has also become a destination for intensive tourism, with flows increasing annually. Continued economic development poses threats of environmental pollution and degradation. A sustainable balance between environmental protection and development requires modern environmental policies and management practices, employing well-qualified and competent staff. Preparation of graduates for sustainable development and nature conservation is the main responsibility of the universities.

SOUTH-EASTERN SIBERIANS ATTITUDES TO NATURE

Peoples' attitudes to nature, the environment and development in Russia are still rather bifurcated. On one hand, many people retain aspects of the previous communist regime, which treated nature as something to be fought and overcome. This approach generated several environment disasters, e.g. Lake Aral, Kara Bogaz-Go, Virgin Land campaign (Tselinograd – Astana). On the other hand, more environmentally-friendly development concepts and principles are becoming more common. Currently, a serious threat for Baikal is posed by the development and operation of paper and pulp mills, apparently following the previous 'struggle with nature' perception. A serious pedagogic approach to change these perceptions and behaviour is needed to cultivate sustainable development and should be founded on three fundamentally important assumptions for the 'greening' of education in South-Eastern Siberia: a) understanding the global uniqueness of South Eastern-Siberian nature; b) understanding the necessity of nature conversation for future generations; c) appreciation of the necessity of sustainable development for the region and country. Higher education of the region plays leading role in forwarding the pedagogic aims to local society to combine conservation of biodiversity with economic development.

Numerous Federal and local regulations and projects are directed towards the principles which balance present economic development and nature conservation for future generations. Conservation through harmonious exploitation is the aim of sustainable development, which requires the relevant University education and training. To be successful and sustainable, South-Eastern Siberia needs high quality, well-trained people for both the public and private sectors. Currently Russia as a whole, and South-Eastern Siberia in particular, urgently requires skilled specialists in (inter alia): environmental policy and management; environmental protection; wildlife protection; sustainable agriculture, forestry and fishery; and nature tourism.

Universities from leading cities of South Eastern Siberia namely; Bratsk, Chita, Irkutsk and Ulan-Ude, with conjunction of EU education system may have power to meet the challenge by 'greening' their university courses. The Universities are to elaborate environmental curricula integrating sustainable development with nature conservation. The programmes and modules to develop should cover four Russian National Priorities: Life science; agriculture, forestry and fishery; environmental protection and computing and meet the provisions of the Bologna Process, respect Russian education frames (ФГОС-3) and apply cloud computing technology. Subject area focuses on sustainable development of South-Eastern Siberia through modern environmental management and policy. The general objective for the Federal education structures is to assist South-Eastern Siberia to meet this challenge through higher education.

CLOUDSI PROJECT

Poznań University of Live Science in collaboration with Irkutsk State Agricultural Academy had initiated several undertakings with an aim to support developing university courses allowing to solve problem of conservation of biodiversity in conjunction with economic development. The idea was supported by several EU (UK, Italy, Poland) and Siberian Universities and named CLOUDSI Consortium. All South-Eastern Siberian partners had excellent knowledge on Siberian biodiversity and economy. All EU partners had good practical experience in the Bologna process implementation and in designing sustainable courses.

CLOUDSI's principle motivation was to encourage South-Eastern Siberian academics to prepare of high quality environmental modules for university degrees combining sustainable economic development with environmental protection and wildlife conservation. The second motivation was that Russian Universities, while advanced in the introduction of Bologna principles, still need EU assistance for their further development. The third motivation is the requirement for high quality staff capable of elaborating and realizing sustainable development of South-Eastern Siberia and Baikal environs and highly likely to pursue their careers in the region. With this motivation, CLOUDSI aims was encouraging to develop new modules for Bachelors and Masters programmes by universities in Chita, Bratsk, Irkutsk and Ulan-Ude providing capacity for the realization of environmental policy and management in South-Eastern Siberia, which combine environmental policy with sustainable economic development. Module development was to focus on: a) consistency with the Bologna Process with particular emphasis on competence; b) Russian priorities for environmental protection, wildlife and life sciences; agriculture, forestry and fishery, c) Russian standards for higher education; d) sustainable development of the unique natural resources of South-East Siberia and Lake Baikal.

The CLOUDSI partners have spotted four major target groups of the project: 1) the academic staff and management teams in the participating Russian universities, who become more familiar with the Bologna Process and principles, as well as the up-to-date material and knowledge about sustainable development; 2) the students at these universities and on these courses who benefited from the curricula, and have access to further study, both through the Cloud, and also throughout the Bologna system; 3) public and private enterprises and authorities in the Siberian region who would have more well-qualified and well-trained people to help improve their operations and activities; 4) the UE participants, who learnt about the unique and special issues and problems arising from the development of the region, and improved their understandings of both the limits of present sustainable development principles and ideas, and the opportunities for further developing and refining these for the specific characteristics and situation of the Region. In addition, federal and regional administrations and private firms connected with forestry, hunting, fishery, agriculture, animal production and tourism all need to employ graduates able to implement environmental policy and management in their economic activity, and understand how to pursue sustainable

development which respects the unique natural character of the South-Easter Siberia and Lake Baikal region. And the world in general may benefit through well-educated and trained people to preserve and sustainable develop the natural environment of South-Eastern Siberia for future generations. Cloud computing technology may be called the Project bloodstream as it allows proper functioning of the whole Project. For the project necessary was to create a cloud platform for smooth operation of the Project by facilitating long distance communication, document circulation amongst partners, worldwide output dissemination.

EXPECTED OUTCOMES

The main expected outcome of the CLOUDSI Project would be curricula for four comprehensive environmental modules for bachelor and master degree programmes provided in South-Eastern Siberian universities namely: Environmental Policy & Management; Nature Conservation of South-East Siberia; Sustainable Agriculture, Forestry and Fishery; Nature Tourism. All four modules fit Russian educational priorities closely, i.e.: environment protection, life sciences, agriculture forestry and fishery and computing.

Module competences would describe the main abilities, skills and knowledge students will gain from completion of the module, focused on developing sustainable environmental policy and management. The subject content for each module will be grouped in at least three subject bundles: i) general contextual knowledge and background; ii) core professional knowledge majors; iii) subsidiary professional minors. The proposed modules will be integrated through the underlying philosophy and general objective of sustainable management of the South-Eastern Siberia region environment. Subject cards (module outlines) will be elaborated for each module, providing the name of the leading person of the subject, ECTS, contact hours, methods of knowledge and skills evaluation, detailed content of the lectures and exercises. ECTS will be determined by the expected student workload. Contact hours will set the detailed breakdown of subjects and their weighting within the whole module. The academic content for each module will be in line with the Russian Federal, State, Education 3rd generation Standards (ФГОС-3), introduced 1.09.2011, which are based on the principles of Bologna process with stress on module outcomes, ECTS and competences. Elaborated under the CLOUDSI Project, new modules will substantially support several existing ФГОС-3 standards, for example; 020400 - biology, 022000 - ecology and nature utilization, 100400 - tourism, 110400 - agronomy, 111100 animal sciences. CLOUDSI modules will be developed either by 'greening' existing courses or designing new ones.

CONCLUSION

Peoples' attitudes to nature, the environment and development in Russia are still rather bifurcated. On one hand they treat nature as something to be fought and overcome and on the other, more environmentally-friendly development concepts and principles are becoming more common. Hence a serious pedagogic approach to change these perceptions and behaviour is neededContinued economic development poses threats of environmental pollution and degradation The conservation of biodiversity in conjunction with economic development as the major challenge for South-Eastern Siberia. Universities of S-ES are responsible for proper diffusion of the pedagogic approach to the dwellers of S-ES. Hence the 'greening' of University education is needed. Cooperation between SES with EU universities may satisfy the major challenge for South-Eastern Siberia

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Marek Tabert[34]

TYPES OF OPERATIONS IN MANUFACTURING PROCESSES OF WOOD INDUSTRY ENTERPRISES

Abstract: The paper defined basic concepts connected with manufacturing processes and a classification was proposed for manufacturing operations found in wood industry enterprises. The presented classification was based on the identified constitutive characteristics of individual types of manufacturing operations. The duration of manufacturing operations was analyzed in detail.

Key words: manufacturing process, wood industry, classification, types of manufacturing operations, groups of operations, duration of manufacturing operations

INTRODUCTION

Manufacturing processes in wood industry enterprises are similar to those in enterprises of the machinery manufacturing industry. However, in the wood industry they are much more varied. Manufacturing processes in the board or pulp and paper industries differ considerably from those in furniture enterprises, while those differ from manufacturing processes in sawmills.

In relation to wood industry it was attempted in this paper to define and classify the basic component of all manufacturing processes, i.e. different types of manufacturing operations. Processes and operations were defined based on their primary identified characteristics (constitutive properties). These characteristics were subsequently used as classification criteria in the proposed classification system.

In relation to the machinery manufacturing industry the literature of the subject presents such classifications, although they vary in the degree of their specificity and they are not comprehensive. However, classification criteria are rarely applied in the adopted classification system. To date no papers have been published covering this problem in the case of wood industry. Practically such studies were limited to the application of certain solutions, which were used in the case of the machinery manufacturing industry. This paper attempts to fill this gap and thus a comprehensive approach has been proposed for the analyzed problems in reference to manufacturing processes and operations found in wood industry enterprises. Moreover, characteristics and an analysis of duration of manufacturing operations (duration of the operations cycle) are presented in terms of material components of operations as well as principles of establishing standard worktimes.

BASIC DEFINITIONS

A manufacturing[35] process[36] (production process) of products[37] is a set of actions organized in the form of manufacturing operations[38] performed at workstations in an enterprise. Moreover, it includes natural processes and intervals between operations, during which products are stored

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[35] Production (Latin productio = derivation) – manufacturing something to meet human needs. Słownik języka polskiego pod red. W. Doroszewskiego. Encyklopedia PW. Internet:
http://encyklopedia.pwn.pl/szukaj/produkcja.html (dostęp: 11.01.2016).

[36] Process (Latin processus = progress, procedure) – an ordered series of successive actions, linked by cause and effect dependencies, i.e. results of preceding actions are input (initiate) successive actions. Kopaliński W.: Słownik wyrazów obcych i zwrotów obcojęzycznych. Pierwsze wydanie w Internecie. [Online]. Wyd. De Agostini Polska, Sp. z o.o., Warszawa. (access: 11.01.2016). Available on the Internet: http://www.slownik-online.pl/oslowniku.php.

[37] Product in a general sense may be an initial object of work: raw material, material, an element, subassembly, assembly or final product. The term was applied in this sense in this paper.

[38] Operation <Latin operatio = action> – an action or successive actions aiming at performance of a specific task. Kopaliński W.: Słownik wyrazów obcych i zwrotów obcojęzycznych. [CD-ROM]. Optimus – Pascal, Multimedia 2010.

waiting for the performance of the next operations. Manufacturing operations, natural processes and intervals between operations are elementary components of manufacturing processes.

A manufacturing process aims at the conversion of input products: timber raw materials, non-wood materials, elements, subassemblies and assemblies into output products (final products). Operations and natural processes comprising a manufacturing process are performed in a sequence resulting from technological, design and utility requirements of the manufactured products. Initiation of manufacturing operations is coordinated in terms of the time and location of their performance, as well as technological and organizational requirements of the process [Tabert, Lis 2014]. In wood industry enterprises the course (procedure) of a manufacturing process of products of the same type is a repeatable, i.e. cyclic[39] phenomenon. For a single run it assumes a form termed the production cycle (manufacturing cycle) [Gryffin 2013].

A manufacturing operation is a set of actions, which were distinguished in terms of their organization from the manufacturing process to be performed cyclically on products by employees at their workstations [Brzeziński[40] 2013]. The same type of manufacturing operations may be performed at the same time on more than one workstation if they are technologically interchangeable (equivalent). Such a set of workstations is referred to as parallel workstations. A manufacturing operation is a basic organizational unit of discreet manufacturing processes.

Natural processes in the manufacturing process are physico-chemical changes taking place in the product outside the duration of manufacturing operations. They are necessary technological components of manufacturing processes. They take place naturally in the product, i.e. with no participation of human labor or technical means of production and with no purposefully supplied energy. Natural processes are distinguished in terms of their organization from the manufacturing process only when prior to the initiation of the next manufacturing operation waiting time is required for the completion of the natural process. In such a case products covered by a natural process are stored for the period of physico-chemical changes in a distinguished production area (e.g. trolleys, conveyors, storage counters, etc.). Natural processes (e.g. conditioning of wood materials after drying, hardening of glue lines after assembly operations, conditioning after staining and lacquering, etc.) are characteristic components of manufacturing processes performed in wood industry enterprises.

Operation intervals are periods during the performance of a manufacturing process, in which products are waiting at storage locations situated between workstations for the initiation of the next operation [Brzeziński[41] 2013]. The waiting time results from the principles of organization of manufacturing processes as well as organization of work time in an enterprise. In a broader sense operation intervals include not only waiting (passive) times of products for the performance of the next technological operation, but also times of performance of auxiliary operations (transport, quality control, maintenance and storage) [Tabert 2015].

TYPES OF MANUFACTURING OPERATIONS AND THEIR CLASSIFICATION

Manufacturing operations vary in their properties. Some of these properties are constitutive (basic) properties, which make it possible to distinguish operation types. Table 1 presents classification criteria formulated based on constitutive properties as well as names of thus distinguished operations.

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[39] Cycle (gr. kýlos = circle) – successive actions, processes or phenomena constituting a closed development entity within a time frame and which is repeatable. Doroszewski W., ibid.
[40] Brzeziński M.: Organizacja produkcji w przedsiębiorstwie. Wyd. Difin, Warszawa 2013, s. 45.
[41] Brzeziński M.: ibid.

Table 1. A list of classification criteria and terms describing types of operations

Classification criterion	Names of types of manufacturing operations
Changes in quantitative flow of products	Dividing, combining, flow dividing
Changes in the form and shape of products	Dividing, combining, processing
Scope of changes in product	Technological, auxiliary
Type of auxiliary actions constituting operations	Maintenance, control, storage, transport

Source: Own study.

In terms of consequences of the performance of operations in the quantitative flow of products through a manufacturing process we distinguish dividing operations (divisions), combining operations (assembly, linkage, bonding) and flow operations. As a result of performance of an **operation dividing** an input product it is divided into two or more flows of output products. Several parallel output flows are formed from one input flow of products. For example, the operation of cutting a particleboard of commercial size into panels may lead to the formation of several elements with the same or different dimensions. Next panels are separately transferred to different sections of the manufacturing process, where they are worked and finished differently.

An effect of a **combining operation** is a combination of two or more input products into one output product, which is next transferred to the next operations of the manufacturing process performed in series. In this way from several input flows of products we obtain one output flow. Combining operations are found first of all during assembly of subassemblies, assemblies and final products (e.g. assembly of a cabinet frame, assembly of door hardware, etc.).

A flow operation (processing) causes no changes in the number (or amounts) of output products in relation to input products. As a result of its performance one flow of input and output products is formed. In furniture factories flow operations are first of all processing operations, e.g. milling, turning, drilling, etc. Their objective is to change the shape and/or gross dimensions to net dimensions**.**

In view of the scope of changes, which are caused in the product by manufacturing operations, they are divided into technological and auxiliary operations (handling, paramanufacturing). Technological operations are performed in order to change the product in terms of its dimensions, shape, composition or physico-chemical properties. In diagrams and graphs of manufacturing processes technological operations are marked with the symbol of a circle ○ . Technological operations in terms of the type of changes, which they cause in the dimensions and shape of products, are divided into dividing, combining and flow operations.

A technological operation may be divided into smaller performance units, such as settings, procedures, positions, transitions, actions, work movements, sequences and elementary movements. The division of operations into smaller units is used in designing the course of operations and their series, as well as in standardizing times of operations. The scope of the division of operations into component elements is dependent on the complexity of operations and accuracy of the determination of time standards.

Auxiliary operations make it possible to perform technological operations in a proper sequence, at an adequate time and location and following the quality requirements causing no changes in product properties. Auxiliary operations in terms of the type of basic actions, which are divided into operations:

    – maintenance, denoted with the symbol of a isosceles triangle ◺

    – control, denoted with a square □ ,

    – storage, denoted with an equilateral triangle ▽ ,

    – transport, denoted with an arrow ⇨ .

The system of technological operations arranged in terms of the order of their performance, presents the structure of a technological process of a specific type of product. Similarly, the system of all manufacturing operations forms a structure of the manufacturing process of a specific type of product. The structure of both technological and manufacturing process for a specific type of product is designed in the form of documentation – a process flow-chart – by technological units of the enterprise. Figure 1 presents classification criteria and relationships between types of manufacturing operations.
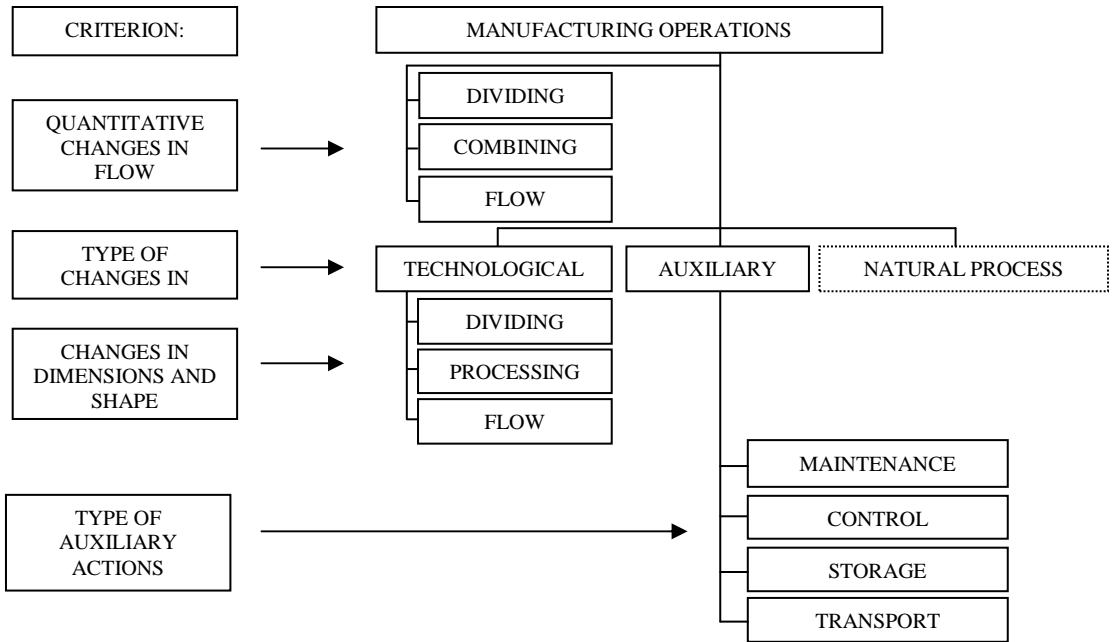
Fig. 1. Types of manufacturing operations. A broken line marks the operation of a natural process, which is not always distinguished

Source: Own study.

Authors of some studies propose treatment of natural processes such as operations, defining them as **operations of natural processes [Liwowski, Kozłowski[42] 2007]**. In such a case an operation of a natural process is defined as a separate set of physico-chemical changes, occurring without human labor, work of machines and equipment and with no energy supplied on purpose if for these processes periodical storage of products on an allocated production area is required. The concept of operations in natural processes may be used in the case of a formalized record of the structure of a production schedule, in which natural processes are distinguished.

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[42] Liwowski B., Kozłowski R.: Podstawowe zagadnienia zarządzania produkcją. Wyd. Wolters Kluwer Polska Sp. z o.o. Kraków 2007, p. 18.

GROUPS OF OPERATIONS

In the production process we distinguish homogeneous groups of operations in terms of the type of changes taking place in products. Sets of technological operations form technological processes, while sets of auxiliary operations comprise auxiliary processes. Moreover, we distinguish natural processes, which are a series of physico-chemical phenomena taking place outside manufacturing operations.

The aim of technological operations comprised in technological processes is to introduce specific changes in physical and/or chemical properties of products. In a technological process, depending on the type of applied technology we distinguish processes of modification of dimensions and form (e.g. mechanical working, plastic working), processes of physico-chemical changes (e.g. drying, glueing, lacquering) and processes of assembly and disassembly. Within chemical processes we distinguish processes of analysis (decomposition), synthesis and exchange.

A technological process may be divided into technological phases[43] (e.g. the phase of machining, the phase of assembly). A technological phase is composed of technological operations with common characteristics or of operations realizing the same objectives. The scope of individual phases is specified under manufacturing conditions frequently in an arbitrary manner, taking into consideration organizational and technical requirements. In the technological phase we distinguish stages[44] and methods of processing. A stage is distinguished based on technological homogeneity of operations (e.g. timber drying). In turn, the working method is distinguished in terms of the method of performance of a group of operations, e.g. within cutting processing[45] we distinguish working methods such as turning, drilling, planing, sanding, etc.

Performance of operations classified as auxiliary processes do not cause purposeful changes in product properties, but it only facilitates performance of technological operations in a proper sequence, in a proper time and location and in accordance with quality requirements. In auxiliary processes, depending on the type of operations they consist of, we distinguish the following processes:

– maintenance, which are a set of maintenance operations,
– control, which are a set of control operations,
– storage, which are a set of warehousing operations,
– transport, which are a set of transport operations.

Moreover, in the manufacturing process we distinguish work processes. Work processes are composed of sets of manufacturing operations, in which performance workers are required. In most cases manufacturing processes and work processes overlap.

DURATION OF MANUFACTURING OPERATIONS

Duration of operations (duration of an operations cycle) is the period between the times of initiation and completion of performance (a single course of a production cycle) of a single operation on a batch of products. It is equivalent to the period of time, during which a workstation is occupied by actions, comprising an operation. The primary objective of these actions is to provide the product with required properties at a specific stage of the manufacturing process. The term "operations cycle" is used to stress the repeatability of a set of actions constituting a manufacturing operation and it overlaps with the term "manufacturing operation". Actions included in operations may be performed in four systems: by a single worker or a group of workers and with the

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[43] Phase (gr. phasis = appearance, spectre) – the status of a process, system or development of a phenomenon at a specific time. Kopaliński W.: ibid.

[44] Stage (Latin = track; a measure of length, race over a distance of approx. 180 m.) – the period of a phenomenon. Kopaliński W.: ibid.

[45] PN-60/D-01003. Machine and manual wood working. Division names and terms.

participation or with no participation of technical means of production. Technical means of production are composed of tools, tooling as well as machines and equipment constituting the equipment of a workstation. The duration of operations comprises two phases (stages):
– preparatory and
– execution (performance).

The preparatory phase of operations is formed by actions, through which a workstation is adapted to actions constituting the execution phase. Actions of the first phase do not cause changes in dimensions, shape or physico-chemical properties of manufactured products. Within the preparatory phase we may distinguish two groups of actions. The first group is composed of ordering actions performed before the initiation and after the completion of the performance phase of operations. They consist in the collection (return) of products, tools, manufacturing documentation as well as ordering and cleaning the workstation. Time, in which actions of this group are performed, is defined as the preparation-completion time.

Actions of the preparatory phase, which are included in the other group consist in the exchange of tooling, tools as well as setting and regulation of equipment, with which the workstation is equipped. Time, in which actions of this group are performed, is defined as workstation changeover time.

On manual workstations actions of only the first group are performed and for such a situation the time of the preparatory phase of operations is called the preparation-completion time. In turn, in machine-manual workstations both groups of actions are performed. Then the time of the first phase of operations is sometimes called workstation changeover time. In both cases the same symbol – TPZ, is used to denote changeover time.

When planning manufacturing processes the duration of the preparatory phase is established when the share of this stage in the duration of performance of operations is considerable. Then the established time becomes a component of the standard[46] of operation time. Typically it occurs when the share of time of the preparatory phase in the duration of performance of operations exceeds 20%. In the establishment of the time of the preparatory phase first of all standard TPZ time is used, assumed for application in an enterprise. They are established for groups of operations or less frequently for individual operations, based on measured actual duration of operations at workstations. TPZ standard times may also be established as a product of the TPZ time share in the duration of the execution phase of operations, adopted for a specific group of workstations and the duration of the execution phase of operations.

In wood industry enterprises, for a numerous group of operations standard changeover times or preparation-completion times are not established. In such situations actions connected with the preparatory phase are most often included in the handling time (TO), being a component of the standard unit time (TJ). Then the time of performance of operations on a production batch denotes only the time of the performance phase, at no TPZ time used.

During the performance phase of operations first of all actions aimed at a change of properties of manufactured work objects are performed. They are mainly technological actions, e.g. processing, assembly or finishing. As a result of these actions products change to a required degree in terms of their dimensions, shape as well as physico-chemical properties. Such actions constitute the essence of operations, thus their names are often the basis for the formation of operation names. For example, during turning products are provided with new profiles and the operation, within which such actions are performed, is called a turning operation.

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[46] Standard (Latin = measure) – a rule, recipe, a principle of action. Kopaliński W.: Optimus – Pascal, Multimedia 2010.

In actions, which constitute a manufacturing operation, three basic material components of the workstation are involved: workers (P), products (W) and equipment of the workstation with technical means of production (S), i.e. tools, tooling as well as machines and equipment. During the performance of these actions components of the workstation may be engaged in four systems:

1. Workers work on the product using no tools, machines or equipment of the workstation (P→W) – e.g. a worker transfers products from (or to) storage location.

2. Workers work on tools and equipment of the workstation with no products involved (P→S) – e.g. a worker replaces a tool and changes the setting of equipment.

3. Workers work on products using tools, machines and equipment (P→S→W) – e.g. a worker using a pneumatic screwdriver attaches cabinet door hardware using screws.

4. Tools, machines and equipment of the workstation work on products with no participation of workers (S→W) – e.g. a milling machine performs technological actions automatically – it mills a panel side.

Duration of actions belonging to systems 1 and 2 is the time of the preparatory phase, with system 1 referring to the preparation-completion time and system 2 referring to changeover time of the workstation. Actions included in systems 3 and 4 are connected with the time of the execution phase of operations. Actions found in all the four systems may be found in periods, which do not overlap and may differ in their duration (length of time). Their distribution during the operations is dependent first of all on the type of the workstation and the type of operations. The potential distribution of distinguished (1 – 4) groups of actions during the operations for manual or machine-manual workstations is presented in an example given in Fig. 2, while for machine workstations – in Fig. 3.

Time of the execution phase of operations is established as a product of unit time (TJ) and the number of products (N) of the same type, comprising a production batch. A unit time comprises the time of the execution phase of the operation referring to a single product. The time of performance of operations on a production batch of products (the duration of an operations cycle), covering the first and second phase of operations, is described by a formula:

$$TWO = TPZ + N \cdot TJ, \tag{1}$$

where:

TWO – time of performance of operations on a production batch of products (duration of an operations cycle),

TPZ   – time of the preparatory phase of operations, (changeover time or preparation-completion time),

N*TJ – time of the execution phase of operations on a production batch of products,

TJ   – unit time (time of the execution phase of operations, referred to a single product), number of products of the same type, constituting a production batch.

Material
components of

Worker

Equipment of
the
workstation
Product

Preparatory phase	Performance phase	Preparatory phase

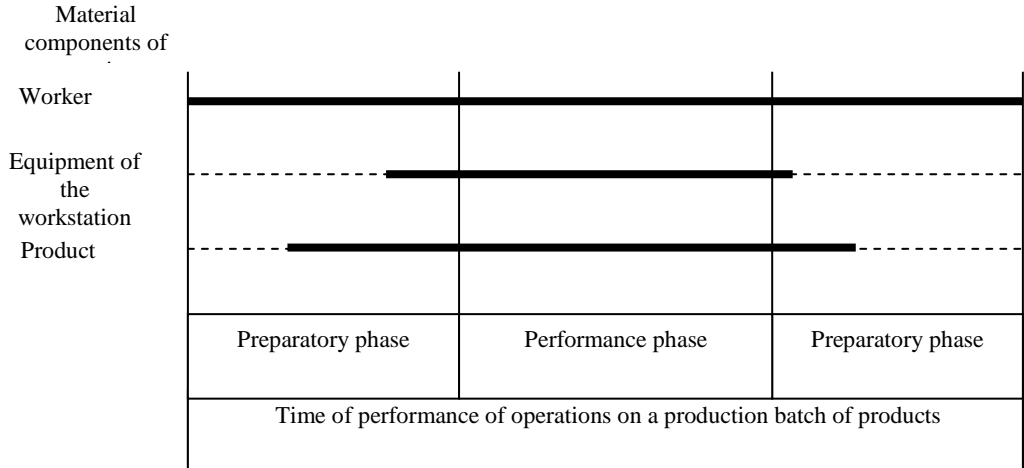Time of performance of operations on a production batch of products

Fig. 2. An example of the distribution of actions with the participation of: a worker, equipment of the workstation and products on manual or machine-manual workstations during performance of operations on a production batch of products. A solid bold line denotes the time of involvement of individual components in the course of operations, while a broken line denotes the idle time of these components

Source: Own study.

Material
components of
operations

Worker

Equipment of
the
workstation

Product

Preparatory phase	Performance phase	Preparatory phase

Time of performance of operations on a production batch of products
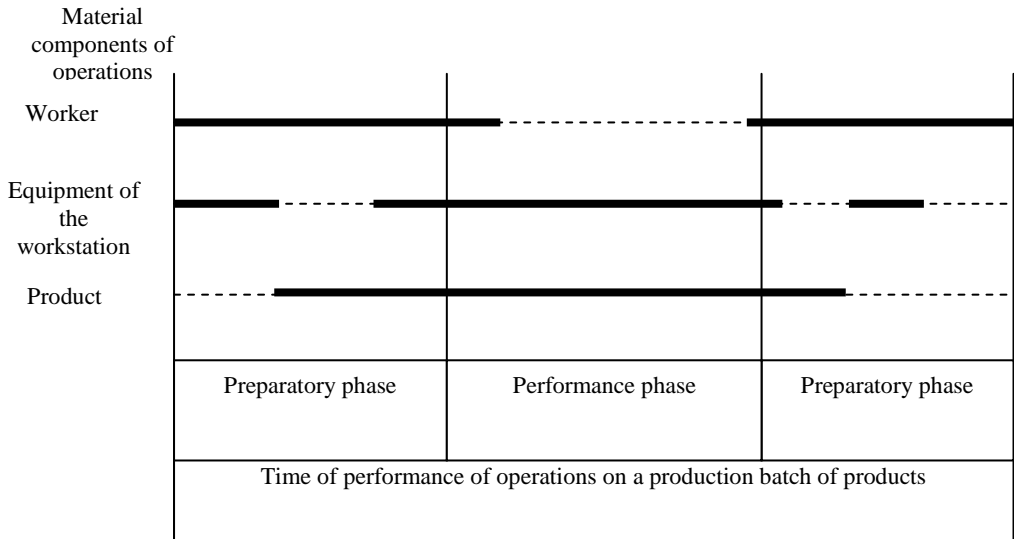
Fig. 3. An example of distribution of actions connected with: the worker, equipment of the workstation and products on machine workstations, during performance of operations on a production batch of products. A solid bold line marks the time of involvement of individual components during the course of operations, while a broken line denotes idle time of these components

Source: Own study.

Time of performance of operations on a single product (single detail), sometimes also called **performance time of detailed operations (TWD)**, which is described by the formula:

$$TWD = TPZ / N + TJ. \tag{2}$$

CONCLUSIONS

In cognitive processes a significant role is played by definitions of concepts and classifications of objects and phenomena (processes), which are subject of studies. They constitute basic tools of communication in research papers and during presentations at conferences, when specific findings in a specific field of science are presented. They facilitate precise discussion of analyzed problems, clarification of disputes and frequently prevents or eliminate them rapidly. Creation of a stable, commonly accepted concept network as well as classification of objects and phenomena are an important stage in the development of each research area as well as a pre-condition for its maturity.

Definitions and classifications proposed in this paper contribute to the establishment of a concept network concerning organization of production and manufacturing process engineering in relation to wood industry. At the same time they are components and supplementation of similar solutions, which have been published by the author of this paper for materials and structural components of products, production workstations and the related organization structure of an enterprise, as well as the production cycle and its structure. The first two groups of definitions and classifications refer to objects (products and the workstations), while the third group refers to phenomena (the production cycle), which are subjects of production organization. Manufacturing processes and manufacturing operations discussed in this paper need to be classified to the category of phenomena, which take place in production enterprises of wood industry. The next step, which should be analogously undertaken, is connected with the systematic classification of procedures (methods) of solving problems occurring during design and planning work in terms of production organization.

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Marek Wieruszewski[47], Zbigniew Malinowski [48]

THE MODELLING OF SAWING EFFICIENCY INDEXES FOR MEDIUM-SIZED SAWMILLS

Abstract: Production planning is necessary for rational use of means for maintaining production continuity. The pursuit of modelling throughput levels is conditioned by many varying parameters, such as the throughput level, machinery stock and variability in the manufacturing of sawmill products. Ordering the quality and classes of raw material thickness has considerable impact on the indexes of qualitative and quantitative efficiency.

Key words: softwood, material efficiency, qualitative classification, softwood material thickness classification

INTRODUCTION

Korczewski, Krzysik, Szmit (1970) provide a short definition of qualitative efficiency in their study. They define it as the ratio between the volume of particular quality products with a particular degree of processing and the volume of products at one of earlier stages of processing. Efficiency is calculated for raw materials in the form of logs, sawn materials and other semi-finished products. To sum up, efficiency is the resultant of the relation between the qualitative and dimensional traits of processed raw material and the quality of products obtained (Pachelski da in 1966, Hruzik 2006).

The achievement of high efficiency of logs in higher quality groups depends on good recognition of wood defects in round material and the influence of these defects on the quality of sawn assortment (Korczewski, ad in 1970, Lis , Popyk 2005, Hruzik 2006).

Based on the literature study of the quantitative material efficiency in sawing, which was conducted at elemental wood processing plants on softwood material assortments (with pinewood predominantly processed) with different diametric and qualitative groups, the mean quantitative efficiency indexes were averaged for variable diametric intervals. For the diametric intervals of 14-19cm (14-24 cm, 1st class of thickness) literature indexes range from 45% to 55%. For the thickness interval of 20-29 cm (25-34 cm, 2nd class of thickness) indexes reach the efficiency level of about 55-65%. When the log diameter exceeds 30 cm ($\geq$35 cm, 3rd class of thickness), indexes reach values of 65-75%. Detailed values of achievable quantitative efficiency in optimal and maximum throughputs are determined by verification of individual, assumed sawing methods with reference to the applied forms and diameter of the material. The final efficiency of products requires allowance for further prefabrication processes with due loss resulting from processing (Hruzik 1979, 1993, 2006; Prace KMTD 2000-2013).

As far as the literature data (Hruzik ad in 2005, Wieruszewski ad in 2006) on the processing of round softwood into constructional timber assortments is concerned, the efficiency ranged between 66% and 70%. When investigations are referred to throughputs to elements of the garden programme, quantitative efficiency can be estimated at 33-53% with reference to the throughput of raw material from the diametrical interval of 12-20 cm (Hruzik ad in 2005, Wieruszewski ad in 2006).

Based on the results of material efficiency in sawing we can say that the total sawing efficiency increases along with greater diameters at half-length of the log sawn. It chiefly affects the amount of side material produced in the sawing process. The mean value of the total quantitative efficiency for

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typical sawmill throughputs into materials of general use is assumed at about 55-62%, which results from the raw material and processing method applied. We can assume that the average value of quantitative efficiency for edged timber cut into laths is 60%, whereas the material efficiency in the process of acquiring softwood semi-finished products from unedged timber may reach about 80%. The efficiency of prefabrication with losses at all stages of planing is usually about 75% (Hruzik 1993, 2006; Prace mgr 2000-2013).

AIM OF STUDY

In order to verify the indexes of material efficiency in the plant selected for the research it was justified to make reference to the volume and assortment forms of acquired sawn materials and semi-finished products for particular purposes. The analyses of wood processing in the enterprise during a five-year period were used to balance the assortment and quantitative throughput with allowance for the technological potential, machinery stock and volume of production. The sawing analysis (based on sawing lists) enabled the determination of throughput variability indexes during the studied periods of the enterprise's activity. This verification gives a possibility to compare and refer the results of sawmill production in a medium-size sawmill enterprise during the entire period under study. Apart from comparable throughput levels of 28-31 thousand m^3 per year, similar sawing levels in consecutive years are also important indicators (Table 1). It justifies the assumed methodology of comparing throughputs in a particular one-year interval with a simulated sawing level in a medium-size wood enterprise.

Table 1. Monthly sawing percentage between 2010 and 2014

Year	Sawing percentage between				
	2010	2011	2012	2013	2014
Month	%				
1	6,9	8,1	7,6	7,9	6,9
2	7,2	7,6	8,3	8,4	8,4
3	10,1	10,9	10,4	9	8,1
4	8,8	8,4	7,5	9,9	8,3
5	10,5	7,9	7,5	7,6	8,8
6	10,2	9,5	7,9	9,2	9,4
7	4,7	8,2	9	8,6	8,0
8	8,6	9	8,2	9,2	9,1
9	9,1	8,9	8,2	8,6	9,0
10	9,2	8,4	9,5	8,8	9,3
11	8,2	7,7	8,8	7,6	8,4
12	6,5	5,4	7,1	5,2	6,4

The data in Table 1 show the monthly percentage of sawing in the yearly throughput between 2010 and 2014. The data indicate stable and similar sawing indexes in consecutive months of the year. The data and verified documentation were used to compare the levels of purchase and throughput of wood material in the exemplary enterprise.

RESULTS AND ANALYSIS OF STUDY

The data on the qualitative and thickness classification of softwood (Tables 2 and 3) may be a possible pathway to throughput modelling with quantitative material efficiency achieved during processing, based on the knowledge of the machinery stock (frame saws and bandsaws for logs) in the enterprise. The assumed procedure results from the confirmation of full control of material flows recorded with lists of sawing and sorting of finished products during the period under investigation. This study also allowed for considerable qualitative and dimensional repeatability of the sawmill production, which was shown in available documents on round wood processed between 2010 and 2014. The analysis of purchased raw sawmill material revealed that the wood was characterised by similar qualitative and dimensional parameters. As far as the thickness parameter is concerned, there was a noticeable decreasing tendency to lower classes of thickness.

Table 2. A qualitative comparison of softwood purchased between 2010 and 2014.

	Share and volume of wood			
	2010	2011	2012	2013
Quality and dimensional class				%
WA1 3	0,00	0,00	0,04	0,00
WB1 1	0,06	0,06	0,04	0,11
WB1 2	2,71	1,48	0,66	2,05
WB1 3	3,26	1,18	0,43	0,93
WA0 2	3,29	3,76	3,23	2,83
WA0 3	3,58	3,35	2,79	2,33
WB0 1	2,00	2,46	1,74	2,18
WB0 2	**12,96**	**13,55**	**15,03**	**14,11**
WB0 3	4,24	4,05	5,07	4,42
WC0 1	**18,71**	**22,54**	**22,36**	**19,12**
WC0 2	**35,78**	**31,89**	**34,67**	**36,66**
WC0 3	9,85	8,62	8,72	11,39
WD 1	0,81	1,58	1,24	0,53
WD2	1,98	3,14	2,69	1,75
WD 3	0,77	1,22	1,01	0,98
S2A	0,00	0,00	0,00	0,00
S2B	0,00	1,11	0,28	0,61

Table 3. A comparison of classes of thickness of softwood sawn between 2010 and 2014.

Dimensional class	Volume and classes of thickness				
	2010	2011	2012	2013	2014
	%				
W 1	**21,58**	**26,65**	**25,38**	**21,94**	21,94
W 2	**56,72**	**53,82**	**56,27**	**57,40**	57,40
W 3	21,70	18,42	18,03	20,05	20,05
S	0,00	1,11	0,28	0,61	0,61

The enterprise's documents specifying the amount of raw material sawn by means of the machinery stock were used to determine the volume of logs to be sawn and timber produced in individual months between 2010 and 2014. The data were used to calculate the mean quantitative material efficiency in individual periods. The results are shown in Table 4. The efficiency values shown in the table are the basis for verifying the throughput model with reference to the real amount sawn in the enterprise under study. The results point to the noticeable share of the third class of thickness as the main qualitative form of softwood material sawn and confirm the predominant character of thickness classes W1 and W2 in the total throughput.

Table 4. Material efficiency in round wood processing between 2010 and 2014.

	Efficiency of wood				
Year	2010	2011	2012	2013	2014
Month	%				
I	53,6	55,9	60,1	57,8	58,4
II	55,5	56,1	59,3	58,0	60,2
III	56,5	56,9	57,5	58,0	58,4
IV	55,8	56,3	54,3	59,4	60,2
V	56,0	56,4	54,9	58,0	60,2
VI	55,1	56,4	57,9	57,6	60,1
VII	55,7	56,4	57,5	53,3	60,8
VIII	55,8	60,1	58,3	55,4	60,6
IX	55,2	62,0	58,4	56,3	61,3
X	56,2	60,5	57,8	56,4	60,7
XI	55,5	61,4	60,2	59,8	62,1
XII	57,3	69,2	57,8	78,4	70,8
Total	**55,7**	**58,7**	**57,8**	**58,3**	**60,4**

As far as the raw material resources in the enterprise under study are concerned, the material efficiency level (56-60%) was determined as the one typical of a medium-size sawmill (with a throughput of 30 thousand m^3 of round wood) with basic equipment and standard sawing technology. It is noteworthy that in December 2013 and 2014 the throughput efficiency increased (78% and 74%). It resulted from the low weight of logs documented in the sawing lists for these periods and from the increase in the weight of timber in warehouse lists.

In order to verify the obtained efficiency results with the simulated model material efficiency in softwood sawing diametrical intervals of processed round wood were taken into consideration. For the 1st class of thickness the indexes of 50% were assumed, for the 2nd class of thickness – 60% and for the 3rd class of thickness – 70%. The material efficiency values were presented within the mean limits of achievable indexes. As far as the throughput of round softwood into assortments of unedged timber of higher quality classes is concerned, including constructional timber, the efficiency ranged between 66% and 70%. The throughputs of medium-dimensional wood allow us to assume the range of quantitative efficiency between 33% and 53%. The mean value of 45% was assumed in the calculations. The assumed literature values were based on the verification of sawing

couplers, including the applied technologies, form and diameter of material, but without further prefabrication processes (Table 5).

Table 5. A simulated comparison of timber volume based on assumed literature efficiencies for classes of softwood material thickness between 2010 and 2014.

Comparison of timber volume based [%]					
Dimensional class	2010	2011	2012	2013	2014
W 1	18,0	22,6	21,4	18,4	30,8
W 2	56,7	54,7	57,0	57,7	48,9
W 3	25,3	21,9	21,3	23,5	19,9
S	0,0	0,8	0,2	0,5	0,5
Total	60,0	59,0	59,2	59,7	56,5

For the assumed purchase value of 30,000 m^3 between 2010 and 2014 the model-averaged efficiency of the throughput of softwood material should amount to 60% in 2010, 59% in 2011, 59% in 2012 and 60% in 2013. The low value of simulated efficiency in 2014 may have resulted from the weight percentage of raw material with the 1st class of thickness and the lack of a warehouse list at the end of the year.

Lower efficiency values could indicate variations between correlation the simulation and real use of raw wood material in the sawmilling process (processing method, selected couplers, etc.). In order to verify the data based on the enterprise's documentation and simulated volumes of acquired sawn materials, allowing for the assumed values based on the research and literature (assumed efficiency indexes), we determined differences in the volume between 2010 and 2014 (Table 6).

Table 6. A comparison of the volume of hardwood timber between 2010 and 2014, including the simulated efficiency method.

Units of measure	Timber volume obtained by a sawing process				
	2010	2011	2012	2013	2014
	Simulated volume				
m^3	18003,74	17703,08	17766,59	17915,8	16964,3
	Timber a sawing process				
m^3	16 691,38	18 520,60	17 103,16	18 747,30	16526,1
	Differences timber in relation to the theoretical assumptions				
m^3	1 312,36	-817,52	663,43	-831,50	438,20
%	7,3	-4,6	3,7	-4,6	2,6

The study unquestionably proved that between 2010 and 2013 there were failures to estimate the amount of timber produced. It is particularly noteworthy that in 2014 the possibility to acquire particular amounts of timber was underestimated (based on the literature indexes). Between 2010 and 2013 the timber shortage was greater than 2412 m^3.

The verification of the amounts of round wood sawn into timber confirms divergence between the values in available documents of the enterprise and the simulated values. Both verification methods based on the literature data and throughput indexes resulting from the enterprise's documentation for the period under analysis point to divergence in the real sawing performance. In the analysis of 2010 there was a 7% difference in the deficit of timber volume between the simulation based on the literature indexes and the status quo. The analysis of 2012 revealed that the divergence reached a significant value of about 4%, as resulted from the simulation. In 2011 and 2013 the divergence of about 4% was noted. In 2014 the with the real value of sawing processes indicated a deficit of about 3% in the volume of throughput of softwood assortments, as compared simulated result.

SUMMARY

The study on the possibility of forecasting throughputs by means of modelling indexes adjusted to the technological development of enterprises let us conclude that this procedure enables an approximate forecast of the achievable volume of sawn materials. When making statistical analyses, the allowance for the indexes of dimensional variability in material plays a significant role in production simulations. Significant shares of the first and second classes of thickness show the achievable parameters of quantitative material efficiency. Simultaneously, selection of the material quality gives a possibility to plan the share of assortments with higher quality parameters. In consequence, it increases the market value and potential clients' demand. The modelling of efficiency processes shows the possibilities of production planning based on a stable qualitative and dimensional structure of acquired sawn assortments and materials for particular purposes. The variability of assessed parameters significantly increases the forecasting error.

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THE IMPORTANCE AND APPLICATION EXAMPLES OF DIRECT PACKAGING UNITS IN POLISH MEAT INDUSTRY

Abstract: The purpose of this paper is to define the role, importance and functions of direct packaging units used by Polish meat industry. The national and international sources of knowledge were reviewed and technological characteristics of direct packaging units for meat and meat processed products were made. The article also presents advantages and disadvantages of the showcased packaging units. The analysis revealed a great variety, high quality and technological sophistication of applied packaging materials, as well as the visual value and ease of storage of packed meat and its products, all of which are attributes important to individual customers.

The analysis demonstrates that in Polish meat industry artificial direct skins are commonly used in packaging meat and meat processed product. This is a result of the characteristics and specific properties of this skin group; they are available in a wide gamut of colours, labels and tags informing about its content and use. This packaging style and type can highlight meat and meat product offerings to reinforce the brand profile and improve recurrent purchase rates.

Key words: direct packaging units, natural and artificial packages, packaging material, packaging techniques, meat processing sector, Poland

INTRODUCTION

Meat production and processing is one of the key food industry sectors in Poland, both in terms of level of product sales and employment. The meat processing industry has seen a boost in structural development and transformation of production in the last decades of the 20th century. In the years 1990-2000, the growth of industrial meat processing was dictated by the increasing demand of the Polish market, the sale share of which was 90%. In the years 1995-1998, a crucial driver of meat processing growth was the export of food products to eastern countries and increasing industrialisation of production. This increased the share of the meat processing sector from 65 to 80% in the market supply figures. A primary reason for this was the diminishing significance and share of local processing capacities and the increasing processing ratio of food, with the growing added value in food prices.

The economy of meat production and processing began in the prehistoric era. The primeval cultures had known how to dry and smoke meat as far as 1000 years B.C., while sausages were made and seasoned even before the reign of Julius Caesar in Rome. Vikings, during their explorations, carried cattle, pigs and sheep to North America and bred the animals on a large scale. After the American Civil War, meat would be stored in blocks of ice, wrapped in sawdust. Meat processing and refrigeration plants began working all year round with the introduction of ammonia-cooled refrigerators at the end of the 19th century. Mechanical meat cutting was deployed at the turn of the 19th and 20th centuries, and this gave rise to industrial meat processing. Already in the year 1860, cold freight rail cars were operated in North America for hauling of beef and swine carcass, while the properties of meat were studied by many laboratories. The first electric refrigerators,

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commonly known as "fridges", began appearing at American homes in 1913, and Europe followed the trend after World War Two.

THE OBJECT AND METHOD OF THE RESEARCH

The purpose of this work is to define the role, importance and functions of direct packaging units used in the polish meat industry. The paper also presents advantages and disadvantages of the showcased packaging types. The work attempts to systematise the basic concepts related to packaging and presentation of the skins used in the production of meat and its products. This aim required the use of secondary references, i.e. domestic and foreign bibliography dealing with the subject, and the methods of descriptive, comparative, deductive and synthetic analysis.

RESULTS AND DISCUSSION

Given the present and accomplished availability of raw meats and their advanced processing technologies, preparation of meals both simple and sophisticated is relatively easy. The greatest challenge in the environment of strong competition between domestic and foreign meat producers and processors is to adjust the production range to the needs of customers, who make the buying choices according to habit, beliefs, needs, dietary regime and sensory evaluation. Purchase of meat and its products is subject to change with the living conditions and lifestyles, as well as the global trends in food and nutrition [Baryłko-Pikielna N., Wasiak-Zys G., 2004; Grunert K.G., 2006; Szczepańska A., 2007].

Based on the research results of other authors, four food consumer patterns can be identified. They are subject to modifications according to the buying power and nutritional tradition [Bryhni et al. 2003; Resurreccion 2004]. The first consumer pattern entails the relationship between nutrition and human health. The second consumer pattern is the increased consumer awareness to safety of meat and its products to health. The third consumer pattern is the increasing demand for 'convenience' food, i.e. products that are easily and relatively quickly cooked. The third consumer pattern is pro-environmental and most frequently displayed by young and wealthy persons who make informed decisions about their health and approach to the environment.

The access to food in Poland is unrestricted in physical, economical and health terms[51]. Meat and its products are a major segment of the food manufactured and consumed in Europe. Meat, meat meals and meat products are important components of daily hot meals, as well as savoury additions to breakfast and supper.

A specific characteristic of meat and its products is the short shelf life. Meat and meat products are among frequently purchased food articles [Jeznach M., 2008]. The nutritional behaviour of consumers reflects the nutritional needs and represents the expectations towards appearance, quality, storage methods, point of purchase, or even meal planning. The purchase of meat and meat products largely depends on economical drivers, followed by marketing drivers, and – to a small extent – psychological drivers. The income per household is the essential indicator of the satisfaction of qualitative and quantitative food needs [Szwacka-Mokrzycka J., 2013]. The decision to purchase food products appeases hunger and supply the human body with the required nutrients; it also defines the social functions and stimulates well-being of the consumer [Grębowiec M., 2015].

An average human being consumes 73 tons of food in their lifetime, including 5 cows, 20 pigs, 29 sheep, 760 chickens, 46 turkeys, 18 ducks, 7 rabbits and ca. 1000 fish [Litwińczuk, Barłowska, 2012].

The annual meat consumption rate is higher in the European Union than in Poland. The annual meat consumption rate is over 100 kg/person in Denmark, Belgium, Germany, Ireland, France and Portugal, with the highest rate claimed by Spain, at 134 kg/person [Dolatowski Z., Borys A., 2011].

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[51] The physical, economical and health availability according to the food definition by the WHO.

IMPORTANCE AND FUNCTIONS OF PACKAGING UNITS

Food packaging is the final stage of meat processing and meat product manufacturing. The process includes: packaging filling, portioning, forming, wrapping and sealing. The primary function of the food packaging is to protect the food from biological, chemical and mechanical external effects. Food packaging units enable and greatly facilitate handling, transport and logistics of food [Baranowicz, 2001].

An undisputed prime function, yet one of the many other functions of direct packaging units, is protection of the product. The second function of importance is to form a protective barrier against damaging external effects and define the crypto-climate inside the packaging. The third function of importance is to prevent mechanical deformation of the packed product. This function is related to the biochemical characteristics and rheological properties of meat and its products. This is of special importance in the meat industry, where various types of products are packed: raw, pickled, whole, portioned, ground, processed, and with or without bones. Skins are the most numerous group of direct packaging units, and the most diverse one in terms properties and functions.

The fourth function of importance is that the packaging materials intended for meats and meat products must not react chemically with the contents, while preserving the contents adequately from external effects. Moreover, the specific physiochemical parameters and histological characteristics of packed meats and meat products requires specific packaging materials that feature defined permeability to processing media (gases, steam and smoke), flexibility, contractility, mechanical strength, welding performance and visual value.

The selected packing materials and forms for meat and its products are the resultant of many factors, the most important of which include the following product characteristics: chemical composition, physical form, texture, porosity, and the storage location and time before consumption. Moreover, the packaging should correspond to the processes and factors that stimulate physical, chemical, biological and biochemical changes within the product. The packaging should also correspond to the method and conditions of transport, with the risks of mechanical damage the contained product can be exposed to.

To narrow down this topic, a thesis can be formulated that the double use of packaging units is extremely interesting in marketing communication. First, the packaging shall inform what it contains, i.e. what product is inside. This is a strict integration of the packaging object and the product object, and specifically the loose, viscous, greasy or liquid products that would be commercially non-viable without a packaging of some type. Second, the semiotic system of packaging signs shall inform about the packaging, i.e. the essence of the packaging, its usability, functionality, ergonomics and environmental impact [Ankiel-Homa M., Szymczak J., 2007].

TYPES OF DIRECT PACKAGING UNITS

The meat industry uses various packaging units that can be made of natural, artificial or synthetic materials. They include [Gajewska-Szczerbal H., 2004]:

1) Properly cleaned, prepared and preserves fragments of internal organs from slaughtered animals, especially of the alimentary tract and urine bladders;
2) Three-dimensionally formed and reconstituted materials of natural origin, e.g. animal leather, wood, cotton, starch, and other;
3) Plastics, mainly organic polymers;
4) Aluminium and steel sheets.

Skins for meat products are of a special importance in practical applications. The forming and portioning of the material mass, called cured meat stuffing, is possible only when the skins are sufficiently formable and of relatively poor cohesion. The skins have two functions. First, the skins maintain the form of the contents representative of simple geometrical bodies and settle the

cohesion of contents components until the processed meat material begin to change their rheological properties. Second, the skins improve the effectiveness of applied food preservation. Direct packaging units , e.g. metallic packaging units, are intended to prevent plastic deformation of the flowing plastic viscous material mass, or prevent its fragmentation by gravity. Metal cans prevent plastic deformation of ground pasteurised and sterilized meat product batches.

Natural skins applied in Poland require approval for consumption from the Veterinarian Sanitary Inspectorate and must meet specific quality requirements. The skins shall be clean, bright, odourless, neutral in taste, degreased, free from holes (continuous), resist crushing, in specific calibres (inner diameter ratings) and in long continuous sections. Note that the quality of natural skins strictly depends on the breed of slaughtered animals, their nutrition and climate of rearing. The intestinal skins from European slaughtered animals are more fragile and feature thinner walls that the skins from animals reared in South America or Asia, where the latter require bathing in proteolytic enzymes, organic acids or combinations thereof.

In Poland natural skins are made from (a) the small intestine of pigs, cows, calves, sheep, goats and horses; (b) the large intestine, in whole or specific portions, of pigs, cows, calves, sheep and goats; (c) urine bladders of pigs, cows, calves and horses; (d) cow and horse gullets; and (e) pig stomach. A major share of Polish frankfurter sausage production is packed in pig small intestine skins. Natural skins are semi-permeable, i.e. capable of transmitting processing media, e.g. smoke, steam and gases. Natural skins are also contractible, and thus facilitate formation of sensory attributes to matured meat products. Natural skins are susceptible to smoking, skin drying and full drying of contents. They also aid in sensing the desired tenderness of assorted frankfurter sausage types. They are neutral in taste and edible, due to being digestible. The weaknesses of natural skins includes susceptibility to negative quality changes, especially caused by microbial infestation; mechanical damage, limited diameter and length, limited compatibility with automatic processing, as well as the relatively poor visual appearance of contained cured meats.

The meat industry has reduced many drawbacks of natural skins by replacing them with artificial skins. The skins are called artificial because they can be manufactured on an industrial scale, irrespective of the raw material origin and type. Artificial skins are manufactured from natural materials, e.g. bovine skin collagen, vegetable cellulose, or plant polymers; they may also be made of synthetics, such as polyamide (PA), polypropylene (PP), polyethylene (PE), polyester (PETP), polyvinyl dichloride (PVDC), plastic-coated textiles, or textiles coated with PA or polyterephthalate diesters, or entirely from polyterephthalate diesters.

The undisputed advantages of artificial skins are: proper sanitary and hygienic conditions, lack of odour, high bursting strength, uniform thickness and porosity of walls, unlimited section lengths, availability in all calibres, colours and forms, corrigibility and in-packaging conditioning, sealing with clips or cord ties, colouring, printing of text and information labels, automated stuffing and sealing in batons, as well as distribution in corrugated and wetted ready to stuff forms.

Single- and multi-layer protein skins are among the earliest types of artificial skins. Protein skins are manufactured from hardened collagen proteins, regenerated cellulose and organic polymers. The recorded first attempts to manufacture protein skins occurred in 1925. Mass production of protein skins began in 1933. The first reason to begin the manufacturing of this type was the insufficient availability of natural skins. Protein skins are used for scalded, smoked, fermented and skin dried products. Raw and long-life sausages are packed in easy-shrunk skins that facilitate even growth of desired mould on the meat. Collagen skins may contain salt, which dehydrates the contained product during maturation.

Collagen skins are manufactured in seamless 'sleeves' or garlands. They are available in different calibres, diameters and lengths, with adjustable wall thickness. Collagen skins may release aromatic, colouring and/or preservative chemicals from the preparation during thermal processing

of batons. Collagen skins are kept in dry and cool rooms at +5-15°C. They exhibit high strength to stuffing and clip sealing. Moreover, they perfectly take the colour and aroma during smoking. Aside from traditional collagen skins, edible collagen sheets are manufactured for wrapping of meat products, pickled or scalded in nets. Collagen wrapping films reduce the weight loss of scalded smoked meats, limit the thermal leakage and increase the visual value.

Viscose skins are a group manufactured from generated cellulose. They have become popular and most often used due to the plethora of possible structures and related performance characteristics. Those skins are made of cellulose from high quality wood or cotton seeds. Pure cellulose is used in single-layer small-calibre cured meat skins. These can be clear, striped, smoke-coloured or artificially coloured with inside-deposited pigments, or printed over. Cellulose skins can be stuffed with all types of manual and automatic stuffing machines. Their shelf life is one year, if stored at +5-35°C and 70% of relative humidity.

The third contemplated group of skins are starch skins, a potential substitute for the natural varieties. They are odourless, microbiologically pure and fat-free. Starch skins are used for packing of high quality uncooked cured meats, raw hams or salamis.

The fourth group are organic polymer skins. These are inedible barriers that do not transmit gases or aromas, and rare varieties are permeable to steam and smoke. Their prime advantages include high strength and flexibility, non-permeability, stable calibre dimensions, ease of printing, as well as stuffing over calibre of 3 to 5% to make the cured meats properly compacted and compressed. Next-generation polyamide skins are available in various colours for packing of cured meats and other processed meat types. Their primary advantage is that they prevent discolouration of the stuffing by light. Once stuffed, the skins retain the required calibre and enable further processing, cutting, in-packing conditioning, as well as clip sealing in manual, semi-automated or automatic machines. Polyamide skins resits high boiling and scalding temperatures, as well as low freezing temperatures. Polyamide skins are used in Poland for packing of scalded or cooked cured meats, poultry meats, jellied meats and brawn.

Novel and improved versions of polyamide skins appeared in the 1980s. These include: heat-shrunk barrier PA skins, PVDC skins, PETP skins, and special skins made of polypropylene film bonded to cellulose foil with modified starch.

Flexible nets still enjoy popularity as direct packaging units for cured meats. This is a more sophisticated variety of traditional lacing of hams and cured meats [Grajewska-Szczerbal H., 2004]. The nets are made of rubber (Latex) threads spun with PET, PE or cotton yarns. The nets resist thermal processing at up to +250°C. Various mesh sizes are applied, and the smaller the eyelets are, the higher is the tying force. The nets are available with flavourings and colourants, also in the versions released from the structure and into the product being smoked or scalded. The nets can be put on directly on the meat product or after wrapping the product with thin film.

The last of the contemplated direct unit packaging forms are metallic packaging units, which are 20% of all thermally preserved product packaging units in the world. Special cans, or tins, are used for packing of meat and its products. They are rigid packaging units manufactured from thin-wall metal sheets and sealed with double-pleated lids. The can cannot allow passage of gases or liquids, and it protects the content from infestation. The can bottoms vary in form and capacity. There are two general can types: assembled and press-formed. An assembled can comprises the lid, the bottom and the shell, i.e. side wall or cylinder. Press-formed cans comprise two parts with the lid. Commercially available cans are lithography finished or with sticker labels. More often than not the buying decision is resolved by the visual appeal of the packaging, and lithography finished cans are superior in this regard.

CONCLUSIONS

Given the modern times of booming competition and fast-paced life, it is very important to match the forms and quality of meat packaging units to contemporary consumer demands. The analysis allows to draw a conclusion that artificial direct skins are common in packing of meat and meat products in the polish meat industry. This is a result of the characteristics and specific properties of this skin group; they are available in a wide gamut of colours, and labels and tags informing about its content and use. This packaging style and type can highlight meat and meat product offerings to reinforce the brand profile and improve recurrent purchase rates.

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