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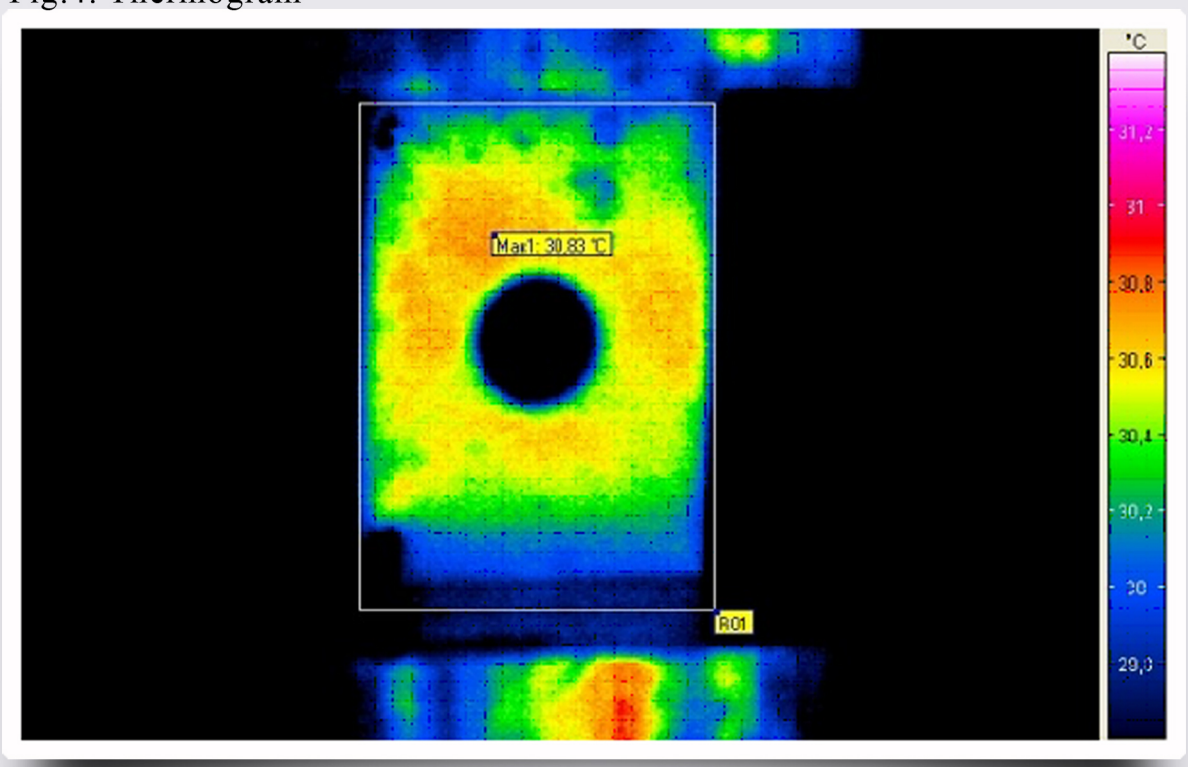
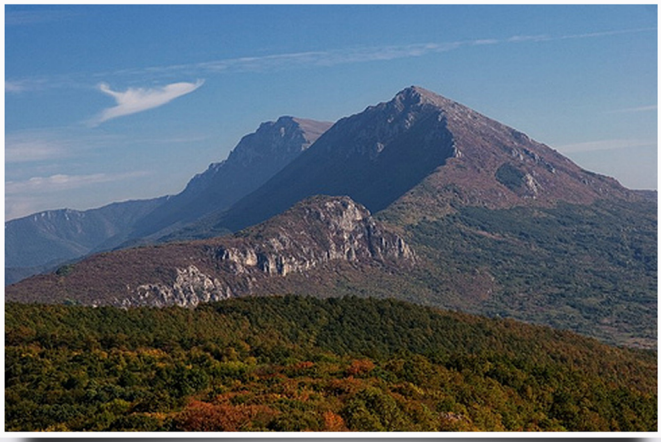
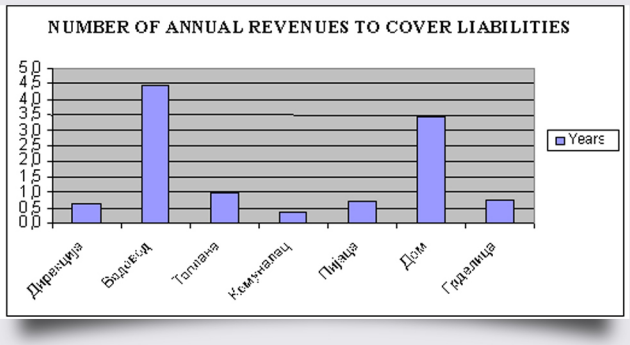
Fig.4. Thermogram



SUVA PLANINA – A MOUNTAIN IN SOUTH -EASTERN SERBIA





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ECONOMIC VALORIZATION OF RURAL TOURISM (SUVA PLANINA – A MOUNTAIN IN SOUTH -EASTERN SERBIA)

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Abstract: *In this paper, an attempt was made to emphasize the importance of the phenomenon of rural tourism providing the example of Suva Planina ("Dry Mountain") since rural tourism is attracting the attention of potential tourists day by day, because it provides the compensation of what people lose in big agglomerations. Suva Planina has many potentials for developing this type of tourism and thus to enrich the tourist offer of the City of Niš region.*

Keywords: *rural tourism, economic valorization, development, Suva Planina.*

1. INTRODUCTION

Rural tourism is one of the motivational forms of tourist circulation and represents a form of tourism in rural areas. The village is an anthropogenic tourist base, usually located within the emphasized recreational and serene environment. Recreational potentials are primarily expressed by the very atmosphere, because the village is characterized by preserved nature, the absence of pollution and large green areas. Besides recreational potentials tourists are attracted to villages by the opportunity of including tourists in some rural activities such as: livestock pasture management, fruit harvesting, forestation etc. Tourist attraction of the village to a large extent depends on the attractiveness of accompanying facilities and attractions.

Rural tourism typically represents the extra vacation and usually lasts between 3 and 10 days max. It has a seasonal character, with the peak season in spring (March - May) and autumn (September - October). Tourists who decide on this type of tourism are generally highly educated, aged 40 to 50 and live in urban areas.

2. WORLD AND SERBIA - SAME DIRECTION, BUT DIFFERENT

Thirty years ago, rural tourism was the only additional activity within tourism on the whole. However, nowadays this kind of tourism has a more significant role in its development. The rate of growth of tourist demand in rural areas, in the last 20 years, is deployed by region as follows: Europe 52%, Africa 8.1%, 4.1% Middle East, South Asia 9.4%, South East Asia and Pacific 10.8%, 5.4% North America and other parts of the world 4.3%. A study of shorter trips of the European population in the mid-nineties came to conclusion that 19% of tourists used circular tours, 10% traveled to the mountains, not during the skiing season, and 9% traveled for leisure and recreation in rural areas. Everything points to the exceptional direction of European population towards these destinations (Stefanović, 2010, p.48).

The market trends worldwide are in favor of village tourism, which is also affirmed byte World Tourist Organization (WTO). Findings in the last 15 years show clear growth,

and the biggest growth rate was registered in some Southern and Eastern countries, almost 25%. In Europe there are 200.000 registered service providers and 2.000.000 beds available. Number of people who are directly or indirectly employed in rural tourism is approximately 500.000. The annual tourist consumption in rural tourism is about 65 billion Euros. Almost 98% of all registered accommodation is in EU countries. In the Balkans rural tourism is the most developed in Slovenia.

Republic of Serbia has outstanding possibilities for development of rural tourism. Those possibilities rely on preserved and unpolluted nature, clean and unpolluted air and unspoiled rivers, with rich flora and fauna, and preserved traditional way of life. Those benefits are particularly interesting in the hilly and mountainous areas, which provide tourists with opportunities to practice numerous activities like: cycling, hiking, mountain climbing, organized field trips, etc. There is also a possibility of engaging tourists in agricultural works (farming, fruit harvesting, livestock pasture) if the tourists show interest for such activities (Jovičić, 2002, p. 145).

Development of rural tourism in Serbia started spontaneously thirty years ago. Urban population started going to the countryside, wishing to escape from the hectic lifestyle. At the beginning, rural tourism in Serbia was supported only by individual households but later on rural tourism involved more and more people. A great number of tourist associations, agricultural cooperatives and tourist-catering businesses promoted the development and popularization of the rural tourism.

The World Tourist Organization (WTO) recommended Serbia to develop rural tourism. The Tourism Development Strategy in Serbia plans significant activities in this type of tourism, giving it a great importance. Rural tourism has to provide the preservation of nature and rural environment as well as cultural heritage, also and to motivate local population economically in order to stop them leaving their farms and thus encourage participation in this work. That type of tourism would not only be able to preserve the environment but also it would make some progress in development of rural areas in Serbia.

In order to provide better results and to develop rural tourism in appropriate ways, a strategy of its development should be made. The key questions and principles of strategic development of rural tourism can be divided into three major categories:

- ✓ Social aspects, which include initiation of contacts between rural and city populations well as motivation of rural population.
- ✓ Environmental aspects, which include raising awareness about biological, spiritual and physical values of nature and the necessity of preserving the rural environment.
- ✓ Economical aspects include the possibilities to realize additional revenues for local and regional economic development, and reversing the process of depopulation and the revival of abandoned rural communities.

The rural tourism strategy should include long-term, mid and short-term goals of developing this type of tourism. Long-term goals include the development of international acceptance of the Charter for Rural Tourism, then establishing the basic guidelines for the future development, identifying potential users and potential tourist regions, initiating the necessary research in order to identify areas suitable for rural tourism development, etc. (Stanković, 2000, p.46). Mid-term objectives refer to identifying special rules for landscaping, possible adverse effects of tourism in order to stop them, urban, architectural and economic integration of tourism, land use, etc. Short-term development goals refer to the organization of animation in rural tourist areas, encouraging creative initiatives by the

locals, presentation and sale of local handicraft and agricultural products etc. (Štetić, 2003, p.45).

3. PROSPECTS OF RURAL TOURISM DEVELOPMENT

To ensure further development and expansion of rural tourism all above mentioned is necessary to conduct grading and standardization of services, especially when it comes to housing and to the Law on Tourism.

In addition to categorization and standardization of services, development of rural tourism includes investments in infrastructure (roads, telecommunications), and the preservation of the village from attacks of civilization. It is important to educate rural households and hosts who wish to engage in these activities. In this regard it is important to engage local tourism and non-governmental organizations, and all other interested parties. It is necessary to organize lectures, collect literature through which the village hosts can primarily indicate the economic viability of rural tourism. And then it is necessary to make them familiar with all standards and other requirements necessary to create high-quality tourism (Stanković, Ćirković, 2003, p. 67).

In order to involve rural areas in tourism it is not only the equipment and facilities that are necessary, but also the people should prepare for the reception of guests. Locals must have the desire, ability and opportunity to provide services and to meet the expectations of tourists. In addition to courtesy and quality of services, locals must know the needs of tourists, in order to meet tourists adequately. That is why there is need for education of rural people for development of tourism. The main areas for studying are: nature and environment, sustainable development and rural tourism, psychology and sociology of human behavior, quality of service, food, customs and culture, etc.

When a certain level of development is reached, it is necessary to make efforts to organize additional activities for attracting tourists, such as organized trips, exhibitions, variety of shows, events, etc. It is also necessary that the rural tourism product should have adequate sales channels. Actually unorganized, uncontrolled development should be overcome and an organized sale should be provided, which will greatly contribute to plants matching supply and demand. On the whole, tourism demand is now more sophisticated, more flexible and selective in relation to different elements of tourism supply (quality, price, etc.). (Čomić, 2003,78).Therefore, striving to make the offer more personalized should contribute to further development of rural tourism.

Another requirement would be the development and market research. It is necessary to determine target markets or target segments in which the tourist product of rural tourism should be placed. In the domestic market, it would be mainly urban population of certain age and educational background, and affordability. Foreign market sales would have to be much more direct so that the demand for individualization and personalization of the tourism product can be met. It is necessary, it offers authentic, genuine and quality tourism product in accordance with international competition.

Development of rural tourism in Serbia doesn't have a long tradition and it has not yet reached its potential. One of the main reasons for this situation is that it has never been accompanied by adequate stimulus. Therefore, it is necessary to significantly engage the government and other relevant entities in order to apply thee necessary measures which can be classified into four categories:

1. Economic (giving financial support to rural households)
2. Infrastructural (building roads, infrastructure of postal network, electrical and communal network)
3. Organizational (activation of local and republic authorities)
4. Educational (education and informing of local residents)

The economic benefits of developing this form of tourism can be huge. First of all to consider that half the Serbian population lives in rural areas, which means that we have half a million of rural households. If only 10% of these households choose to engage in tourism, it would bring Serbia 1.6 billion Euros in revenue and only from night's accommodation and catering. If we add the income from customs duties, transport, consumption of extra services, etc. it would mean that this income would be much higher. For example, if a rural property, consisting of only 2 double-bedrooms at a cost of 20 Euros for the full board for only 200 days per year, the annual income would amount up to 16.000 Euros.

To achieve this it is necessary to engage not only the rural population, but also other sectors of economy - transport, construction industry, food industry etc. Particularly in this regard a significant share of agriculture should be included. In this case, tourism and agriculture are closely linked, a common basis for the village. Opportunities for development are high due to the fact that today there is an increasingly popular trend of environmental protection and healthy nutrition. All in all, with planned and meaningful activities, rural tourism in conjunction with other economic activities could bring the country significant economic benefits. Even according to some data, Serbia is ranked among the 20 most attractive destinations in the world. (Čomić, 2001, p. 66).

4. WHAT IS IT LIKE AT SUVA PLANINA?

Besides the fact that local tourism companies and organizations are not making enough effort to form and activate the tourism products of the village, it is important that only people from the rural areas show more interest in engaging in tourism development. Because of this we can only talk about the individual efforts of tourism, run by a handful of interested individuals. Thus, at Suva Planina there are few villages that are included in the tourist trade.

The development of rural tourism in the area of Suva Planina deals with Tourist Organization of Niš. This Tourism Organization was established in 1995 as a service, for promoting the development and promotion of tourism in the area of Niš and Niška Banja. These activities include the organization of information and propaganda activities, and promotion of tourist offer of Niš and Niška Banja at fairs and markets at home and abroad. As such, this organization coordinates the accommodation of tourists in rural households. In addition to this organization, the development and promotion of rural tourism is promoted also by the Tourist Organization Gadžin Han, which operates in the municipality of Gadžin Han, and the same organizations from Bela Palanka and Babušnica (Petrović, 1998, p.44).

4.1. Suva Planina – Facts about Rural Tourism

Rural Tourism at Suva Planina is at a very low level of development. If only the activities of rural households are regarded, it is clear that the current situation is not nearly promising as the available resources. In the villages there is no adequate tourism infrastructure so there cannot be a more intensive use of tourism potential.

However, it is important that most of the villages (especially those near Niš) have public utilities and facilities that would be ready to adapt to the tourist activity in a relatively short time. If the villages of Suva Planina would become a real tourist attraction, being able to attract the tourists, it is necessary to build adequate transportation infrastructure and to secure supply chains. Also, one of the most important prerequisite is to educate the rural population for this type of tourism in order to prevent migration and demographic trends of aging population. In addition to this, it is essential to raise awareness about the necessity of environmental protection, which is the basis for tourism development in this case.

First of all, it is necessary to identify the villages which have enough potential to attract the tourists. A commission should be formed which would give certificates to rural households interested in this kind of tourism. These households have to meet the requirements in terms of training, arrangement of accommodation, hygiene, etc. It's a pretty discouraging fact that the Tourism Organization of Niš registered only one household (in the village of Bancarevo) which deals with hosting tourists while the Tourism Organization of Gadžin Han does not have any registered rural tourist households. These organizations should call for tender for the classification and to initiate the development of rural tourism. And when there are a larger number of households involved in tourism, it is necessary to exercise constant control and quality of tourism services.

All in all, there are many opportunities and raw potential, natural and anthropogenic, which can serve as a very reliable basis for the activation of these tourist villages. On the other hand, there are a number of restrictions and obstacles for the development of rural tourism. To remove these obstacles, a joint action of tourism organizations and rural populations is necessary.

4. 2. The Potential of Rural Tourism Development

As mentioned before, there is a wide range of waste potential that could be used in order to activate the tourism products of Suva Planina. The most important are as follows:

1. Suva Planina is located at the crossroads linking East and West, Europe and Asia. The immediate vicinity of the international European road E-80, this position makes it extremely convenient because passengers in transit are regarded as potential tourists. Certainly the vicinity of Niš, as well as a large urban center, makes Suva Planina available and easily accessible.
2. The existence of utilities and other infrastructure in most villages is an important prerequisite for developing tourism potentials.
3. The existing material base of tourism and receptive accommodation facilities can be used more intensively.
4. The possibility of building new as well as expanding and renovation the existing infrastructure necessary for the activation of intense tourism. This does not include only accommodation facilities (houses and flats), but also the tourist facilities needed for the development of sports and recreational tourism (skiing, hiking, etc.), the transport infrastructure, catering and other facilities.
5. The natural values such as the preserved nature, favorable climate, rivers, springs, wells, rich fauna and flora, specific landforms such as cliffs, are not only rural but also known accompanying forms of tourism.

6. The rich cultural heritage represented by numerous monuments, monasteries, churches, and customs, traditions, crafts, architecture, also represent important potentials. It is important to emphasize that this category is not used as much as it can be for promoting tourism.
7. Settlements that are for centuries there with rich culture and tradition, and the population should be involved as a main carrier of tourism development.

Planning and scientifically based approach in the use of the above mentioned potentials, and involvement of state and other important subjects could transform Suva Planina in one of the most attractive destination of rural tourism, not only in Serbia, but also in the entire Balkans.

4. 3. Prospects of Rural Tourism Development

There are numerous ways and opportunities to improve the development of tourism at least to an acceptable level. Taking into account its potentials, there is a great possibility of promoting numerous tourist attractions. The tourist offer of Suva Planina, would first involve excursions and possibilities for practicing winter sports. It is known that the existing facilities for skiing and other sports and recreational activities are not sufficient. Therefore, the existing ski slopes should be upgraded and forests cut down for training and building of new slopes on Bojanine Vode site. Besides this, other appropriate places should be identified for building ski slopes.

In urban areas, smaller hotels or similar facilities should be built where the tourists in the winter season would be accommodated. These accommodation facilities should be built in traditional architectural style, being not detrimental to the appearance and physiognomy of the village. The best and most economical solution would be to renovate existing facilities and adapt them for this purpose. Every hotel should, in addition to the housing, also have additional facilities that would complement the stay (swimming pools, gyms, sports fields, etc.). Also, the hotel "Trem" in Donji Dušnik, the only existing object of that type, should be improved and open for guests. This hotel would be particularly suitable for the accommodation of student excursions and other major groups (Stamenković, 2001, p.67).

Interested owners of rural households could also be involved in tourism. The rooms and apartments in rural households should be equipped in accordance with the criteria of categorization, but in an authentic, country specific style, so that tourists come in contact with the rich culture and tradition.

Surely, in order to make this mountain area profitable, it should be made attractive and appealing to tourists during the other seasons. The tourist stay during other seasons could be completed with the whole range of recreational activities. Considering the existence of numerous, attractive locations, a special attention should be paid to the organization of excursions. Visit to Jelašnička gorge, climbing to some of the tops of Suva Planina, or visiting Vetenaško or Divljansko monasteries, are only some of the possibilities. In terms of excursions, it is important to equip certain locations for short stays (benches, tables, gazebos, waste disposal sites, etc.). Providing a simple and good communication with the localities is also important.

The rich fauna and the existence of hunting grounds at Suva Planina, is an excellent prerequisite for the development of tourism. If we take into account the fact that hunting is a very expensive activity, it means that this type of tourism appears as a significant source of revenue.

When creating the tourism product, local lifestyles should be presented through various events and activities. Thus, for example, various agricultural activities could be organized involving the participation of tourists (picking fruit, cultivating the land, etc.). Through various events tourists can be introduced to local customs, folklore, folk costumes, etc. Particular attention should be focused on events that have already reached a certain stage of development, as it is the case with winter ascent of Trem. The need to invest resources and efforts into this event every year rises to a higher level, because that is the only way they can attract more participants and gain more importance.

The series of opportunities for tourism development is also embedded in the combination of rural tourism of Suva Planina with health and health resort tourism of Niška Banja and tourism in the City of Niš. The point is that it is quite rare to have clean and preserved natural areas in such a short distance from major urbanized area. Thus, for example Jelašnička Gorge as a unique natural attraction is located just on a 30 minute drive from the City of Niš.

In order to develop rural tourism at Suva Planina and reach the desired results, promotion of tourism facilities in all its segments should be well defined. Rural tourism should be promoted on the domestic and international market. When it comes to foreign tourists, the most attention should be paid to passengers in transit (already highlighted the importance of pan-European road E-80), as well as foreign tourists visiting Niš. The attraction of foreign tourists should be based on the adaptation of rural tourism to their individual needs.

As for domestic tourists, the most promising segment of demand would be the urban population, mainly from Niš, and from other cities in Serbia. Given the high degree of pollution, high population concentration in cities, and therefore stressful lifestyle, more and more people are expected to go to nearby villages in search of rest and restoration of mental and physical state. Tourists with higher education and greater ability to pay are usually prone to such services.

4. 4. Obstacles in Rural Tourism Development

As we can talk about many opportunities for the initiation and development of rural tourism at Suva Planina, *there is also a series of obstacles and constraints. Some of the* most important are:

1. Lack of adequate tourism infrastructure starting from the level of equipment of the tourist accommodation capacities. The capacity to accommodate is not only scarce, but also is of very low quality. The same applies to other tourist and catering facilities.
2. Poor transport infrastructure, particularly in terms of local road traffic. It has already been noted that some of the most important routes are damaged and closed for use; such as the local road to the village of Gornja Studena leading to the site Bojanine Vode.
3. Lack of awareness and education of rural people on all aspects of tourism development, so that even where there are attempts to accommodate the tourists, they are not conducted in accordance with the categorization.
4. Lack of concern about preserving the environment and natural resources, and their ruination and pollution (in this sense a very good example is the painting of forests at Suva Planina).

5. Ruination of cultural monuments and other objects of great importance for tourism activation.
6. Lack of adequate human resources for tourism development, as well as legislation in this field.
7. Insufficient use of modern technologies in agriculture, but also in other sectors.
8. The processes of depopulation and ageing of rural populations, the extinction of traditional crafts, poverty and economic drawbacks.

4.5. Rural Tourism Capacity Development

4. 5. 1. Mountain Lodges

As one of the highest mountains of Southern Serbia, Suva Planina has been and remains a favorite destination for hikers and nature lovers. That's why there were built a number of mountain huts in the mid last century. Such is the case for example with hiking on the plateau home plates, which was built back in 1932. Among mountain lodges that are equipped for the admission of tourists and mountaineers which are still functional four of them can be singled out "Studenac", "Ploče," "Čika Dane" and "Čelin Kamen".

Mountain Lodge "Studenac" is located at Bojanine Vode resort below the cliffs of Sokolov Kamen, at 860m altitude which was built in 2001. Total capacity is 65 beds, which are arranged in 11 rooms and bedrooms. The lodge has electricity, water, heating on the solid fuel, bathrooms with hot water and toilet. Within the lodge there is a restaurant (70 seats). The largest recorded circulation is during the winter, when there are conditions for skiing and during summer when conditions are suitable for hiking and excursions.

Besides the mountain lodge "Studenac", near the outing spots, at the foot paths, "Sokolov Kamen" is yet another object – the Ski House "Niš", which has a capacity of 20 beds.

Mountain Lodge "Čika Dane" is on the lawn Smrdan near Pasarela at 1.467m altitude. The lodge was built in 2008 and has a capacity of only 10 beds. The price of accommodation is negotiable. The lodge has electricity and water, and a fireplace. The lodge is near the peaks Golemo Stražište, Pasarelo, Trem and Divna Gorica. It is possible to walk to the fountain Rakoš, and Divljan resting place.

Mountain Lodge "Ploče" is at 600 m altitude on the plateau Ploče near the old road leading from Niš to Bela Palanka. This mountain lodge was built back in 1932. It has a basement, ground floor and the attic. It has been repeatedly renewed since it was built. The capacity is 50 beds in 5 rooms, with the possibility of using twenty extra beds. The lodge has a generator for electricity and water supplies from nearby sources. This facility is owned by the Mountaineering Association of Niš. Next door there is a home motor-cross track club "Catapult" from Jelašnica, where races are held.

Mountain Lodge "Čelin Kamen" is in the village of Donja Studena, beside the road connecting Niš to Bojanine Vode. Built in 1998 it consists of two buildings - one with dormitories and a small sitting room and dining room and the other with 2 more beds. The lodge has a capacity of 32 beds arranged in two dormitories with a shower. The lodge is run by Mountaineering Society "Čelin Kamen" situated in the village of Donja Studena. The lodge was visited by many climbers from Serbia and abroad, who climbed on some of the peaks of Suva Planina. The Mountaineering Club was particularly active during the winter ascent on the Trem, when the village was visited by lots of people. The lodge has a

club which serves drinks, organizes events, and also you can buy maps of Suva Planina with marked hiking trails and get all the necessary information.

Mountain lodges are generally intended to be for accommodation of mountaineers, hikers and recreational athletes who engage in various activities on Suva Planina. However, accommodation is not the only purpose of these facilities. They often organize socializing before or after climbing to the peaks of some mountains, including the preparation of traditional foods and drinks. Even though the accommodation is at a lower level of quality, these places provide intimacy and they are always eagerly visited.

One can mention the children's recreation center "Divljana", located on the slopes of Suva Planina near Divljane, 6 km from the main road Niš - Sofia. This youth center is designed for children from primary schools, who attend the so called “School of nature” in the clean and preserved environment. Facilities cover an area of 4000 m² and they are capable to accommodate 200 children. "Divljana" is the only adequate space in Serbia for children attending “School of nature”.

The restaurant which is worth mentioning is the ethnic tavern *"Kod Brke"* in Jelašnica village. The inn is on the way to Bojanine Vode and within the last few years it has been very popular among the citizens of Niš. Decorated in traditional style it offers old specialties from the region, such as stuffed dried peppers, stuffed cabbage rolls and traditional pies. Capacity of the restaurant is mostly full, so booking is required, especially during the weekend. Considering the fact that this facility is run very successfully, there is a plan to open a hostel too.

4. 5. 2. Hotel "Trem" in the Village of Donji Dušnik

Donji Dušnik village is located on the banks of the river Kutinska, left tributary of the Nišava river, at the foot of Suva Planina, 10 km southeast of Gadžin Han. It is an agricultural and farming settlement. According to tradition, the name of the village is associated with the saying of an ottoman nobleman called Zaplanjski aga, who stopped here to rest traveling through Zaplanje: "This village is a real treat for the soul". In this village, at the foot of Suva Planina at 600 m altitude there is a hotel "Trem" which is a health resort (Simonović, 1982, p.345).

Hotel "Trem" (Category B) was completed in 1979. The hotel offers 80 beds in single, double and triple rooms. There was a restaurant with 150 seats indoors and 60 seats in the hotel garden.

The main purpose of this hotel was for health and recreation purposes for workers from the Municipality of Niš and Gadžin Han. Later on the construction of facilities associated with the hotel was completed (a small pool, sport courts, etc.). It created the conditions for the hotel throughout the year.

The hotel is surrounded by a park area of 3 hectares, and given the proximity of Niš and Niška Banja it is suitable for the accommodation of pupils' trips, sports training, etc. Hotel "Trem" is the only facility of this kind on Suva Planina.

4. 5. 3. Rural Tourist Households

In the whole wide area of Suva Planina, there are only two households with rooms and apartments for the reception of guests. Only one is registered. Both of these villages belong to the Municipality of Niška Banja, while in other municipalities, there is no registered household engaged in tourism and accommodation of guests.

A) Bancarevo

The village is located in the area of Kunovičke River (a tributary of the River Jelašnička), 19.5 km southeast of Niš. Area districts encompass 700 ha. Bancarevo belongs to the medieval Serbian villages and was mentioned first in 1498 when there were only 11 houses. About 80% of the total population is engaged in agriculture and farming. The emphasized trends of this settlement are population aging and population decline.

The household of Ranđelović Nikodija is in Bancarevo which is the only registered domestic tourism facility not only in the Municipality of Niška Banja, but on the whole Suva Planina. The household offers 15 beds in double rooms. In addition to rooms with private bathroom, there are two double rooms with a shared bathroom. The rooms are arranged in three different objects, mostly of recent construction. The rooms are equipped with a kitchen stove, TV, computer, mini library. Heating runs on electricity or on solid fuel. The yard is spacious, decorated and available for guests staying in this household.

In addition to rooms for accommodation, the household offers a dining room where homemade and traditional food is served. The most famous dishes are burek with nettles and goat cheese and beans "tavče". The host provides transportation services to Niš and Niška Banja, if necessary. The mild climate and fresh mountain goat milk can be used to treat bronchitis and have a beneficial effect on health.

B) Donja Studena

Donja Studena is an agricultural and farming rural compact settlement. It is located at 360 - 400 m altitude on both sides of the road that leads to Jelašnica and Bojanine Vode. The village is located 18.5 miles southeast of Niš. The village area occupies an area of 711 ha. There are strong karst springs, known as Studenska springs. Donja Studena is known for its mills. There were more than 30 mills in this area. The traces of prehistoric and medieval remains can be found at the locality called Latin City. In addition, the total population of about 18% is engaged in agriculture. In recent years there has been a decline in population. (Popović, 2001, p. 23).

The household of Živković Dragiša located in Donji November offers fully equipped one-bed apartment. The apartment includes the bathroom and a kitchen, a separate entrance, and guests can use the garden. The apartment has a TV, and the heating runs on electricity. This apartment offers its services within its offer of mountain lodge "Čelin Kamen".

During winters, a large number of climbers from Serbia and abroad come to Donja Studena mountain lodge and sometimes there are not enough rooms to accommodate them. Therefore, there are private households that cooperate with mountaineering club and accommodate guests. Thus, there can be up to 70 beds in private households. It is clear that local people already have experience and potential for rural tourism development, unlike in most other villages.

Gornja Studena is a village which has the lowest recorded depopulation rate. These natural and demographic characteristics were very favorable for the development of rural tourism. This can be added to the fact that two decades ago most of the buildings were constructed for recreation. At the beginning of the eighties there was a tourist company called "Bojanine Vode" formed in Donja Studena. Initially, the company was dealt with the natural environment and the mountain hut which was built in 1963. Later on the tourist association directed its activities to those tourists who were not engaged in mountaineering.

The main problem of rural hosts who want to get involved in tourism development is finances. The fact that these households do not receive adequate support and encouragement from the municipalities and the state, makes it not profitable enough for these households to engage in tourism. Investments in tourism very often have a political background, which further complicates the process of development and progress, because of the change of government and changing attitudes towards this issue. Lack of organization and financial resources results in the development of tourism to comes down to an individual and sporadic attempts. There is another important problem in relation to the tourism infrastructure. Lack of adequate quality accommodation facilities, may discourage potential guests, even in cases where there is interest in visiting a village. In most communities there are not only facilities for accommodation, but also all other structures that would provide tourists with a complete and quality accommodation. This includes the regulated sports grounds, swimming pools, walkways because farm owners must find ways of attracting tourists themselves.

You should also note the lack of professional and scientific-based knowledge. Given that there are adequate human resources in tourism, the question is of quality of services provided. The above household and accommodation facilities offered are not subject to categorization, and it is known that this is one of the preconditions for the development of rural tourism.

C) Cottages in Rural Tourism Development

In some villages of Suva Planina there can be seen the expansion of cottage settlements. Built cottages, as well as those that will be built can successfully be adapted for the reception of guests, although the stay in them is considered a form of tourism. It is particularly suitable for development of tourism, taking into account the fact that the potential tourists come mainly from nearby, large cities. This trend can best be seen in the Prosek village (Mitić, 2006, p. 8).

One could estimate that the intensive construction of cottages will continue in the future. That's why this trend should be viewed in terms of tourism activation of such facilities. It is essential that the building of the cottages does not violate the capacity of space, therefore this issue should be given a special attention. If the development of this settlement is in accordance with the spatial plan, then this type of tourism could even appear as one of the dominant forms of tourist business at Suva Planina.

5. CONCLUSION

Through the analysis of natural and manmade values of Suva Mountain, one can come to the conclusion that this area is very suitable for the development of rural tourism. Many villages are still not spoilt by the onslaught of urbanization. They have preserved the traditional way of life and work, and as such they represent a kind of tourist value. Tourist sites, climate, natural curiosities, and rich cultural heritage - these are all resources that could be used in the formation of the tourism product.

However, despite all the opportunities it is generally difficult to speak about the development of tourism and economic effects. Besides the lack of adequate tourism facilities and infrastructure, in conversation with the residents of villages, I came to a conclusion that perhaps the biggest obstacle to tourism development is the disinterest in this type of activity. Most of the rural population is older and does not understand how to facilitate tourism development, while younger and more educated people are leaving the village and going to bigger cities. Even in cases where there is interest, there is a lack of financial resources and support of the state and local communities.

This implies that it is primarily necessary to develop awareness and educate local residents for tourism development. Professional staff should also be trained, as the main bearers of development. At the same time there is a need to study the needs of target markets and potential tourists, in order to obtain the data required to create the quality tourism offer. Tourism should be developed adhering to the principles of sustainable development and in collaboration with the tourism companies and organizations, both at local and national level. Only under such conditions, will tourism become a factor in the development of rural settlements and lead to economic prosperity.

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IMPORTANCE OF KNOWLEDGE IN CONTEMPORARY ECONOMY

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Abstract: *Rapid changes in today's economy put companies to the test and make them struggle to find new ways of survival on the market. The global crisis, technological advancement, race for all types of resources and markets dictates new rules which imply constant changes. If companies want to survive and be successful they will have to adapt and adopt the changes very fast in order to gain or maintain the competitive advantage. Contemporary companies rely on human resources and their ability to acquire new knowledge and apply and disseminate it through innovations, creative and flexible solutions, and high quality performance. Companies have become learning organizations, continuously updating their knowledge and skills while putting human resources, as the most important factors for adapting to rapid changes and challenges, in the center of equation. Contemporary organizations require efficiency, productivity, high quality work and creativity of their employees. In order to acquire these, employees have to posses a ray of competences, knowledge, character traits, skills and motivation.*

Key words: *knowledge, learning, competitive advantage, learning organization, contemporary company*

1. INTRODUCTION

The change of role and the way contemporary companies work is caused by the radical change of role their employees play. Therefore, new, modern managers are needed who can enable efficient implementation of company strategy and politics in the times of huge economic inevitability, rapid technological changes, dynamic transformations and ownership relations.

Rapid economic development requires new knowledge which needs to be in line with innovations existing in the business world, because that is one of the important conditions for survival on the contemporary instable global market.

Today, companies are becoming learning organizations more and more because that is the only way to survive in the turbulent environment. Knowledge stands out as the main resource and source of competitive advantage today. Namely, the advantage belongs to those companies which are capable of learning continuously and apply new knowledge in order to make superior products and services.

Organizational learning influences the development of innovations within a company. Having in mind all of the constant changes in the environment, a company gains the competitive advantage through innovative efforts based on new knowledge. Changes do not stop there. Companies are adjusting their organizational design, systems, management and organizational culture in order to induce organizational learning and apply knowledge efficiently.

The end of 20th and the beginning of 21st century is determined by the struggle for intellectual capital. The intellectual capital, namely human resources, became the factor providing the company with success. A company's competitive position depends on the intellectual capital today. It influences business decisions and makes the company superior in comparison the competition.

2. KNOWLEDGE AS A BASE FOR DEVELOPING ECONOMY

The main change which is creating and shaping all of the changes happening in the contemporary world is the technological advancement. The technological advancement represents the result of accumulation of knowledge, especially in 19th and 20th century. Technology is the most dynamic factor of development. The contemporary society according to Drucker is the knowledge society – knowledge has become the basic resource and the most useful asset. In respect to that, Drucker realizes three development phases:

1. For hundreds of years , during the first phase, knowledge was embedded in tools, processes, products and that's what caused the industrial revolution;
2. During the second phase, from 1880 until its culmination at the time of WWII, knowledge was applied to work – this announced and introduced the productivity revolution;
3. The last phase began after WWII. Today, knowledge is only applicable to knowledge – this is the management revolution ([4], p. 26).

In the contemporary society knowledge is the strategic source of power and wealth and it represents the economic resource. The basic social group, according to Drucker, is represented by those who use knowledge, that is, people who are capable of using knowledge for the purpose of conducting business activities and he calls them *knowledge workers* who apply knowledge to knowledge and therefore increase the productivity ([4], p.12).

During the 60s Peter Drucker used the phrase *the age of discontinuity* in order to define, in the best way possible, the multiple development of technology and knowledge, international economy and ideologies. During the 90s, this term became a reality of contemporary business development where entrepreneurial management dominated. Namely, more and more companies, despite the size, financial strength and ownership status, are starting to act as entrepreneurs, adopting basic entrepreneurial postulates and applying entrepreneurial management. It is based on the following:

- Embracing changes
- Creating innovations,
- Knowledge as the basic economic resource.

In the new society knowledge will become a strategic source of power and wealth, and the basic group will be those who use knowledge, that is, people who are capable of using knowledge for the purpose of conducting business activities and Drucker calls *knowledge workers* who apply knowledge to knowledge and therefore increase the productivity. Knowledge becomes the basic economic resource, which enables the other three resources to be productive: work force, capital and natural resources. Traditional production factors, such as land, work force and capital did not disappear, but became secondary – they can be attained relatively easily provided the knowledge is present as well ([4], p.47).

Knowledge becomes the turning point of production. Knowledge becomes a tool, a resource to obtain certain results in the social and economic development. In the contemporary economy, knowledge is being applied to knowledge. In such a society education becomes an imperative – the knowledge society requires educated people who are responsible and who can contribute to the society by applying their knowledge.

According to Deming [3], knowledge cannot be replaced. Knowledge can be obtained along the path Deming calls *deep knowledge* which consists of the following elements: understanding and appreciating the system, knowledge about variations, knowledge theories, and technologies. Deming thinks that the preparations for the future require of the employees never to stop learning. This learning implies the continuous *mapping* of the surroundings (technical, social and economic) in order to feel the need foe innovation, new product, new service or for innovating the existing methods.

The contemporary concept of management puts a man in the spotlight – a man is the most important resource for business prosperity. People are the core potential of a company. Employees have to be the starting and the final point when improving the quality of doing business. Therefore, Edward Deming, in his model for successful management and quality improvement, which consists of 14 principles, paid a lot of attention to people:

- Permanent education of all employees should be introduced (principle 6);
- Introduce programmes such as decision making and personal improvement (principle 13);
- Engage all of the employees in order to implement the transformation (principle 14).

Education and creation of human resources is one of the most important tools for creating the economic development strategy and politics. Contemporary companies require efficiency, productivity, high quality work and creativity of employees, and for acquiring this they have to posses a list of capabilities, knowledge, character traits, skills and motivation. In the contemporary organization learning is not only an organizational function, but introduces into all of the processes, the very structure and the organization management.

3. CONTEMPORARY APPLICATION OF KNOWLEDGE

Contemporary tendencies of market economy countries development show that education and creating human resources are priorities in the national strategies and policies dealing with social, economic and technological advancement. Investing in education, that is, creating adequate human resources which can adapt to changes is regarded as an investment and the education politics is not only regarded as the politics to create human resources but it is the part of the general development politics of the society.

Technological development during the privatization process, while the market economy and the information technologies are slowly picking up, require changes in the very organization, strategic and operative planning and education of new human resources.

Education and knowledge are the new factors of competitiveness. Each individual should constantly educate himself and improve his knowledge. Those who constantly educate themselves and improve the productivity of their knowledge makes the organization productive. This fact points to the new role of education – education should be penetrate all layers of society. The education system has to be open, dynamic, proactive as much as the knowledge. The success of a company more and more depends on the productivity of knowledge. Riderstral and Nordstrom point out that „what makes the

essence and the source of the competitive advantage – knowledge, quality and people – have to become the everyday imperative for all of the employees'' ([6], p. 269).

The Stanford University research, which acknowledges these principles and at the same time makes one think, points out the fact that all of the human knowledge accumulated until 1900 was doubled until 1950 ([1], p. 154), and that it has been doubled each 5 to 8 years since. How does that quantum of growing human knowledge influence and how will it influence the internal organization and behavior of people? Organizations will have to ready, open and capable to receive and adopt new knowledge and be active enough and dynamic to apply that knowledge. Employees should adjust to *deep knowledge* and dedicated specialization in this field which will replace wide knowledge – knowledge of various things in traces. Also, due to the erosion and amortization of knowledge which during the period of 3 to 5 years outdates, more than 50% of the employees should constantly gain new knowledge. Permanent education and training are very important for the professionalization. This fact implies a new role of education – education should be embedded into all layers of the society.

The success of a company depends on the constant investment into learning and acquiring new knowledge. By acquiring knowledge organizations create new and improve the existing products and services. Knowledge represents the key development resource and the basic means of acquiring the competitive advantage. Acquiring, maintaining and developing the competitive advancement on the market depends on the readiness of an organization to learn. When there is knowledge, as a basic resource, organizations manage to make the other resources productive (work force, capital and natural resources), but the productivity of knowledge should be improved constantly.

Human knowledge, even though tends to quantify, represents the source for providing the value for buyers and owners. A big piece of new for the business community is that capital cannot replace human resources and their knowledge. Therefore, it is essential for the survival of a company in the contemporary economy, based on knowledge, to attract and keep good and competitive workers which represent the most valuable element of a company. Economy based on knowledge, requires constant learning and acquiring of new knowledge. In order to acquire new knowledge, organizations establish their own education centers which provide trainings and develop skills of their employees.

Inducing knowledge and learning influences to a great extent the development of innovations in a company, because learning and knowledge represent an important factor of innovation. The level of innovation influences the competitive advantage, and knowledge is the only secret source of the competitive advantage. In order to develop an organization, constant regeneration, improvement and aggregation of knowledge is needed, which can be obtained by learning. Organizations promote the importance of learning which is becoming a usual activity. As a result of a constant learning new knowledge is acquired. Acquiring knowledge is a process which should be accompanied by motivation. Organization which tends to acquire its competitive advantage on the market should innovate and learn faster that the competition. Today, the synonym for a successful organization is the learning organization because it accumulates all available knowledge, experiences and intellectual resources in order to have good performances and results for its stakeholders.

Learning organizations constantly promote learning through constant interaction, team work and communication with the surroundings. People need to realize that the process of learning is a constant one, but at the same time they should also be constantly

motivated, encouraged, urged to think systematically, to learn one from another. Learning and acquiring new knowledge represents a change for the employees. Employees are usually resistant to changes. In order to avoid misunderstandings, changes should be presented to employees in an acceptable manner for them, explain the importance of a change for them and the whole company. The manager's task is to create the environment favorable for learning where the employees will compete in acquiring new knowledge.

In order to create and use knowledge more easily one should first consider market sensitivity. The learning process in regard to creating the competitive advantage consists of two dimensions: organization learning and market learning which is showed in the Picture 1. As an output of organization and market learning there are two qualitative dimensions of the business success – innovations and quality. The whole process results into acquiring the competitive advantage, [2].

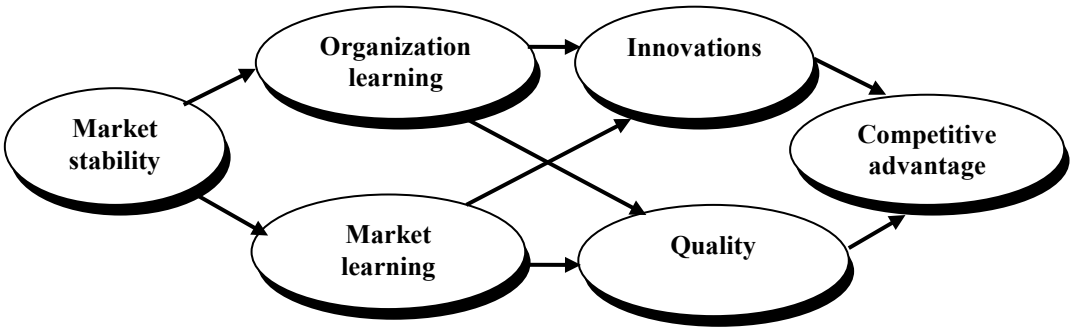

Figure 1. The learning process in regard to acquiring the competitive advantage [2]

Knowledge used for creating innovations can be divided into knowledge of internal and external sources. Internal knowledge is embedded in the efforts of a company and has a dominant role in the innovation and development process. External knowledge is used by companies which do business in specific and complex fields, such as biotechnology. In the contemporary economy, knowledge has become the most efficient contemporary weapon for acquiring the competitive advantage, also the precondition of innovation, and innovation is the precondition for the growth of intellectual capital. Innovations are fast and one is constantly replacing the other.

In order to maintain its competitive advantage a company has to constantly innovate, in other words to increase its knowledge database. Apart from knowledge intellectual capital encompasses all nonmaterial values of an organization and represents the competitive weapon on the market. Knowledge represents only one segment of the organization's intellectual capital.

4. NEED FOR KNOWLEDGE, NEED FOR LEARNING

An organization knows as much as its employees know, therefore, the readiness of the organization to provide for its employees the conditions for their development. While organizations are adjusting to the changes in the environment, the employees are adjusting to rapid changes imposed by their jobs and the working conditions. Education and constant improvement of the employees become key factor of human resource development, organizational flexibility and competitive advantage.

The fundamental goal of education is to help the organization to reach its objectives by increasing the value of its key resource – people it employs. Educating means investing in employees in order to make them more adjusted to their jobs.

By providing opportunities for education, the productivity increases while the work processes decrease. On average, by increasing the education in employed by 10% the total productivity rises by 8,6%, while the increase in the capital equipment of 10% increases the productivity by 3,4% ([5] p.70). This example shows that the intellectual potential of the employees is more important that the available physical capital. Therefore, it is obvious that the success depends on the employees and their will to learn.

Investing in employees is regarded as investing in the future, acquiring competitive advantages on the market and providing comparative advantages. A lot of companies apply continuous learning which requires understanding of the complete system, including the interconnections among their jobs, work units and the company. Managers have an active role in mapping the needs for education. Today, the continuous learning becomes one of the most important forms of management and human resource development. Contemporary companies are allocating more and more of their resources (money, time, information, energy, etc.) to increasing education and continuous learning. Management is starting to realize that continuous education and improvement of employees are the most efficient means for acquiring the competitive advantage, the basic assumption for entering the market and competing with the competition for the trust of the consumers [7].

It is essential to adjust the educational programmes to the knowledge and skills development in the future. If the educational system does not transform into creating people who learnt how to think and how to learn, there will not be the learning organization which is competitive in the ever-changing environment.

Innovations are required in regard to doing business on the whole, therefore, the innovations in the organizational structure as well. The hierarchy definitively belongs to the past. The prominent ones will have healthy, creative and adjustable structures. A team is capable of delivering results far better than those which would be a simple sum of all its members. Cohesion should be established and the team should function on defined principles.

Successful companies should build their future on the efficiency and high performances of their units. This requires higher collective intelligence based on knowledge, competence and understanding. Such an organization which learns faster that the competition could be named or described as the learning organization. Contemporary organizations are becoming more and more learning organizations, not because their managers and employees like learning new things, but because that is the only way to survive in the nowadays environment.

Employees in learning organizations are constantly trying to learn new things and apply them in order to improve the quality of products or services. Companies which tend to become learning organizations usually change their organizational structure into teams,

establishing smaller units or profit centers intended for gathering and exchanging knowledge and making decisions in order to improve services and/or the product quality.

Some companies even define how many working hours an employee should dedicate to learning. It goes from 10 to 50% of their working hours, depending on the post. Also the company organizes different trainings within the very company. New knowledge and new technologies, those that did not exist at the time when we first found employment, require continuous training. According to managers' estimate, special trainings are defined for certain employees. The environment of a contemporary company requires constant learning, adjusting and innovating, independence, responsibility, self-development and the readiness to taking risks.

Traditional organizations based on centralized organization and production have been replaced by modern organizations which focus on learning, acquiring new knowledge and intelligent leadership. The learning organization really provides room for its employees to research and improve their knowledge continuously in the filed they find interesting. The only permanent source of competitive advantage of an organization is in its capability of continuous learning. Organizations are more competitive on the market because they learn more and know more than their competitors. The aim of the organizational learning is to disseminate knowledge and make it available to all of the employees [9].

The management of a company is responsible for creating favorable conditions for learning and for defining company strategy and politics but should not neglect motivation, development, communication and behavior of their experts. The responsibility of experts within a company is huge because they should learn constantly and innovate their knowledge and skills which will help them manage new technologies very easily, resulting in the development and advancement of the company. Therefore, the business sector has an obligation and the need to invest into highly skilled personnel who will apply and develop new technological achievements. Thus, there is a range of requirements put in front of the employees in order to make their knowledge and skills up-to-date. The contemporary model requires learning and acquiring new knowledge and skills at all organizational levels [8].

It is vital to let the experts do what they were trained for and provide opportunities to all employees to constantly learn.

5. CONCLUSION

Education, knowledge, creating human resources is one of the most important instruments for creating national strategies and politics of social, economic, technological and cultural development in most of the countries in the world. It is known that education, knowledge and high quality human resources as development factors cannot be replaced by any substitutes.

Contemporary organizations require efficiency, productivity, high quality work and creativity of their employees. In order to acquire these, employees have to posses a ray of competences, knowledge, character traits, skills and motivation. In the contemporary organization learning is embedded in all of the processes, the very structure and the management of the organization. The level of learning in an organization can become the only competitive advantage, and the lifelong learning and knowledge dissemination can become the main task of the employees.

Knowledge, being inseparable of human resources, represents the essential resource and the main source of competitive advantage and profitability today while enabling the

company to create new and improve the existing products and services. The main hubs for generating innovation are learning organizations. Knowledge has become the most efficient modern competitive weapon because it represents the precondition for the intellectual capital growth.

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THERMOGRAPHIC MEASUREMENT OF FE 360 AND 09G2S

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Abstract: *This paper presents a summary of recent research activities at the laboratory in the field of Infrared Thermography for Thermoelastic stress analysis (TSA). Combining thermal imaging techniques measurements tension and Thermal imaging analysis gives a general picture of the distribution of tension. In this work the visual and virtual instrumentation based on infrared analysis of thermoelastic stress is presented. A simple test shows that the parts of the construction where the highest tension occurs, are determined by the thermal analysis. The TSA also helps to make a faster and in a predictable manner, without need for extensive iterative investigations, what reduces both time and costs.*

Keywords: *computer, digital image, measurement, infrared thermography, Thermoelasticity.*

1. INTRODUCTION

Thermoelastic stress analysis is based on the principle of thermoelastic measurements. This principle is well known in gases: adiabatic compression or expansion caused by temperature variations. This effect exists in solid and liquid, and the temperature difference but they are very small compared to gas. Usually the compression of a solid element causes temperature rise and cause traction state temperature reduction.

The theory of thermoelastic effect was initiated by Weber [1] and Kelvin[2] isotropic homogeneous material under adiabatic conditions, then proceed Blot [3] and Rocca&Bever[4] in the modern mechanical and thermodynamic theory. Within the elastic range, material submitted to stretching or compression stresses experienced reversible negative or positive temperature ("~ 1 milli Kelvin for 1 MPa stress in mild steel) Thermoelastic stress analysis using radiometry consists of measurements with scanning infrared radiometer, these very small temperature variations of the sample under mechanical loading, then calculate the stress map with adequate model thermoelastic coupling. [5] First studies using a standard infrared camera were completed in early 1980. [6-8]. To achieve adequate solutions in terms of stress measurement, statistical noise rejection method was previously proposed to improve the resolution of standard thermal infrared thermography equipments [9-10]. Statistical advantage of our procedure is that there is no synchronization necessary link between the testing machine and IR equipment. Thermal resolution of about 2 mK, responds to stress resolution of about 2 MPa for steel, will take less than 5 minutes in industrial tests, [11] operating procedure can be easily adapted to any infrared thermography camera. Usually in thermoelastic stress analysis, hypothesis adiabaticiti applied, ignoring the heat conductivity of the sample. If this is the case at high frequencies or low loading conducting material, it is much more uncertain in most current tests. In the case of academic sample, the influence of heat diffusion is

most current tests. In the case of academic sample, the influence of heat diffusion is quantified by means of the finite element model of thermoelastic coupling, according to the experimental results. Moreover, adiabaticiti criterion is rigorously established. Finally, several techniques have been proposed inverse to restore attenuated thermal contrasts under nonadiabatic conditions, and the results obtained by the successor model of thermal diffusion are presented. [12]

The concept of thermoelastic stress analysis based on infrared thermografy and stress-pattern analysis by thermal emission is presented. This technique uses computer enhancement of infrared detection of very small temperature changes in order to produce digital output related to stress at a point on the surface of a structure, a stress graph along a line on the surface, or a full-field isopachic stress map of the surface. Under cyclic loading, at a frequency high enough to assure that any heat transfer due to stress gradients is insignificant, the thermoelastic effect produces a temperature change proportional to the change in the sum of the principal stresses. Although calibration corrections must be made for use at widely differing ambient temperatures, the technique works over a wide range of temperatures and on a variety of structural materials including metals, wood, concrete, and plain and reinforced plastics[13], [14].

2. THERMOELASTIC STRESS ANALYSIS (TSA) MEASUREMENT PRINCIPLE

Explanation of the thermoelastic effect, measurement principle, history and applications can be found in [3]. Thermoelasticity is based on the thermoelastic effect, i.e. every substance (solid, liquid or gas) changes its temperature if volume changes due to external loading. For an homogeneous solid material, if no heat exchange take places (i.e. the loading is sufficiently quick) the temperature change ΔT can be related to the stress by the following equation (1) [15], proposed the first time by Lord Kelvin in *Encyclopaedia Britannica 9th edn. In 1878*:

$$\Delta T = \frac{T\,\alpha\left(\Delta\sigma_1 + \Delta\sigma_2\right)}{C_p\,\rho} \qquad (1)$$

where $\Delta\sigma_1 + \Delta\sigma_2$ represents the sum of the stress time fluctuation in two perpendicular directions on the specimen surface (i.e. the first stress invariant time fluctuations), α is thermal expansion coefficient, T is absolute temperature of the component, ρ denotes density and C_P corresponds to specific heat at constant pressure.

In order to apply this measurement principle to detect stress maps, it is therefore necessary to measure a spatial distribution of temperature changes. In order to have a non contact stress measurement technique temperature changes can be measured without contact on the surface on a loaded mechanical component by a differential thermo camera. Typically temperature fluctuations are measured synchronous with a reference signal, related to the loading cycle of the mechanical component. The data processing is performed by the lock-in technique, that mix the output signal from the infrared detector with a reference signal related to the dynamic loading.

The new idea proposed here is that the measurement of heat movie with high speed and high resolution thermo camera. Here DeltaTherm 1560 system produced by the Stressphotonics benefits. At each dynamic random time signal recorded at each pixel thermal film evaluation power spectrum is performed. Map amplitude spectrum of each peak detected represent the map of the first stress invariant at that frequency or operating mode forms in terms of stress, according to equation (1).

This measurement technique could appreciate the obvious benefits of intrusive techniques, using acceleration sensors as a contact for example, but it is also important to respect the benefits not contact other optical techniques.

A possible approach for thermal processing film in order to obtain operational mode shapes described by many newspapers, possibly useful technique for thermal film processing. Brincker R., Zhang, L., Andersen, P. (2000). - Brincker, R. and Andersen P. (1999) - R Brincker., Zhang, L., Andersen, P. (2000) - H. Herlufsen and N. Moller, Bruel & Kjaer, Denmark (2002) - Aoki, M. 1987 - Viberg, J. (2007). [16],

2. EXPERIMENTAL PART

The Materials and Instruments Tested

The standard sheet specimens from the steels Fe360 and 09G2S were subjected to static tensile test at rate of deformation $e = 2.4\times10^{-3}\ s^{-1}$. The chemical composition of the steel Fe360 was *0.15 wt % C, 0.2 wt % Si,* 0.*52 wt % Mn, 0.17 wt % Cr, 0.13 wt % Ni,* and *0.25 wt % Cu* and steel 09G2S was *0.12 wt % C, 0.8 wt % Si, 1.7 wt % Mn, 0.3 wt % Cr, 0.3 wt % Ni, 0.3 wt % Cu.*

2.1. Used Equipment for Testing

For recording and the analysis the infrared camera Varioscan 3021ST, JENOPTIK Laser, Optik, Systeme GmbH producer (Fig. 2) was used. The basic characteristics are:

-Measuring temperature range from -40°C do +1200°C and – Thermal sensitivity ±0.03ºC at 25°C. Spectral range 8–12μm, Detector type MCT (HgCdTe), Detector cooling- Liquid nitrogen, 360 x 240 pixels.

Fig. 2. Varioscan 3021ST, JENOPTIK Laser, Optik, Systeme GmbH used in this research

Varioscan high resolution is a high-quality optical measuring slow-scan thermographic system, which is scanning the object field in a raster using a single element detector. Varioscan high resolution (model 3021ST) is a thermographic system for the wavelength range of 8–12μm, width temperature resolution of ±0.03ºC and temperature

The horizontal scanner scans in lines with 360 pixels each, and recording at a frequency of 135Hz. This scanner operates as a resonance oscillator driven by a DC motor. The vertical scanner builds up the complete image from the individual lines. At an image refresh rate of 1Hz up to 240 lines can be captured. VARIOSCAN *high resolution* can also operated with the following resolutions (pixel x lines): 360x200, 360x100 and 360x50, with image refresh rates 1s, 0.4s and 0.2s (depending on number of lines).

On the Model 3021 are used MCT (HgCdTe) detectors and having an edge length of 50x50µm. The Model 3021-ST works with an integrated Stirling cooler. The output signal of the detector is amplified, digitized width 16bits, visualized with an 8bit resolution (256 colors) and transferred for further processing to the PC-104 module. Every color of the displayed thermogram represents a defined temperature. The implemented control software Irbis controls all camera functions.

IRBIS ® 3 Analysis Software

The implemented control software Irbis controls all camera functions.

InfraTec's state-of-the art IRBIS ® 3 software package is the ideal tool for fast thermographic image data analysis and comfortably creating reports in Microsoft Word.

Software for polynomial approximation model is given in [17-19]

2.2. Results and Discussion

Tests were performed on the testing machine of 100 kN (10 /91 ZDM type, accuracy class 1, "WPM Industriewerk Leipzig" VEB Thürengen Industriewerk Rauenstein, Masch. Nr. 2214/22- 1963) at the Laboratory of Mechanical Materials, Faculty of Mechanical Engineering in Niš (Fig. 3). The detection of a defect depends on three factors, which are a geometrical factor FG, a thermal factor FT and a detection or measure factor FD.

Experimental validation

Part I - 09G2S

Fig.3. Test in Laboratory

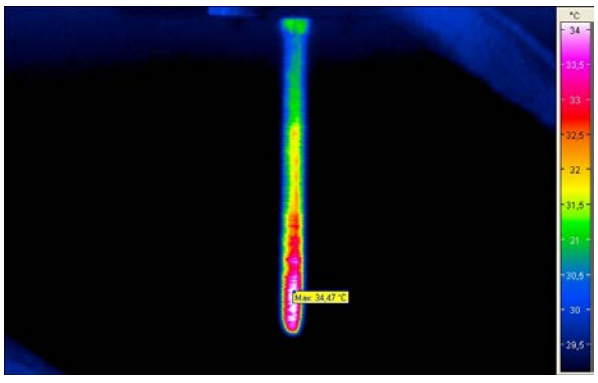

Fig.4. Thermogram

Figure No:	Time t (hh:mm:ss)	Tmax (ºC)
101003	13:22:08	30,50
101004	13:22:12	30,48
101001	13:22:12	30,50
101002	13:22:16	30,69
101013	13:22:20	30,24
101044	13:22:24	30,23
101045	13:22:28	30,23
101005	13:22:32	30,33
101007	13:22:36	30,33
101008	13:22:40	30,22
101009	13:22:44	30,22
101010	13:22:48	30,36
101011	13:22:52	30,17
101012	13:22:56	30,13
101013	13:23:00	30,24
101014	13:23:04	30,21
101015	13:23:08	30,45
101016	13:23:12	30,28
101017	13:23:16	30,28
101018	13:23:20	30,35
101019	13:23:24	30,58
101020	13:23:28	30,58
101021	13:23:32	30,40
101022	13:23:36	30,40
101023	13:23:40	30,44
101024	13:23:44	30,54
101025	13:23:48	30,46
101026	13:23:52	30,53
101027	13:23:56	30,58
101028	13:24:00	30,64
101029	13:24:04	30,71
101030	13:24:08	30,75
101031	13:24:12	30,74
101032	13:24:16	30,75
101033	13:24:20	30,76
101034	13:24:24	30,84
101035	13:24:28	30,91
101036	13:24:32	30,80
101037	13:24:36	30,72
101038	13:24:40	30,73
101039	13:24:44	30,91
101040	13:24:48	30,98
101041	13:24:52	30,99
101042	13:24:56	30,95
101043	13:25:00	30,99
101044	13:25:04	31,03
101045	13:25:08	31,06
101046	13:25:12	31,23
101047	13:25:16	31,47
101048	13:25:20	31,42
101049	13:25:24	31,44
101050	13:25:28	31,44
101051	13:25:32	31,48
101052	13:25:36	31,61
101053	13:25:40	31,61
101054	13:25:44	31,65
101055	13:25:48	31,65
101056	13:25:52	31,75
101057	13:25:56	31,71
101058	13:26:00	31,80
101059	13:26:04	31,83
101060	13:26:08	31,96
101061	13:26:12	31,91
101062	13:26:16	31,95
101063	13:26:20	32,17
101064	13:26:24	32,27
101065	13:26:28	32,26
101066	13:26:32	32,21
101067	13:26:36	32,36
101068	13:26:40	32,26
101069	13:26:44	32,33
101070	13:26:48	32,42
101071	13:26:52	32,43
101072	13:26:56	32,48
101073	13:27:00	32,48
101074	13:27:04	32,66
101075	13:27:08	32,66
101076	13:27:12	32,64
101077	13:27:16	32,87
101078	13:35:12	32,87
101079	13:35:18	33,01
101080	13:35:24	33,03
101081	13:35:24	33,13
101082	13:35:28	33,16
101083	13:35:32	33,17
101084	13:35:36	33,21
101085	13:35:44	33,44
101086	13:35:48	33,45
101087	13:35:48	33,63
101088	13:35:52	33,75
101089	13:35:58	33,88
101090	13:36:02	34,03
101091	13:36:06	34,41
101092	13:36:12	34,53
101093	13:36:18	34,72
101094	13:36:24	34,83
101095	13:36:24	34,88
101096	13:36:32	35,14
101097	13:36:38	34,57
101098	13:36:52	34,47

Table 1. Temperature values for some parts of the temperature changes vs. time diagram

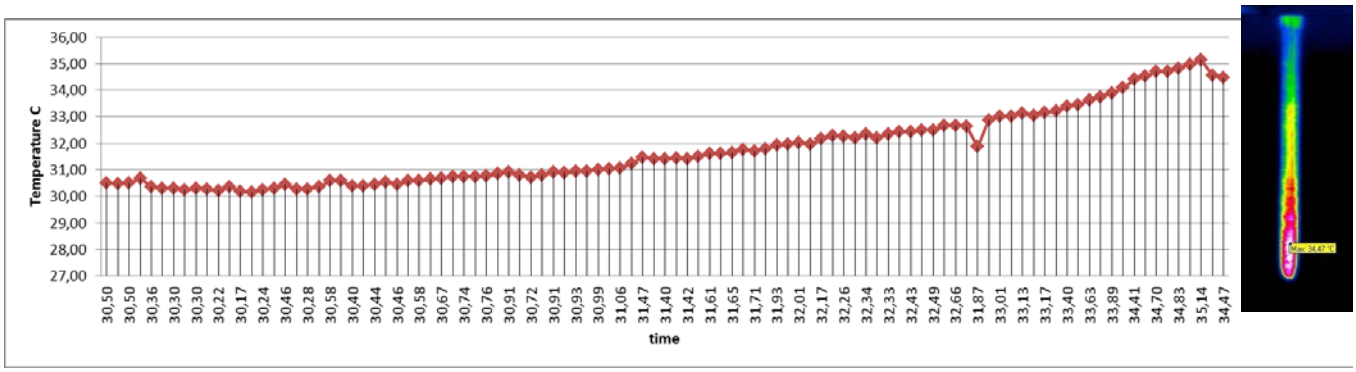

Figure 5. Diagrams temperature changes vs. time with thermograms in specific points

Part II - Fe360

Fig.3. Test in Laboratory

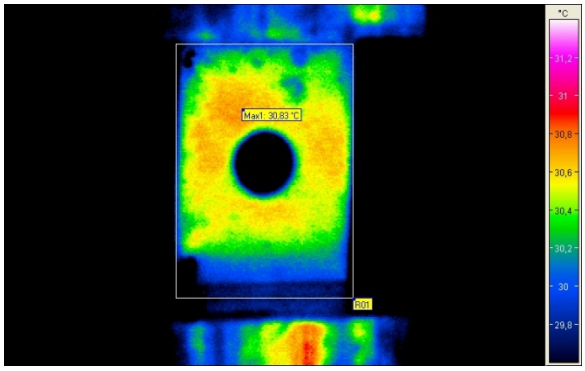

Fig.4. Thermogram

Figure No:	Time t (hh:mm:ss)	Tmax (ºC)
101041	22:30:12	30,54
101042	22:30:18	30,51
101043	22:30:22	30,82
101044	22:30:26	30,72
101045	22:30:30	30,59
101046	22:30:34	30,61
101047	22:30:42	30,64
101048	22:30:46	30,72
101049	22:30:50	30,64
101050	22:30:56	30,83
101051	22:31:00	30,77
101052	22:31:04	30,73
101053	22:31:08	30,71
101054	22:31:14	30,81

Table 1. Temperature values for some parts of the temperature changes vs. time diagram

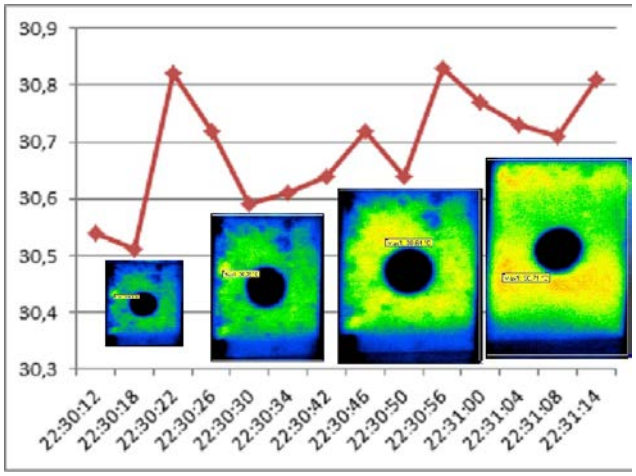

Figure 5. Diagrams temperature changes vs. time with thermograms in specific points

3. CONCLUSION

The thermovision method possesses to investigate kinetics of elastic and plastic deformation of steel. By the thermograms can be determine the beginning of local yielding. Analyze of temperature change during deformation of steel possess to find the yielding moment. The onset of limitation states on the macromechanical level, independently of differences in the mechanisms of deformation and development of damages, one can determine by characteristic changes in the temperature of sample heating.

The experimental results for steel specimens, considered in this paper, indicate the fact that the testing of metal structures requires new contactless methods. A joint measurement concept Thermoelastic Stress measurement system from an extended infrared and digital image correlation technique has been presented. One of the advantages of the presented procedure, in addition to the greatly simplified experimental test set-up, is the fact that the relevant thermo-mechanical fields are directly evaluated into a finite element mesh, and hence the interface with numerical simulations aiming at identification does not involve any unwanted loss of accuracy in unnecessary projection steps for the comparison. Combining thermal imaging techniques with measurements using a measuring tape tension can lead to great benefit in maintaining these structures. The proposed procedure of non-destructive analysis provides good basis for a wide range of investigations and eliminates, or reduces, the need of expensive destructive tests. The TSA also helps to make a numerical analysis faster and predictable, without need for extensive iterative investigations, what reduces both time and costs.

Acknowledgement

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ENTREPRENEURSHIP IN SERBIA AND IMPACT OF GLOBAL COMPETITION

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Abstract:*This paper analyzes the relationships between competitiveness, economic development and economic policy, and the importance of competitiveness, which has the power of the Serbian economy in the international market.*

Competitiveness of the Serbian economy even after twelve years of the fundamental transition is still very low. A huge number of indicators about the weak competitiveness of Serbian companies originate both from domestic and foreign sources. In a survey conducted by World Economic Forum concerning the level of global competition, Serbia is yet at the 85th place out of 137 countries surveyed.

Keywords: *entrepreneurship, companies, economic development, global competitiveness.*

1.INTRODUCTION

Depending on the degree of integration of domestic companies in international business environment and the quality of their functioning, the efficiency of the entire Serbian economy in modern international economic relations is determined. The process of companies' reintegration is a very complex task, which is enabling companies to successfully participate in the international market competition.

It should be stressed out that the competitiveness of Serbian economy after twelve years of the fundamental transition is still very low. The low competitiveness of domestic economy is a fact because more than half of total exports are composed of the export of raw materials and semi-finished products, which we very often get back as imports of finished products at prices many times higher.

2. ADJUSTMENT OF COMPANIES IN GLOBAL COMPETITION

The main feature of companies in Serbia is a high degree of unadjustment in terms of the growing trend of business globalization. The future of Serbian companies is even uncertain if they are still nationally oriented. Creating an effective and appropriate strategy is impossible without information about the global environment, competition and markets.

The disadvantaged status of our economy in the international environment should be sought within the internal and external factors. Internal factors are primarily related to inadequate implementation of global strategy of our organizations, which is inappropriately represented to a world audience, and their potentials for international cooperation. When it comes to external factors, then it definitely should be noted that the functioning of our economy in terms of isolation during the last decade of the 20th century certainly did not contribute to its positive publicity abroad [1]. It is expected of Serbia to make all necessary efforts to repair the image of the domestic economy to the world, to

send a clear message that we want to build a business environment that will guarantee the safety of operating conditions.

Harmonization and adaptation of development strategies of domestic companies in terms of global business operations must be synchronized with the activities of the state related to advancement and export promotion in order to create the image of the national economy of international character. The contribution of international recognition of our organizations can originate from the influential people or friendly companies of other national economies that their attitude promoted the place and role of our companies on an international scale. It should be noted that our country does not have an adequate system of institutions whose function is to promote export activities. This situation requires the urgent intervention of the state in creating the conditions for adequate involvement of local companies in the global market, which should be supported by promotional measures of the state aimed at building a favorable image of the country, improvement and promotion of exports and international recognition of national firms.

The existence of high risk should be taken into account, which implies participation of domestic companies in the global market and includes a careful choice of entry forms into global processes. To what extent will local companies involved in international competition depend on their success and their economic power. Smaller local companies should select the entry form that requires less cost and risk, or the form that shares the same multiple partners.

3. OPPORTUNITIES AND THREATS TO DOMESTIC COMPANIES

The constant changes in the global market environment in modern conditions lead to a permanent increase in the number of market participants and the strong competitiveness increase. On the proper treatment and favorable market prospects in such conditions can only active participants count who have the initiative and who are trained to operate under market rules and principles. Domestic economic actors in the described environment should greatly appreciate the changes, because the time of the dominant bonding company for the domestic market definitely become a thing of the past.

The work of managers in training their company for radically and continually adaptation to new conditions, means redefining business strategy, and then to redesign the organizational structure. In redefining the strategic choices our companies should go to the European and world markets as the business horizon, regardless of their size and strength.

At the beginning of the internationalization our companies should use the forms of joint arrangements with local partners, and after the acquisition of optimal quantum experiences can become independent by purchasing capacity of local partners, by establishing its own branches and the like. In addition to opportunities offered by global markets, domestic companies may be confronted with many dangers. The danger of globalization can be defined by [2]:

- creation of dependency,
- reducing the creativity of management,
- loss of corporate identity,
- weakening of its own brands,
- declining usefulness of lessons learned
- possible loss of larger profits,
- loss of market share in domestic market.

Creating dependence, as one of the dangers with which the domestic company may face in case of their binding on the principle of common long-term arrangements with global companies. In this situation, the possible termination of business relationships with foreign partners may reduce the future ability of domestic companies to adequately respond to the changes.

Long-term bonding of local companies with global companies affected by the loss of creativity and innovation of local managers. Implementation of their business activities, in whose creation they do not participate fully, be sure to discourage their activities.

Loss of corporate identity is another danger that accompanies domestic companies in global business conditions. It can occur as a result of the identification of small features of local companies at the international level. The weakening of its own brand of products is also a danger, given that the majority of domestic companies engaging in the production of foreign products can lead to the loss of identifying the names of companies and their products in national terms.

4. IMPACT OF GLOBALIZATION ON THE DEVELOPMENT OF SERBIAN COMPANIES

In the organization of the economy and the pursuit of competitive advantage, world trends, establish quality and not quantity growth. Strategic alliances are very attractive and necessary form of the modern economy. Including a very complex process of research and management in general and not only changes [3].

Strategic alliances are formed in order to expand markets and stabilize the economy undertakings. This alliance is realized synergies from the combination of asymmetric competence, and pacify competition.

Strategic alliances via the dynamism of the conflicting interests are cautious all the partners involved and contribute to faster economic growth. In this sense, strategic alliances can play a significant role in the training of Serbian companies for efficient integration into the global processes of capital and technology transfer. In addition to their efficient use of property should contribute to the transformation of our companies and it suited management system (reduction of transaction costs, rather than individual performance of our companies) [4]. Then, strategic alliances contribute to the creation of technological and vertical networks, consortium agreements, especially in research and development.

The globalization of markets causes the internationalization of business and globalization of companies. Developmental behavior of companies is subject to the state capital and product markets, the development of innovation and organizational forms. Mainly in the modern economy (mostly as achieving competitive advantages) all the more confirms the quality, not quantity growth companies.

The rapid development of technology on one hand, and the liberalization of legislation on the other hand, promote the companies in connection constantly striving to adapt to business environment, and in that direction company connectivity (strengthening mutual dependence) increases competitive position in the market.

5. PARTICIPATION OF SERBIAN COMPANIES IN THE GLOBAL MARKET

The process of formulating a global strategy is essentially the activity of putting the relationship and alignment of competency of companies with opportunities and dangers in the international community.

Access to global market demand appropriate mix of business functions, tailored to the objectives to be achieved. Different target markets have different stages in the life cycle of international product.

Analysis of global and individual national and regional markets is the basis to define the objectives and strategies for each market, predicting their interdependency. The emphasis is on the balance between global, regional and national similarities and differences [5]. Objectives of comanies help to make decision on the selection of attractive markets, and at the present three types of goals:

1. short and long-term return on investment (profit and cash flow)
2. market participation (the ability to cope with competition)
3. entrance to the so-called leading markets (particularly important goal in the initial phase).

For business success in the global marketplace company needs to have adequate potential.
In the global market both the expertise and resources of the companies determinate policy, strategy and company structure.
Access to global markets also assumes basic understanding of the determinants of national competitive advantage. The character of competition and sources of competitive advantage differ not only by industry but also by segments (groups) branches. Companies win and maintain competitive advantage through the improvement, innovation and overall success. According to Porter, four factors contribute to the nation that shape the environment in which domestic companies compete to enhance or limit the creation of competitive advantage: factor conditions - position of the nation in production factors (skilled labor and infrastructure), demand conditions - the character of the domestic demand for goods and services sectors, connecting and supporting branches - the presence or absence of branches that supply or are associated (and which are competitive with each other), strategy, structure and rivalry of the companies - conditions in the national economy that drive the creation, the organization, enterprise management, as well as the nature of domestic rivalry.

Porter's analysis of the determinants of national advantages, shows that the conditions for business success are created the first in the national economy and domestic market. So the most important reason for international success is the intense competition among companies within the domestic market [6]. Many authors cite more strategic options in the global market, or different variations of generic strategies (the cost leadership, differentiation and focus - based on costs or differentiation) that are used in the global market.

The basic strategies of the global market are:

1. global strategy of high share (large dominant company - economy of scale),
2. global strategy of local participation (large companies - strategic differentiation),
3. strategy of global niches (non-dominant large and small companies focusing on products).

Then we can distinguish four ways of achieving competitive advantages:

1. global mega companies (serving the world market),
2. companies-oriented geographic niches (selection of target customers)
3. so. European specialists (present at national and regional markets) or regional specialists,
4. companies customers of portfolio (large diversification).

However a key issue in determining the performance of emerging markets is to reliably answer the question whether the company has a competitive advantage, and whether it is useful to new markets. In seeking a reliable answer to this question with the marketing aspect the following combination is used: internal analysis, competitive analysis and external analysis.

Based on consideration of competitive advantage one can go to seek appropriate strategies into new markets. It is believed that the good strategies are based on one hand – on the company competence, and on the other – on the critical success factors in the industry.

Global orientation means that the company is not limited only to business activities in a familiar or traditional markets, but also to attractive new national markets (where it is important to choose the right time and right way into new markets).

6.CONCLUSION

The difficulties facing our economy and global trends in the globalization of markets, impose a lot of urgent challenges which need to be tangled. It is expected from the management of local companies, in the light of new circumstances, the constant search for competitive advantage, and to be skillful, to adapt to continuous changes. Without a solid integration into the world market trends, our companies can not solve their problems, a lack of capacity to identify opportunities and threats in the global environment may endanger their serious and substantial participation in the international market.

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ENVIRONMENTAL IMPACT OF THE PRICING POLICY

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Abstract:*Economy or ecology, or both of this? For a long period of time ecology didn't occur as a specific problem in the economic development. All of the activities were mainly focused on business economy, economic improvements and enlargement of profit.*

However, serious ecological issues occurred in the second half of the last century and changed the relations between ecology and economy. Ecology has become an important factor of the economic development.

Significant changes are visible in the economy of business entities, too. Ecological issues are truly respected, both in ecological costs and income benefits. It is especially explicit in the area of products policy and service prices.

Keywords*: ecology, economy, ecological costs, prices.*

1. INTRODUCTION

In the past, economic development and business economy were a constant threat to the environment. Everything was subordinated to profit. Natural resources had been carelessly destroyed or used improperly. The environment was polluted and human health endangered.

As time passed by the conflict between economy and ecology became more evident. Ozone holes, Greenhouse effect, increasing pollution of water and soil and rain forests were some of the environmental problems which caused serious concern in the entire world. Everybody realized that this situation was unsustainable.

Providing a sustainable economic development now means overcoming the antagonisms in this field. In other words, the environmental protection has to become an important factor in the industrial development and a binding aspect in the economy of business entities. [1]

In the business economy, the ecological component may have a double role, i.e. it may represent a cost, but it could also contribute to the increase of the income. This role could especially be reflected through prices of products and services, which is the topic of this paper.

2. ECOLOGICAL COMPONENT AS AN ELEMENT OF COSTS AND SELLING PRICE

When ecology was not regarded as a factor in the business economics, ecological costs were not included in calculations of costs and business results. The logic was that natural resources were available for free, while damages occurred in the process which should have been repaired by the society or government. That is the reason why natural resources were used recklessly and the environment suffered global damages. On the other hand, business entities which used natural resources had an economic freedom in this aspect, since the significant share of costs had no influence on their business results.

After introducing ecology as a complementary field, significant changes happened in the business economics. Environmental damages caused by business entities were treated as business costs and were named ecological costs. This way they became an element of cost price, as well as selling price and thus a part of business entities' expenses.

If we divide costs according to their share in cost price, cost price has the following structure [2]:

$$CP = C_{dir} + C_{ind} ,$$

where:

CP is cost price,

C_{dir} are direct costs and

C_{ind} are indirect costs.

Direct costs are all of the costs made during the creation of the use values. Direct costs can be monitored, analyzed and directed, i.e. they can be managed, such as material costs, facilities costs, labor costs, production service costs and non – material costs. These costs are directly included in the calculation of cost price.

The second group of costs are general or common costs. They are also originated during the operations of business entities, but they are related to more products. By their origin, they are divided into general operational costs and general management and sale costs. Before they are included in the calculation of cost price, they have to be distributed to elements by certain mechanisms (keys). These costs can also be divided as the previous group.

Ecological costs (Ce) make the third group of costs included in the calculation of cost price. Basically, they have a character of common costs since they are also related to more products. Ecological costs are expressed through pollution of air, soil, water and negative influence to the environment generally. In literature, they are often named as external costs. Including these costs into product price enables so-called "interning of external effects". The principle of external environmental costs interning is based on adding these costs to individual (private) costs of the pollutant. Interning enables converting of external negative effects made by pollutant into internal effects, by including external costs into price calculations and other means of financial obligations. Thus, external costs are included into internal calculations of costs and incomes and also into the internal calculations of the company budget. [3]

So, cost price is a sum of direct, indirect and ecological costs:

$$CP = C_{dir} + C_{ind} + C_e$$

If a product price would be made only by internal costs (direct and indirect), marketing balance would occur at point A, with balance quantity Q_b and balance price P_b (Fig.1).

When ecological (external) costs are included, price rises and offer (O) decreases, hence offer curve moves from O to O_1 and new marketing balance occurs at point B (Fig.1.).

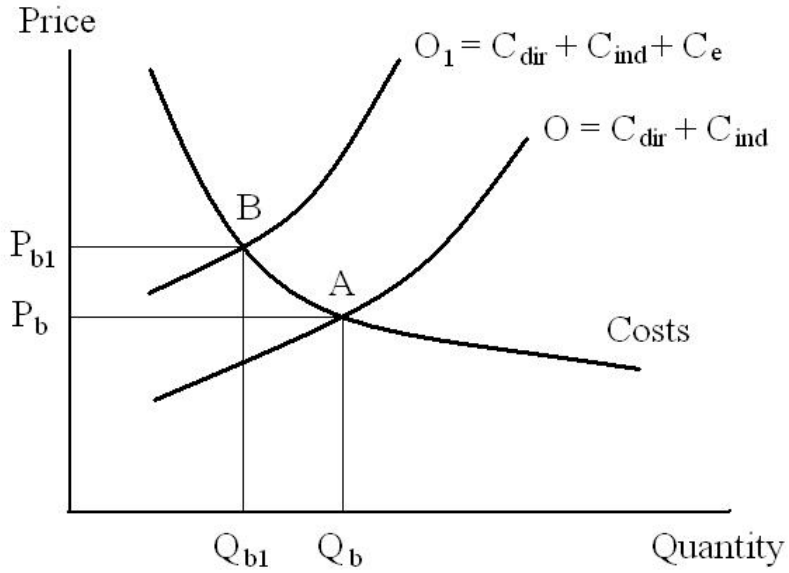

Figure 1: Marketing balance with and without ecological costs

Besides, in case of use of non – renewable natural resources, there is one more element of price cost, so-called user cost (C_u). This is a consequence of limitations of such resources. The user of non – renewable resources diminishes the possibility of their use in the future. Hence, it is treated as additional cost in price cost:

$$CP = C_{dir} + C_{ind} + C_e + C_u$$

Addition of user costs causes new marketing balance (Fig.2):

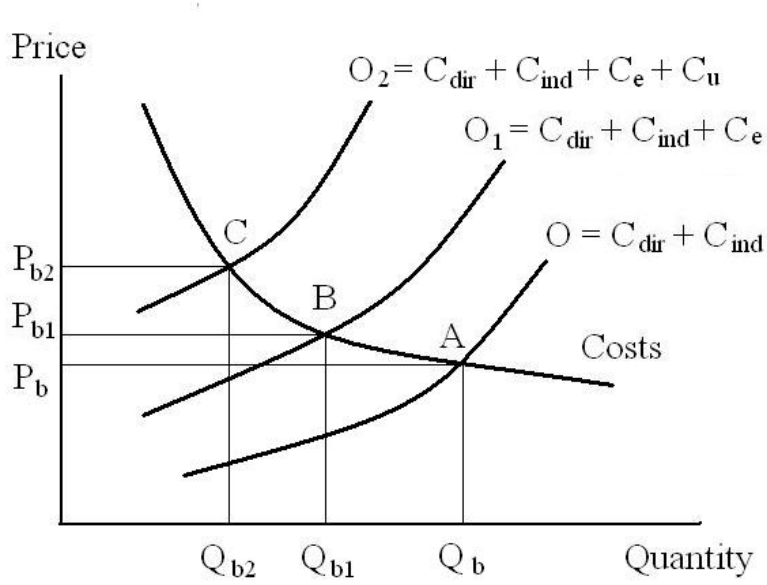

Figure 2: Marketing balance with internal costs, ecological costs and user costs

When product sale price includes only internal costs, marketing balance is achieved in point A. When the price is increased by ecological (external costs), curve O becomes curve O_1, with balance in point B. Finally, after adding user costs, the price is highest while offer is lowest, which is represented by curve O_2. In this case, balance is achieved in point C, with quantity Q_{b2} and price P_{b2}.

Such situation should motivate business entities to use natural resources rationally. Ecological and user costs make the product more expensive, so business entities with lower additional costs (C_e and C_u) will be more competitive at the market and will have better positioning.

Product sale price is also dependent on different taxes. In our country, we have ecology tax and a compensation for products which become special waste after use. Ecology taxes are determined by Local Governments (Municipalities and Cities) in order to solve environmental problems on their territories. For business entities, these taxes have a character of costs and they are included in calculations of business results. The compensation for handling special waste is intended for producers and importers of products which become special waste after use. This way, costs of handling special waste are covered. These are the following products: all sorts of tires, products containing asbestos, batteries, mineral and synthetic oils and lubricants, electric and electronic products, products used for production, distribution and measuring of electric energy and electro-magnetic fields. These taxes and compensations are calculated in product price, i.e. they increase the product's retail price.

3.ENVIRONMENT AND PRODUCT PRICES

Many natural goods are not the subject of market exchange; hence they don't have market value and they are called non-market goods. However, these goods are often related with commercial goods and they may have the influence to their value, both positive and negative.

In literature, there are many methods of environment evaluation. These methods can be direct and indirect. The first group of methods is based on simulated markets, while

the second group relies on market prices of products and services which are strongly related to natural goods considered in evaluation, i.e. non-market goods. [4]

For instance, in some city, the level of air pollution varies. The city area is divided into several zones. Air pollution is the highest in downtown area, and it decreases towards suburbs. The level of the air pollution is directly related to the real estate prices (Fig.3).

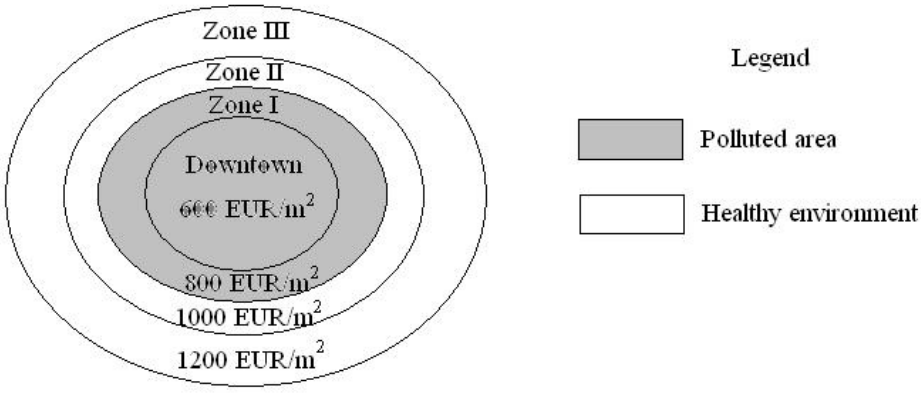

Figure 3: Zones of air pollution and real estate prices

In the downtown area, with the highest level of air pollution, the demands for real estates are the lowest, as well as prices. As level of air pollution decreases, the real estate prices grow, hence they are the highest in the suburbs, in Zone III. Of course, this is the case only if no other factor which affects real estate prices is taken in consideration. In this case, differences in real estate prices may be treated as a value of clean air ("hedonist price").

Also, in this example, the average real estate value is 900 EUR/m^2. In the downtown area, prices are below average due to air pollution, while in the zones with clean air, prices are above average. There are many similar examples. For instance, prices of products and services in touristic destinations are usually higher than in other areas. Values of non-market goods, such as clean air, healthy environment, become valorized through products and services they are related to. Their values increase the values of products and services realized on touristic market.

Also, the environment may have a significant influence on labor price level, i.e. wages. In a market economy, labor is considered as goods, and hence it is a subject of offer and demand on the market. Level of wages depends on the labor market.

So, if all other elements of price of labor are identical, employees in polluted areas will have higher wages, because there will be less interest of employees in such areas. In order to provide the quantity and quality of workforce they need, employers have to offer higher wages.

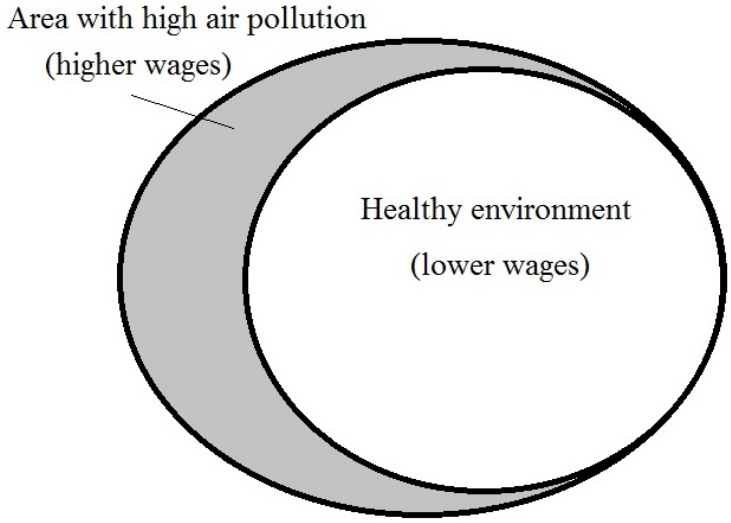

Figure 4: Influence of environment to level of wages

The situation is opposite in healthy environment. Offer of labor is higher, hence the need for employees is lower and their wages are lower.

Difference of wages in two areas should compensate environment issues (method of hedonist wages).

4.CONCLUSION

Ecology is a relevant and an obligatory factor in the modern economy, with a strong influence to growth and development in macro-economy, and as an important element of the business economics of business entities at the micro-economical level. Economy and ecology being complementary represent our reality.

Ecological costs are an obligatory element of cost price and selling price. This is the way to provide funds for rehabilitation of the environmental damages. Also, ecological costs, as a part of product price, may have a significant influence to product positioning on the market. This way, business entities are forced to minimize environmental damages in order to minimize ecological costs.

At the end, numerous elements of the environment, treated as non-market goods, may have a huge influence (positive or negative) on prices of products and services related to them. Realization of market goods provides valorization of non-market goods.

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ECONOMY AND ANTI-CORRUPTION STRATEGY

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Abstract: *Corruption is one of the worst diseases of the modern business economy and healthy business. Its general interpretation is based on the disruption of normal order and business relationships. Corruption causes individuals, groups or institutions to morally fail and it fosters on greed. For these reasons, the paper focuses on corruption as a particular form of social pathologies, the causes of its occurrence, consequences and ways in which it is possible to suppress it.*

Keywords: *corruption, economic disease, mode of operation, moral stumbling, social pathology.*

1. INTRODUCTION

The word „corruption“ comes from the Latin word *corruptio*, which, besides „bribing, suborning and immorality“, also means „the process of decaying, rottening and disintegrating“. It is particularly harmful if it is spread endemically when it is not possible to do almost any business without making „coruptive” actions. Easy way to get privileges and benefits (material or of any other form) within the state intervention and on the market, is a fertile soil for creation of so-called „corruptive schemes“. Corruption destroys the relation of trust at establishing normal business relationships. Since, with this process, it is not only the question of conventional kleptocracy or reign of thieves, but also of the kakistocracy, that is, the reign of scam and people belonging to the worst social strata, devastating trust, not only into elected representatives of management but also into state authorities is an inevitability following corruption (Napoleoni, 2009).

All before-mentioned, together with the loss of trust of business structure into economy, represent the most severe consequences of this pathologic process. To prevent it on time, it is necessary to develop consciousness of the fact that corruption exists and that it spreads very quickly. If the consciousness is late, the state is going to be or it is largely in the hands of the system of corruption. When it is obvious that nothing in the society can be done without bribing or doing a contra favor to an „important“ or „person in charge“, the problem becomes evident. To dynamize and revive both production and service business means profitability of that business, but also the profitability if investing in a certain project in circumstances in which the laws and rules of „normal“ business activity should be respected. The basic source of the business capacity, trade competence, profitability and dynamic growth, companies, and the economy, as well, have to seek primarily in human creativity, innovativity and new entrepreneurship’s culture considering all human resources as the most precious „property“ (Pokrajac, 2004). It is corruption that destroys the basis of business, that is, destroys trust into business activities and trust into people and institutions that those people represent.

2.BASIC INDICES OF CORRUPTION

Corruption is the negation of law and legal state, which endangers equality, motivation for legal and lawful work, solidarity and safety of citizens (Mihajlović, Sovtić, Plavšić, 2011). As an ancient disease of the economy and society, it refers primarily to capitalism, and, later, to „economy of the countries in transition". The basic condition for quick break-through of the economy of countries in transition is transformation of property or the process of privatization, which is, together with the process of removing the state (legal) legislature, has made extremely fertile soil for its creation. Recently, the convenient forms of corruption have been „supplemented" by a new repertoire of immoral and criminal (corruptive) business activities, while, through „corruptive"methods, there are fulfilled immoral, illegal and unlawful aims. The following can belong to the social groups prone to „dirty" actions and attaining those aims:

1. Political institutions, involving reigning political parties and members of those parties being on managing positions of a company or in a ministry;
2. State institutions, as well as individuals representing them.

The listed groups, misusing their position and authority, through corruptive actions, offer legal state functions, transforming such behavior into criminal action (http://sr.wikipedia.org/sr). On the other hand, most companies and population are begging for the institution that can be „available" to them when they need to fight against various forms of such behavior. During the course of the whole history of mankind, it has been necessary in the social context to establish the relation between the bearers of reign, who manage with disposable material resources and political power, and subordinate and dependent people who, in order to satisfy their existence needs, are forced to rely on organized help by the state. The latent nature of such help is of charity-hypocritical nature because, essentially, it represents a perfidious form of punishing the disabled through control and preservation of the existing social system which makes them such (Petričković, 2010). Therefore, the institutions of social welfare serve to protect the interests of reigning state-political structures and their economic domination, since, as social agents and guards, do integration of 'unsocial' norms into existing norms of value of deeply dehumanized and socially unfair society (Petričković, 2010). The following are classified as the indices of existing and creating corruption:

1. If the laws, most often „good, however, out of order" are not respected and conducted and are not practiced;
2. Occurrence of isolated „underground world", which is stronger and more dangerous than the state legislature.
3. Great profitability obtained from corruption and criminal actions for the doers, particularly because they are beyond the regulations of the fiscal (tax) policy.
4. It is developed two-fold protective covering involving givers and users of means of corruption, based on illegal regulations (in health-care, school system, judiciary institutions, police forces, administration, etc.), therefore, it is hard to reveal it.

Due to corruption, in most of transitional economies, it is imported goods of bad quality which is out-of-date, dirty technology, thus, the products are dangerous to health (GMO food). Corruption is not only the channel for the break-through of dirty technology, but also the channel for the breakthrough of foreign „investments-predators", „cleaners of dirty money", speculators of all types, as well as various subjects in the zone of crime.
The World Bank defines corruption as misuse of public authorities for acquiring private benefit, yet, its existence in the private sector must not be neglected. Analysts of social and economy processes often point out that corruption „breaks into all pores of economy and

social tissue“, thus, endangering the reign of law, democracy and human rights, undermining good administration, equality and social justice, violating competence, disturbing thus stability of dominant institutions, as well as moral basis of a society (http://www.paragraf.rs/propisi/ - European Council on corruption).

3. CORRUPTION ON THE MACRO AND MICRO ECONOMIC LEVEL

The simplest and most widely accepted definition of corruption has been given by the international non-governmental organization Transparency International (founded in 1993) as follows: „Corruption is the abuse of public service to obtain personal benefit“. This definition was accepted by the World Bank, too, as well as some other global institutions, which determined this phenomenon on the macroeconomic level by the following equation:

Corruption = *discretional authorizations + monopoly in decision-making – obligation to render the account*

The equation could be explained in this way: discretional rights together with the monopoly in decision-making are not subject of obligatory rendering the account, however, this obligation is excluded. The fact, that accounts are not rendered, means that there is corruption in its general sense. Corruption in the world of business often has only conventional juridical explanation interpreted in the following ways:

1. Direct or indirect demand or receipt of money by public organ, that is, person performing a public function as an exchange of any action, or lack in performing the function;
2. Offer or guarantee of any money or any other privilege, indirectly or directly, to public sector (the person performing the public function, as an exchange for any action or negligence);
3. Act or negligence in performing duties by a public officer or person performing a public function purposeful to gain illegal privileges for him himself or the third party;
4. Abuse or appropriation of any property as a result of an action;
5. Participating, as an initiator, instigator, accomplice, ally or coverer beyond the act has been done, as an exchange for a certain benefit, both material and non-material (Pokrajac, 2004).

The process of corruption can be analyzed on two levels, both macroeconomic and microeconomic. On the former level, corruption leads to:

1. State loss, that is, budget money, through tax consumption (expensive concessions, expensive equipment, irrational or excessive import), as well as through hasty indebtedness on the expense of future generations;
2. Rejection of citizens and companies to pay taxes regularly as a result of state officers and officials being corrupted;
3. Absence of supervision or poor supervision over spending public money which causes weakening of the bank system, particularly in regard to losing trust of the depositors;
4. Occurrence of price instability and inflation, which most influences the poor most, and which is a general macroeconomic result.

On the microeconomic level (companies, firms), the process of corruption means the following:

1. Leads entrepreneurs into financial crime and avoidance of paying taxes and customs duties; it is called the economic „underground";
2. Since the tax and fiscal money do not go to the state budget, the state does not manage to cover the public needs and provide public services;
3. The economy, from transparent and legal business operations, goes down slowly to „grey economy";
4. There are developed conditions for the „criminal economy" and development of organized mafia, formed on different bases (interest, tribal, kindred, political, regional, etc.).

The before-mentioned analyses of the macro and microeconomic fields represent the systemic corruption. In favor of the systemic corruption there are the World Bank researches and experts who revealed the information that 5-8% of gross world product pour off through the corruption cannels, meaning also that there is as much non-production and gross social product used out of control. If there is additional 3-5% of gross product that circulates through the channels of the drugs trade, it is clear that enormous amount of money circulates in grey and black economy, and that it is possible to buy and bribe almost all institutions of modern societies.

4. BASIC CAUSES OF CORRUPTION

Corrupted states manage to attract both filthy lucre and the money obtained by dirty jobs, and dirty technology. Since, foreign, public and private investors and bankers know that any investments will cost them 20% and more than usually, they will, naturally, run away form the countries in which there is present the system of corruption as the way of living and operating. Due to it, in countries in which this pathologic phenomenon reigns, the surroundings and natural sources are irretrievable victims of „masters" of corruptive actions, who do not care for solidarity between generations, preservation of the natural sources, economic sovereignty of the country and perspective of free and ethical entrepreneurship. In the social sense, corruption increases poverty, hitting the weakest. Proportionally to their earnings, living costs are much more expensive for unprotected strata of society, while it is impossible for them to use some public services since they cannot follow financially some „price lists of the corruption actors".

Corruption causes creation and increase of inequality of citizens in various fields, such as: conditions for schooling, health care, issuing permits, obtaining supplies, etc, opening, thus, the door of organized crime and formation of various types of mafia (http://sr.wikipedia.org/sr). Since, it keeps acquired privileges of individuals, and to a disadvantage of general prosperity, making usurpation of public sources and wealth by individuals, „legal" corruption is a unique hinder for the prosperity of the society and economy. The most important factors of effectiveness of business operations are those which are integral part of the economy-financial system and those who make trade conditions of business operations. Stability and development of financial policy is directly proportional to the stability of the measures of financial-economy system (credit banking instruments, foreign currency and other tax regulations, and other system laws). It has been proved in practice that often and greater changes of measures of economics and financial system, especially credit-banking instruments, foreign currency and tax laws, reflect negatively on the stability of the financial policy of companies (Vunjak, 1994). Business operation conditions on the trade are important exterior factor of the financial policy of a

company, because they belong to the group of relatively limiting factors in the way how companies behave in their business activities (trade of suppliers, buyers, monetary trade and trade of capital, foreign currency trade, investments from abroad, loans, etc.). *Therefore, a company tries to function in accordance with its business surroundings, tax surroundings and the surroundings of the financial system.*

To enable the economy function without being disturbed, adequate conditions for business activities have to be provided. Firstly, it is necessary to trace the cause that might be a hinder to business activities. Although they are different in various countries, the following may be characteristic for global corruption (Mihajlović, Sovtić, Plavšić, 2011):

1. General state of economy (crises, recession, unemployment);
2. Social image of the society and development of the „social state", measures and institutions;
3. Tradition of the state administration;
4. Level of cultural and political development;
5. The surroundings;
6. Repressive measures of the state (more or less developed).

In addition to the before-listed causes on the global level, the basic ones for corruption in transitional economies, among which there is the economy of Serbia, involve the following (Mihajlović, Sovtić, Plavšić, 2011):

1. Relation to the „social“ capital considered as ,,belonging to someone else“ – irresponsibility;
2. Breakdown and almost complete devastation of social property through the process of privatization – creation of fertile soil for robbery of basic means and capital – domination of the corruptive methods;
3. Tendency of former structures of administration to keep reign and privileges in public companies at any price;
4. Obscure, often legally poorly regulated behavior in the processes of privatization – previous arrangements and fraud-ridden buying or selling of public means and goods to friends to reigning political parties or financiers of the political parties. Such attitude spreads quickly and penetrates deep the society and political system;
5. Too-wide norming and failure to have the real picture of existing relations – creation space for corruption;
6. A wide range of discrete estimation by officials and politicians;
7. Developed public opinion and wide social condemnation of corruption and bribery do not exist there – serious social reflex ion;
8. Insufficiently developed role of supervisors and transparency of business transactions (except when it is about a great state or business secret that “has to be” proclaimed so),
9. Fading away of tradition of respecting public norms –the system of „evading the law" has been developed;
10. Open trade as a measure for regulating competence does not exist;
11. Non-developed and inefficient antimonopoly and anti-oligopoly legislature;
12. Easy reach to wealth, position and power in the society through bribe and corruption in contrast to legal systems of business activities and earnings;
13. Crisis of development, high rate of unemployment, cessation or liquidation of companies, unsafe conditions for business activities, underdeveloped social function of the state, ,,destruction of the social state", etc.;

14. Globalization of the economy and internationalization of business activities – space for great corruptive and criminal activities has been opened (washing money, drugs trade, enormous capital being „circulating“ in illegal spheres - with such capital, it is possible to buy real capital, such as companies, soil, buildings, equipment), incompetent political parties start their reign, possibility to corrupt individuals and institutions of the system;
15. Decentralization – causes increasingly greater number of corruptible people, dispersion of means and decision-making, accumulating functions – it is hindered the transparency of the politicians' activity;
16. Financing political parties and elections campaigns (particularly from the grey or black zone), funds, donations – especially, when it is not clearly regulated.

From the aspect of business economics, it is widely accepted that it is „stolen most" in the public sector, while it is „cheated most" in the private sector (Mihajlović, Sovtić, Plavšić, 2011). Meeting the business relation „at any price", both in private and public sector, it is increasingly present the „pathologic business activity" of bribing, blackmailing and racketing (Napoleoni, 2009).

5. CONSEQUENCES OF CORRUPTION IN ECONOMICS OF BUSINESS

Corruption is a particularly complex, multidimensional and hard to eradicate, negative social phenomenon (Stojiljković, 2011). It is the type of specific behavior in which, by the help of „promise“, that is benefit, or offer of money, the person, being in charge or having an authority, is forced to act in contrast to the law and his/her duty. State administration is a complex and dynamic system of social regulation, in fact, an essential social subsystem of the state organization, functioning and activity (http://www.comparativelaw.info/pzr.pdf). Corruption is present in the public sphere, therefore, it refers to the state and public institutions. However, we must not neglect the fact that it is present also in the private production and service activities, especially in trade. It is also present in media, sports, show business, art, even in the civil sector in civil non-governmental organizations. Since, it is an overwhelming social process, impossible to define easily, it has been described variously and explained according to the following consequences:

1. Prevents safe direct investments, both foreign and domestic;
2. Slows down or even makes impossible the development and limits trade;
3. Leads to irrational and wasteful uses of the public budget;
4. Encourages „grey economy“, thus decreasing the tax sources and incomes.

The most serious result of so-called public corruption is the possibility of individuals, officials and elected representatives, such as members of the parliament, mayors, ministers, to obtain illegally the rights, authorities, property or money which do not belong to them, but are public, in fact, state, municipal or rights belonging to someone else (http://www.google.rsjavna/korupcija). The term „illegally" may be interpreted in the following way: „it is not in general, public but in private interest, meaning, not to the right and law but for bribe and personal interest" (http://sr.wikipedia.org/sr). That is why there is the term „bribe and corruption" consisting of two words. Thus, each corruption activity involves at least two sides: „dishonest“ official and „unconscious“ citizen. Probably the gravest consequences of corruption are in the sphere of culture, since they have long-term effect on formation of a new, perverted and immoral style of behavior, offering a bad example, disencouraging creativity and entrepreneurship of those who want to work and earn in an honest way (Napoleoni, 2009).

Corruption endangers and „poisons“ many relations in society, public affairs and activities of the individuals. It is often present in procedures of public purchase and application, paying taxes, duties, customs fees and fines, at attaining various rights, permits or allowances, at getting jobs, health care services which unconscious official „sells“ to the one who does not have the right to it or advantage of it, instead of awarding it free of charge to the one who has the right to it. Public officials, outside the law, not acting in accordance with moral laws and proscribed regulations, in their own interest „sell" what must not be sold. Corruption devastates elementary relation between citizens and politicians, particularly because of the fact that politicians should equally and justifiably represent citizens, since they are financed by the citizens' money, being, thus, obliged to ensure freedom, equal chances and solidarity for those people. In addition to the before-mentioned, the results of corruption are reflected also in realizing their own, personal or group, behalf, and to the expense of social behalf. Corruption is an illegal activity in which the briber offers material or non-material goods purposed to influence a certain political or decision of public interest. The consequences of corruption can be found in illegal trade in which the „seller" violates the basic rules of business activities and economics, which he himself should strictly respect and protect. In other words, such a seller „sells“ the authorities entrusted to him by others, violating thus not only the law but also good practice. In contrast to him, the „buyer", also illegally, tries to acquire something that he cannot obtain in an honest way (Mihajlović, Sovtić, Plavšić, 2011).

6. STRATEGIES FOR CONTROLLING THE CORRUPTION IN SOCIETY

According to the before-mentioned, it is easy to conclude that corruption represents, first of all, malady of a society, better to say „the gravest one" of the whole economic system. Although it may be controlled and reduced, its existence on a certain level, is an inevitability for each society. Since, it cannot be completely eliminated, to control corruption involves developing strategies which will minimize it in all fields (http://www.diplomski.rs/). If it acquires the endemic dimensions, it, as a pathologic and destructive process, bears with itself large consequences, such as:

1. Political;
2. Economic;
3. Social;
4. Juridical;

Forthcoming investors from the country and abroad are most interested in the political and social circumstances of the country and its economy. It is primarily meant here of the *stability of the state, legislature, conditions for investing, safety of the profit repatriation, state of the economy and estimation of the future*. Basically, needed and desired capital results from labor of such a great number of people producing more than they have been consuming for years. Using knowledge, effort and resources, economy, as well as society, produces more, therefore, it can save more. The more advanced society, the greater capital. A society will be more advanced if the capital saved in that way is more purposefully and profitably turned over. Skill in financial management can be one of the crucial rings, especially in modern conditions of circulating of capital, and particularly in its increase through profitable investing and, after that, engagement in the process of the capital circulation (Krasulja, Ivanišević, 2011). Therefore, if they want to invest, the range and level of corruption in the economy is the crucial factor for potential investors. Each capital requires „solid", safe and profitable investment. Domestic investors, especially when it is about their own capital, pay special attention to *branches of economy*, the fields they would invest in both when considering a new investment and purchasing a company.

That is why they pay great attention to the *level of corruption in public institutions*, since, the greater the level, the „more expensive“ the investment. The level of corruption is often expressed by the „rent" taken by the reigning political party. However, it is necessary to draw attention to so-called fiscal illusion; it explains why a certain government would become more than what citizens want. There is still no explanation why it happens. We can ask a question if the discreet right, that the public administration and paternal state has, is in fact a powerful device within fiscal illusion to widen public sector and increase the government machinery of the pretext of exercising the „people's will". Unfortunately, it is so in almost all developed OECD courtiers, except in Switzerland and Japan (Ristić, Komazec, Kovač, 1992). In civilized countries, responsibility for a bearer of a public function is obligatory, while mistakes in their private lives are not evaluated as the same ones made by ordinary people (http://sr.wikipedia.org/sr). „The corruptivity of the best is worse than of any others'(Jezuits, 16th century). One of the most significant measures undertaken by the state, the strategy of controlling the pathologic process and behavior, is *preserving the authority of institutions* of a legal state and reign.

The most important thing is to enable independent and just ***judiciary***, which is separated from executive authorities. Localization of the malady can hardly be expected without ***rigorous measures*** of the jurisdiction, pursuit for crime, social condemnation of families of the corrupted, dispossession in property and other forms of sanctions. Therefore, the first and basic step in controlling corruption is ***making public administration sound***. Primarily, it means to engage officials who are real experts, to be well-paid and to whom it can be entrusted to exercise the legislature and decisions in public services. It is not enough only to reveal and punish the participants in corruption, but it is also necessary to inform them that corruption is „not worthy“. Profitable economy and entrepreneurs require successful *anticorruptive policy* to be exercised, since it is the basis of any business in a long-term period. Entrepreneurs, as a „sound frame", basis of certainty and successfulness in business, have set the following measures, expecting them to be undertaken (Stojiljković, 2011):

1. Political responsibility – openness and transparency of political decisions, together with „fair“ political „competence“ among political parties, through programmes, critics, staff);
2. Strengthening state institutions, especially the parliament – public responsibility in the procedure of revision of the budget uses;
3. Independent judiciary (from the state and political parties) and independent prosecution organs - strict execution of penalty measures and punishments;
4. Supervision by the government and public administration organs of public contests, budget means, public property and public supplies;
5. Participation of the civil society in public life; the role of media in public life – media should be allies of the state in the fight against corruption – to spread information on corruption, suggest activities, organize public testimony, debates and explanations;
6. Independence of the media – develop especially investigative journalism dealing with anticorruption struggle (this form of investigative journalism has been increasingly spreading in our country, being increasingly more important and popular with the people);
7. Creation of successful private sector of economy – especially ensuring normal conditions by the state for subjects in business activities, protective and encouraging policy without firms and company managers privileged by political parties. Among these, there are also enhancing and rationalization of

conditions for foundation of companies and firms, as well as transparency of property over them and control of business operations;

8. Reform of public administration – a very significant factor in the struggle against corruption, referring to separating business functions and making regulations in the field of accountancy and auditory supervision of usage of public financial means, etc.

We need to say that the list of the before-mentioned measures and strategies does not involve all on the measures for the successful struggle in controlling corruption. Since the case of „buying a state“ by the mafia, large capital, foreign business banks, lobbies, international capital and institutions, it is necessary to increase political responsibility of the public subjects and authorities to its extreme limits. The managers themselves should learn how to function in the times of crisis (Jovanovski, 2008). This should be the attitude of all domestic experts. Investigating honest behavior and developing it is a cyclical process. What is necessary is to educate the public permanently, as well as to carry out constant campaign through the media, the aim of which is to strengthen sensitivity of the public to any kind of corruption, both in economy and in all public services (health care, educational system, administration, police, jurisdiction, etc.). Corruption is not genetically inborn evil, but it can be characterized as „the evil produced in a society" (Mihajlović, Sovtić, Plavšić, 2011).

Taking into consideration the place where it originated, its roots and causes of spreading, we should point out that it is the place where it is possible to find out remedy for its control and further spread. We should act as to prevent it by elimination of causes. Numerous examples worldwide point to the fact that, while struggling against corruption, we should be clear, willing, persistent and consistent. Since in the countries with transitional economy, including Serbia, there is neither large-scale and efficient front nor institutions for successful struggle against the pathologic way of business activities, these economies represent a symbol of modern corruptive systems. We point to the fact that there are many intriguing and successful programmes and policies, already applied in the countries such as Singapore, Chile, Hong Kong and Japan (Mihajlović, Sovtić, Plavšić, 2011). Using the examples of those countries, it is necessary and advisable to apply and adapt, as much as it is possible, the strategy of controlling the system of corruption both in the economy of Serbia and the economies of the countries in transition. In addition to the effect of the consequences of corruption, efficient long-term policy demanding multifunctional approach and strategy should be applied.

7.(NON)EFFECTIVENESS OF THE STRUGGLE AGAINST CORRUPTION

Corruption is an extremely complex, multidimensional, hard to eradicate, negative social phenomenon. The awareness about spreading the corruption and its harmfulness has been spread so much that a few years ago it was initiated that the right to life in the world without corruption is to be accepted as a basic human right. The essence and nature of corruption are like a hundred-head hydra, a giant leach or a plant pest, extremely adaptable to the change of life conditions, and capable of rapid mutation. That is why the way from strong moral condemnation to efficient strategy of reducing corruption is exquisitely complex. What is the reason why, after two or three decades since the changes occurred, Serbia is still in something that can be called defective democracy, and what is necessary to be done to enable people to live in a decent, civilized and “a little bit boring society“ in which the political elite does not induce sensation in a six year old when on the newspapers or electronic media cover page?

One should ban partocracy, establish stable representative institutions, with elections at which all participants could compete with almost the same, at least theoretically, chances. The independent jurisdiction, independent media from their owners and great advertisers, in a word, the society that is not seized by corruption endemically in needed, however, first of all, – autonomous jurisdiction (Stojiljković, 2011). Methods and tactics of efficient anti-corruptive strategy have to be well harmonized with its bearers and actors, at least to the level of how deep the roots of corruption are and how many motifs and causes there are, how much complex, various and tied among themselves its forms in practice are. Corruption is not going to be reduced either by non-coordinated organizing, otherwise professionally correctly arranged campaigns or existence of a series of anti-corruptive institutions. The struggle against corruption involves application of a large scale of devices - from preventive and educational to repressive, penalty-judiciary ones.

The change of relations of power plays the key role, that is, consciousness and behavior of citizens, with simultaneous mobilization of sufficient political will and readiness to radical changes, however, without, at any price, pseudo changes within the political elite, which mean that the things are changed in such a way that everything stays more or less the same as it was (Stojiljković, 2011). Any rational and complete dealing with corruption contains at least four narrow, formative circles of problems. The conventional example of non-economical and non-trade behavior of public institutions is a widespread practice of „framing-up" of public supplies and tenders. In the countries in transition, a significant number of failed privatizations has been carried out within complex and spread chains of corruption, while, the companies, having been previously devastated, were sold dirt-cheap, so that, new owners could either obtain attractive locations or get rid of rivals. On the other side, corruption in privatization represents a kind of informal tax burdening both private sector and investors. To attract investors from abroad, Serbia has to reduce corruption, that is, eliminate informal tax on investments. There is a direct and indirect connection between corruption and poverty. The direct influence is reflected in increasing prices and decreasing the quality of public services, which have become more increasingly available to the poorest. The indirect influence is seen in the fact that increasing public costs slows down the economic growth, which, consequently, causes reduced possibility to finance public services.

8. CONCLUSION

Any complete research of corruption would have to deal with systematic analysis of its economic aspects and dimensions, causes and consequences, and, first of all, with organization of the trade of corruption. Insiders and oligarchs make the greatest profit in non-structured institutional frame. Their power reduces only when liberalization and privatization are followed by strengthening of discipline, that is, reign of law and judiciary, creating clear anti-monopoly jurisdiction and favorable climate for investing. Economic system cannot be based on the phrase of a spontaneous and elemental function of the trade. In the countries in transition, exaggerated deregulation would cause growth of unemployment, recession and resulting in decline of means for financing programmes of social welfare, while exaggerated foreign liberalization would seriously endanger less developed economies. In the economy chronically suffering from the lack of capital, it is hard to expect inflow of capital to occur if corruption, as one of the basic levers of „organized crime", is present in the system of economy. Corruption does not involve only the relations between citizens and public reign, but also the relations among citizens themselves in any activity. According to all before-mentioned, we can conclude that corruption causes increased inefficiency, developing ineffectiveness of available means, as

well as increasing prices of goods and services. Therefore, it is inevitable for any country, particularly for the states in the process of transition, to take the bull by the horns and slowly „cut it off“ and control.

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Review Article

APPLICATION OF ANALYTICAL MODEL IN EVALUATION OF THE PUBLIC ENTERPRISES

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Abstract:*The aim of this paper is to show that standard results analysis methods obtain significant data for public companies, from which one can draw conclusions about their specific market position. The work covers all public companies doing business on the territory of a local self-government (City of Leskovac), the professional community and the opportunity presented by this approach, because so far such an analysis has only been done for Serbia as a whole. The reported results are important not only analytically, but also can serve as a basis for drafting the business policy of the local public enterprises, and economic policies of local public authorities. In some places, such opportunities are so designated.*

Keywords*: Public utilities, productivity, efficiency, profitability, liquidity*

1. INTRODUCTION

The results of operations of public enterprises (hereafter: PE) in Leskovac, which are presented here, are based on the annual accounts of the company in 2010. All of the public enterprises dealing with public utilities, not governed by the local self-government are not included. In some places, where analytically interesting, some of the results from previous years will be emphasized. The long-term comparison of results is possible because the methodology of such studies has already been done in the area of Leskovac. [1]

At times, comparative indicators of the overall economy of the City of Leskovac in the same year will be presented, prepared on the basis of all economic reports from companies that reported annual balance sheets. This complements the comparative analytical method. For further comparisons we can use similar analyses carried out for the national public enterprises. [2]

The analytical method consists of standard performance indicators (productive, cost-effectiveness, profitability, liquidity) as the basis of the income statement, and balance sheet of the public enterprises. The available data from the annual financial statements of public companies and balance sheets obtained from the Business Registry Agency of Republic of Serbia (2011) were used for the analysis. The results enabled the internal comparison of individual and overall performance of all public companies. The analysis was focused more on the overall performance.

2.RESULTS BY INCOME STATEMENT

Meso Economic Framework

Meso economic conditions in 2010 in the wider region (Republic of Serbia) were slightly better than when the crisis started. Due to the stability of macroeconomic aggregates (monetary, fiscal, credit) to the total volume of activity was still higher than the average level of the previous year (estimated: 2.5%). The retail prices have risen by 11.7%, the Serbian budget ranged from projected deficits and interest rates in the capital markets were stabilized.

Consequently, probably the total flow of financial resources in the City of Leskovac public enterprises during 2010 amounted up to $ 12.2 million EUR, a million EUR less than the previous year. In general, the overturn within this part of the public sector in the nominal amount was less than the total annual budget of the City of Leskovac (20.6 million). However, it should be noted that this these are not comparative counterparts because the gross turnover of the public enterprises and funds is presented, which is partly recorded in the budget of the City or in two or more enterprises at the same time (for example – Resources for the common utility consumption, are part of the revenue / expenditure UP Department of Urban Planning and Construction, but also the part of the revenues of public enterprises active in this common field).

The total revenue for all public enterprises of the City of Leskovac, therefore, in 2010 amounted up to 1.26 billion RSD and realistic (when stripped of inflation) was lower by 5.6% than last year (when the nominal amount was as this year's). At the same time, the total revenues of all enterprises headquartered in the City of Leskovac were lower in real terms by 2.6%, thus, public enterprises had two times lower revenue than its immediate environment in which they operate.

In the following table there are basic data about public enterprises of Leskovac, [3] together with other data providing the real global picture of the public sector. The year proceeding the year of the analysis was also included, in order to monitor the short-term dynamics of the public sector development.

Note: Average exchange rate in 2009 for a EUR was 94.60 RSD, and in 2010 it was 103.70 RSD. The cumulative average inflation in 2010, compared to the previous year, was 6.5% (the index level) which defines the nominal annual economic values and gets the real growth rate, compared to last year, stripped of inflation components.

Table 1: Key indicators from the income stat

	Total revenue		Total expenditures		Gain-loss	
Description	2009	2010	2009	2010	2009	2010
Budget of Leskovac	1.868,9	2.141,2	1.840,4	2.073,3	28,5	67,9
Urban Planning and Construction	517,7	429,4	512,1	428,3	5,6	1,1
Water Supply	270,8	316,6	322,8	353,5	-52,0	-36,9
DH	218,3	237,1	218,1	248,9	0,2	-11,8
Public Utility	79,3	105,4	82,2	107,8	-2,9	-2,4
Open Market	104,4	99,8	115,1	102,2	-10,7	-2,4
Housing	37,3	40,1	37,2	40,4	0,1	-0,3
Grdelica	31,8	37,8	39,6	40,6	-7,8	-2,8
Total public companies	1259,6	1266,2	1327,1	1321,7	-67,5	-55,5
Companies.–Leskovac total	34.946	36.739	35.640	36.181	-663	-722

From the table it is evident that public enterprises of the City of Leskovac (amounting up to 80% of all of the utilities of the City) on the whole, in 2010, had negative business results, in other words, the expenses were higher than revenues for 55 million RSD (which is less by 12 million RSD than the previous year). The largest negative contribution to overall business results of all enterprises was by Water Supply Enterprise with 37 (previous year: 52) million loss and District Heating Enterprise with 12 million of expenses over revenues, whereas, in fact, all companies were in the red except Construction and Planning.

In general, the public utilities sector of the Municipality of Leskovac, for years it was considered to have had a good market position in comparison to other areas. However, such a position is getting worse in 2003, until 2009 when there was a real growth of 3.3%, but with the decrease of 5% in the previous year. The analysis of the costs of the municipal services shows that there were certain adjustments at the end of the year, amounting up to the inflation, which is an important reason for the slight nominal increase in total business activities of public enterprises to which most of the public enterprises contributed. It also shows that the performance of the public enterprises rely predominantly on prices and revenues, while when expenditures are considered, there is a lack of efforts to improve the business efficiency. The founder of the companies in that respect, could cause further price correction beyond the inflation component by presenting an appropriate evidence of saving on the expenditures in order to improve the business efficiency.

On the other hand, the fiscal and public component of their financing is the stabilizing element which improves the position of these companies in the local business market. When the expenses are not in line with the current revenues, they often do not provide the services in the envisaged volume, thus, that is how the income is being stretched. Respectively, the founder should develop a much more efficient mechanism for controlling the provided utility services by the public enterprises through its Administration for Utility and Housing Affairs.

Indicators of Business Efficiency

To measure the performance of the public enterprises there are three economic indicators [5]

- Economic efficiency, as the ratio of operating income and expenses, which is an (ir)rational towards the operative costs,
- Labour productivity, which is measured by the total operating revenue per employee, which is an expression of (ir)rational use of labour,
- Profitability, as the ratio of operating results (profit or loss) in respect to the operating funds employed (presented as property, plants and equipment on the last day of the fiscal year), which is an expression of (ir)rational use of the property allocated to them.

As an additional, internal, criteria for success, public enterprises were ranked according to each efficiency indicator. Therefore, one can clearly distinguish the individual market position of each public enterprise (by the founder as well) and how they were managed.

The analysis in this section shall be commenced with the indicator of good management, which is portrayed in the following table. [6]

Table 2: Indicators of business efficiency

- In millions of RSD. –

Description	Operating income	Operating expenses	Operat.income of 100 RSD. Operat. expenses.	Increase cost-effective	Rank 2009	Rank 2010

	2009	2010	2009	2010	2009	2010	ness in %		
Urban Planning and Construction	517,5	428,3	423,9	370	122,1	115,8	-5,2	1.	1.
Water Supply	226,3	255,2	285,4	294	79,3	86,8	9,5	6.	7.
DH	212	216,3	195,3	230,5	108,6	93,8	-13,6	2.	6.
Public Utility	77,2	104	80,8	104,7	95,5	99,3	4,0	4.	3.
Open Market	92,1	98,5	104,1	101,7	88,5	96,9	9,5	5.	4.
Housing	37,9	43,9	37,6	38,4	100,8	114,3	13,4	3.	2.
Grdelica	30,5	37,6	38,9	39,6	78,4	94,9	21,1	7.	5.
Total PC	1193,5	1183,8	1166	1178,9	102,4	100,4	-1,9	1-7.	1-7.
Companies Leskovac-total	32.483	34782	31.894	33.155	101,8	104,9	3,0		

The largest part of the total income and expenditure of public enterprises in 2010 are in fact operating income and expenses (with 93%), which promotes the visibility and transparency of their work. The same comparison in the past 4 years, was around 90%, which means that the overall result of these companies is not based on the extracurricular activities (financial, special and other income and expenses). Contrary to the overall business performance, in this part of the balance, there was a surplus in operating income over expenditure of 13 million RSD, suggesting that the negative overall results are due to other activities than the operating balance sheet items.

As in 2009, when all of the companies had a negative result, in 2010 the same was with most of the public companies, apart from the Construction and Planning and DH enterprises. In fact, the total operating result was achieved thanks to the PE for Construction and Planning, which dedicated the annual plan to resolving issues from the previous period (claims, debts, lawsuits), so the operating income was considerably above operating expenses. This suggests that the source of the most of the business problems of a company is not due to the business related activities of the income statement, but to other financial operations. [7]

However, these results are shown when the business is considered static (only during one year). The dynamic perspective, in comparison to the previous year, which is the purpose of the analysis in this section, shows that the two public companies increased the cost of doing business (Planning and Construction and PE Grdelica). Their share in the total operating income and expense is large, so the increase of the costs was significant. Therefore the whole public utility sector in the city recorded a general decline in profitability of 1.9% (0.9% the year before), the fourth year in a row, achieving the negative indicator of good management. This indicator shows that public enterprises in the Municipality of Leskovac, despite the stable public funding, their business activities are not in line with the available resources, which is constantly repeating and induces the air of uncertainty regarding the allocated activities to these enterprises.

The following table shows the data of the other two criteria of efficiency.

Table 3: Indicators of productivity and profitability

- Assets in 000 RSD –

Description	Operating income per worker 2009	Operating income per worker 2010	Labor productivity growth in%	Rank 2010	Operating funds 31/12/ 2010	Gain/loss by FA (%) 2010	Rank 2010	General rank for the three indicat..
Urban Planning and Construction	4569,1	4342,3	-10,8	7.	337.116	0,3	1.	2.
Water Supply	561,5	717,1	19,9	3.	2.256.538	-1,6	3.	6.
DH	3261,5	3492,4	0,5	5.	58.583	-20,1	6.	7.
Public Utility	410,6	556,9	27,4	2.	196.033	-1,2	2.	1.
Open Market	730,9	876,7	12,6	4.	123.554	-1,9	4.	4.
Housing	676,7	738,5	-0,9	6.	64	-468,7	7.	5.
Gdelica	469,2	638,1	27,7	1.	35.585	-7,9	5.	3.
Total PC	1193,5	1192,1	-6,2	1-7.	3.007.473	-1,8	1-7.	1-7.
Companies Leskovac-total	3500,3	4263,5	14,4		22.763.080	-3,2		

Note: The real growth in productivity is calculated by adjusting the nominal growth of operating revenue per employee, with the amount of the retail price of 6.5%. The real growth in operating funds is calculated by subtracting the nominal growth with the annual increase in retail prices in 2010 by 11.7%.

The absolute amount of operating income per worker is not a quantitative indicator by itself. It just shows which of the PEs are labour intensive, and which are financially intense. Therefore, there are two groups of companies - those with financial intensity (Construction and Planning and DH) and all other labour intensive enterprises, where PE for Water Supply has become, after 5 consecutive years, more labour intensive and less financial intensive company, which had been for years.

Only real growth of labour productivity in 2010, in comparison to the previous year, shows the efficiency flow. It is not only the result of the changes in business revenues, but also of the change in the employment during the same period (the faster the income growth, the higher the labour productivity growth). It had already been said that there was a real decline in the operating income in 2010 (by more than 5%) and a slight decrease in the real total employment. Together, both indicators resulted in the fact that the total productivity of public enterprises in 2010 was decreased by 6.2%. This is the fourth year with the decline in productivity for the last 5 consecutive years, where 2009 was the only positive year.

In fact, all public companies had an increase in the labour productivity, except for Planning and Construction and *Dom* whose decrease in operating income was so large that it determined the overall rate of productivity. When neglecting the operating results obtained from the analysis of the Planning and Construction, one can conclude that all of the public companies, as a whole, had increased the productivity by 5.6%. However, the labour productivity of all companies with headquarters in the City of Leskovac, which produced the financial statement (predominantly private sector) was increased by 14.4%, which indirectly confirms that the unproductive public sector employment cannot affect the growth of employee productivity.

The solution to this situation is usually based on the rise of the operating income in order to match the absolute number of employees, or on the reduction of employees and matching the real volume of utility activities undertaken in accordance with the statute of a

company. Having in mind that the serious possibilities of increasing the revenue were exhausted, only downsizing remains.

The indicator of profitability does not have any greater analytical value, given the fact that all available operating funds are not accounted for (according to the balance sheet those are: property, machinery and equipment) which a public company uses, provided by the founder (or the citizens), but did not enlist it as its own property, since the Law on Public Utilities does not permit this at the moment. The profitability rates are caused by the non-profit public policy of the public enterprises. Therefore, they are relatively low (-1.8%), and even lower than the average (-3.2%).

In the context of the future development of the public utilities, as a separate development policy, one might think about projecting a profit based enterprise to which the performance of such activities will be delegated (which need not be public). Respectively, the precondition would be the redefinition of the public utility costs based on the reproduction. The transfer of the property into the ownership of the public companies is a strategic issue that will be defined by the new Law on Public Utilities, Law on Local Self-government Property, and the selected restructuring strategy and the transformation of enterprise ownership strategy.

As the efficiency and productivity, this indicator is also negative. The rate of cost-effectiveness in 2010 decreased by 1.9%, productivity by 6.2% and profitability by 1.8%. In this way the negative trend continues because, with the exception of 2009, during the last three years, all of the three indicators were negative. At the end of 2010 the total value of assets governed by the public companies actually decreased by 10.3%, caused by the high value of ponders for the share capital assets in the most capital intensive PUC for Water Supply, which reduced the volume of operating funds by 10%. In fact, the volume of operating funds of all public companies was reduced, so together with the negative operating result there was the decrease in the economical use of these funds.

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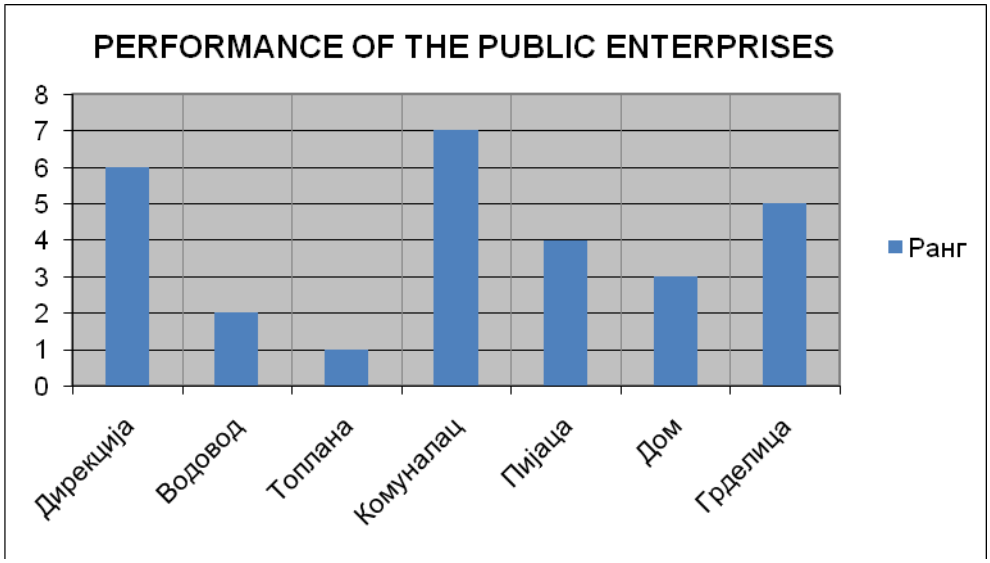
At the end, the table shows the overall ranking of all PEs determined on the basis of individual rankings for all three indicators of business performance. The Graph represents the performance of all of the seven public companies, where the larger column the greater the business success.



According to this, the best operating results in 2010 were made by public enterprises Public Utility Company, Planning and Construction and the PUC "*Grdelica*" then two

similar PEs, Market and Housing, and the worst public utilities Water Supply and DH, where the latter company for the first time reached the weakest operating results.

3. BUSINESS PERFORMANCE ACCORDING TO BALANCE SHEET

In order to assess the liquidity of the public enterprises two criteria were selected on the basis of their balance sheets. The long-term financial stability was considered in relation to the ration of the available current assets and total liabilities and the short-term liquidity, the ratio of the obligations towards buyers and suppliers.[8]

Indicators of the liquidity

The state of permanent liquidity in the balance sheet of PEs at the end of 2010 (or at the beginning of 2011) is measured by the ration of the available working assets and total liabilities that the company has at the time (December 31st). The ratio of the liabilities and the current assets indicates the relative ability of the company to respond in the future to the volume of liabilities.
The table below shows the basic indicators.

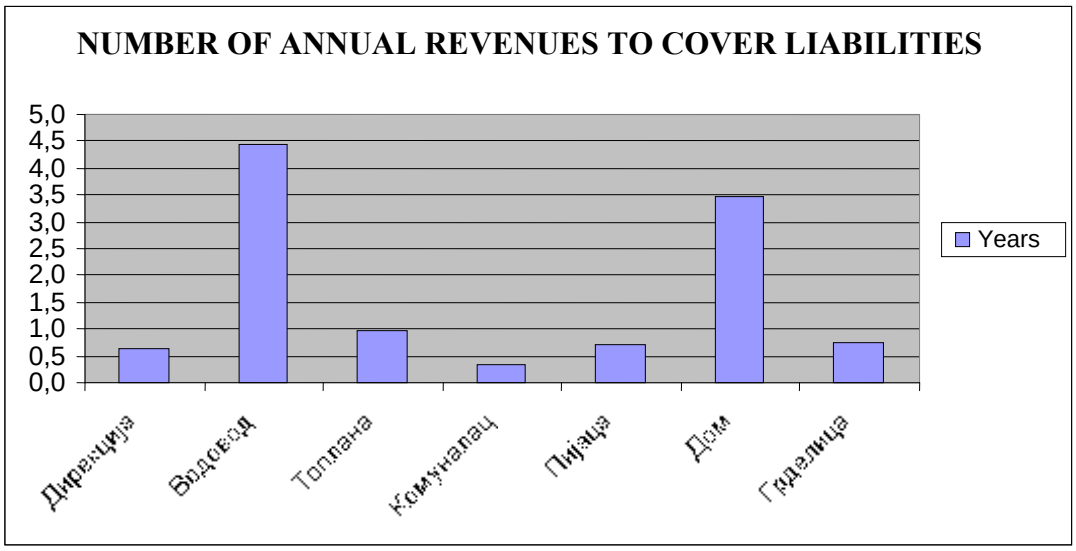
Table 4: Liquidity on 31st December 2010

- in a million RSD rate in% -

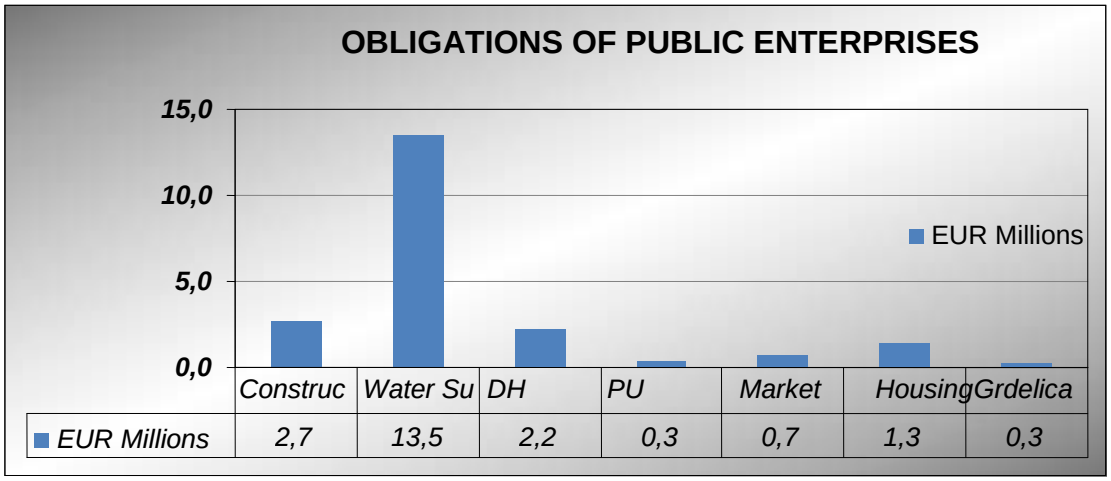
Description	Total current assets 31/12		Total liabilities 31/12		Real growth rate in%		Asset liability coverage		Real growth of the liquidity.
	2009	2010	2009	2010	Working assets	Liabilities	2009	2010	
Urban Planning and Construction	351,7	287,2	345,4	279,5	-26,9	-27,6	101,8	102,8	0,9
Water Supply	96,8	115,8	1.327,5	1.401,5	7,1	-5,5	7,3	8,3	13,3
DH	191,3	234,8	182,2	229,4	9,9	12,7	105,0	102,4	-2,5
Public Utility	48,5	58,6	24,1	35,4	8,2	31,5	201,2	165,5	-17,7
Open Market	8,6	14,2	65,4	69,9	47,8	-4,3	13,1	20,3	54,5
Housing	126,1	141,9	124,2	139,8	0,7	0,8	101,5	101,5	0,0
Gdelica	17,7	17,9	25,7	28,3	-9,5	-1,4	68,9	63,3	-8,2
Total PC	840,7	870,4	2094,5	2183,8	-7,3	-6,7	40,1	39,9	-0,7
Companies Leskov.-total	20.663	22.997	35.863	37.275	-0,4	-6,9	57,6	61,7	7,1

As during the previous three years, at the beginning of 2011 public companies of Leskovac, were net borrowers, which meant that the total liabilities exceeded the current assets by a whopping 1.3 billion. This indicated the great destabilization of the liquidity of the enterprise, or the multiple overshooting of obligations in relation to the current revenue inflows. All this was happening at a lower level than (by 6.2%) than in the previous year. This can result in the potentially negative operating results can in the next several years. The management of public companies would have to take the necessary business moves that will this decrease the ration between the current assets and liabilities to a lower level which guarantees the sustainability of the current liquidity.
The following graph shows the relative ratio of the level of total liabilities of all public companies in 2010 in relation to their total income reported in the same year, as the number of annual revenues that can cover the level of commitments from the current year.

As a comparative criterion, a comparative indicator for all companies headquartered in the City of Leskovac, which produced their balance sheet (1.03 of annual income required to cover the total commitments from the previous 2009) should be used.



Unlike the previous graphs which reflects the relative proportions, the following graph shows the volume of the total liabilities of all public companies at the end of 2010 expressed in euros, from which one can see their absolute levels (in million EUR) and the relative ratio of the mutual obligations.



The lowest level of liability coverage with available assets at the beginning of 2011 had, PUC for Water Supply (only 8.3%), then two other public companies, Market with 20% and the PUC "*Grdelica*" with 63%. The performance indicators for PUC for Water Supply indicated such a state, while the PC Market's result show the seventh year in the row of such an illiquid status, which for years earlier had a completely different liquidity position. These companies had a large and a long-term liquidity instability caused by the investment activity that was constantly endangering the on-going operations which requires of the management to draft an adequate development strategy.

The greater coverage of liabilities with the current assets was present in PE for Urban Planning and Construction, Housing and PUC "*Grdelica*" and especially Public Utility Company with 65%. However, the coverage of liabilities with current assets in

absolute value was not enough, so this part of the public sector in Leskovac, began 2011 with sputtering liquidity situation of 40% (with 1.3 billion less compared to 1.2 billion from the preceding year). It is interesting that this shows that the ownership transformation of a part of the operations of Public Utility Company caused the business activities to stabilize together with the rest of the operations, which it had retained.
Finally, in the last column of the table presented in this section, there is the indicator shows the overall dynamics of the liquidity situation of public enterprises. It shows that compared to the previous year, there is a continuity of decrease in all public enterprises as a whole (-0.7%, respectively, -8%, -1.2% and -27%), which is a direct consequence of the absolute and relative deterioration of the long-term liquidity of PE for Water Supply, because most of the companies made an improvement of this indicator. At the same time, the real growth of liquidity in all public enterprises in the City of Leskovac increased by 7.1%. This section shows the results of operations of public companies which are typical for the public sector. Liabilities are greater than the amount of assets in order to meet the current needs of the political moment, and the long-term liquidity is constantly unsustainable.

Indicators of short-term liquidity

The detailed explanation of the financial situation of public enterprises can be drawn by analysing their short-term liquidity, since this kind of issue is dominant, in the sense that all of the obligations of these PEs are usually just short-term liabilities. This is presented in the following table.

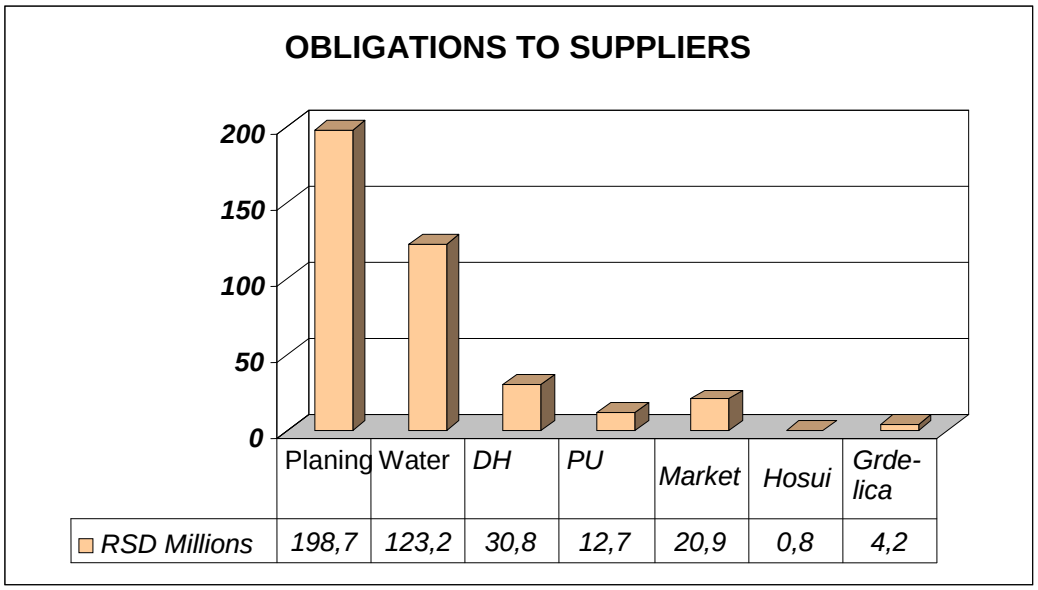
Table 6: Short-term Liquidity on 31st December 2010

-in a million RSD -

	Short-term receivables and investments				Current liabilities				Receivables from commit 2010(%)	Customers to suppliers 2010 (%)
	Total		Customers		Total		Suppliers			
Description	2009	2010	2009	2010	2009	2010	2009	2010		
Urban Planning and Construction	34,4	50,1	14,6	31,2	308,6	229,5	272,4	198,7	21,8	15,7
Water Supply	82,6	101,4	68,9	95,8	1.320,3	1.398,9	100,3	123,2	7,2	77,8
DH	166,1	222,2	154,2	209	182,2	152,4	64,8	30,8	145,8	678,6
Public Utility	47,7	57,9	46,9	57,3	24,1	32,9	13,3	12,7	176,0	451,2
Open Market	8,5	14,1	4,1	6,4	63,8	68,9	13,3	20,9	20,5	30,6
Housing	125,7	141,6	123	140,1	124,2	139,8	0,8	0,8	101,3	17512,5
Gdelica	14,5	14,8	14,4	14,5	25,7	28,3	5,3	4,2	52,3	345,2
Total PC	479,5	602,1	426,1	554,3	2048,9	2050,7	470,2	391,3	29,4	141,7

The inability of public enterprises to cash their products and services is now clearly visible, because out of all short-term liabilities 92% comprise claims from their buyers (previous year 89%).
In general, short-term claims of all public companies are out of balance (index 29, the year before it was 23). Such a situation was typical for earlier years when they were a net short-term borrower (index 70 in 2005). At the end of 2010 all companies with headquarters in the City of Leskovac, which expressed the final balance sheets had two times higher

coverage of current liabilities (index 61), so this also confirms the important difference between the way of doing business in the public sector and in the private sector.
The ratio of claims towards buyers and liabilities towards suppliers in all public companies is reversed. Namely, customer claims are by 42% higher (was less by 10% in previous year) than the liabilities towards suppliers, which is a consequence of not being able to cash their products and services. This is especially high in four public companies Housing, DH, Public Utility Company and PUC "*Grdelica*").
The following graph shows the absolute volume of liabilities towards suppliers of all 7 public companies at the end of 2009 in millions of RSD.



4.CONCLUSION

Public companies in Leskovac in 2010 operated with lower overall revenues than in the previous year (by 5.6%) and had a total net loss of 55 million RSD. The results of operations of public enterprises predominantly rely on the prices and revenues, while there is a lack of efforts to improve the efficiency of operations concerning expenditures.
According to all efficiency indicators, public companies achieved a negative result: the thriftiness fell by 1.9%, productivity by 6.2% and profitability by 1.8%. The solution to this situation is the increase in operating income in order to match the absolute number of employees. This possibility was already used by increasing the prices for the public utility services at the end of the previous year and at the beginning of this year. Or, one should decrease total expenditures and match them with the contracted public utility services in line with the stature of the company.
All of the public companies finished the previous year as net debtors of 1.3 billion RSD because of all the commitments exceeded current assets by 2.2 billion RSD. An additional problem is that the obligations are short-term, but there are so many that they exceed the annual income of all public companies by 72%.
The applied analytical method for determining the performance of public enterprises (based on the example of a local government) has shown that they can get a real indicator of the current and the dynamic state of a sector, which has a specific position on the market on the global market. They can be considered internally and externally in comparison to all companies from the same region, but also in relation to the timing. The results of the

analysis have proved to be good mechanisms for directing the business policy of the public enterprises, their control and the performance evaluation in a particular local self-government. The applied analytical method can initiate a similar approach in other municipalities and cities. This is particularly important when starting the restructuring process of the public utility sector.

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MARKET AND APPLICATIONS OF BONDED MAGNETS

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Abstract: *Bonded technology provide a possibility of applying various types of magnetic powder and polymer matrices in order to achieve optimal dynamic mechanical, magnetic, environmental and economical properties of final magnet. Primary applications of permanent magnets include automotive, personal computers, mobile phone, commercial motors and generators. The pricing and delivery for rare earth magnets, specifically neodymium-iron-boron (Nd-Fe-B) magnets are in crisis. The producers did not anticipate the dramatic increases and thus are not in a position to fully cover their demand. Although the USA represents the largest market for neodymium-iron-boron (Nd-Fe-B) magnets, all US suppliers of this material are either distributors or value-added resellers of product produced in Asia, predominantly in China. The price increases to the goal of the Chinese government to control its reserves of rare earths as well as to cleaning up existing environmental issues related to past mining practices and preventing new environmental issues.*

Keywords: *Bonded magnets, Nd-Fe-B, Market, Application*

1. INTRODUCTION

Permanent magnetic materials have been used for many years in various devices for converting electrical to mechanical energy and vice versa. [1-3]. They are a unique part of modern technical equipment and modern technologies. From many points of view requirement for applications is still growing. Although the materials used to produce permanent magnets are constantly being improved, the basic role of the magnet remains practically the same: generation and increase the magnetic flux.

In recent years, increasing in production and application of Nd-Fe-B magnets in spite of significant fluctuations in the world economic scene is present. It is anticipated that in the next five years the total market of Nd-Fe-B magnets will increase from the current $2 billion to about $4.8 billion [4]. This spectacular increase in production is predominantly influenced by increased production of personal computers (PCs) in the last 10 years, where the Nd-Fe-B magnets are used as components of hard drives. In current period, the demand for magnetic materials hardness and resistance to corrosion, have significantly contributed to the development of bonded magnetic materials.

Widely used bonded magnets have become an important part of various electrical devices essential for everyday life. Very good magnetic and mechanical performances are utilized in various apparatus such as: hard discs, scanners, DVD and CD drivers, different types of sensors [5], automatic office tools, automotive parts, spindle motors, magnetic bearings, and other applications. Bonded magnets produced by extrusion method can be used as reprographic magnetic rollers or brushes with set of required performances. Injected bonded magnets are used primarily in the automotive industry.

Ferrites are still dominant magnetic material in the market, but bonded magnets are becoming increasingly important and required due to their advanced magnetic properties. Flexible bonded magnets are often used for advertising purposes, for example as magnets for the fridge. Although this looks like a secondary application of bonded magnets, it shows their characteristics to be ultra thin and printable on a variety of images and text. Permanent magnetic materials have a wide range of applications due to large energy product and high volumetric efficiency. The largest progress in the development is found for magnets based on Nd-Fe-B with annually world production of around 39110 tones [6].

2. THE APPLICATION OF BONDED MAGNETS

On the basis of application areas, bonded magnets can be classified into [7]:

- Rubber or elastomeric bonded flexible ferrite magnets (BFFM),
- Plastic bonded ferrite magnets (PBFM),
- Polymeric bonded rare-earth magnets (PBRM).

Bonded flexible ferrite magnets can be ultra thin and very long strips. Their main application is to serving as: seals for doors and refrigerators, drive wheel for video recorders, the components of small motors for hard disk or floppy disk drivers, magnetic rollers for printers and scanners. The field of application of plastic bonded ferrite magnets are also magnetic rollers, magnetic deflector beams for color television sets, rotating magnets in motors for office equipment, magnets for rotational or frequency sensor, cooling fans, various motors in the automotive industry, etc. The application of polymer rare earth bonded magnets includes: fans, various miniature motors which are used in audio video technology or household appliances, but primarily, they are used as a miniature engine parts. The PBRM group includes a Nd-Fe-B bonded magnets. Permanent magnetic materials based on Nd-Fe-B have wide range of applications as presented in Fig. 1.

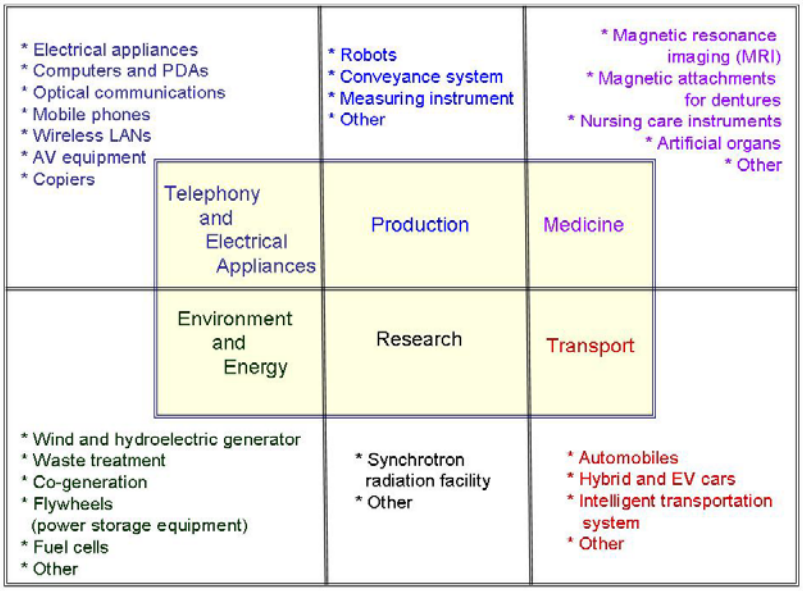

Fig. 1 – Schematic illustration of bonded magnets application

Bearing in mind that price of automotive fuel in the offing will rise, so the consumers will prefer a clean diesel fuel or hybrid electric vehicles. Bonded magnets are an important factor as an integral part in the production of hybrid cars. China became the most important country for trade of magnetic materials in general and unavoidable competitor in the production of bonded magnets. During 2006 China produced 51% of the total world production of ferrite magnets and 86% Nd-Fe-B magnetic materials. It is anticipated that total market value of world production of magnetic materials will be around $ 20 billion by 2020., and China will produce about 80% of total world production of magnets [8]. They are already the main manufacturers of bonded ferrite rollers for reprographic use, as well as magnets for disk drivers and their components.

Further development of bonded Nd-Fe-B magnets is directed on improving his mechanical properties. Fracture strength of this type of magnet increased by about 75% compared to a commercial Nd-Fe-B magnet. Also, very easy machining is one of the most important characteristics. .

For the bonded magnet manufacturers in Japan, as the leaders in this field, a very important fact is to undertake the price reduction of the products and maintain the existing quality. Otherwise, they will force to cede the leadership position in the global market. Price of final bonded magnets had to be between 30 and 40 $/kg to still be competitive manufacturers of parts for the automotive industry. Total world production of bonded magnets in 2005., divided by sector of application is shown schematically in Fig. 2.

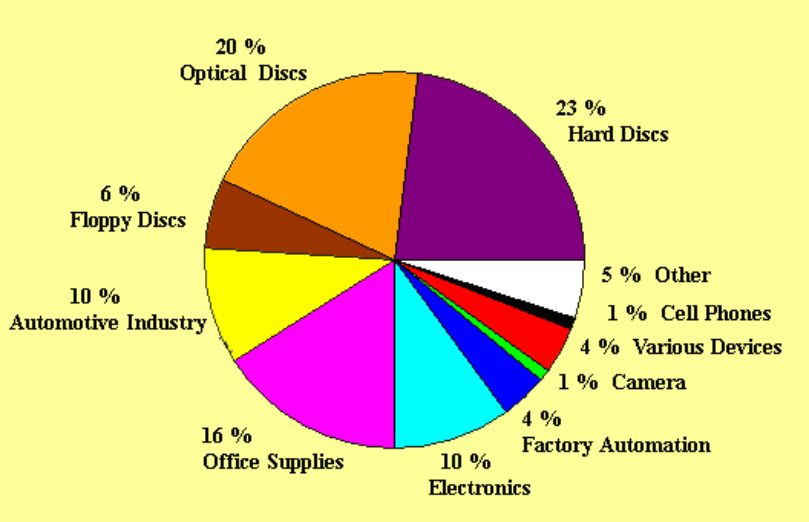

Fig. 2 - Production of bonded magnets in 2005. year

A very important discovery was Sm-Fe-N bonded magnets that can be used at temperatures up to 150 °C. Recent data indicate that Sm-Fe-N has high resistance to corrosion and superior flexural strength compared to Nd-Fe-B bonded magnets. This type of bonded magnet aspires in next decade to occupy a central place in the automotive industry, since high corrosion resistance and thermal stability are required [9]. One of the most advanced products is micro-pumps, [10] that work on the principle of electromagnetic energy. The main characteristic is a very small volume while the current strength and capacity of existing large pumps are retained. In the brushless DC motors (as a component of electromagnetic pumps) with an output between 40 to 70 W, physical contact with the engine is completely eliminated. As a consequence, there is no moving parts in the unit, which aims a very long life time ie. low wear of components. This type of unit contains injected bonded Nd-Fe-B magnet and an increased ability of heat dissipation.

These micro pumps have flow performances about 3.2 l/min with a maximum differential pressure of 7 bar.

The bonded magnets manufacturers should be use rare earth magnetic powder with lower concentration of main components neodymium, praseodymium and cobalt, because they are relatively expensive materials. Depending on the type and composition of magnetic powder, polymer, route and condition of bonded magnet production, material with desired properties can be pre selected. Depending on the mechanical and magnetic properties their price fluctuates, but it is only a few percent higher than the cost of production. It follows, if bonded magnets become more expensive on world market, many customers will accept new prices and will continue to use the many advantages of compression and injection molded bonded Nd-Fe-B magnets.

Further development of magnetic materials is focused on optimization and control of nanostructures. For example, miniaturization of MEMS requires materials having a large coercivity and remanence in order to maintain high values of magnetic energy with a reduced volume [11]. Thin films based on Nd-Fe-B permanent magnets are very important for the development of improved micro pumps, micro sensors and MEMS [12].

3. THE MARKET OF BONDED MAGNETS

Two facts lead to increases of the rare earth magnets amount in the market in recent years: increase in total energy product, as a basic standard of magnetic materials quality and cost efficiency. The main reason could be the high cost of ceramic ferrite magnets. The main topics of discussion in worldwide magnet meetings are related to rockets that could be launched into space, and raw rare earth materials cost necessary for that purpose. The price of rare earth neodymium, most commonly used material in the production of sintered and bonded Nd-Fe-B permanent magnets is most concerned. The low price of about 8 $/kg of neodymium have been stabilized at market. However, the price began to rise in late 2005. and has practically doubled in mid 2006. In late 2007, the price of Nd is beginning to stabilize in the range of 25 $/kg to 30 $/ kg. The fact is that on the worldwide market of permanent magnetic materials, ceramic ferrite is still dominant. This type of permanent magnet is still the most economical magnetic material. In Fig. 3 the growth of prices of neodymium per kilogram in 2005. and 2006.is illustrated.

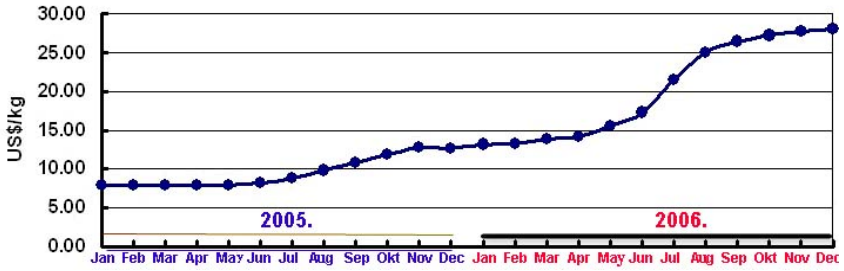

Fig. 3 – Trend of neodymium growth rates in 2005. and 2006.

A total sale of sintered Nd-Fe-B magnets is increased by about 6% compared to the ceramic ferrite, while bonded Nd-Fe-B magnets increased for only 1%. The main commercial application of Nd-Fe-B magnets begins with its innovation in 1983. Some of latest commercial Nd-Fe-B materials are still composed by cobalt, but iron mostly replaced cobalt due to much lower cost. This fact has led to the situation that neodymium became the basic element of Nd-Fe-B magnets composition. Neodymium's sensitivity growth rate can cause commercial capability applications growth, especially due to fact that

neodymium concentration typically makes 25-30mass% of the total weight of Nd-Fe-B magnets.

Neodymium is not always cost only 8 $/kg. In late 1980's. the rare earth magnets have been enabled a miniaturization of basic consumer products such as hard discs; sintered Nd-Fe-B magnet were produced for actuator head; bonded Nd-Fe-B magnet for motor shaft.

At present, disks size reduction makes significant advances in magnetic data storage properties Miniaturization and production of sintered and bonded Nd-Fe-B magnets are still in progress. However, the cost is controlled by final product more than cost of raw materials. Nevertheless, Nd-Fe-B magnets are commercially viable; although the price of neodymium in the market has increased dramatically while the price of hard drives and components continuing to decline [13]. Compared to ferrites, success in increasing participation in the global market will depend on reducing the cost of both raw rare earth material and final magnetic product.

Hard disc drives and other consumer electronic products are still the leading market for Nd-Fe-B magnets, but the new main application is in the automotive industry and the office automation equipment. Improving performance is provided only by Nd-Fe-B magnets. Price of miniature magnetic products depends mostly on the manufacturing process or technology, while the price of robust magnetic products depends mainly on raw rare earth materials price. This fact brings us back to the beginning of the story about the price of neodymium for spaceships and their impact on future opportunities where Nd-Fe-B magnets could repress ferrites from the world market [14].

The rapid growth rates of rare earth materials in recent years mainly derived from the actions of the Chinese government, due to fact that China is the main source of rare earth ores. They have introduced the newest measures related to improve the control environment pollution of smelters and abolished the tax on exports of both rare earth materials and important recent products of sintered Nd-Fe-B magnets that are very dependent on the neodymium. It appears that the growth rate of neodymium is stabilized in 2006, but the reasons for its rapid growth still occur. In 2011, driven by the enormously high market prices of major rare earth raw materials such as praseodymium and neodymium, Nd-Fe-B material price soared accordingly. Against such backdrop, the investment has increased substantially in Chinese Nd-Fe-B industry; in many key production areas of rare earth also have witnessed rapid growth in Nd-Fe-B capacity, with the scale of industry capacity reaching 300,000 tons, while a majority of new capacity projects still have not been put into production. In 2011, China’s Nd-Fe-B output reached 83,000 tons, nearly the same as that in previous year, and still giving priority to sintered Nd-Fe-B products. Under the price hiking of rare earth raw materials, major Nd-Fe-B manufacturers showed strong bargaining power by successfully transferring the cost pressure to downstream clients, thus achieving performance enhancement by a large margin [15]. This suggests that one should not be expected: the recent return to the low cost price from 2005.

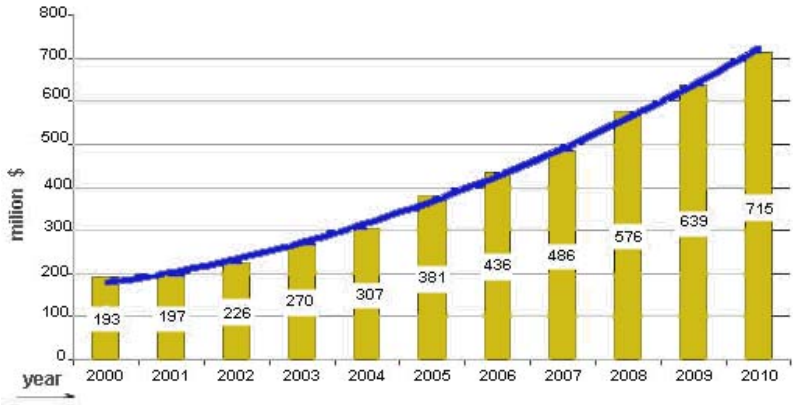

Fig. 4 – Production dynamics of hard disks since 2000.

Miniaturization is an important factor which enables the improvement of the product. The fact that the investment required to convert ferrite to Nd-Fe-B magnets will be justified, from the point of neodymium higher prices and stability of future long-term price. Possible application of Nd-Fe-B magnets (as a potential magnet that could replace ferrites) requires careful and comprehensive analysis of the technical possibilities and economic forecasting.

Around 50% of the total of Nd-Fe-B bonded magnets production has application for data storage. All manufactured hard disc drives use bonded Nd-Fe-B magnets as irreplaceable component of spindle motors. It is anticipated that the hard disks industry will continue with dynamic growth at least until 2010. (Fig. 4).

In recent years there has been the miniaturization of others. The products such as: electronic devices, memories, notebooks, smart phones and others contain also a small hard disc drives. For example, Apple iPod has a hard disk size of a coin. Therefore, the industrial requirements are aimed to produce small and very powerful hard disc drivers. Since 2006 up to date, world production of hard discs from 2.5" is increase for 10%, while the production of 3.5" hard discs dropped by the same percentage.

In China, mobile phones and PCs as consumer electronics for the Nd-Fe-B materials have traditional market demand. Among them, only the TDK Company has annual demand of Nd-Fe-B approximately 4000 tons. As the world's largest mobile phone production base, domestic demand for mobile high-performance Nd-Fe-B has steadily rising trend. In 2010 China's production of mobile phones was 998 million pieces, while the demand for high-performance Nd-Fe-B was 2500 tons. Including DVD players and CD-ROM drive high-performance Nd-Fe-B annual demand was more than 1500 tons [16].

Table 1 – Properties and advantages of most common magnetic materials

Type of magnet	Advantages			Properties	Application
	Price	Magnetic flux	Machining		
Ferrite	√			Good price, Low performances	Office tools, Large motors
Sintered Nd-Fe-B		√		Superior performances of basic form	VCM, MRI, Hybrid cars
Bonded Nd-Fe-B			√	Geometry accuracy, Medium performances	Spindle motors, Hard discs

Beside the basic purpose of Nd-Fe-B magnetic materials in the hard disks manufacture, they are increasingly appearing in all other applications where the ferrite magnet was used. Table 1 shows comparative advantages of different types of magnets and their specific application.

4. PERMANENT MAGNET CHARACTERISTICS AND COST

It is well known that the maximum energy product (BH)max is commonly used measure of the magnetic materials quality, because it shows the best combination of magnet features to produce magnetic flux and transfer it (flux) in the air gap. Product B x H is a direct measure of energy per unit volume of the magnet. Therefore, the final price depends on the value of the magnet $(BH)_{max}$.

Factors that directly affect the price of rare-earth permanent magnets are: the process of production, purchase of raw materials and the required performance of the final product. Sintered Nd-Fe-B magnet is anisotropic material with excellent magnetic properties obtained by compression molding process. This is the most widely used method for sintered Nd-Fe-B magnet production. Using the axially oriented fields much better magnetic orientation is obtained. Consequently, improved magnetic properties and lower price of final product is achieved (Fig. 5).

Sintered Nd-Fe-B can also be produced in the form of radially oriented ring providing the field alignment in the mold. This is a very complex process, and therefore, very expensive magnets are produced. The most of the bonded Nd-Fe-B magnets are produced from isotropic magnetic powder which magnetizes only after the production process. This is a much simpler and more economical manufacturing process that gives high density magnets ie. high magnetic remanence, resulting in a more suitable price. Anisotropic bonded Nd-Fe-B magnet has the highest cost price ($/kg) because the fine powders are highly unstable. This issue can be solved by batch process, which includes alignment in magnetic field. This orientation produces more superior magnetic properties compared to isotropic bonded magnets.

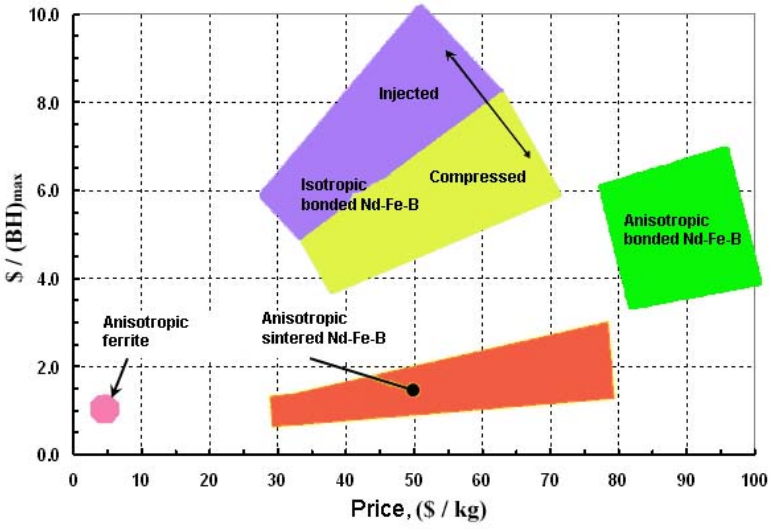

Fig. 5 - Permanent magnetic materials cost in relation to amount and the maximum energy product

The price diagram should be taken as a value tool in the process of understanding the magnetic materials. It can be represented as the ratio of the magnetic properties with

changing the prices. Simply, the diagram shows that if the higher density of magnetic materials and/or better orientation of magnetic powder exist, the cost is higher.

5. CONCLUSION

It could be concluded that Nd-Fe-B permanent magnets represents the materials for many future applications in various branches. Some indications of development and application in the near future show the potential purpose of these materials is in production of hybrid cars, elevators, air conditioning, etc. The hybrid vehicles are into the stage of rapid development. The high-performance hybrid car demand in 2014. will reach 7500 tons of Nd-Fe-B. China has become the world's largest elevator manufacturing base, the largest elevator market and the world's second largest elevator ownership countries. Use energy-saving permanent magnet synchronous traction machine elevator will lift the industry's future development direction. Also, there is a great demand for rare earth permanent magnet materials in the medical, robotics, machine tools and other areas.

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