MARKETS FOR WOOD AND WOODEN PRODUCTS

ZAGREB 2013

NOVAKOVA – POTKANY – GIERTL – KROPIVŠEK – JOŠT – PALUŠ
PAROBEK – POSAVEC – BELJAN – MORO – MOTIK
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MAREKTS FOR WOOD AND WOODEN PRODUCTS

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PREFACE

WoodEMA, i.a. is an international association for economics and management in wood processing and furniture manufacturing establihsed in the year 2007, with members from 13 countries on 3 continents at the moment. Since one of the main goals of the association is to promote science and results of scientific and professional work of its members, Association decided to start issuing scientific books each year. Each scientific book will be dedicated to a different topic and it will be related to a different field of expertize of the Association and its members.

This is the first issue of scientific books and we agreed that the first topic should be dedicated to MARKETS FOR WOOD AND WOODEN PRODUCTS. Some of our members, but some non-members as well, who have research activites in fields of expertize related to the main topic. In this issue we have 8 chapters with 15 authors from 3 Central-European countries who presented their research results in the area of marekting, economics and trade related specifically to wood processing and furniture manufacturing.

Main goal of this scientific book is to stress the problems that wood processing and furniutre manufacturing companies meet in their every day praxis, the way to solve those problems and to improve activities of that industrial branche using scientific methods and models.

This is the first attempt of WoodEMA, i.a. to help this way collecting some knowledge and transfering that know-how further on. We hope to publish many other books this way providing scientific and professional help to our industrial branch in different menagerial areas of expertize.

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1. MARKETING COMMUNICATION IN THE FURNITURE INDUSTRY

Renata Nováková

"In good times went orders on our furniture almost themselves, now marketers must set off out of office, in the world."

Vladimir Šrámek Decodom managing director

1.1. SPECIFIC TECHNIQUES OF MARKETING COMMUNICATION IN THE FUTNITURE INDUSTRY

The development within the areas of company´s communication with the internal and external environment has been recently influenced by various economic and non-economic events. The overall character of trading has been changed radically as well – the competition increases, there are more business opportunities and the trade environment is subjected to constant changes. These basic indications must be taken into consideration within the communication of companies active in furniture industry with their customers, suppliers and purchasers, who represent the connecting link in the retail chain. Some professionals in the area of marketing recommend abandoning the notoriously known tools and techniques of communication and instead of that suggest focusing on new trends. These trends which should help them become different within the competitive environment. The others prefer integrated marketing communication and there are many traditionally thinking professionals who emphasize the return to classic proved forms of communication. From the studies in professional literature we know about the communication tools such as advertising, sales promotion, public relations and personal selling. Within the mentioned communication tools there are various communication techniques, which might mutually overlap or they are specifically given for a particular tool out of those mentioned. In our paper we would like to deal with the industry branch which ranks among the traditional branches of the Slovak national economy - the furniture industry.

We can say that:

-the furniture industry represents the highest degree of recovery of wood,

- in Slovakia there are more than 100 furnishing enterprises with over 25 employees,
- in the furniture industry is, in terms of employment in sector (woodworking and furniture industry) about 51 % of workers.
- most people in this sector in EU employs Italy (363 000 of jobs), then Poland, Germany, Spain and the United Kingdom (Annual Report European Panel Federation – EPF for 2009-2010).

If we are talking about furniture industry, we must say about competition versus crisis versus communication.

Competition are in this areas:

a) coping with the fact of cheaper imports from the small Polish furniture producers

b) competition from small woodworkers – cheaper products without tax

c) quality both the competitive edge in the fight for customers.

Crisis has shown in the following:

- Order in the furniture industry – Decodom- year on year decline in orders of 15 to 20 %
- Problems have smaller firms linked to a small number of customers.
- Annual expenditure on purchase of furniture are for example: German spend annually 700,- EUR, Of Bohemia spend annually 120,- EUR and to compare in Slovakia spend annually 70,- EUR.

The furniture industry has been recently in the doldrums, which is to be reasoned by the influence of the crisis development. The competition within the global environment has been severe and the market prefers producers from Poland, who can offer cheap products, or producers from Italy, who offer exclusive products. The perception of a product in the furniture industry is significantly focused upon its visualization and therefore the communication is focused more or less on areas which make this product visualization possible. We believe that the fairs and exhibitions, even though we speak about well-known form of communication, might raise the product awareness within the furniture industry. Fairs and exhibitions are not cheap matters; they may represent an effective way of external communication with customers and other subjects. Dealing with the position of fairs and exhibitions in communication mix, their running and various views of professionals on such a form of communication, we will try to generate the positives and negatives of exhibitions and fairs and their importance for the furniture companies.

Table 1 Lagest companies in the furniture industry according to revenues in 2011:

Company name	According to revenues 2011 (000 EUR)	According to revenues 2010 (000 EUR)	Difference in %
SWEDWOOD SLOVAKIA, S.R.O.	160.613	162.614	- 1,2
DECODOM, S.R.O. TOPOĽČANY	57.850	58. 272	-0,7
KIKA NÁBYTOK SLOVENSKO, S.R.O.	29.100		-1,2
LIND MOBEL SLOVAKIA, S.R.O. KRUPINA	7.808	16.694	- 53,2

1.1.1. Position of fairs and exhibitions in communication mix of furniture companies

Fairs and exhibitions are popular and frequently used communication mix tools of furniture companies. However, in professional literature there is no clear classification into one of the communication mix tools. Without mentioning the names, we would like to emphasize the fact, that some professionals rank this communication technique among the sales promotion, others to personal selling and there are those who speak about public relations or about an independent communication tool. We identify ourselves with the statement that ***fairs and exhibitions are not independent communication tools, but they represent a combination of several communication techniques.***

On basis of this fact they can not be labelled under any of the above mentioned communication mix tools. If we would like to make a relevant classification, we would have to focus more on characteristics and main objective and goal of an exhibition or a fair.

From the historic point of view fairs and exhibitions have been shaped as an independent and fast growing branch and new institutions established on the international scale took patronage of the international activity. To mention some examples: UFI, established in 1925 in Milan or IFEZ established in 1985 in Belgium, Germany and France. Among the oldest and most important organizations there is the Bureau International des Expositions – BIE, which

was established in Paris, 1928. In the former Czechoslovak republic important and internationally acknowledged organizations were established, e.g. BVV - Brnenské výstavy a veľtrhy (Brno fairs and exhibitions), Agrokomplex – Výstavníctvo Nitra (Exhibitions Nitra), etc. Activities of these institutions have remained in existence up to present days.

Before we start dealing with the specificities of fairs and exhibitions as such, we should define the terminology which will be used in the article further on.

The term exhibition is in literature sources defined as systematic, clearly arranged and in advance well-considered presentation of exhibits which are part of the given thematic whole (in our case furniture and housing) and are in accordance with the overall intention.

The term fair is a business exhibition event with rules and possibility of international attendance. It is here where the business contracts are signed and the small sale of exhibits is not allowed. It is important to add that it is an international economic exhibition of samples, not depending on its name and following the habits of a country where the event takes place, represents a big market of consumable goods and devices. It takes place in specifically given period, in the same location and the exhibitors can present samples of their production with the purpose to conclude business contracts on national and international scale. Fairs might be general or specialized.

Typical features for exhibitions and fairs are:

- specifically set goal,
- precisely set duration period,
- clearly set location,
- accessibility of the public,
- commodities must be in accordance with the goals of the event,
- marking with specific name,
- promotion.

Among the most important functions of exhibitions and fairs we list:

1. *Economic function* **–** resulting from the fact that each exhibition stimulates the efficiency of the reproduction process and from the international point of view it is considered to be the so called 'mirror' of economic politics of a particular country.
2. *Social function* – closely related to *informational function.*

3. *Contact and promotional function* - their importance is to be seen in the context of marketing and promotional policies.
4. *Research function* – has been recently gaining more importance for various types of analyses and researches.

In practice there are several classification possibilities of exhibitions and fairs. We have chosen the following ones:

Classification of exhibitions:

- World exhibition – international exhibition presentation of non-commercial type, which might have wide universal content focus, or it can be specialized on a specific
- International exhibition – exhibition event, the participating exhibitors are from several countries
- Regional exhibition - exhibition event of a geographic, economic or political region
- National exhibition – an independent exhibition event of one country in another, with the focus to point out the possibilities of mutual cooperation
- Official participation – an independent state exposition on an international exhibition, or a fair abroad. It consists of partial expositions of individuals which are connected with an idea, architectonics and graphics into one whole
- Trade exhibition – common exhibition of exhibits accompanied by retail
- Specialized exhibition – exhibition event focus on a particular branch.

Classification of fairs:

- Universal fair
- Multispecialty fair
- Professional fairs
- Congressional fairs
- Regional fairs.

1.1.2. Recommendations for the presentation of furniture producing companies on fairs and exhibitions

As it has been already mentioned in the introduction the nature of fairs and exhibitions has changed a lot recently. Many exhibitors perceive these activities as a social event only; they put

emphasis on the social function and do not realize the possibility of participating with the business goal. The reason, why they keep participating in fairs and exhibitions is their will not to fall behind their competition. It is a bit strange perception as nowadays it is not enough just 'to be there'. The participation in a fair or exhibition should bring some positive results for the company. Not to mention the fact that the participation in a fair or exhibition always means some expenses for the company. The decision to participate in such an activity should therefore be part of long-term communication strategy of a furniture company. In this case it is not important whether the company participates in one or two dominant events a year. Important is to be well-prepared for the event, manage the whole organization and try to use several marketing possibilities. Before a furniture company decides to participate, it has to clarify which of the following goals should be achieved:

- Presentation of the company
- Introduction of new products – awaken interests of new markets in a product
- Sale – strengthen the sales
- Exchange of experience
- Exploration of export possibilities
- Exploration of competitiveness
- Development of personal contacts
- Acquisition of new customers
- Collection of new data about market
- Check up on price margin
- Service on market
- Development of distribution ways
- Search for new sales representatives
- Testing the acceptance rate of goods on
- Introduction of a prototype
- Introduction of product innovations
- Extension of range of goods, etc.

We could list even more goals or motivational reasons. The surveys among the visitors of established fairs and exhibitions in the Czech Republic and Slovak Republic show that 11% of visitors go to the exhibition or fair with the goal to buy or order - if not on the spot, then shortly

afterwards. Many exhibitors underrate this fact and the worst mistake they make most often is that they do not collect contacts to which they could subsequently answer or communicate via them.

On the basis of the above mentioned survey we have found out the most frequent mistakes the exhibitors make:

a) *low activity* – the staff of the exhibition stand waits passively for the visitors to talk to them or come up with a demand.

b) *no fast diagnostics* – salesmen have the tendency to deal with each customer. It is not a problem if the attendance is low. However, once there are several visitors or potential customers at the same time, the salesmen have to be able to select who deserves their attention and who does not.

c) *no orders are made* – the salesmen do not try make a deal. The task for the staff in the exhibition stand is not only to inform but also to make business.

d) *no contact data are collected* – many visitors are not willing to give their personal data to the staff. The serious ones usually are. It is always good to reason to the visitors why it is worth to give the staff a contact, e.g. you could inform them about the prepared interesting events after the fair and your intention to send them more information about it.

e) *the contacts are not monitored* – once we have collected the contacts it is important to contact the potential customers within few days after the event (one week the latest). If you do not do it, your competition will.

f) *no surveys are done* – on a fair or exhibitions there are your potential customers and competitors at the same place and time. It is important to utilize this situation. It is recommended to do a questionnaire with customers and check the products of one´s competitors.

But we must say that fairs and exhibitions are not free!

Some costs are:

a) payments organizer of the exhibition – lease area, administrative fees, technical works....

b) payments for the design and implementation of the stand – hire of construction and facility stand, graphic design, assembly and dismantling of the stand .....

c) The cost of running the stand – staff salaries, advertising, transportation, travel, accommodation, toof on the stand.

For example payments organizer are:

- Registration fee: 130, - EUR
- The exhibition area of 26 – 50 m2: 2080,- EUR
- Surcharge for 2 open side + 5 %: 104,- EUR
- Power supply to 5 KW: 316,- EUR
- Night surcharge for refrigerator: 37,- EUR
- Intake and wast water: 225,- EUR
- Exibitor cards: 5 ks zdarma, next 17 EUR
- Parking card: 50 EUR/ks
- Assembly pass: 33 EUR/ks
- Daily cleaning stand during the exhibition
- : 1 EUR/m2 32 EUR

Total costs can be: 3386,- EUR

For example payments for the design and implementation of the stand are:

- Floor – the cheapest exhibit carpet with adhesive tapes, his lay and disposal after the exhibition: 160,- EUR
- Basic design exibition stand to 5 m: 1600,- EUR
- Additional stand equipment – for example 1 pult with bar stools, 2 vitrina, 2 table with 4 chairs, kitchen snik, fridge, crockry for 12 people, rack, bin: 490,- EUR
- Electrical installation: 200,- EUR
- Graphics – manufacture inscriptions, banners and image printing and their installation: cca 1300,- EUR

Total costs can be: 3750,- EUR

For example the costs of running the stand are:

- Advertising: cca 2000,- EUR
- Refreshment in the stand: cca 500,- EUR
- Transportation of exhibits: 150,- EUR
- Travel: cca 250,- EUR
- Wages and salaries during the exhibition: cca 1800,- EUR per person

And total cost of running the stand can be: 4700,- EUR

And the total costs for all three items can be:

- k A) cca 3386,- EUR
- K B) cca 3750,- EUR
- K C) cca 4700,- EUR

Total: 11.836,- EUR

1.1.3. Exhibitions of furniture industry in Slovakia and their importance for marketing communication

In Slovakia there are several exhibitions focused on furniture, interior accessories and interior design events held annually. The best known are MODDOM, taking place on 16 October - 20 October in Incheba, Bratislava. This year it is already the 18th. The International fair of furniture and interior design takes place in March (5 March – 10 March 2013) on Exhibition Grounds Agrokomplex in Nitra. This year it was the 23rd. Both events are accompanied by numerous marketing activities which cumulate several tools and techniques of communication mix. For better explanation we will use in our paper detailed information about the 23rd International fair of furniture and interior designs Agrokomplex.

Table 2 Participation in trade fairs furniture and living in Nitra (2008 – 2011)

	2008	2009	2010	2011
Number of exhibitors	*485 (77 foreign)*	*430*	*450*	*374*
Number of visitors:	*75 917*	*72 232*	*63 590*	*58 021*
Total leased area for exhibition purposes	*24 485 m2*	*25 000 m2*	*25 000 m2*	*20 802 m²*

1. Characteristics of the event, topics of the fair

New trends in design, interior culture by the Slovak designers and producers, ecology and housing, nature and technology, progressive wood materials for creative industry – these were the main topics of the important furniture fair 'Furniture and Housing' which took place in Nitra (Agrokomplex, 5 -10 March 2013) for the 23rd time. This furniture presentation and interior accessories is very popular among the fans of beauty, design and cosy homes. It is associated with the beginning of spring and it represents a strong impulse for the beginning of a new furniture business season in Slovakia.

The fair of furniture and interior design 'Furniture and Housing' started in 1991 in Nitra with more than 50 exhibiting companies. Nowadays it counts more than 400 companies from several countries of the world on the area of 20 000 m².

As such it ranks among the most important furniture events in Central and Eastern Europe. Regular annual participation of more than 70 000 visitors proves that the fair is both communication and presentation possibility for companies and it is very attractive for the wide public.

23rd year of the international fair followed its previous successful years. The furniture fair offered modern world design presented by the dominant European designers and producers. Regarding the structure of goods the fair focused mainly on furniture for living rooms, sitting and kitchen furniture, hall furniture and not to forget the style furniture. The interest of exhibitors increased in presentation of materials for interior and lounge furnishings which is proportionate to the growing demand of users who ask not only for goods but for particular designer service as well.

In 2013 various furniture innovations characterized by the elements of Slovak designers were introduced. These designers had more chances to prove successful abroad than they did in Slovakia as the low-income groups prefer cheaper furniture imported from Asia with no regard to quality and design.

2. Design Forum

An inseparable part of the fair is also the 16th year of the furniture design exhibition **Design Forum.** Design Forum is a project of the Design Department at the Academy of Fine Arts and Design in Bratislava, respectively Research-Implementation Centre. The project originated more than 16 years ago. Its establishment was supported by Agrokomplex -

Výstavníctvo Nitra, which organizes this non-commercial activity together with the Academy of Fine Arts and Design and with the Slovak Design Centre. The primary goal of this event is to support the author design, its creators – designers and quality domestic series production.

Design Forum creates special space for young authors and students of schools focused on furniture design. All the exhibition years were given a particular idea. During the 16th year of Design Forum exhibition the Slovak designers worked with the 'Harmony and Contrast' topic. Current period offers to designers and producers various materials and technological possibilities of their processing. This fact is reflected also in their use in interiors. It is mainly the combination of materials applied in designs, furniture production and interior accessories which may add interest to interiors and exteriors evoke new emotions and mediate new experience to customers. The exclusive Design Forum exhibition 2013 showed new approaches of designers, architects and design students when using various materials and their combinations in housing. The organizers introduced products, prototypes or functional models of furniture, interior and exterior components and interior accessories. For all the innovations we can mention some of those which were exhibited this year in Nitra.

Figure 1: Harmony and Contrast – combination of materials in interior

3. Student studies of veneer

Centrum súčasnej architektúry ARCHA matériO (The Centre of Current Architecture ARCHA matériO) introduced a collection of student work of veneer on the Furniture and Housing Fair 2013 in Nitra in cooperation with FA STU (Faculty of Architecture, Slovak University of Technology in Bratislava). The handwork with material is really necessary and enriching experience for the students of architecture, design and applied arts. Within the

workshop focused on research of veneer shape possibilities the architecture students of FA STU created several charming designs – 3D studies which were introduced to the professional and non-professional public on the Furniture and Housing Fair 2013.

Figure 2: Collection Ottoman – amusing furniture into every flat, by Dušan Voštenák

4. Specialized events

The 23rd year of the Furniture and Housing Fair was accompanied by professional specialized events and discussion forums, which reacted to the current topics of furniture industry. We also present the division of exhibition halls according to commodities.

We may state that the furniture and housing fairs represent an important place for the presentation of furniture and interior accessories of domestic (Slovak) and foreign producers and sellers. The professional public has a chance to acquire new knowledge and confront them with the reality presented in the exhibited goods. It is the confrontation and comparison of domestic and foreign furniture which helps the producers find the position with their production on consumer markets.

Table 3: Division of exhibition halls according to commodities

Division of exhibition halls according to commodities		Biggest exhibitors in 2013:
A **B** **C**	Style furniture and interior accessories, interior and garden furniture, Interior furniture Interior furniture, mattresses	Bakero Export – Import , s.r.o. Říčany Bianca , s.r.o. , Liptovský Mikuláš
F	Furniture for living rooms, bedrooms, rooms for children	Blum Július GmbH Höchst
G	Bathrooms, saunas, swimming pools	Brik , a.s. Kremnica
K	Fair opening	Damil S.R.O. Pezinok
M1	Soft furnishings, doors, floors, interior accessories, fireplaces	DSM , s.r.o. Banská Štiavnica
M2	Interior furniture	Fines , a.s. Žilina
M3	DESIGN FORUM	INREBYT s.r.o., Bratislava
M4	Kitchen, appliances, furniture fittings, interior furniture, light fitting	IN – ELIS SK, s.r.o. , Brezno MEUBLE , s.r..o Dubnica nad Váhom
M5	Interior furniture	
S	Sale of interior accessories **Vp** Garden and interior furniture	

1.1.4. Case study – marketing communication in Aldima, s.r.o.

Founded in 1996, ALDIMA s.r.o. focuses on manufacturing and selling stylish furniture. The Company headquarters are in Turčianske Teplice, part Diviaky. Its beginnings are associated with the production of raw frames of chairs and stools for export to Italy. In 2002, the Company decided to sell stylish furniture in Slovakia and started buying furniture from Italian companies and selling it on the domestic market. Since then the Company has built a positive and stable image at home and abroad. In 2005, the Company decided to enhance their offer of ALDIMA furniture by Scappini, the high quality Italian furniture. Co-operating with many Italian companies, the company keeps expanding their partnerships. Their priority is to offer the latest high quality stylish furniture and maximise customer satisfaction.

1.1.4.1. Assortment of products

The Company currently offers a large scale of products that can be divided into the following categories:

Seating:• chairs and easy chairs,• bar stools,• armchairs and divans,• stools and benches,• office chairs,

Stylish furniture:• dining tables,• dining rooms,• studies,• TV stands and TV cabinets,• bedrooms,• tables,• mirrors,• consoles and dressers,• other accessories.

The main advantage of ALDIMA is undoubtedly the widest choice of chairs of all the companies offering stylish furniture in Slovakia. In the Company headquarters, there is a showroom (Figure 4) where potential customers can view in detail the wide range of products and purchase the chosen product directly on the spot.

Figure 3: Showroom

Trying to meet the demands and wishes of their customers, the Company enables individual customers **to design their own chair** and choose the frame, shade of wood, upholstery fabrics as well as various accessories and details (buttons in the back rest, a fabric hem or a metal chain trim of upholstery) from the current offer. The resulting price is then derived from the elements selected. Some types of chairs can be seen in Figure 4.

Figure 4: Chairs (www.aldima.sk)

Target group

Stylish furniture is quite expensive and definitely is a matter of taste. Style, beauty and elegance are its chief features. People who like this sort of furniture have developed keen interest in history and art.

ALDIMA Company focuses mainly on the target group of men and women aged 25-45, upper middle class with an average monthly salary of 1,000 euro and more. They are demanding users with an eye for detail, who request intrinsic quality for their money.

In addition to individuals, the Company has a stable customer group consisting of designers and architects who prepare stylish designs of homes, restaurants or mansions for their clients.

Competition

Manufacturing and selling stylish furniture is not so common in Slovakia so far, so the competition in this sector is quite limited, which is partly due to the generally low standard of living. Most people in Slovakia currently prefer cheaper and possibly more fashionable furniture to investing in to expensive unique pieces. There are therefore more companies offering cheaper and financially affordable furniture of all kinds.

ALDIMA's headquarters are in Turčianske Teplice, part Diviaky. It is the only company of its kind in the sector and does not therefore need to worry about tough competition. Its major competitor is Amima Company located in Bab near Nitra. In addition to the common field of interest, both companies have quite similar names, which may be confusing for some customers.

Other competitors are Trias and Seva-style, both located in Banska Bystrica. Haky furniture located in Košice can be considered a distant competitor.

1.1.4.2. Company's advertisement in comparison with competition

The following section will discuss in detail the advertisements ALDIMA Company uses for its promotion in comparison with competition. All the necessary information was provided to us in the interview of the Company CEO who ultimately selects the type of advertisement.

As a small company, ALDIMA is trying to save finances for the graphics of its advertising campaigns, and therefore it does not hire the services of professional advertising agencies; instead, there is an internal employee delegated to create graphic designs of the printed advertising materials and then consult them with the CEO. Upon approval, the designs are implemented in practice. In addition, the employee is also responsible for communication on the Internet, graphic design of the Company website and information up date. Besides, he is in charge of purchase of materials and supervises the actual course of distribution of goods.

Printed advertising

The Company does not use advertisements and commercials in newspapers or magazines, since such form of communication did not prove to be effective.

In 2009, the Company invested into advertising in the quarterly magazine *Style of Housing*. Commercials appeared in each issue of the year. However, the magazine focuses primarily on the latest trends and modern furnishing, and stylish furniture was therefore devoted quite a limited space. The message thus did not fully affect the target group and funds were used inefficiently. The advertisement would be worth it only in case of a specialised magazine devoted exclusively to stylish furniture: the readership would be substantially narrowed, but the number of the affected people from the target group would be higher. Since such a magazine does not exist in Slovakia so far, the Company prefers the following printed advertising:

Flyer

Flyer provides a simple form of a brief overview of the current offer. It is mostly used to demonstrate the chairs and tables belonging to the best-selling product. The information on price was intentionally omitted in the flyers in order not to discourage potential clients; besides, the price may vary. In case of a genuine interest in the advertised products, the flyers provide

contact information where the clients can get the detailed information. The current flyer of the Company can be seen in Figure 5.

When compared to the competition, the flyers have a similar graphical format (except for the background colour), showing mostly stools or chairs. Flyer of Seva-style differs in one detail: in addition to pictures of products, it lists also the price.

Brochure

ALDIMA uses also brochures to advertise their products. The brochures may contain a lot more pictures and samples of the assortment offered. They also include products that are not manufactured directly in Slovakia, but imported from Italy. A sample of a brochure can be viewed in Appendix No. 1

As far as we know, Aldima Company, our competitor, also cooperates with Italian producers and the design of its brochures is therefore very similar to ours. The difference is in the labeling of the products. While our company provides the codes of individual products, Aldima uses the Italian names, e.g. chairs of the Firenze, Carlo, Milan or Verona collection.

Figure 5: Company's flyer

Catalogue

Customers can view the full assortment of ALDIMA in the catalogues which are available only at the Company's headquarters. A fairly shortened version of a catalogue is provided in AppendixNo.2. It contains pictures of individual products, as well as the pictures showing fully furnished offices, dining rooms or bedrooms, which may inspire our customers and perhaps motivate them to buy another piece of furniture for their homes.

Similarly to the flyer or brochure, the catalogue provides only the codes and brief specifications of individual products without quoting the prices. Customers can use provided contact information in case of deeper interest.

Our competitor Aldima is ahead us: its catalogues are available both in print and online on the website, which is a significant competitive advantage. The difference is also in the size: Anima's catalogues are considerably smaller, around 30 to 40 pages, while ours are sometimes 90 or 100 pages. Other competitors also provide a link for catalogue on their websites, but in fact display only images of individual products.

Minor printed materials

This category comprises business cards (Figure 6) and card calendars (Figure 7), which represent a really inexpensive and most practical promotional tool and are therefore an inherent part of corporate printing, including our competitors. Minor differences are only in the design and technology used. A business card should introduce accompany representative in a serious way. Card calendars can provide customers with the necessary contacts.

Figure 6: Business card of the Company CEO

Figure 7: Card calendars

1.1.4.3. Outdoor and indoor advertising

Outdoor advertising via billboards and city lights is not affordable for ALDIMA as a small company. According to the CEO, billboard is not targeted to a specific group, besides, its direct visual contact with drivers is very short, and it is therefore not worth of investing.

ALDIMA unanimously eliminated also the use of indoor advertising media, such as **flyers in public transport or eye-catchers and stands in shops**. Such forms of advertising are absolutely inappropriate for the products of the furniture industry, stylish furniture in particular, as they do not address the target group. It is neither used by any of our competitors. It is suitable rather for promoting various events, services or products of daily consumption.

Promotion on the Internet

Nowadays, the Internet is an indispensable part of most of our activities. For customers, it serves as a tool off east and efficient search for products or services. It saves both time and money that would be spent in conventional acquisition of information, e.g. visiting companies in person or comparing different products and their prices. ALDIMA therefore decided to use the Internet for its communication with customers. For this purpose, the Company has developed a website, using occasionally also Facebook social network. Both will be discussed further.

In our opinion, e-communication used by the Company is not sufficient; the Internet definitely offers a much vider scale of options for financially affordable conditions. This was confirmed also by the Company CEO. In the last chapter, we will therefore try to design other means of advertising which might be efficiently implemented in the Company practice.

Company website

Promotion on a website provides the visitors with perhaps the best and most complete picture of the Company. It is the main tool of publicising the necessary information.

The website of ALDIMA provides its visitors with all the necessary information on the Company and its assortment. In the section of the latest news, they can view the latest products and innovations inspired by the current trends in the field of stylish furniture. There is also a section with the business conditions and contacts together with a map, so that customers can learn who to contact in case of interest.

When compared to our competitors, the website of our Company has certain advantages, but also some imperfections which we will be analysed further and compared with our major competitor, Aldima Company.

As we can see in Figure 8, the website contains a FAQ (frequently asked questions) box, which is considered a significant advantage. It contains a list of frequent questions along with the answers. The Company thus tries to satisfy its customers and simplify its search for required information.

In the upper right corner, a customer can also notice Facebook (in the red circle). Clicking it, the visitor is redirected to the ALDIMA fanpage; when joining it, the customers are kept informed of what is happening in the Company and what new products have been launched on the market.

When compared to the website of the competing Aldima, our Company has won a competitive advantage by placing on the website a video briefly illustrating the entire manufacturing process of stylish chairs. The customer can thus see not only the finished piece of furniture, but also the way it is made, which is interesting and attractive for all visitors, both current and potential.

However, there are also some imperfections on the Company website. A major problem is the wrong way of displaying QR code on the main page. It should definitely be removed from there, and placed in the print advertising media (flyers, brochures) where it belongs: after sensing it, the customers can be redirected to the ALDIMA website.

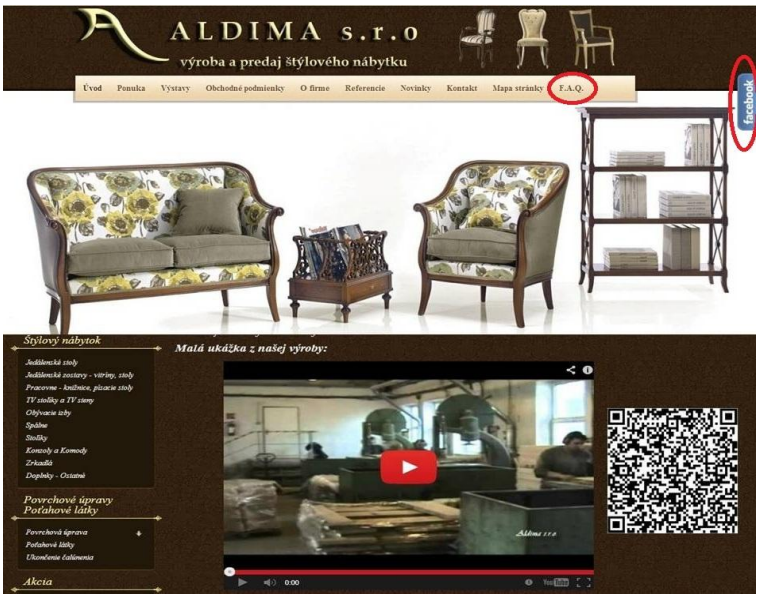

Figure 8: Company website

Source: www.aldima.sk

Another deficiency is inconsistent use of font, which is a certain disadvantage in comparison with the websites of competitors. The menu is written in a classic straight font, while for the assortment, they use italic. For the announcement of special events and promotions as well as invitations to exhibition, they use a colour font, which is quite distracting. We therefore strongly recommend consolidating the font, not to spoil the first impression of potential customers visiting the site.

The website of the competing Amima Company also provides its visitors with the basic information about the Company and its products. In Figure 9, one can spot two differences from the ALDIMA's website: 1/ there is a link than on-line catalogue, 2/ certificates box. Two catalogues of the years 2011 and 2012 are certainly a competitive advantage, because customers may comfortably view them in detail in their homes. The box Certificates displays certificates on meeting all requirements for the implementation of quality management system in compliance with the standards in the field of the stylish furniture manufacturing.

Figure 9: Website of a competitor

A site visitor may be interested in reading references of satisfied customers, but he will definitely appreciate seeing how the Company products are used in practice. This is another competitive advantage of ALDIMA Company: photos of the locations furnished with the Company products, such as the Nová Scéna theatre in Bratislava or a wedding hall in the Municipal Office in Dunajská Streda etc. Amima provides just a list of guesthouses, restaurants and cafes which are fitted with its furniture.

Fanpageon Facebook

ALDIMA Company has decided to address people via Facebook, where it designed its fan pagein 2011 (Figure 10). The fan page displays the best photos of the Company products, information on special discounts and invitations to exhibitions. Unfortunately, the communication is not as intense as expected, which is due to rather low number of fans. However, to keep abreast of the time, the Company should inovate the fanpage making it more attractive for clients.

All other competing companies also use their fanpages for promotion, but their communication is much more intensein comparation with our Company. They frequently update information in their fanpage sand the number of fans keeps growing much faster.

Figure 10: FanpageAldima

Source: https://www.facebook.com/aldimasro?ref=ts&fref=ts

Television and radio spots

Although television and radio currently belong to the most attractive media, only really big companies can afford the **TV and radio commercials**. It is mainly due to the high cost of the media space. None of the Slovak companies producing stylish furniture has ever placed a TV or radio commercial. It is not just about high financial costs, but also the delivery of advertising message to their target group of customers. It is quite difficult to estimate which TV station these people watch, or what radio station they prefer.

Other ways of presentation

Being successful in the market means to address potential customers in the most effective way, make the offer attractive for the customers, influencing thus customers' buying behaviour. Marketing communication of ALDIMA Company is not focused only on information about the benefits and quality of its products, but also seeks to obtain feedback. It is really very important for the Company to regularly identify all the needs and wants of its customers in order to satisfy them. In addition to advertising, it here for uses the communication tools with direct contact with clients such as personal sale, trade fairs and exhibitions.

Personal sale

Not many companies manufacturing stylish furniture allow their potential customers viewing the product assortment directly. If so, only in a very limited way, like e.g. the Trias

Company that sells exclusively through the Internet, but interested customers may contact the authorised person by phone, arrange a visit to the Company showroom and view the exhibition of a few pieces of furniture.

ALDIMA Company prefers personal contact with their customers; in the Company headquarters, the Company therefore established a showroom, where customers can view various products and communicate details directly with qualified personnel who try to understand the customers' needs and recommend the right product. Personal sale is very important for the Company as it enables to get immediate feedback.

Trade fairs and exhibitions

Trade fairs and exhibitions are a very appropriate method of promoting furniture to public. The most important Slovak exhibitions include an exhibition of furniture and housing held at the Agrokomplex, Nitra, and the MODDOM exhibition in Incheba , Bratislava.

As already mentioned above, ALDIMA has the largest selection of chairs of all competitors offering stylish furniture in Slovakia, and it therefore tries showing various types of chairs in its exhibition stands (Figure 11).

Of course, the Company also displays other furniture on offer: sofas, chairs, tables, cabinets and mirrors. Individual pieces of furniture are typically presented without quoting the price. Interested customers may contact the Company representatives in the stands and ask about the details. Clients can also obtain some printed advertising materials, such as flyers, brochures and business cards with the necessary contact information.

Figure11: Company's stand in the exhibition in Nitra

During the Furniture and Housing exhibition in Nitra held on 5 - 10 March 2013, we carried out a survey to receive feedback from the visitors. We decided for personal questioning without having prepared a list of questions to ask. We wanted to carry out the interview in an informal way, not to bother visitors. The interviews were carried out on 8 March 2013 from 10:30 to 18:00. We addressed the people who popped in our stand, focusing on adults, without classifying them into groups based on gender or age. We asked them whether they had heard of the ALDIMA Company before and what they liked the best or did not like of the Company offer. We did not record the exact number of addressed people, but the total number of respondents was 42. We learnt that most of the interviewees had known our Company before from the previous exhibitions, the printed advertise ments they received there, and they had also visited the Company website. We met many frequent and satisfied customers, who come to see the exhibition every year and buy a new piece of furniture for their homes.

Based on people's responses, we found that despite the limited range of advertising, the Company has gained many satisfied customers mainly at the exhibitions.

It is worth to mention the Coneco Building Fair organised on 9 - 13 April 2013 in Bratislava. In comparison with competitors, ALDIMA Company gained a price less advantage: as the only furniture manufacturing company, it invited also the companies from different sectors to present their products (floor coverings, staircases, book-cases), and they all together designed and presented interiors tailored to the specific customer needs (Figure 12). Visitors could thus view a fully furnished room and get contacts for each of the manufacturers of the exhibited products.

Exhibitions and trade fairs undoubtedly have a very positive impact on the position of our Company in the competitive market environment. Expenditures for this form of promotion are worth it: number of our customers keeps increasing. As frequent visitors to the furniture exhibitions, they recognise ALDIMA Company and even recommend it to their friends by word of mouth. Participation in fairs and exhibitions can be therefore unambiguously considered a real contribution to creating a positive image of the Company.

Figure 12: ConecoTrade Fair

Source : Photograph from the archives of Aldima , s. r. o.

Analysis of Aldima's cost for advertising and promotion

The following section will closely look at the money the Company spent for different advertising means and its promotion at exhibitions. We will analyse the overall turnover of the Company for the past four years.

Table 1 shows the resulting sum for the past four years in euro. The cost for commercials in the Style of Housing magazine in 2009 reached the total of €1,600. Since such form of advertising was found ineffective, the Company decided not to use it in future. As for the cost of flyers, it increased by € 100 for the past two years, since their amount and popularity rose along with the number of events such as exhibitions and their visitors. Brochures distributed either in the exhibitions or in the Company are less popular; their cost therefore keeps declining every year. The price of large catalogues for the use in the Company includes also the cost of their minor versions distributed to the genuinely interested customers. The cost for catalogues gradually decreased. In 2009, minor printed materials such as business cards and card calendars cost € 560.Since a lot of them remained undistributed, the expenditures turned out unreasonable. The Company was therefore reducing their number and consequently also their cost every year until the final amount of €160 for about 1,600 pieces able to cover the demand. The most costly are promotions at the exhibitions attended by the Company every year since 2003. As shown in Table 4, the costs were reduced from€ 11,500 in 2009 to €6,400

in 2012, which was particularly due to the smaller display area and the way of arranging the stand in a more attractive way. The Company has saved considerable money while attracting more customers and significantly increasing the number of orders after each event.

The cost of the Company website, as mentioned above ,is negligible, since it was designed and is currently administered and updated by internal employees.

Table 4: Cost of advertisement and promotion

	2009	2010	2011	2012
Advertisement in journals	1600	-	-	-
Fyers	300	300	400	400
Brochures	600	500	400	300
Catalogues	800	800	650	650
Business cards and card calendars	560	280	280	160
Exhibitions	11 500	8 800	6 200	6 400
Total costs:	13 760	10 680	7 930	7 910

Figure 13 illustrates the total cost of advertising and promotion in individual years. The highest cost reached €13,760 euro sin 2009, when the Company invested significant funds into advertising via magazines, minor printed material and larger exhibition area. Costs were about the same in 2011 and 2012. The Company tried to save money for brochures, catalogues, minor prints, and costs for exhibitions.

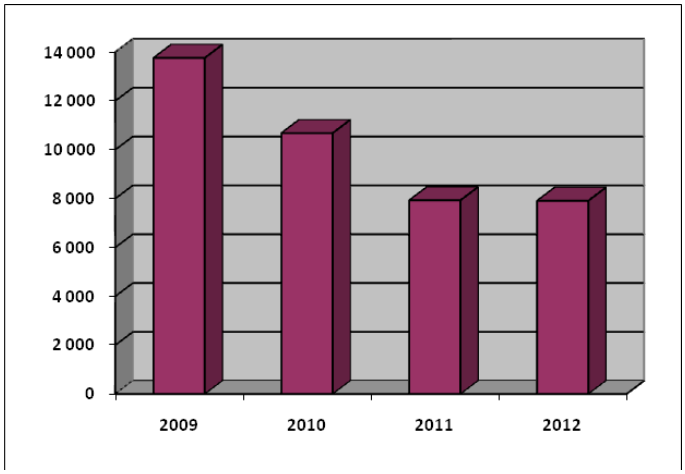

Figure 13: Total costs

Besides the total cost of promotion, Table 5 shows also the number of customers and the annual turnover. The year 2009 represented the highest costs, as well as the highest number of customers, which resulted in the final turnover of the Company, reaching €265,000. With gradually reducing the cost of advertising and promotion, however, the Company lost some customers and subsequently the annual turnover also decreased. The year 2012 may be considered a success, as the costs were the lowest ever, but the number of customers increased, and the resulting turnover reached €234,000. That year, the Company launched its website and intensified on-line communication with the target customers for almost no extra costs.

The annual turnover of the Company is graphically illustrated in Figure 14. The Company's turnover was the lowest in 2010. Since then, the number of customers has increased steadily. Despite significantly reduced costs of advertising and promotion, the total turnover of 2012 is similar to that achieved in 2009.

Table 5: Company's turnover for the past four years

	Cost for promotion in €	Number of customers	Company's annual turnover in €
2009	13, 760	202	265, 000
2010	10, 680	133	166, 000
2011	7, 930	152	206, 000
2012	7, 910	174	234, 000

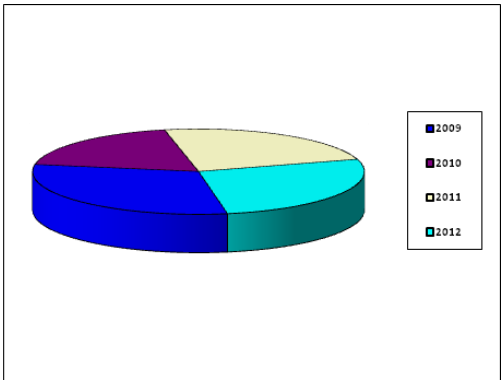

Figure 14: Company's annual turnover

1.1.4.4. Analysis of outcomes and recommendations

Based on the analysis of the current state of utilising various types of advertisements by ALDIMA Company and its competitors, we identified the following facts:

The Company invests its funds to cheaper types of advertising. As for traditional means, the Company uses just print, and, based on its previous experience with ineffectively incurred costs for advertising in a magazine, it currently focuses mainly on advertising via flyers, brochures and catalogues. Electronic media such as television and radio have been excluded in favour of the communication through the Internet.

Based on our findings, we can conclude that the Internet represents the most suitable alternative for the Company, effectively addressing the desired target group for limited cost. Besides, the Company uses also other tools of communication mix, such as personal sale, trade fairs and exhibitions, which are associated with higher costs, but bring a real benefit to the Company, as confirmed by the increasing number of customers participating in exhibitions. The results of a survey organised at the exhibition in Nitra proved that most of the visitors had had some information about the Company before, and many of them were even frequent customers.

By using the method of comparison, we highlighted the common and different features of advertising of the companies operating in the furniture industry. We can conclude that, similarly to ALDIMA, the competing companies manufacturing stylish furniture in Slovakia also decided to prefer the cheaper methods of advertising.

Our recommendations for improving the current situation were formulated on the basis of the facts learned from the analysis. We tried to propose solutions that would bring maximum benefit for minimum financial costs.

Customers may be easily confused by the similar names of two biggest competitors in the field of stylish furniture manufacturing: ALDIMA and AMIMA. To distinguish itself from the competitor, ALDIMA might at least try to change the **colour** and **graphic design of its website**, which might be a welcome and reasonable change.

We also recommend **strengthening communication via fanpage** on Facebook. Frequent updates of pictures of products, news and invitations to exhibitions might attract more fans, keeping thus Company abreast of the competitors.

The Internet nowadays provides both big and smaller companies with affordable alternatives of promotion and advertising able to address the target group. Our recommendation

for the Company is to use **contextual advertising.** After entering the keywords, browsers provide the desired content, enabling thus interested customers to quickly get the information about the relevant companies and their products or services.

After entering the keyword “stylish furniture” in Google, one can see a list of companies, with Aldima in the seventh position. Interested people naturally first click the links in the first places belonging to competition. We therefore recommend the Aldima Company using contextual advertising which we consider truly effective. Its costs are not too high and it is directly targeted to the people who have a genuine interest in stylish furniture.

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2. STATISTICAL PROGNOSIS OF BASIC BUSINESS PERFORMANCE INDICATORS IN THE WOOD PROCESSING INDUSTRY OF THE SLOVAK REPUBLIC

Marek Potkány, Gabriel Giertl

Each company faces the question of monitoring its performance and comparison with the competition. Company performance can be monitored on the level of basic and relatively simple indicators (sales, profit, productivity, value added), but also through complex systems of monitoring (balance scorecard, or indicator of economic value added). The improvement of statistical surveys and analysis in the economic practice can has a beneficial effect to the monitoring of performance in each company. To know how to use the appropriate theory and practical statistical and analytical tools for data processing and studies preparation as a supporting material for decision making in business management, represents an organic component of economic education. The using of spreadsheets and statistical software with applications in the field is in this age of ICT more desirable and obvious.

2.1. BUSINESS PERFORMANCE

The term ***"performance"*** is used very often, but nowhere in the legislative act is precisely defined. European Foundation for Quality Management defines "performance" as "a rate of achievement by individuals, groups, organizations and processes" *(EFQM Excellence Model).*

If we would like to measure the performance, we have to act in relation to a defined target value result. According to Lesáková (*Lesáková, 2004*) performance of the company is the company's ability to achieve the desired effects or outputs, and preferably in measurable units. By this statement is the problem of performance divided into two issues:

1. ***What are the required outputs?***
2. ***How to evaluate (how to measure) their performance (in which units of measurement)?***

The term performance is necessary understand as the ability of the company to the best capitalize of investments in business activities *(Frost, 2005)*. As reported Neumaierová and Neumaier *(Závadský, 2005),* the value of the company is determined by its performance. If we want to increase the value of the company, it is necessary to improve its performance. It means, if we want to increase business performance, we should to increase the performance of business processes, and particular in the main processes.

During the evaluation of business performance there has been many times created the vision that necessary is only to check whether the plan is achieved or is not achieved. Therefore, it is very necessary to remind the need to focus on the evaluation of procedures and tools whereby plans has been completed so it is important to evaluate the strategy and its effectiveness.

Traditional approaches for measure the business performance have basic lack, because they provide only a retrospective view to competitive position of the company, which had been existed at some moment in the past. These analyses do not be just static and outdated, but they are incomplete also. They provide only few opportunities to reveal the real dynamic and variability of business profitability factors.

Classical financial indicators do not say anything about the fact, why the overall results are as they are, or which business field could be improved for closer and better achievement of strategic objectives. Conventional indicators have the tendency to reflect and maintain the operational dividing and separateness of business departments. Partial indicators monitor the performance of individual business departments so it is very impossible to monitor their impact on the overall (total) results. Therefore it is necessary the completion of classical financial indicators by the series of dynamic and more prospective indicators, adapted to the specific competitive conditions.

To ensure a successful strategy we should pay the attention to two basic sets of issues, which are:

- ***continuously and systematically pay attention to basic business strategy and monitor whether:***
  - is chosen the right direction of procedure and default strategic hypothesis are valid;
  - attention is directed on key issues.
- ***focus on strategic performance and to monitor:***

- what performances are achieved by currently used strategies;
- whether actual expenses are compatible and comparable with the plan;
- whether current strategies are suitable;
- if strategies need to modify or make changes.

The basic assumption for performance evaluation is to identify indicators that a company wants to achieve. Those indicators represent a certain level of expected results. The following step is the measurement of these indicators. It means measurement of actual results, that a company has been reaching and the comparison with the expected output. Determine the differences - deviations from the expected values and it is necessary to determine their cause.

Following step is the realization of corrective measures, which may have the character of improving the implementation of individual activities, divert of resources, changes in performance indicators or even strategies correction.

It is also very good to remind that nothing is forever and in case of evaluation benchmarks it is doubly true. It is also necessary constantly and in a long-term to monitor the explanatory power of selected business performance indicators. As well as business priorities and competitive environment have been developed, should be also developed parameters for evaluation *(Dudoková, 2004).*

2.1.1. Traditional indicators for performance measurement

The essence of performance, as an economic category, has three elements. The first is to define the target value which is compared with the actual performance to required performance. The second elements are criteria for goals evaluation - an indicator or set of indicators. The third element of performance is the system of performance measurement and evaluation, which defines the rules for measurement parameters and methods of evaluation. The basic precondition of performance evaluation is to identify indicators that the company wants to achieve and these indicators represent a certain level of expected results. This is followed by the measurement of this parameters, it means measurement of the actual results, which achieve the company by the comparing with the expected performance. Subsequently are determined the differences - deviations from expected values, and then for these deviations is

necessary to determine their causes. Basic indicators of performance measurement are follows: *(Franko, J., Losonczy P., Németh, L.., Strelcová, S., 2005):*

- **Sales:** Revenues of the company, the company receives them from the sale of its output to the customer, respectively external customer.
- **Economic result**: by using this indicator is usually measured profit of enterprise. Basically, the difference between revenues and costs of the company.
- **Labour productivity:** labour productivity is generally understood as the amount of production made for the company by one employee per unit time. It is expressed as the efficiency of human labour, thus some degree realized the ability to create the values. Labour productivity is expressed as the ratio between the volume of production, made for a certain amount of time and amount of labour spent on it.
- **Value Added (VA):** is currently one of the most advanced forms of expression profitable business. In this indicator is the profit increased by the amount of depreciation and wages, which would ensure the future long-term development of the company and its prosperity. The value-added means:

VA = production value - intermediate consumption (1)

where:

- VA = wages + benefits + social operating surplus (ie. depreciation + / - profit before paying interest and taxes, or loss),

- Production value - for the production of revenues (sales), intermediate consumption (the cost of raw materials and services).

All items (except the labour productivity) are relatively easily identifiable from the outputs of the financial statement and statistical annuals, so their values are relatively easily available.

2.1.2. Modern indicators for performance measurement

Balance Scorecard

If the company connects with financial and strategic objectives even customer perspective and goals from the area of the business processes, gains the balanced set of business

objectives and indicators well known as a **BSC - Balanced Scorecard**. This system then allows to achieve not only short-term financial results but also and mainly strategic objectives for long-term development of the company.

BSC system is not used only to determine the objectives of the company as a whole but also is used to evaluate the objectives for lower levels of the company. Moreover, BSC can measure and evaluate the specific contribution of individual departments to overall company results, therefore the fulfillment of complex business objectives. BSC method is compatible with techniques such as are ABC or EVA. However, it is important to realize that the BSC method should not be based only on the inputs and outputs of the financial accounting, but this method should use the wide range of information provided by the management accounting. But it is also necessary, for effective strategic management using BSC method, to realize the wide diversity criteria, methods for individual companies and always look for their long-term optimal balance *(Petřík, 2005).*

Economic Value Added

EVA has become probably one of the most important indicators in the present, which is used to measure of business performance and to determine the overall value of the business from the owner perspective or potential investor (Shareholder Value Based Management).

Simply, it could be said, that the main aim of this unconventional indicator is to interpret real operating profit from the perspective of company owners. This step could by done by charging interest expense on own capital which is invested into the business as well as by assets which are not counted because they are used in operating business activities *(Rajnoha, 2008).* The basic formula for calculating indicator EVA has the traditional and widely known and used form:

$$\mathbf{EVA} = NOPAT - (WACC * C) \qquad (2)$$

where:

NOPAT - net operating profit after taxes,

WACC - weighted average costs of capital,

C - volume of invested capital (in accounting terms) (Capital). (Šinko, 2008)

2.2. STATISTICAL TOOLS OF PERFORMANCE INDICATORS ANALYSIS

The basic statistical tools that can be used for analysis and forecasting of performance include ***regression and correlation analysis*** and the ***time series theory.***

Regression and correlation analysis are currently one of the most commonly used statistical methods in economics. The essence is based in the expression by suitable mathematical function, which fits for defined empirical situations only approximately, with a certain probability. Demand for the application of these methods is also increasing in management of companies *(Scheer, 2007).* During the monitoring of many socio-economic phenomena it is aim to see if changing one or more variable affect another variable and how. In examining the relationships and dependencies between variables are used techniques of regression and correlation analysis *(Sodomová, 2000, s. 129).*

Regression analysis is the summary of statistical methods and procedures used to study the interaction between two (or more) variables, when we observe the dependence between them. The task of regression analysis is to find a form of dependence, express it through mathematical function and to determine the parameters, with the basic aim - estimate values of mean values of the dependent variable *(Pacáková, 2003).*

Correlation analysis allows assess the tightness of dependences, it means, the extent to which independent variables explain the variability of the values of the dependent variable and the appropriateness of choice of the regression function *(Klein, Bahýl, Vacek, 2002).* Simple linear correlation (often called as a simple pairwise correlation) examines the interdependence of two random variables (economic indicators) that from the aspect of the position in the linear regression model distinguishing between dependent (explained) variable -Y and the independent (explanatory) variable - X.

In the simple linear correlation are solved two tasks - regression and correlation. The regression task is to determine the regression line y = a + bx, it means determine the line that the best describes a given linear relationship. Within correlation task we find the strength (the tightness) of dependence, which is determined by the correlation coefficient **r.**

$$\mathbf{r} = \text{cov}(xy) / s(x)\, s(y) \qquad (3)$$

where:

$cov(xy)$ – *covariance of random variables X and Y*

$s(x), s(y)$ – *standard deviation*

Correlation coefficient takes the values from interval < -1, 1 >, while assume *(Sodomová, 2000)* : r = 0 – variables X and Y are not linearly dependent, r > 0 – between X and Y is a direct linear relationship, r < 0 – between X and Y is an indirect linear relationship. If is the absolute value of the correlation coefficient closer to 1, the dependence is stronger. If r = 1 and r = - 1, it is a functional dependency, not statistical. Through squared exponential of correlation coefficient (r) is obtained the coefficient of determination **d**.

$$d = r^2 \qquad (4)$$

The coefficient of determination takes the values from interval < 0, 1 > and it´s hundredfold determinates what percentage of the total variability in the dependent variable Y is explained by linear regression function of the explanatory variable X. *(Pacáková, 2003).*

Time series analysis. The time series is a chronological sequence of materially and spatially comparable values of some quantitative characteristics of the phenomenon. *(Pacáková, 2003).* Increasing importance has obtained the time series of economic indicators. The effort to understand their development in the past and possible estimation of the development in the future in recent years has led to the development of methods for the analysis and prognosis of economic time series. *(Pacáková, 2003).*

Classical approach in modelling of time series evolution is based on Decomposition method. By using this method is each value of y_t, t = 1,2,..., T decomposed to the value of the trend (Tr_t), cyclical, seasonal and random components, the combinations are different. Choice of decomposition depends on the fact if it is the series of annual data or short time series, and also it depends on the length of T - time series. In the time series of annual data is most common (Tr_t) trend and random component (E_t) in the form:

- additive form = $y_t = Tr_t + E_t$
- multiplicative form $y_t = Tr_t \,.\, E_t$ pre t = 1,2,...,T

Time series are used for characterize of data in special shape. Input information for prognosis is necessary to obtain from time series by suitable analysis. The aim of the statistical

analysis of time series is to understand and describe the characteristics of the development and changes in the values of variables at a time. The aim is put together a quality mathematical and statistical model of time series and based on it to interpret the correct results, to estimate the values of variable in the future periods and to understand their importance for economic practice. *(Pacáková a kol., 2009).*

The determination of trend consists in replacing the empirical values by theoretical values that the best represent the regularity expressed by empirical values. The trend in the time series is identified by non-analytical or analytical methods.

The estimation the trend component of the time series by non-analytical method belongs primarily to the method of moving averages. In this chapter we are dealing with the models of trend, which are expressed as a function of time, it means analytically. The trend estimation by analytical method is based on finding the suitable type of trend function (linear, quadratic, exponential, logistic), in the estimation of the parameters and in the assessing of adequacy of the selected trend function by testing of individual parameters. Here it is necessary to use the knowledge from regression and correlation analysis. The dependent variable is *Y* with values y_t of the time series and the independent variable is variable *t* for *t = 1,2 ..., T.* Values of a random variable E_t are marked in the trend functions the same as in the regression analysis, by the symbol ε_t. *(Pacáková, 2003).*

Random component in the time series has not systematic character, therefore it can not be described by any function of time. *(Klein, Bahýl, Vacek, 1998).*

Through estimation of the standard deviation of random errors is the standard deviation calculated from the residual variance as follow:

$$s_{y \cdot x} = \sqrt{\frac{\sum (y_i - \hat{y}_i)^2}{n - p}} \tag{5}$$

where:

$\sum (y_i - \hat{y}_i)^2$ *– the sum of residues squares (deviations of the measured and balanced) values*

$n - p$ *– degrees of variance (range of file reduced by the number of parameters of a trend curve, in case of the regression line p=2)*

In the simple linear correlation is s_{xy} marked as a standard error of regression line and determine the accuracy of the regression model.

2.3. ANALYSIS OF THE CURRENT SITUATION IN WOOD PROCESSING INDUSTRY IN SLOVAK REPUBLIC

In the use of wood has been combined force of nature and mind of man for thousands of years. Wood is very useful material for all of us and through the trees, which are the lungs of the earth, nature is able to function in balance, so that ensures the survival for all of us. Wood as a high ecological and renewable source is undoubtedly one of the healthiest building materials, which by his structure, colour and aroma has very positively influence on the human psyche and creating a pleasant friendly atmosphere. Given that the wood is flexible and able to resist to tension and pressure, has excellent insulating features and significant utilitarian and aesthetic value. Wood is the most widely used structural and decorative element of modern architecture in interior and in the exterior also. Natural using of wood prevents the excessive release of carbon dioxide (CO_2) into the atmosphere, which occurs in the production of energies and consumption of non-renewable resources (oil, gas, nuclear fuel).

Wood processing industry (WPI) is focused on the utilization of wood. WPI is quite dynamically developing industrial sector in the European Union (EU), which represents about 10% of the whole EU manufacturing industry. From the perspective of state support in Slovakia it is necessary to provide for WPI higher care and better support, as it is in reality. WPI is a branch of industry which is relatively independent on the import of raw material and is permanently capable generates a positive balance of foreign trade.

WPI participates in the total sales of industry in the Slovak Republic approximately 10%[1] and also in the export at the level of 10%[2]. According to harmonized classification SK NACE[3], valid since 1st January 2008, is wood processing industry (WPI) in Slovak Republic divided into three sub-sectors: wood industry SK NACE 16, pulp and paper industry SK NACE 17 and furniture industry SK NACE 31.

[1] http://www.vedavyskum.sk/lesnicko_-_drevarsky_komplex/drevospracujuci_priemysel
[2] http://www.euroekonom.sk/download2/strategia-financneho-investovania/Financne-investovanie-Odvetvova-analyza.pdf
[3] http://www.statistics.sk/pls/wregis/ciselniky?kc=5205

Wood processing industry (WPI) has in the Slovak economy relatively still small proportion, but in the last decade it has been seen a significant influx of foreign investments in this sector. Investments were directed to the pulp and paper industry (group Mondi - Germany, Metsa Tissue - Finland), to the furniture industry (Sweden - Swedwood, Lind Mobler - Denmark, Furni Finish - Belgium) and to the wood industry (Rettenmeier - Germany, Skipper Investment - Luxembourg , Doka Industrie - Austria) and to the production of chipboards and fibreboards (Kronospan - Austria). Domestic companies contribute to investments with a very low share.

Most companies, which operate in wood processing industry, are associated in the Slovak Association of Wood Processors (Slovak abbreviation ZSD SR), that is a voluntary organization of employers, respectively managers and owners of companies. This association (ZSD SR) had 122 members in June 2010. All current members of ZSD SR are representatives of wood processing industry or related industries (manufacturing or trading companies), or represent a scientific and research potential, by their activities they do not pollute the environment and try to develop activities which are oriented to export. The Association is a full member of the National Union of Employers (NUE) and Slovak Industry Association (SIA). ZSD SR is a member of association of the European Confederation of Woodworking Industries (CEI-Bois), established in Brussels (www.cei-bois.org), the European Federation of Woodworking Machinery Manufactures (EUMABOIS), with executive headquarters in Milanofiori (www.eumabois.com) and European Furniture Industries Confederation (EFIC), established in Brussels (www.efic.eu).

The development in the timber market has been influenced by several changes and factors, in last years. First of all, it's windy calamities that were not only in Slovakia but also in the Nordic countries, Germany, Czech Republic and they caused that in the timber market has been high supply of raw wood. Another fact that caused this situation is the stagnation of the construction industry due to the economic crisis, which reduces the demand for building and joinery products. Furniture, pulp and paper industries, given the small domestic market, are highly oriented to export, and these industries have to hold on in the hard competitive struggle. Whole this situation caused that the price for wood raw material and for wood products was reduced. Raw wood and wood products are accumulated in the storages or have been sold below real price and also is decreased the volume of purchase of raw wood. In this situation plenty of institutions try to search the way how to save the costs and many companies very often use the outsourcing, in last time. They try to delegate the implementation of many non-core activities to

external companies, that are specialists in specific outsourced area and they can these activities provide cheaper and better. Companies have used outsourcing as a form how can be increased their competitiveness *(Dvořáček, Tyll, 2010).*

Basic input material for wood processing industry is raw wood, which is provided and delivered by forestry industry. For wood processors are produced by foresters average 6.5 million cubic meters of raw wood per year. In 2008, the companies operates in Slovak´s forests delivered to the domestic market 8.8 million cubic meters of raw wood, which was one of the largest timber delivery in Slovak´s history and was exceeded by 500 thousand cubic meters the delivery of the wood in 2005 after the big windy calamity. In the first quarter of 2009 in compare with the same period in year 2008 decreased the market with the raw wood in Slovakia by 46%. Negative development has also prices for timber, in the world market prices decreased by 15 - 20 %. In the Slovak Republic, the average price for 1 cubic meter of timber, in the first quarter of 2009, decrease by an average of 24%, during the year, prices have been stabilized and in year 2010 prices began to grow. Although the current situation and condition may seem like advantageous for wood processing industry, it has no influence to the overall efficiency of the wood processing industry *(Drábek, Merková 2010).*

2.4. RESULTS OF STATISTICAL ANALYSIS

Information about the basic indicators for performance measurement in companies of wood processing industry in Slovakia come from the yearbook of industry in the Slovak Republic, by the years 2009, 2010 and 2011, issued by the Statistical Office of the Slovak Republic and the material presented in monograph DRÁBEK, J., MERKOVÁ, M. The effectiveness of direct foreign investments in the wood processing industry, Zvolen: Technical University in Zvolen, 2010, 103 p. ISBN 978-80-228-2196-4.

It is specifically the following indicators: ***Turnover for own product and services, Value added, Average monthly wage per employee, Labour productivity per employee, Profit/Loss before taxation, Average number of employees***. The values of these mentioned indicators, from year 1992 till 2011, present the following Tables 6, 7 and 8.

Table 6. Indicators of performance measurement in companies of wood processing industry in Slovak Republic for the years 1992 - 1998

Indicator	Value	NACE	1992	1993	1994	1995	1996	1997	1998
Turnover for own product and services	thous. €	16	203 711	163 081	168 558	231 428	229 792	257 712	257 306
		31	178 682	169 156	157 803	189 537	220 639	226 205	215 447
		17	349 565	338 046	444 798	623 448	630 233	692 250	708 661
		∑	**731 959**	**670 284**	**771 161**	**1 044 413**	**1 080 665**	**1 176 168**	**1 181 416**
Value added	thous. €	16	38 040	63 732	66 288	76 943	67 663	69 659	66 460
		31	35 849	51 251	48 695	54 404	62 056	67 842	67 937
		17	75 383	67 151	130 618	224 623	168 202	180 090	211 787
		∑	**149 273**	**182 135**	**245 601**	**355 971**	**297 921**	**317 592**	**346 184**
Average monthly wage per employee	€	16				206	0	255	273
		31				191	0	246	268
		17				246	0	356	385
		Ø				**215**	**0**	**281**	**309**
Labour productivity per employee	€	16	11 036	11 230	11 320	15 421	15 591	18 121	20 099
		31	9 953	10 730	11 600	14 921	17 954	18 758	19 798
		17	27 197	23 152	31 715	44 692	45 912	52 182	60 722
		Ø	**14 858**	**14 932**	**18 136**	**25 070**	**26 516**	**29 741**	**33 416**
Profit/Loss before taxation	thous. €	16				-19 086	-13 399	-36 269	-18 104
		31				-14 074	5 154	1 999	530
		17				101 175	11 047	35 156	37 507
		∑				**68 014**	**2 802**	**887**	**19 933**
Average number of employees	persons	16	18 458	14 522	14 891	15 007	14 739	14 222	12 802
		31	17 953	15 765	13 604	12 703	12 289	12 059	10 882
		17	12 853	14 601	14 025	13 950	13 727	13 266	11 671
		∑	**49 264**	**44 888**	**42 520**	**41 660**	**40 755**	**39 547**	**35 355**

Source: http://portal.statistics.sk/showdoc.do?docid=4

Table 7. Indicators of performance measurement in companies of wood processing industry in Slovak Republic for the years 1999 - 2004

Indicator	Value	NACE	1999	2000	2001	2002	2003	2004
Turnover for own product and services	thous. €	16	253 424	291 777	327 704	375 243	369 905	416 732
		31	280 225	336 071	460 518	671 529	887 453	923 777
		17	753 088	960 922	1 093 359	1 092 056	1 032 581	1 083 840
		∑	**1 286738**	**1 588 772**	**1 881 582**	**2 138 828**	**2 289 940**	**2 424 350**
Value added	thous. €	16	67 838	80 893	75 135	90 894	75 181	100 462
		31	67 278	74 738	83 018	76 768	145 712	152 076
		17	234 554	306 150	367 824	328 841	254 805	220 964
		∑	**369 671**	**461 782**	**525 978**	**496 504**	**475 698**	**473 503**
Average monthly wage per employee	€	16	291	325	336	362	385	428
		31	305	350	387	436	477	534
		17	421	477	523	608	619	675
		Ø	**338**	**384**	**413**	**462**	**490**	**540**
Labour productivity per employee	€	16	22 230	26 877	31 331	36 352	40 789	48 433
		31	27 072	37 018	45 855	64 511	80 571	82 791
		17	71 202	94 761	111 247	121 644	121 355	142 337
		Ø	**39 803**	**52 827**	**62 035**	**71 991**	**80 090**	**88 555**
Profit/Loss before taxation	thous. €	16	-10 496	4 189	-741	8 052	-6 674	22 811
		31	-6 424	5 454	-9 575	-87 346	24 606	5 959
		17	44 445	72 022	138 330	152 970	91 136	38 860
		∑	**27 525**	**81 666**	**128 012**	**73 676**	**109 069**	**67 630**
Average number of employees	persons	16	11 400	10 856	10 460	10 323	9 069	8 604
		31	10 351	9 079	10 043	10 410	11 015	11 158
		17	10 577	10 141	9 828	8 978	8 509	7 615
		∑	**32 328**	**30 075**	**30 331**	**29 710**	**28 592**	**27 377**

Source: http://portal.statistics.sk/showdoc.do?docid=4

Table 8. Indicators of performance measurement in companies of wood processing industry in Slovak Republic for the years 2005 - 2011

Indicator	Value	NACE	2005	2006	2007	2008	2009	2010	2011
Turnover for own product and services	thous. €	16	514 769	585 724	678 981	5 857 625	378 192	411 365	455 482
		31	957 044	972 681	1 284 308	948 269	538 539	541 078	566 180
		17	1 083 091	1 203 166	1 414 868	1 402 606	1 087 761	1 135 564	1 151378
		∑	**2 554 905**	**2 761 572**	**3 378 159**	**2 936 639**	**2 004 493**	**2 088 008**	**2 173 040**
Value added	thous. €	16	118 856	136 883	115 816	110 402	75 303	79 402	84 377
		31	177 769	197 764	2 021 587	265 988	161 229	168 859	169 054
		17	236 819	275 022	295 394	280 601	262 339	290 347	277 272
		∑	**533 445**	**609 671**	**613 370**	**656 992**	**498 871**	**538 608**	**530 703**
Average monthly wage per employee	€	16	436	487	544	589	583	635	647
		31	571	573	628	645	636	705	680
		17	728	792	851	899	948	974	963
		Ø	**565**	**598**	**652**	**690**	**722**	**771**	**2 290**
Labour productivity per employee	€	16	51 871	60 503	71 842	67 975	63 241	76 054	85 444
		31	80 900	68 306	80 423	64 019	54 196	56 691	58 526
		17	145 232	165 157	198 990	189 324	178 667	194 963	197 134
		Ø	**87 462**	**88 495**	**103 845**	**95 227**	**98 701**	**109 236**	**341 104**
Profit/Loss before taxation	thous. €	16	25 676	36 771	30 711	4 838	-37 107	-19 633	-36 563
		31	51 802	39 844	15 201	25 219	24 026	8 579	-384
		17	56 707	96 119	81 161	1 130 913	30 661	116 459	85 378
		∑	**134 187**	**172 736**	**127 074**	**143 149**	**17 581**	**105 405**	**48 431**
Average number of employees	persons	16	9 924	9 681	9 451	8 617	6 478	5 724	5 770
		31	11 830	14 240	15 970	14 812	10 578	10 136	10 364
		17	7 458	7 285	7 110	7 409	6 869	6 527	6 385
		∑	**29 212**	**31 206**	**32 531**	**30 838**	**23 925**	**22 387**	**22 519**

Source: http://portal.statistics.sk/showdoc.do?docid=4

The following sections visually present basic indicators for performance measurement of companies operate in wood processing industry in Slovakia. Figure 15 presents the value of turnover for own products and services that still have not achieved the level which was before the world economic crisis. Wood processing industry is in the Figure 15 divided into 3 individual sectors as follow:

MW – manufacture of wood,

MF – manufacture of furniture,

MP – manufacture of paper.

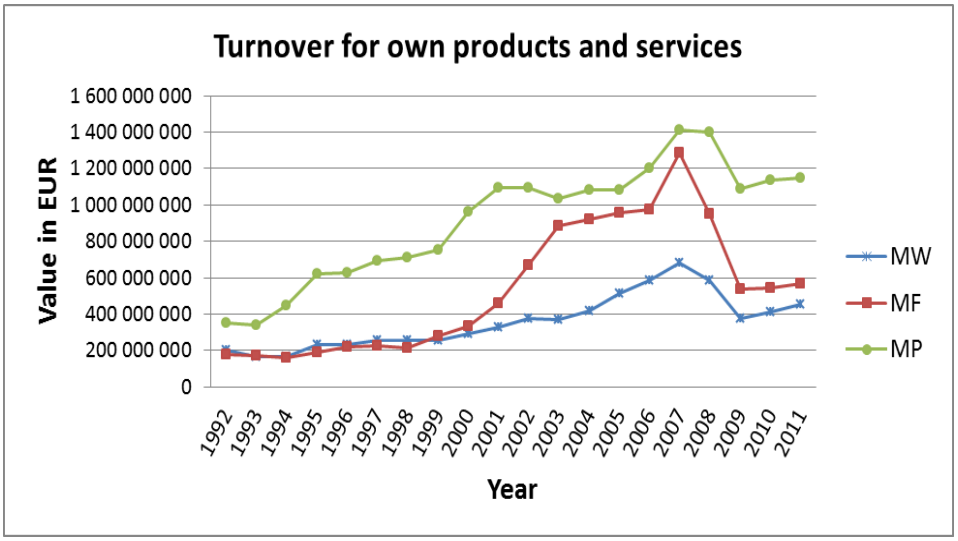


Figure 15. Turnover for own products and services in individual sectors of wood processing industry in Slovak Republic

Figure 16 presents indicators of value added in individual sectors of the wood processing industry in Slovakia. The highest value is reached in manufacture of paper (MP), followed by furniture manufacture (MF) and manufacture of wood (MW).

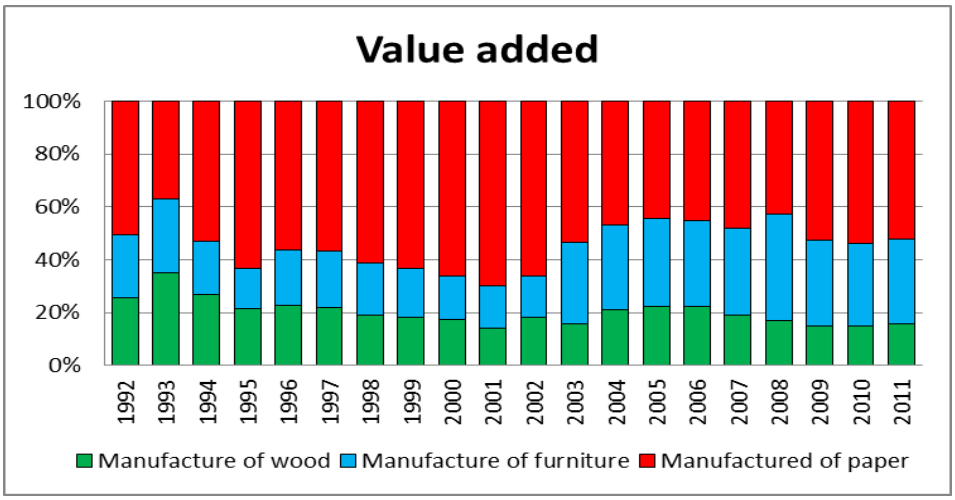


Figure 16. Levels of value added in different sectors
of wood processing industry in Slovakia

Figure 17 presents the average labor productivity for sales revenues and goods in all different sectors of wood processing industry (manufacture of wood, furniture and paper). They have positive upward trend in recent years.

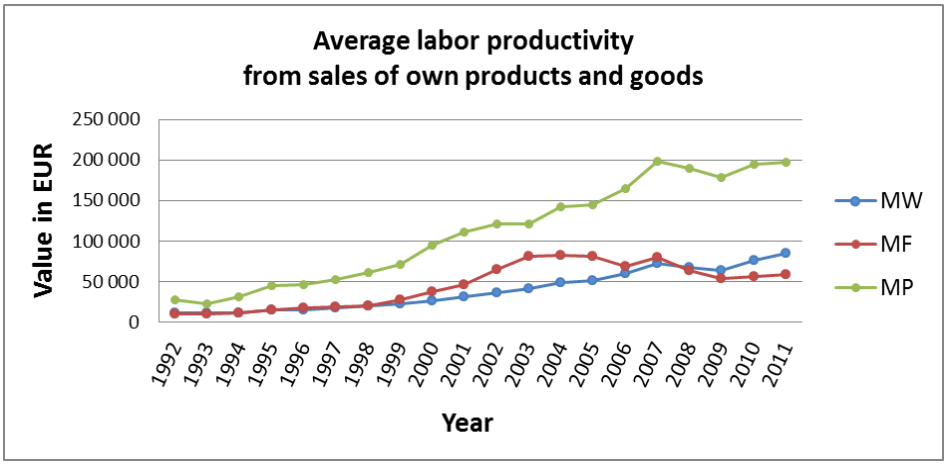


Figure 17. The average labor productivity for sales revenues and goods
in wood processing industry in Slovak Republic

Figure 18 presents indicators of the monthly wage in the various sectors of wood processing industry. The highest values again generate the sector pulp and paper industry, followed by furniture industry sector.

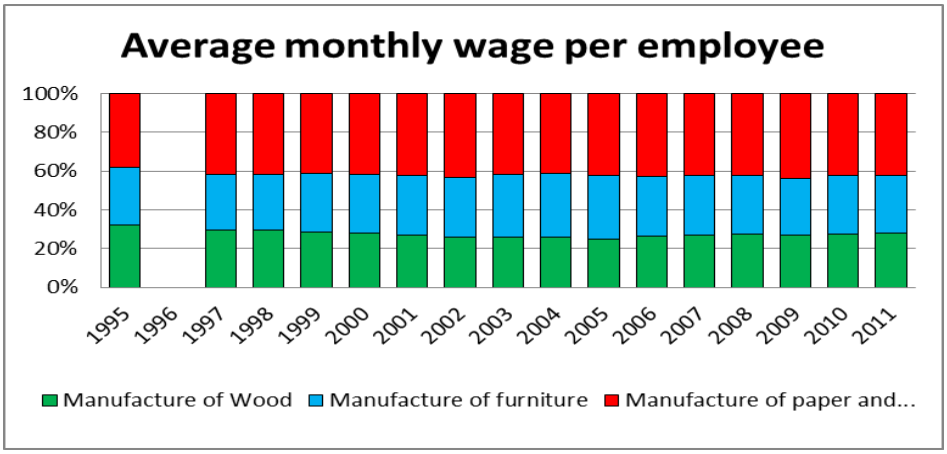


Figure 18. Levels of average monthly wage per employee
in different sectors of wood processing industry in Slovakia

2.4.1. Simple linear correlation

Correlation and regression analysis are focused on the detection of a simple linear dependence between economic indicators of performance for the whole wood sector of wood processing industry. From the selected economic indicators, is presented the dependence of the value added per average monthly wage per employee (Figure 19), by the same way it is possible to analyze the dependence of the value added to the other indicators (sales, profit, productivity), in which a causal dependency.

In the correlation functions are quantified indicators - correlation coefficient (r) and the coefficient of determination (d), the regression coefficients of the regression line task (a, b) and mean errors of regression lines (s_{yx}) (standard deviation of residue). The part of the analysis is also a statistical verification of significance linear dependence between economic indicators by testing the correlation coefficient at the chosen significance level α = 5%.

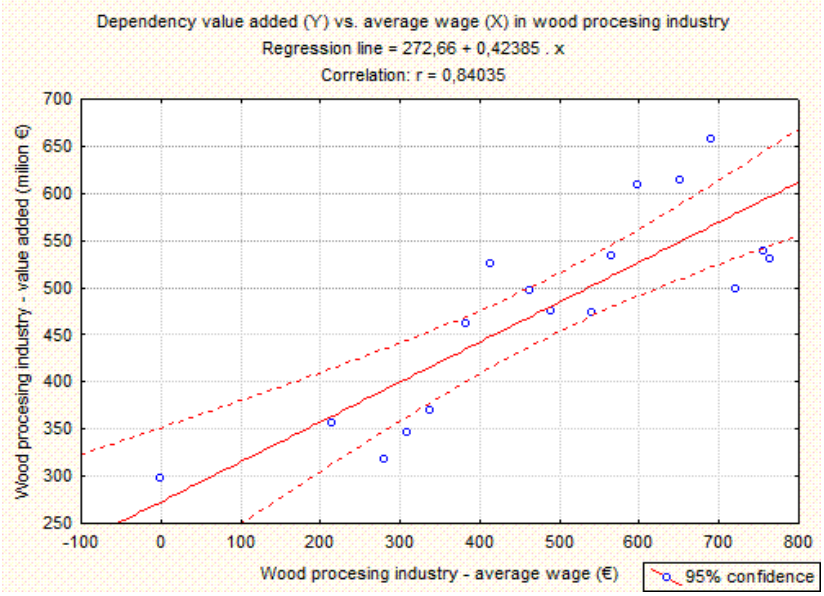


Figure 19. Correlation between average monthly wage and value added in wood processing industry in Slovakia

Between the average monthly wage per employee and value added (Figure 17) was detected very close direct linear relationship, with a correlation coefficient of r = 0.84035. The coefficient of determination $d = r^2$ indicates that the oscillation of the average monthly wage explains 70,6% of value added variability. The remaining 29.4% is attributed to random effects, as well as other factors not included in the regression function. The equation of the regression line has the form y= 272,66 + 0,42385 * x and the value of the mean error of the regression line is s_{yx} = 59,825 mil. €.

The regression coefficient indicates that an increase in the average monthly wage of a unit (1€) may show an increase in the value added of 0,42385 million € annually. The equation of the regression line is also used for prediction, with some reliability allow to predict the unknown value of y, which corresponds to a particular value of x. For example, with increase of average wage at 820 €, is possible to predict with the reliability of 68% of the value added at the level of 620,17 mil. € ± 59,825 mil. € (± 1. s_{yx}), or is possible to predict with the reliability 95% of the value added at the level of 620,17 mil. ±119,650 mil. € (± 2.s_{yx}).

Between the average monthly wage and volume of sales in wood processing industry (Fig. 20) was detected strong linear relationship, with a correlation coefficient (r), r = 0.79275, and with the regression line y = 709.31 + 2.7542. x and standard error of the regression line 453 mil. €. Variability of the average wage explains 63% sales variability. The remaining 37% of variability is caused by random impacts and other unobserved factors (for example productivity). If increase the average monthly salary of 1 € the annual sales will rise in wood processing industry of 2,754 mil. €.

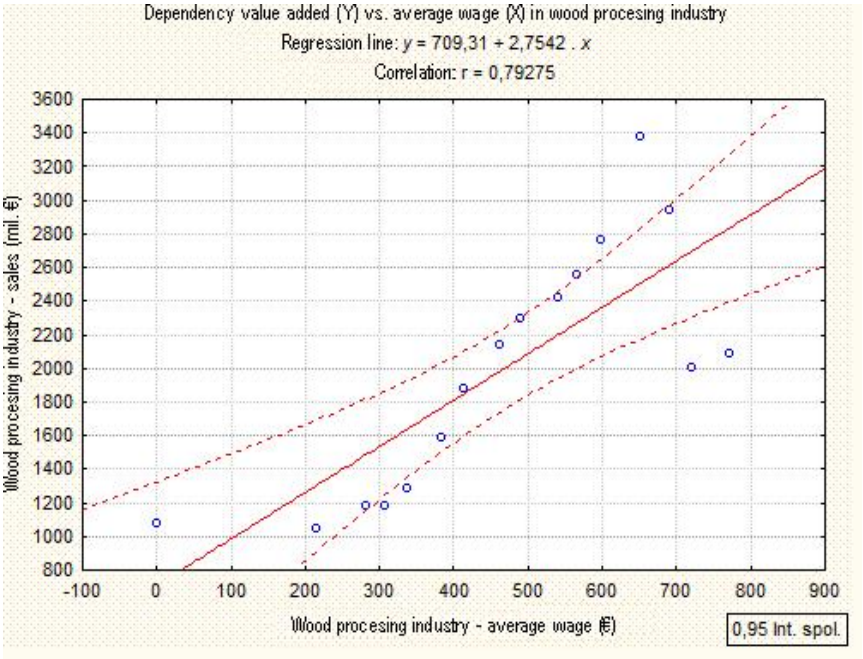


Figure 20. Correlation between sales and average monthly wage per employee in wood processing industry in Slovakia

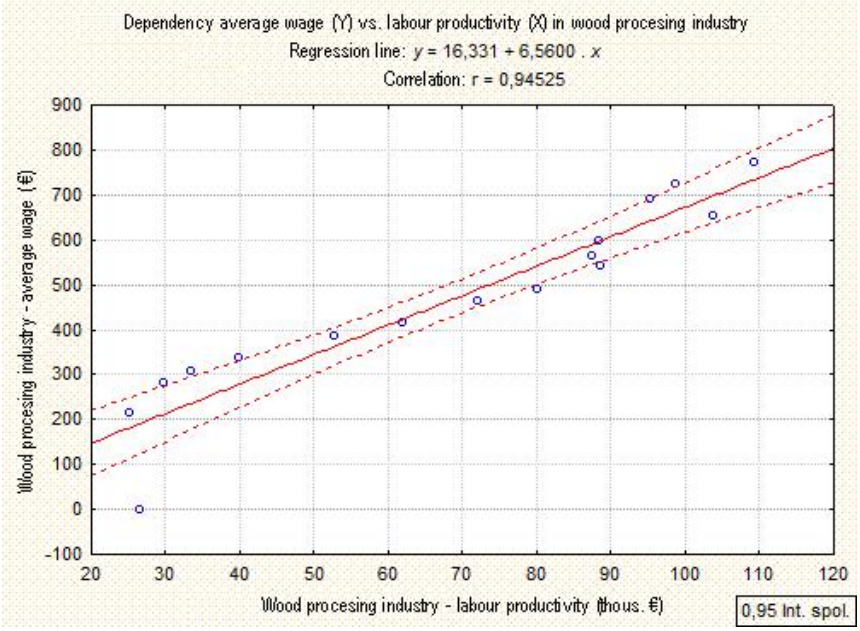


Figure 21. Correlation between average monthly wage per employee and labour productivity in wood processing industry in Slovakia

Between the average monthly wage and average labour productivity in the wood processing industry (Figure 7) is very close direct linear correlation r = 0.94525. A linear regression model with independent variable "average labour productivity" explains 89% of the variability of the dependent variable "average monthly wage". The increase of average labour productivity by 1,000 €, will be reflected by increasing of the average monthly wage by 6,56 €. Standard error of the regression line y = 16.631 + 6.5600. x is s_{YX} = 69.90 €.

2.4.2. Time series analysis

Time series data are used to characterize a special shape. The input information is needed to obtain a suitable forecasting analysis. The aim of the statistical analysis of time series is to understand and describe the characteristics of the development and changes in the values of variables at a time, prepare a quality mathematical and statistical time series model and based

on this the correct interpret results, to estimate the values of variables in future periods and to understand their importance for economic practice.

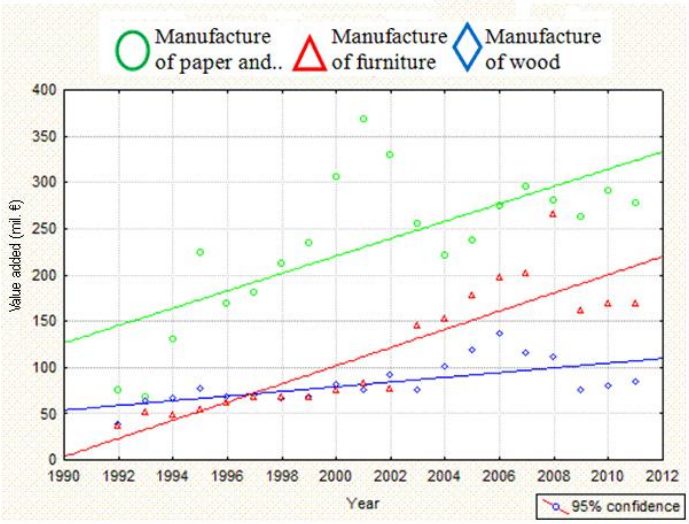


Figure 22. Development trend of value added in all sectors of wood processing industry in Slovakia (for years 1995 – 2011)

Linear trend:

Manufacture of wood (MW): y = - 5004 + 2,5415.x; s_{yx} = 18 128 463

Manufacture of furniture (MF): y = - 196E2 + 9,8336.x; s_{yx} = 32 601 287

Manufacture of paper (MP): y = - 186E2 + 9,3996.x; s_{yx} = 57 222 169

Based on Figure 22, and defined the test parameters can be concluded that in all sectors of the wood processing industry can be observed an increasing linear trend in value added in the reporting period. The regression coefficient of the linear trend model interprets that in the years 1992 to 2011 the value added has grown an average annual rate of 2.54 million € in the manufacture of wood, about 9.83 million € in the manufacture of furniture and about 9.39 million € in the manufacture of paper. Slope of growth in manufacture of wood is significantly lower than in the manufacture of furniture and the manufacture of paper. Standard deviations s_{yx},, residues, serve to estimate the random component of a time series and the deviations are a measure of quality of the estimated model (in case of the existence of several models we choose the most suitable one standard deviation of the residue has the lowest value). Estimated

value in predicting economic indicator in the future based on the model trend, we accurately predict the amount of value added in the manufacture of wood as the standard deviation of residues s_{yx} = 18,128,463 € is the smallest.

In Figure 23 is modelled the trend of development in average monthly wages in wood processing industry, which has growing character, especially in the manufacture of paper (the highest value of the regression coefficient of the trend line b = 50.004). From the values of the standard deviations of residues we can conclude that in the manufacture of paper is the model of linear trend on the highest quality (lowest value s_{yx} = 14,20€).

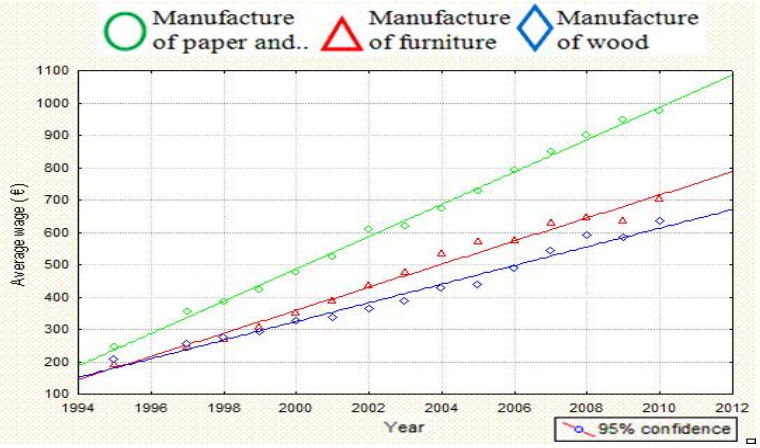


Figure 23. Development trend of average monthly wage per employee in all sectors of wood processing industry in Slovakia (for years 1995 – 2011)

The tendency in the development of economic result in the all sectors of wood processing industry has a constant trend. The values in the period 1995-2010 oscilate around a typical annual average level of 1.78 million € in MW, 5.68 million € in MF and 76.05 million € in MP.

Linear trend:

Manufacture of wood (MW): y = -3160 + 1,573.x; s_{yx} = 22 029 498

Manufacture of furniture (MF): y = -4970 + 2,481.x; s_{yx} = 29 083 598

Manufacture of paper (MP): y = -4810 + 2,440.x; s_{yx} = 41 644 141

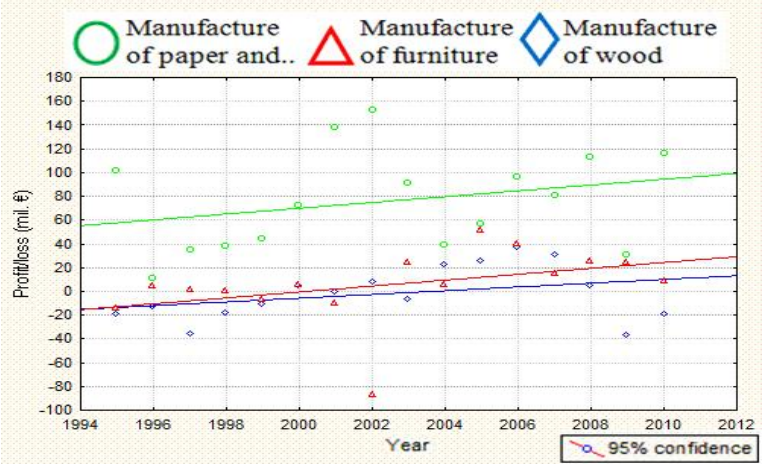
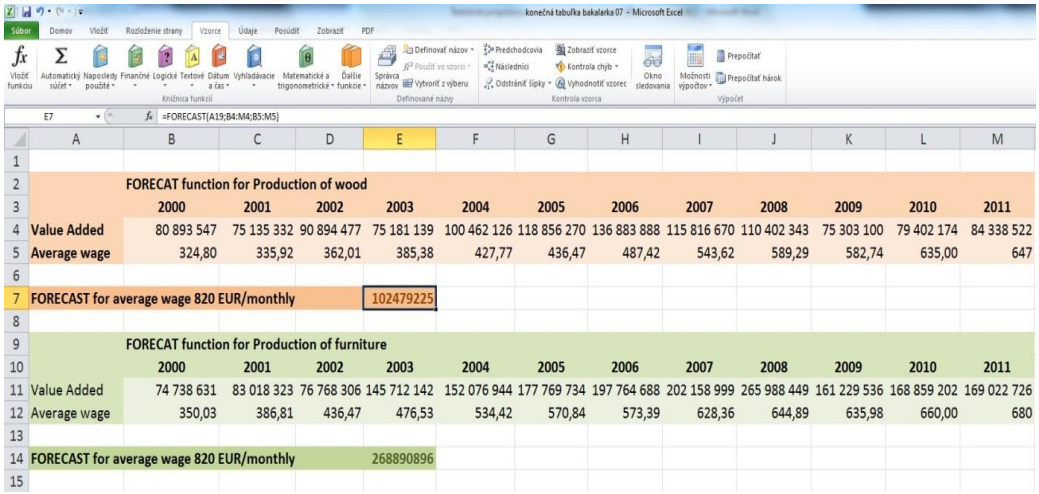


Figure 24. Development trend of profit in all sectors of wood processing industry in Slovakia (for years 1995-2011)

2.4.3. Forecast

To predict the trend will use the available ***FORECAST function in Excel*** that is able to estimate the values of existing future value. The predicted value is the dependent variable (y) for a given value of the independent variable (x). Known values are pairs of numbers x and y, and the new value is estimated using linear regression. This function will be used to estimate the amount of future levels of value added, if we assume that the level of the average monthly wage would be at the level of 820 €/month in the sector of wood and furniture industry. For the analysis we use the input data since 2000.

The function "forecast" assumes that the level of value added in the Production of wood industry, at the level of the average monthly salary of 820 € could be able to achieve the level of 102 479 225 €. The function "forecast" also assumes that the level of added value in the furniture industry, at the level of the average monthly salary of 820 € could reach the level of 268 890 896 € (Figure 25).



	A	B	C	D	E	F	G	H	I	J	K	L	M
1													
2		FORECAT function for Production of wood											
3		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
4	Value Added	80 893 547	75 135 332	90 894 477	75 181 139	100 462 126	118 856 270	136 883 888	115 816 670	110 402 343	75 303 100	79 402 174	84 338 522
5	Average wage	324,80	335,92	362,01	385,38	427,77	436,47	487,42	543,62	589,29	582,74	635,00	647
6													
7	FORECAST for average wage 820 EUR/monthly				102479225								
8													
9		FORECAT function for Production of furniture											
10		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
11	Value Added	74 738 631	83 018 323	76 768 306	145 712 142	152 076 944	177 769 734	197 764 688	202 158 999	265 988 449	161 229 536	168 859 202	169 022 726
12	Average wage	350,03	386,81	436,47	476,53	534,42	570,84	573,39	628,36	644,89	635,98	660,00	680
13													
14	FORECAST for average wage 820 EUR/monthly				268890896								
15													

Figure 25. Prediction of the development of value added through the function "Forecast"

2.5. CONCLUSION

This article offers a view as by the method of mating simple correlation is analyzed the interdependence of selected economic indicators. Time series analysis, due to insufficient data (absence of monthly data, which allow assess the seasonal component of the time series), is limited for the trend component modelling and estimation of random component of the time series. Based on the selected performed statistical analyzes, it can be stated:

- average monthly wage has significantly positive effect on the value added in various sectors of wood processing industry (and revenues),
- time series of value added (as well as revenues and average monthly wages) have increasing linear trend in all sectors of wood processing industry in Slovakia,
- assuming the increasing of average monthly wage to the level 820 EUR, it would be possible, in sectors of the furniture and manufacture of wood industry, to achieve that level of value added per one employee or the level of sales which has interesting value compared with competitive sectors.

We realize that prognosis the level of value added based on single factor, namely the level of the average wage, even though the high value of the correlation coefficient is not absolute relevant. In our article we wanted to present the possibilities of using statistical tools for prediction the development of specific performance indicators in the sector of wood processing industry.

ACKNOWLEDGEMENT

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3. FINANCIAL ANALYSIS OF A SECTOR: A CASE OF SLOVENIAN WOOD INDUSTRY

Jože Kropivšek, Matej Jošt

In today's rapidly evolving business environment, which has strongly changed in recent years due to the global economic crisis, the monitoring of economic and financial indicators is crucial for the maintenance and development of business for the companies and the economy as a whole. One of the most important tool for assessing the financial position and successfulness of a company is financial analysis. Its results are selected financial indicators, which are very important especially in business to business operations and at searching for fresh capital on the market, as this greatly reduces business risk. Financial indicators must enable to assess past business performance to business partners and owners in order to create expectations about the future performance of the company and on this basis, formulate decisions regarding their attitude to the company. For this purpose, the companies for many years (in particular, also the banks) are using rating reports, which are generally related to the risk of non-payment (i.e. the system Basel II). (Slapničar, 2004)

On the other hand, with the analysis of financial indicators the estimation of the performance of the branch can be done, which is key information for the creation and modification of sectorial strategies. Financial analysis shows disadvantages (weaknesses) and risks, and viewed as a whole for the entire branch can greatly affect the development and performance of the sector in the future. In the implementation of financial analysis must be taken into account that there is a great variability in the data and individual indicators among companies in the sector.

The aim of the research is to assess the state of solvency and the degree of financial risk for the entire Slovenian wood industry on the basis of selected financial indicators. Indicators were analysed for the recent 5 years (from 2007-2011), and therefore the impact of the economic recession on these indicators or on the state of Slovenian wood industry was established and determined.

3.1. FINANCIAL ANALYSIS

3.1.1. The definition of financial analysis

Financial analysis is a set of tools and techniques, including fiscal indicators and forecasting, that allow you to measure the current fiscal condition of a government or business and predict trends in its future fiscal condition (Friedlob, Schleifer, 2003). The goal of financial analysis is to assess the performance of a company in the context of its stated goals and strategy (Palepu et al. (2004). Financial analysis is an important tool for assessing the financial position and successfulness of a company because of the two main features: it reduces a large number of data in the financial statements on a few key parameters and it ensures the comparability of financial statements of different sized companies (Slapničar, 2004). Many authors (Elliot and Elliot, 1996; Rees, 1995) at this point are emphasizing the insufficiency of this analysis as an example that such an analysis multiplies the deficiency of financial statements and that the indicators are not distributed normally. That makes problems not only for the statistical analysis but also for the interpretation and comparability of indicators.

There are two principal tools of financial analysis: ratio analysis and cash flow analysis. Ratio analysis involves assessing how various line items in a company's financial statements relate to one another. Cash flow analysis allows the analyst to examine the company's liquidity, and how the company is managing its operating, investment, and financing cash flows. According to Helfert (2001), financial analysis is the process of determining and weighing the financial impact of business decisions.

Main users of financial analysis are:

1. *Lenders and creditors*. Anyone who has lent funds to a company is interested in its ability to pay back the debt, and so will focus on various cash flow measures.
2. *Owners/Investors*. Both current and prospective investors examine financial statements to learn about a company's ability to continue issuing dividends, or to generate cash flow, or to continue growing at its historical rate.

3. *Management*. The company controller prepares an ongoing analysis of the company's financial results, particularly in relation to a number of operational metrics that are not seen by outside entities.

3.1.2. Sources of information for the analysis

Financial analysis depends on the quality of data it uses. The most important source of these data are different financial statements, which are used for financial reporting. In general there are four main financial statements:

- The *balance sheet*, which is a report of a company's assets, liabilities, and equity at a point in time.
- The *income statement*, which is a report of a revenues, expenses, and profit over a period of time.
- The *statement of cash flows*, which summarizes cash flows from operating activities, investing activities, and financing activities
- The *statement of stockholders' equity*, which details changes in stockholders' equity

The main idea of financial statements is to provide information about financial position (balance sheet), performance (income statement), and changes in financial position (cash flow statement) of a company (Vance, D. I. 2003).

3.1.3. Methods of Financial Analysis

In general there are two different methods of financial analysis (Peterson and Fabozzi, 1999):

- *Horizontal and vertical analysis.* Horizontal analysis is the comparison of financial information over a series of reporting periods, while vertical analysis is the proportional analysis of a financial statement, where each line item on a financial statement is listed as a percentage of another item.
- *Financial ratio analysis.* A ratio is an expression of a mathematical relationship between one quantity and another. If a ratio is to have any utility, the element which constitutes the

ratio must express a meaningful relationship. Ratio analysis can disclose relationships which reveal conditions and trends that often cannot be noted by inspection of the individual components of the ratio. Typical ratios are fractions usually expressed in percent or times.

The method of financial ratio analysis is the most common method at evaluating a condition of single company and a sector or industry as a whole. A single value of a financial ratio is not meaningful by itself, but must be examined in context of the past performance. When used in this manner, ratios serve as "benchmarks" against which the company can evaluate itself. Ratios are not ends in themselves but help provide answers to questions concerning specific issues and insights into the operations of a business enterprise. A *time-series analysis* of ratios involves examining the pattern of ratios over time, say 5 or 10 years. We can spot trends and also get a sense of the variability of the ratio over time. A *crosssectional analysis* of ratios involves examining the differences in ratios across firms at a point in time. We generally compare a company's financial ratios with those of the industry leaders, the major competitors, or the average of the industry.

Ratio analysis involves methods of calculating and interpreting financial ratios to analyse and monitor the firm's performance. The only data sources to ratio analysis are the firm's financial statements (Gitman, 2004). Financial management practitioners use various approaches depending on the goal of analysis or business issue. Despite of the number of ratios, they all cohere through their classification. Peterson and Fabozzi (1999) propose following classification of financial ratios according to the way they are constructed:

- *Coverage ratios*. A coverage ratio is a measure of a firm's ability to "cover" certain financial obligations. The denominator is an obligation and the numerator is the amount of the funds available to satisfy that obligation;
- *Return ratios*. A return ratio indicates a net benefit gained from particular investment of resources or any other similar activity. The numerator is the net result of an operation and the denominator is the resources spent for that operation;
- *Turnover ratios*. A turnover ratio is a measure of how much a firm gets out of its assets. It compares the gross benefit from an activity with the resources employed in it;

- *Component percentage*. A component percentage is the ratio of one amount in a financial statement, such as sales, to the total of amounts in that financial statement. (Peterson and Fabozzi, 1999)

3.1.4. Categories of ratios

There are several general categories of ratios, each designed to examine a different aspect of a company's performance. The general groups of ratios are (figure 26) (Fabozzi and Peterson, 2003):

1. *Liquidity ratios* (provide information on a firm's ability to meet its short-term obligations)
2. *Profitability ratios* (provide information on how well the company is managing its expenses)
3. *Activity ratios* (relate information on a firm's ability to manage its resources efficiently)
4. *Leverage ratios* (provide information on the degree of a firm's fixed financing obligations and its ability to satisfy these financing obligations)

Beside this four there are two additional categories: Return on investment ratios, which provide information on the amount of profit, relative to the assets employed to produce that profit, and Shareholder ratios, which describe the firm's financial condition in terms of amounts per share of stock.

Liquidity ratios

Liquidity ratios measure the ability of a company to satisfy its short-term obligations as they come due (Gitman, 2004) and is therefore the most fundamentally important set of ratios. Liquidity also stands for ability of a company to convert its assets into cash quickly and with lower costs as possible. Such liquid assets are necessary to cover any “financial emergencies” and play as a buffer in company’s operations.

- *Current Ratio.* Measures the amount of liquidity available to pay for current liabilities. It measures the margin of liquidity. It is usually better when it is higher – between 1 and 2 (sometimes 1-3). Rapid decreases in the current ratio sometimes may indicate problems.
- *Quick Ratio.* The same as the current ratio, but does not include inventory. It is recommended to have the Quick Ratio higher than 1.
- *Liquidity Index*. Measures the amount of time required to convert assets into cash.

- *Absolute Liquidity Ratio.* Shows the amount of cash available to pay interest. The recommended value of this ratio is 0.2-0.5.

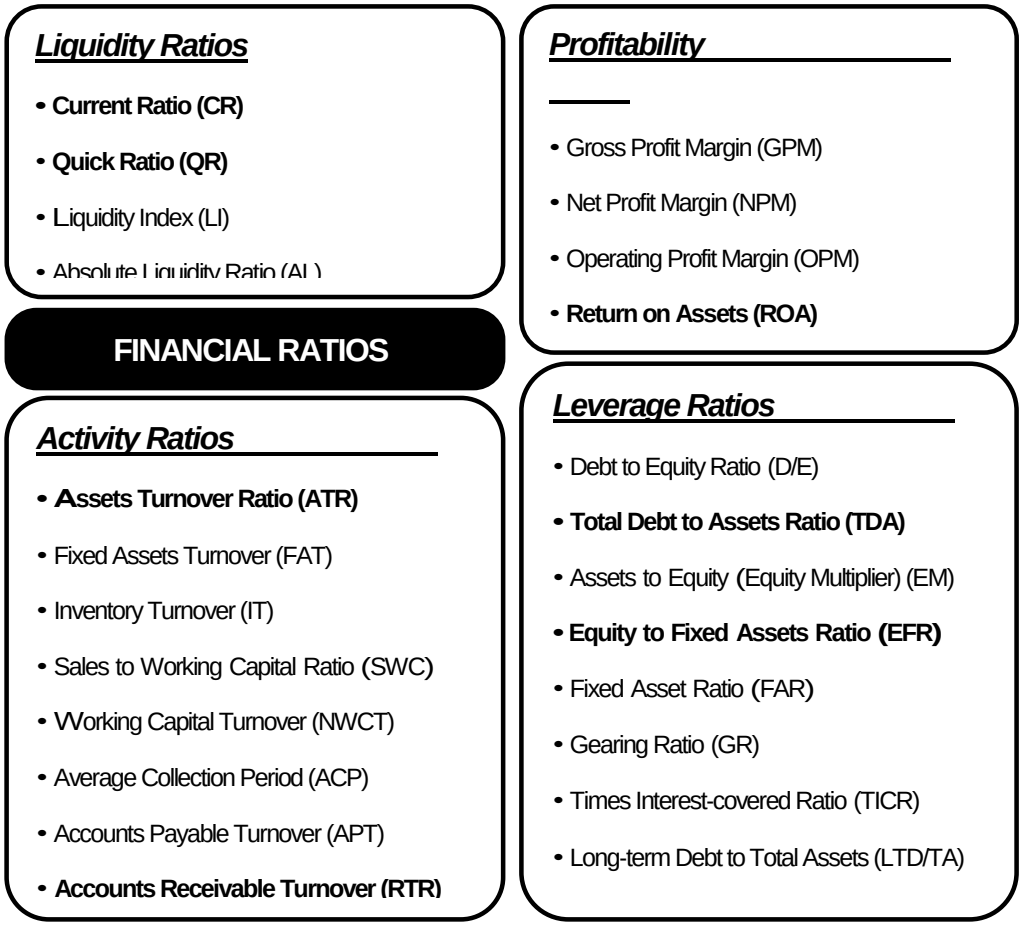

Figure 26: Financial ratio categories (adapted to Fabozzi and Peterson, 2003

- *Net Working Capital-To-Sales Ratio*. Compares net working capital (current assets minus current liabilities) with sales.
- *Operating Cash Flow Ratio* is focused on the ability of a company's operations to generate the resources needed to repay its current liabilities.

Activity ratios

These ratios are a strong indicator of the quality of management, since they reveal how well management is utilizing company resources. Activity ratios measure efficiency of a company by

using working capital. It measure the speed with which various accounts are converted into sales or cash – inflows or outflows.

- *Assets Turnover Ratio*. It measures a company's efficiency at using its assets in generating sales or revenue - the higher the number the better. It also indicates pricing strategy. Companies with low profit margins tend to have high asset turnover, while those with high profit margins have low asset turnover.
- *Fixed Asset Turnover Ratio.* Measures a company's ability to generate sales from a certain base of fixed assets.
- *Inventory Turnover Ratio.* Measures the amount of inventory needed to support a given level of sales. It measures the efficiency of inventory.
- *Sales to Working Capital Ratio.* Shows the amount of working capital required to support a given amount of sales.
- *Working Capital Turnover Ratio.* Measures a company's ability to generate sales from a certain base of working capital.
- *Accounts Payable Turnover Ratio.* Measures the speed with which a company pays its suppliers.
- *Accounts Receivable Turnover Ratio.* Measures a company's ability to collect accounts receivable.
- *Accounts Receivable to Current Liabilities Ratio*. It shows how many short-term accounts receivables are covered by short-term operating liabilities.

Profitability ratios

These ratios measure how well a company performs in generating a profit or help to measure on the other side how well a company is managing its expenses. These measurements allow evaluating the company's profits with respect to a given level of sales, a certain level of assets, or the owner's investment. It is related to the effectiveness with which management has employed both the total assets and the net assets as recorded on the balance sheet.

- *Gross Profit Margin.* This ratio measures the percentage of sales money remaining after the firm has paid for its goods. The higher is the gross profit margin, is better. In general, a company's gross profit margin should be stable.

- *Net Profit Margin*. It measures the percentage of each monetary unit from sales remaining after all costs and expenses, including interest, taxes, and preferred stock dividends, have been deducted.
- *Operating Profit Margin*. It measures the percentage of each monetary unit from sales remaining after all costs and expenses other than interest, taxes, and preferred stock dividends are deducted (Gitman, 2004). A high operating profit margin is preferred.
- *Return on Assets (ROA)*. It is considered as a critical ratio for determining a company's overall level of operating efficiency and it shows how much profit was earned on the total capital used to make that profit.
- *Return on Equity (ROE)*. It is another very important measure of a company's profitability that reveals how much profit it generates with the money shareholders have invested.
- *Return on Capital Employed (ROCE)*. This ratio indicates the efficiency and profitability of a company's capital investments.
- *Return On Sales* (ROS). A ratio widely used to evaluate a company's operational efficiency. ROS is also known as a firm's "operating profit margin".
- *Breakeven Point.* Reveals the sales level at which a company breaks even.

Leverage ratios

These ratios reveal the extent to which a company is relying upon debt to fund its operations, and its ability to pay back the debt. Financial leverage enables a company to have an asset base larger than its equity. A company can finance its assets with equity or with debt. Usual practice is expanding the equity through borrowings and the creation of other liabilities like accounts payable, accrued liabilities, and deferred taxes. Financial leverage increases the company's ROE as long as the cost of the liabilities is less than the return from investing these funds.

- *Debt to Equity Ratio*. Shows the extent to which management is willing to fund operations with debt, rather than equity. The ratio shows how a company finances its operations with debt relative to the book value of its shareholders equity.
- *Total Debt to Assets Ratio*. It measures the proportion of total assets financed by company's creditors. The higher Total Debt to Assets Ratio, the greater degree of indebtedness and the more financial leverage a company has.

- *Assets to Equity (Equity multiplier)* (EM). It is also the component measure of financial leverage. It shows how a company uses debt to finance its assets.
- *Equity to Fixed Assets Ratio (EFR).* It represents the amount of assets on which shareholders have an equity claim.
- *Fixed Asset Ratio (FAR).* Fixed Assed ratio is used to measure the fixed asset ratio over the total Asset. Fixed Asset Ratio can show how much the company depend on Fixed Asset to run their business.
- *Gearing Ratio*. It is a measure of financial leverage, representing the degree to which a company's activities are funded by owner's funds in opposition to creditor's funds.
- *Times Interest-Covered Ratio*. The first coverage ratio, which provides the information about how well a company can cover or meet the interest payments associated with its debt. The ratio compares the funds available to pay interest (EBIT) with the interest expense. The greater the interest coverage ratio, the better is ability to pay interest expense.
- *Long-term Debt to Total Assets*. The ratio measures a share of company's total assets, which is financed by long-term sources. The higher this value is better.
- *Long-term Debt to Long-term Assets Ratio (LDA)*. This ratio shows which part of the long-term (fixed) asset is created by long-term financing.
- *Financial Leverage*. This measure is opposite to the Equity Multiplier Ratio and shows dependency of a company from external sources of financing. The lower this ratio, the higher risk of insolvency a company has.

3.1.5. Limitations on using financial ratios

Financial ratios have certain limitations in their use and are not meant to be applied as definitive answers. They are usually used to provide additional details in the determination of the results of financial and managerial decisions. They can provide clues to the company's performance or financial situation. However, on their own, they cannot explain whether performance is good or bad. Ratios have to be interpreted carefully. Some cautions about using ratios in financial analysis are:

- *Ratios with large deviations from the norm only indicate symptoms of a problem.* It is essential always to carry out additional analysis based on internal data to isolate the causes of the problem. Ratio analysis just directs attention to potential weak spots. It does not provide conclusive evidence and only shows the existence of a problem;
- *A single ratio does not provide enough information sufficient to judge the overall performance of a firm.* Only a group of ratios can practically play key role in it;
- *The ratio comparison should be made using ratios calculated with financial statements dated at the same point in time*. Otherwise, the effects of seasonality may produce incorrect conclusions;
- *The use of audited financial statements for ratio analysis is preferable.* Using an audited financial statement guarantees a certain level of trust both for analyst and for the end-user;
- *The financial data being compared should have been developed in the same way.* The use of differing accounting practices is especially relative to inventory and depreciation and can distort the results of ratio analysis;
- *Results can be distorted by inflation,* which can cause the book values of inventory and depreciable assets to differ greatly from their true (replacement) values.(Gitman, 2004)

Ratio analysis is a useful tool, but a person who deals with it has to be always aware of these limitations and make adjustments as necessary and whenever possible. First, the ratio analysis is not just a mechanical process, as it seems to be. It involves an accurate results interpretation. For instance, a correct conclusion about financial ratio value is impossible without analysis of economic situation both in the industry and in the country. Knowing of environment where studied companies operate helps to make better conclusions for an analyst.

3.2. METHODS AND MATERIALS

The key issue of successful financial analysis is in the right selection of indicators (selection of key performance economic / financial indicators). It is important that indicators are adapted to the intended use, and that the number of indicators is small, since an excessive number of indicators saturate the information. Moreover, some of the indicators may be in the strong correlation with each other, which complicates the interpretation (Slapničar, 2004). In order to facilitate focused and purposeful selection of indicators some authors (for example:

Rees, 1995; Higgins, 1995; Brigham, Huston, 2009; Elliot and Elliot, 1996; Pratt, 1990; Mramor, 2002) classify indicators into different groups, taking into account the content connectivity of indicators. Other authors take into account the mutual correlation of the indicators (adapted from Slapničar, 2004). The most common sets of indicators are: profitability, solvency, structure of funding, turning assets and indicators of market values. Some authors formed the sets differently: certain indicators were putted in group on the different way (Slapničar, 2004).

For the purpose of this research, the analysed indicators were selected from the group of profitability, solvency, asset turnover and structures of funding. The indicators that have been used in similar studies (Ajpes FIPO, 2013; Slapničar, 2004; Peršak, 2011; Rebernik 2008; Hornby, Gammie, Wall, 1997), are selected:

Return On Sales (ROS): A ratio widely used to evaluate a company's operational efficiency. ROS is also known as a firm's "operating profit margin".

$$ROS = \frac{\text{Net Income}}{\text{Sales}} \quad (6)$$

Return On Assets (ROA): An indicator of how profitable a company is relative to its total assets. The higher the ROA number, the better, because the company is earning more money on less investment.

$$ROA = \frac{\text{Net Income}}{\text{Total Assets}} \quad (7)$$

Asset Turnover Ratio (ATR): The indicator ATR measures a firm's efficiency at using its assets in generating revenue. A high asset turnover ratio indicates greater efficiency. A low asset turnover ratio indicates inefficiency, or high capital-intensive nature of the business.

$$ATR = \frac{\text{Revenue}}{\text{Total Assets}} \quad (8)$$

Accounts Receivable Turnover Ratio (RTR): The receivables turnover ratio is an activity ratio, measuring how efficiently a firm uses its assets. A high ratio implies either that a company operates on a cash basis or that its extension of credit and collection of accounts receivable is efficient. A low ratio implies the company should re-assess its credit policies in order to ensure the timely collection of imparted credit that is not earning interest for the firm.

$$RTR = \frac{\text{Net Credit Sales}}{\text{Average AccountsReceivable}} \quad (9)$$

Long Term Debt to Long Term Assets Ratio (LDA): It shows long-term financing of long-term assets and normal stocks. The indicator is a conservative indicator of payment ability, since it assumes that stocks cannot be converted into cash within a short period of time.

$$LDA = \frac{\text{Long term Debt}}{\text{Long term Assets}} \quad (10)$$

Accounts Receivable to Current Liabilities Ratio (ARL): It shows how many short-term accounts receivables are covered by short-term operating liabilities and/or how much short-term operating liabilities could be settled by the realization of short-term accounts receivables.

$$ARL = \frac{\text{Accounts Receivable}}{\text{Current Liabilities}} \quad (11)$$

Current Ratio (CR): A liquidity ratio that measures a company's ability to pay short-term obligations. Also known as "liquidity ratio", "cash asset ratio" and "cash ratio". The ratio shows the ability to pay back its short-term liabilities (debt and payables) with its short-term assets (cash, inventory, receivables). The higher the current ratio, the more capable the company is of paying its obligations. A ratio under 1 suggests that the company would be unable to pay off its obligations if they came due at that point.

$$CR = \frac{\text{Current Assets}}{\text{Current Liabilities}} \quad (12)$$

Quick Ratio (QR): An indicator of a company's short-term liquidity; also known as the "acid-test ratio" or the "quick assets ratio". The quick ratio measures a company's ability to meet its short-term obligations with its most liquid assets. The quick ratio is more conservative than the current ratio, a more well-known liquidity measure, because it excludes inventory from current assets. The higher the quick ratio, the better the position of the company.

$$QR = \frac{\text{Current Assets - Stocks (ali inventories)}}{\text{Current Liabilities}} \quad (13)$$

Equity-to-Fixed-Assets Ratio (EFR): It represents the amount of assets on which shareholders have an equity claim. Empirical analyses of the indicators for Slovenian companies prove that the structure of assets and liabilities are really strongly connected: if among the assets there is a large share of long-term assets, is also among the sources of financing higher share of long-term funds. Such a ratio only ensures the solvency of the company.

$$EFR = \frac{\text{Equity Capital}}{\text{Fixed Assets}} \quad (14)$$

Total Debt to Assets Ratio (TDA): A metric used to measure a company's financial risk by determining how much of the company's assets have been financed by debt.

$$TDA = \frac{\text{Short Therm Debt+Long Term Debt}}{\text{Total Assets}} \quad (15)$$

Fixed Asset Ratio (FAR): Fixed Asset Ratio shows how much the company depend on fixed asset to run their business. But the link between the way of financing and the value of the indicator is not a direct one, though more long-term (fixed) assets in total assets requires a coordinated long-term financing.

$$FAR = \frac{\text{Fixed Asset}}{\text{Total Assets}} \quad (16)$$

In calculating the indicators, the data for sector C16 (wood processing – except furniture) and C31 (manufacture of furniture) were considered; according to the classification of economic activities (Ajpes, 2013). The indicators were calculated for the period 2007 to 2011 (5 years). For all indicators the mutual correlation (Pearson correlation coefficient) was calculated and on its basis the indicators that were highly correlated with each other, were eliminated and were not taken into account in the analysis. For the comparison of values of indicators for sector C16 and sector C31, the Student's T-test was used. If the calculated two-tailed p-values were smaller than 0.05, they were considered as statistically significant (Košmelj, 2001).

The sample was consisted of all companies and sole proprietors operating in sectors C16 and C31. The research was based on searching and preparing data from official statistical databases (Ajpes, 2013). The sample size differs in different years according to the various changes in the number of companies in sectors, but in every year all registered (and functioning) companies in that year were included (Table 9).

Table 9. Number of companies in sample

Sector / Year	**2007**	**2008**	**2009**	**2010**	**2011**
C 16	930	1.543	1.507	1.467	1.489
C 31	1.004	1.052	1.053	1.057	1.050
TOTAL	**1.934**	**2.595**	**2.560**	**2.524**	**2.539**

The majority (more than two-thirds) of companies in each sector were representing sole proprietors. Number of enterprises in sector C31 did not change over the last years, while the number of companies in the business of C16 in 2008 increased by 66% in comparison with the previous year. The increase can be related to the introduction of the new classification of economic activities in the year 2008, which especially in the sector C16 introduces some new sub-categories.

3.3. RESULTS

Table 10 provides data on selected indicators for the sector C 16 and C 31. For all indicators, there is significant decline in 2008, while in some cases the situation improves in recent years.

Table 10. Values of the calculated indicators for both sectors: C16 and C31 (2007 to 2011)

indicators	C 16					C 31				
\ year	2007	2008	2009	2010	2011	2007	2008	2009	2010	2011
ROS	5,63%	0,14%	-0,55%	-0,76%	-0,62%	1,12%	0,09%	-3,87%	-4,82%	-4,48%
ROA	6,45%	0,14%	-0,48%	-0,69%	-0,59%	1,27%	0,10%	-3,36%	-4,49%	-4,15%
ATR	1,065	1,006	0,831	0,872	0,925	1,094	1,026	0,837	0,884	0,886
RTR	5,392	5,222	4,266	4,539	5,127	5,260	5,199	4,274	4,493	4,667
LDA	0,985	1,004	1,043	1,038	1,025	1,036	1,062	1,082	1,002	1,014
ARL	0,512	0,504	0,578	0,552	0,493	0,494	0,490	0,517	0,468	0,495
CR	0,976	0,991	1,067	1,051	1,029	1,034	1,070	1,090	0,989	1,010
QR	0,631	0,626	0,716	0,713	0,653	0,644	0,663	0,654	0,607	0,630
EFR	0,648	0,634	0,706	0,700	0,714	0,826	0,797	0,778	0,687	0,681
TDA	63,1%	63,6%	60,6%	60,9%	60,4%	58,6%	58,8%	59,4%	63,4%	62,0%
FAR	54,6%	55,4%	54,2%	54,3%	53,8%	47,8%	49,3%	50,1%	50,8%	53,7%

Legend: ROS - Return On Sales; ROA - Return On Assets; ATR - Asset Turnover Ratio; RTR - Accounts Receivable Turnover Ratio; LDA - Long Term Debt to Long Term Assets Ratio; ARL -

Accounts Receivable to Current Liabilities Ratio; CR - Current Ratio; QR - Quick Ratio; EFR - Equity-to-Fixed-Assets Ratio; TDA - Total Debt to Assets Ratio; FAR - Fixed Asset Ratio

Calculation of Pearson correlation coefficients between the individual indicators showed that there was very strong correlation among some indicators. Therefore, for a more detailed analysis the following indicators were used:

- Return On Sales (ROS)
- Long Term Debt to Long Term Assets Ratio (LDA)
- Current Ratio (CR)
- Total Debt to Total Assets (TDA)

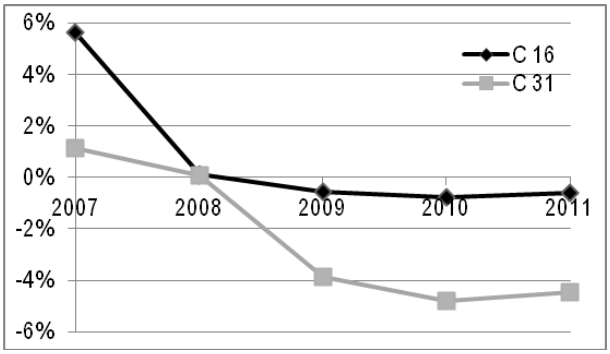

Figure 27. Return On Sales (ROS) for C 16 and C 31 (2007-2011)

Over the last three years both sectors exhibit a real loss, so the indicator "Return On Sales (ROS)" was negative for both (Figure 27). The drop was greater in sector C31 , while a minimum in the both sectors appeared in 2010. In the last year the indicator in the both sectors improved slightly, but they still stays on the negative side. This indicator also affects the "Return On Assets (ROA)" and "Return On Equity (ROE)", their close relationship with ROS is also evident from Table 10.

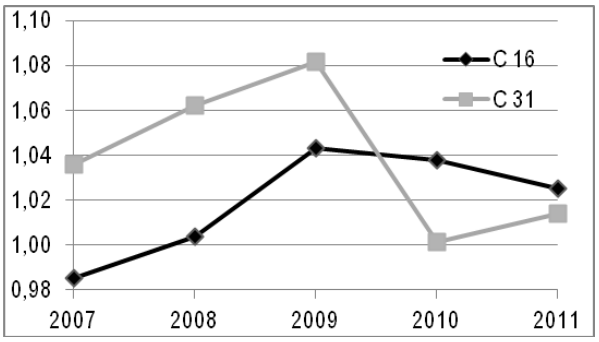

Figure 28. Long Term Debt to Long Term Assets Ratio (LDA) for C 16 and C 31 (2007-2011)

The indicator "Long Term Long Term Debt to Assets Ratio (LDA)" was mainly only a little more than 1 (Figure 28). This indicates a slight threat to long-term solvency which is problematic both sectors. At C31 the value of the indicator in 2011 slightly improved, while the C16 is in declined for last two years.

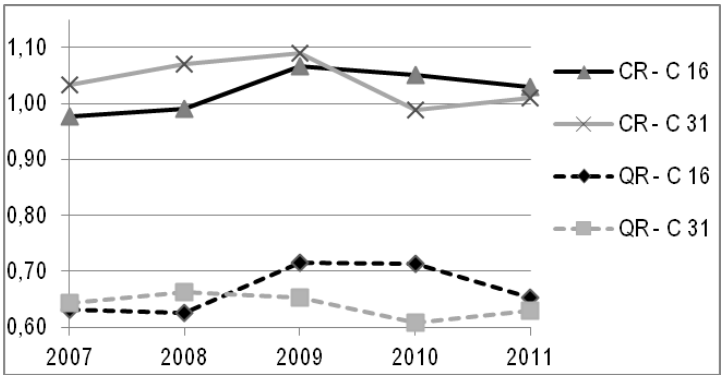

Figure 29. Current Ratio (CR) and Quick Ratio (QR) for C 16 and C 31 (2007-2011)

The "Current Ratio (CR)" has the values a little above 1 for both sectors (Figure 29). It means that on average in the companies there were more current assets than current liabilities. However, when compared CR with the "Quick Ratio (QR)" (the values of QR were much smaller than 1), it can be assumed the significant risk of short-term liquidity. Situation in the C31 was much worse than in the sector the C16, although in the C31 the situation was slightly better in the last year.

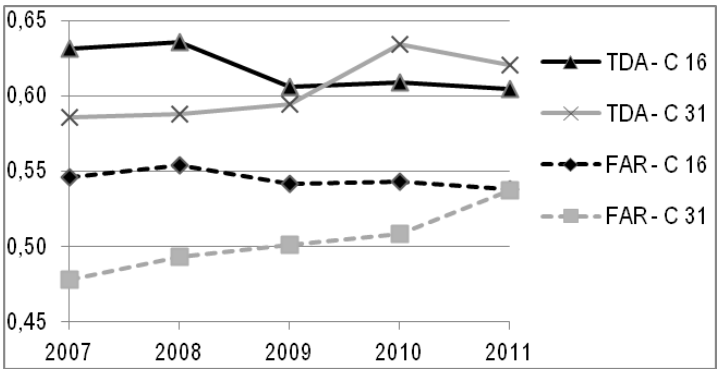

Figure 30. Total Debt to Total Assets (TDA) and Fixed Asset Ratio (FAR) for C 16 and C 31 (2007-2011)

Indicator “Debt to Total Assets (TDA)" showed that in most cases more than half of the assets in the financing structure of funding were in debts (Figure 30). This is relatively unfavourable in terms of both risk investment and long-term solvency. Similarly the indicator "Fixed Asset Ratio (FAR)" also shows unfavourable picture. It indicates a relatively low coverage of current liabilities with current assets (values around 0.5 - ideally more than one). At the same time, the indicator "Long Term Long Term Debt to Assets Ratio (LDA)" shows the problem of covering stocks with long-term sources. According to all three indicators it can be concluded that the short-term liquidity of companies was poor, which may be the result of excessive receivables and / or stocks and inadequate funding of operations. Similarly unfavourable picture shows also the indicator “Equity to Fixed Assets Ratio (EFR)" which values specifically in C31 strongly decrease, was also in the C16 somewhere around 0.7. This means that a substantial part of fixed assets are financed by debt capital, what may the creditors pose a greater risk.

By calculating the t-test, which was used to determine statistical differences of the time series of each indicator, it was proven that for the observed period of time the differences among the values of all the individual indicators were not statistically significant.

3.4. DISCUSSION AND CONCLUSIONS

Based on the analysis of financial indicators it can be found out that the values of the studied indicators worsened considerably at the beginning of the economic crisis, therefore it can be deduced to decreased solvency and increased business risk. In the sector of C16 some of the indicators improved in the last four years, what is indicating a recovery, although the sector is still showing an increased risk for certain creditors, as well as for owners, especially in terms of the coverage of assets with appropriate funds, as well as short-term liquidity. These are the main threats to this sector. In the sector of C31 the situation is not (much) better from the beginning of the crisis. This indicates a high risk of this sector, both for creditors and owners. However, there are little differences between the two sectors, what was also statistically approved.

In this context, the radical measures are necessary for the improvement of the situation and development potential of Slovenian wood industry. Some of them are written in a Platform for the restructuring of Slovenian wood industry (Humar et al., 2012). Besides the urgent providing of higher added value, which would increase the Return on Sales, there is particularly urgent to improve the capital structure, in particular by seeking foreign direct investments in the wood industry companies. In this way the companies would acquire fresh capital for the development and modernization of fixed assets and reduce dependence on long-term debt financing, which would guarantee them a smaller long-term risk. In the economy in general there is a need for improvement of payment discipline, which would reduce the share of accounts receivables in total assets and subsequently improve the short-term liquidity of the companies.

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4. CHANGING PATTERNS OF ROUNDWOOD DELIVERIES IN SLOVAKIA

Hubert Paluš, Ján Parobek

4.1. FORESTRY IN SLOVAKIA

Forest production potential can be understood as the ability of forest to primary produce timber as the basic raw material for wood as well as pulp and paper industry. Forests cover approximately 2.0 million ha in Slovakia, i.e. 41 % of its territory. There is a relatively good composition of tree species consisting roughly of 50 % coniferous and 50 % broadleaved tree species. According to the MPaRVSR (2010) the total growing stock is approximately 452 million m^3. Its composition has shifted to the older age classes, thus strengthening the basis for greater allowable cut originating mainly from regeneration felling. A higher share of broadleaved trees species, its natural composition and especially its age structure are a priori good preconditions for higher production of high quality timber assortments.

The category of commercial forests, creating 81 % of the planned timber felling, is crucial for timber production. The category of special purpose forests accounts for about 17 % and protective forests for only 2 %. Based on the area comparison, broadleaved species in the category of commercial forests are prevailing, covering nearly double area compared to coniferous species. The differences in distribution of the growing stock according to age classes are not so significant as it is almost symmetrically distributed around the 9^{th} age class. The average growing stock per hectare increases with age classes according to the typical growth "S" curve, while coniferous species reach the volume up to 500 m^3 per ha in the oldest age classes. The growing stock per hectare of broadleaved species is lower by about 20-25 %. The growing stock per hectare in the protective forests reaches only 50-70 % of the commercial forests. During the last 20 years the forest area and standing volume has moved by 1-2 class to the older age classes. As a result, the greatest portion of growing stock of coniferous as well as broadleaved species moved from the 7^{th} to the 9^{th} age class and thus closer toward the rotation period. At the same time, the intensity of planned tending and regeneration felling moderately decreased (Petráš et al. 2010).

4.2. ROUNDWOOD PRODUCTION AND CLASSIFICATION

The forest industry has experienced many important changes during last twenty years. After the year 2000 wood processing capacity in Slovakia increased significantly and improved domestic wood consumption (Kaputa and Sucháň 2012). In 2010, total felling was 9.6 mil. m^3; the second highest volume of timber felling in the history of forestry in Slovakia (in 2005, it was 10.2 mil. m^3 due to processing of accidental felling wood after the windstorm in November 2004). In 1993 roundwood removals was only 5.2 mil. m^3 (out of which 2.99 mil. m^3 coniferous roundwood). The current volume and assortment structure of felling is the result of large-scale accidental felling due to the action of harmful agents. The proportion of incidental felling in coniferous forest stands is in the long term around 80 % of the total coniferous wood felling. Income and economic potential of forestry has an increasing trend, but exceeding the planned volume of production diminishes the future felling opportunities. The most important source of income in forestry is sale of timber, which account for more than 78 % of total sales in forestry. Therefore, timber production is considered as the crucial management and economic activity in forestry and related industries. One of the aims of the economic policy of the EU countries is the continuous growth of wood competitiveness (Loučanová 2006). The traditional markets for wood products are saturated and new opportunities are going to be uncovered (Maťová 2009).

In the wood supply chain, assortment process is one of the most important operations. This process decides how and where timber will be use. From the technical point of view, only certain qualities of wood can be used for specific purposes. According to the valid Slovak Technical Standards (STN 48 0055 Qualitative classification softwood round timber, STN 48 0056 Qualitative classification hardwood round timber) roundwood is categorised into timber assortments. The criteria for classification are based on the tree species, timber dimensions (length and diameter) and the presence of wood defects (quality). Each quality class includes timber for particular use within industrial processing or for the final use. For coniferous and non-coniferous wood, these standards distinguish the following quality classes of assortments:

I. quality class - veneer logs (used for production of sliced veneer)

II. quality class - veneer logs (used for production of rotary cut veneer)

III. quality class – sawlogs

IV. quality class - posts, pit props, poles

V. quality class - pulpwood for chemical and mechanical processing

VI. quality class - fuel wood

Assortments in the first three classes (I.-III.) represent logs, quality class IV. stands for other industrial roundwood and quality class V. for pulpwood. Whole those classes are classified as industrial roundwood. The last quality class is fuel wood – a specific assortment of roundwood that is utilised for energy purpose. However, if the international classification is considered, fuel wood is part of energy wood category together with charcoal, wood residues chips and particles etc. Apart from wood assortments defined by the standards, there are also whole lengths, wood chips and standing timber offered to the market (Parobek et al. 2009).

The classification of timber according to the mentioned standards is principally used in timber trade; however, timber processors or merchants often demand specific timber dimensions and have specific quality requirements. From the viewpoint of timber trade the valid technical standards are not compulsory but many domestic timber growers and processors use them as a benchmark for mutual trade in terms of timber quality and dimensions. In foreign trade relations, timber classification standards of foreign timber markets are also used. Apart from the main timber assortments, chips and, during the latest years, also standing timber has been sold. Regarding the timber measurement and timber volume calculation, domestic standards are primarily used.

Removals of fuel wood in 2010, including wood for production of charcoal were 510 thousand m^3 and removals of industrial roundwood reached 9.1 mil. m^3, thus increased annually by 6.92 %. Removals of coniferous industrial roundwood were 6.1 mil. m^3 and non-coniferous industrial roundwood 3.0 mil. m^3 which was 16.4 % more than a year before. Removals of sawlogs and veneer logs reached 5.6 mil. m^3 and increased annually by 17.8 %. A significant part of logs is represented by coniferous sawlogs and veneer logs which production increased by 13.2 % to 4.3 mil. m^3. Non-coniferous sawlogs and veneer logs production was not so high but increased by 36.7 % to 1.3 mil. m^3. Removals of pulpwood were 3.5 mil. m^3 (drop by 6.8 %); about 47 % of this volume was coniferous pulpwood. Removals of other industrial roundwood decreased and reached only 31 thousand m^3.

Foreign trade during last 20 years passed significant changes. New economics changes help to eliminate barriers end expand trade (Šupín, 2005). In 2010, import of roundwood increased and was 650 thousand m^3 (mostly industrial roundwood 582 thousand m^3). On the

other hand fuel wood import was only 68 thousand m^3 and wood chips and particles was 108 thousand m^3, but in this assortments import increased 54 times compared to the previous year. Roundwood exports reached 2.6 mil. m^3 (export of industrial roundwood decreased to 2.4 mil. m^3, wood fuel to 130 thousand m^3 and wood residues to 60 thousand m^3). Only export of wood chips and particles increased and reached 198 thousand m^3, which was two times more than in the previous year.

4.3. SUBTITUTION AND ROUNDWOOD ASSORTMENTS

Throughout the world, the forest and related non-forest sector industries are undergoing gradual, but sometimes major, technological changes. More significantly, the speed of these changes differs greatly between various industries and the resultant competitive pressure is often greatest for the older, well-established industries. The forest industry is, of course, among the older group. Irrespective of whether intermediate or final users are considered, advancing technological evolution mainly results in the substitution of new types of customer satisfaction for old ones. The basic needs may not undergo radical variation, only the ways of satisfying them (Batten and Johansson 1987). Forest industry is a producer of raw and processed wood products. At the present time, thanks to technological improvement and utilisation of new materials it is possible to find substitute for each timber product offered to the market.

Wood demand is so-called derived demand, which means that the volume of wood demanded depends on level of demand for final wood products. The final level of wood consumption and market changes are the reflection of the influence of a range of social, economic and demographic factors, industry structure and the level of industry development. Wood supply is affected by the factors such as available cut, accidental felling, wood stock from previous periods, ownership structure, own consumption, wood price, price of production factors, valid legislation, etc. Wood demand depends on the number and structure of processing industry, energy industry, wood stock from previous periods, economic development, demand of related industries, supporting programs and activities for wood promotion, wood and wood products price, traditions and consumer preferences, etc. Wood has been a primary energy source for humankind from its infancy. Till 19th century wood was utilised as energy sources, in construction sector (houses and ships, coach etc.) and in production of massive furniture. Up to

industry revolution wood was irreplaceable as the most important fuel and raw material for construction, agriculture, crafts, shipbuilding etc. Early shortages of wood have caused both the development of wood saving techniques, e.g. half-timbered constructions in central Europe (Radkau and Schäfer 1987), and the introduction of alternative materials and energy sources. Schulz (1993) postulates that the substitution of wood by other materials and energy sources, which is continuing until today, will be reversed and a new phase of re-introduction of wood will start due to environmental reasons and exhaustion of certain non-renewable raw materials and fuels (Figure 31).

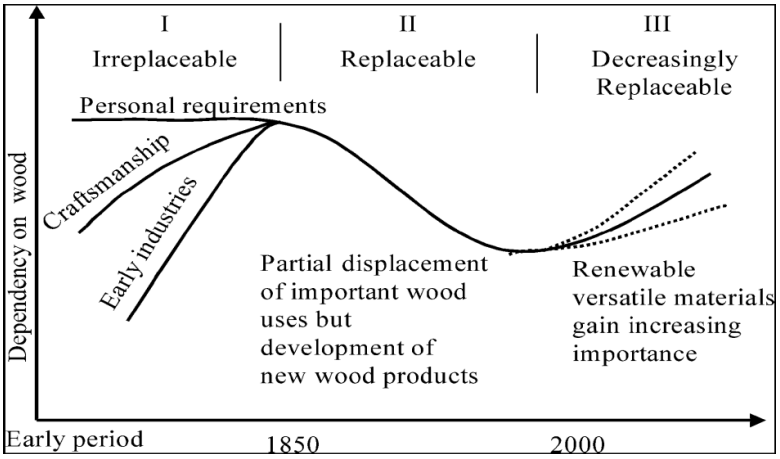

Figure 31. History of wood utilization – Three Phases Theory

Source: Schulz (1993)

From the environmental point of view wood as renewable material is an important resource in the future. In the context of this issue wood substitution meant increasing the transformation of forest biomass into wood products in order to replace products emitting more GHGs per functional unit. Gustavsson et al. (2006) defined wood substitution as any use of wood that replaces other inputs of production in providing equivalent service or function. This can be done by making use of wood instead of fossil fuels (fuel or direct substitution) or/and wood instead of non-wood materials (material or indirect substitution). Material substitution of wood involves either factor substitution (e.g. in the construction or the chemical industries) or product substitution (e.g. furniture, printing paper), meaning that wood can substitute for other materials in a production process or a final product.

The most important materials competing with wood material are plastics, aluminium, steel, concrete, gypsum and brick. In different sectors wood can be substitute for non-renewable materials. For instance steel, concrete, and brick are important alternatives in construction. Aluminium and plastics are widely used in manufacturing of windows and doors. Along with plastics, aluminium is also an important competitor in the packaging sector. The competitiveness of wood is challenged in consumer packaging, building cladding materials and framing materials, whereas it is less challenged for example in transport packaging, pallets, flooring and wallpaper (Burrows and Sannes 1998). Substitution is only one side of the relationship among materials. On the other side different materials are complementary, like furniture production made from wood or wood fibres also including some steel or plastics components. Motives for substitution and for complementarity of materials vary among products and sectors and countries. One of the best examples can be share of timber frame houses in construction sector in different European countries and North American Countries. Thus significant differences are due to many factors such as natural conditions, culture and traditions etc.

In substitution analysis of Gustavsson et al. (2006) describes general material flow of wood among industry sectors. The land where the forest is situated is also included in substitution considerations and two main substitutions are defined: energy and material substitution. Energy substitution takes place if different wood fractions like tops, branches, etc. are used to produce different type of energy, such as electricity, heat, and transportation fuel. When this energy substitutes for fossil energy the substitution has a direct effect on greenhouse gas emissions. Material substitution takes place if wood fibres are used to substitute other materials and products. In the final products markets wood-based products may compete with non-wood products and thus substitute for each other. In addition to the substitution of non-wood materials by wood, there could be inter-wood substitution (e.g. particleboard replaces solid sawnwood).

Gustavsson et al. (2006) in his research confirm that this substitution might lead to a reduction of greenhouse gas emissions not only because concrete, steel, and gypsum are more energy and GHG intensive than wood, but also because wood residues from logging and processing and wood-based products at the end of their lives are used for energy generation. As for the use of wood as a source of energy by households, Osiolo (2009) analysed the factors

influencing household choices for fuel, studied the factors influencing fuel wood expenditures and investigated the factors that influence substitution from either traditional or transitional fuels to modern fuels. All those factors, he classified as economic and non–economic factors. The non-economic factors included e.g. household headship, education, gender, location of the household, size and type of dwelling, houses with chimney, while the economic factors comprised distance to fuel source, fuel prices, the proportion of fuel wood expenditures to the total household expenditure, total household expenditures, rent expenditures, and access to electricity and water.

Considering the fact that the demand for timber is derived demand, the way how wood is finally used and substituted by other materials can influence forest owners to produce assortments demanded by the market. Any changes in the structure of roundwood deliveries would result from the possibility of their mutual substitution. However, it is necessary to notice, that a perfect substitution in production of roundwood assortments does not exist as during the production of one assortment there are, at the same time, other assortments produced as well. In certain cases the demand conditions reflected through the market price can stimulate production of a certain assortment instead of the other one. This process is, however, limited by the qualitative attributes and appropriateness of individual assortments for certain uses. Batten and Johansson (1987) outlined a methodological approach for analysis of substitution. First of all it is necessary to identify sectors as customers demanding commodities as inputs for ongoing activities. For each sector it is also possible to identify different customer groups, each with specific input requirements and substitution possibilities. Let x_{jH} denote the input quantity of product *j* to sector *H.* A product group *I* is defined as a set of products that satisfy the same type of need or function for sector *H.* An example of such a group is the set of various materials that can be used as facing for a building (e.g., bricks, metal, and timber products).

Let a_{iH} be an input coefficient, and x_H the output quantity from sector *H*. Moreover, let p_i signify a product price and τ_{iH} value share coefficient. Then we have:

$$a_{iH} = x_{iH} / x_H \qquad [17]$$

$$\tau_{iH} = p_i a_{iH} / \sum_{i \in I} p_i a_{iH} \qquad [18]$$

$$\sum_{i \in I} \tau_{iH} = 1 \qquad [19]$$

As it follows from the theory of substitution, there is a relation between the relative price of products and its share on final production. Having product properties constant, an increase in relative price p_i/p_j results in decrease of its market share T_{iH}/T_{jH}. The following substitution coefficient S_{iH} can be introduced:

$$S_{iH} = \tau_{iH}/(1-\tau_{iH}) \qquad [20]$$

4.4. DEVELOPMENT OF ROUNDWOOD DELIVERIES

In order to analyse the past development of roundwood deliveries during the years 1993-2011 the official statistical data published for forestry and the national classification of roundwood assortments were used. In particular, the following categories of roundwood assortments were analysed: coniferous veneer and sawlogs, coniferous pulpwood, coniferous other industrial wood, non-coniferous veneer and sawlogs, non-coniferous pulpwood, non-coniferous other industrial wood, and an aggregated category of coniferous and non-coniferous energy wood. First of all, the development of total deliveries and deliveries according to the geographical destination was analysed using the share of export deliveries on the total deliveries. Secondly, the development of a share of energy wood on the total deliveries of roundwood was analysed to examine changing patterns in sale of wood due to the changing demand requirements. Finally, the development of shares of the three main groups of assortments (logs, pulpwood and other industrial roundwood) on the total deliveries of coniferous and non-coniferous industrial roundwood was analysed.

The development of total roundwood deliveries is shown in Fig 32. Both, coniferous and non-coniferous deliveries as well as the deliveries of energy wood have been increasing during the period from 1993 to 2011. An increasing trend in coniferous roundwood deliveries is the result of accidental felling due to the severe windthrown in 2004 and the consequent bark beetle damages in coniferous stands.

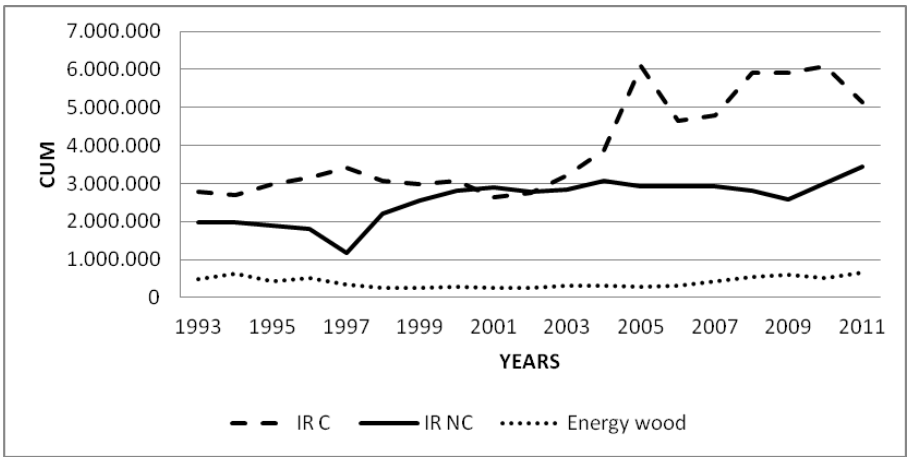

Figure 32. Roundwood deliveries

As it is shown in Fig. 33, in spite of fairly well developed wood processing sector and strong domestic demand for certain assortments such as coniferous sawlogs, a share of export on the total roundwood production is relatively high. Exported volume of wood should reflect domestic conditions and available capacities for wood processing. This is particularly valid for non-coniferous roundwood, where export accounted only for 16 % of the total deliveries, mainly due to high domestic demand for hardwood pulpwood used for pulp and paper production. On the other hand, up to 39 % of deliveries of coniferous roundwood were exported from the country in 2011. In spite of the increasing domestic demand from domestic sawmills there has been an increasing trend in export of coniferous sawlogs during the last years. Reasons for this paradox can be found in price differences between the domestic and export markets.

Fig. 34 illustrates the development of the share of energy wood on the total roundwood deliveries. Traditional use of wood as a fuel for households in the beginning of 90's was reflected in a relatively high proportion of wood fuel deliveries. It should be pointed out that these deliveries consisted completely of wood fuel; an assortment of wood in round or split form. With the increasing possibilities to apply for financial support from the EU funds after Slovakia entered the EU in 2004, forest energy chips, harvesting waste and wood fuel started to be more intensively used in energy sector. This growth has been also supported by the increasing prices of conventional fuels resulting in higher demand for wood as fuel by households. It is also important to mention that with the increasing felling and deliveries of roundwood, the volume of energy wood has been also increasing in absolute term.

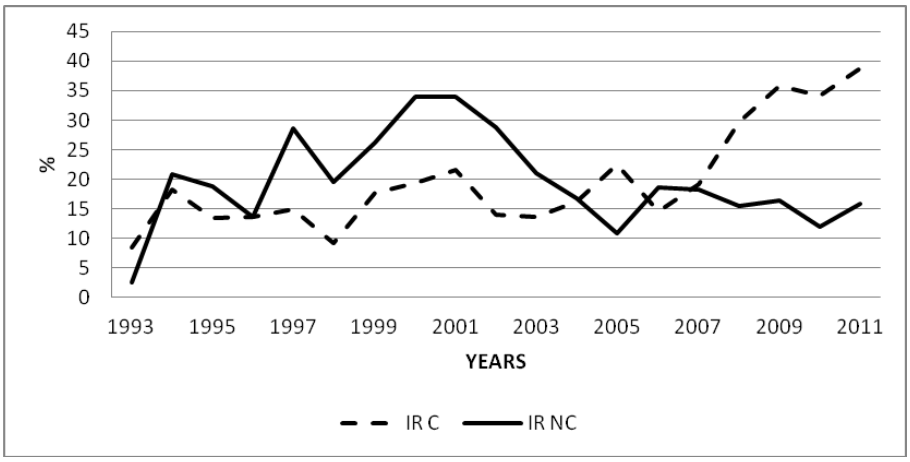

Figure 33. Share of export on total deliveries of industrial coniferous and non-coniferous roundwood

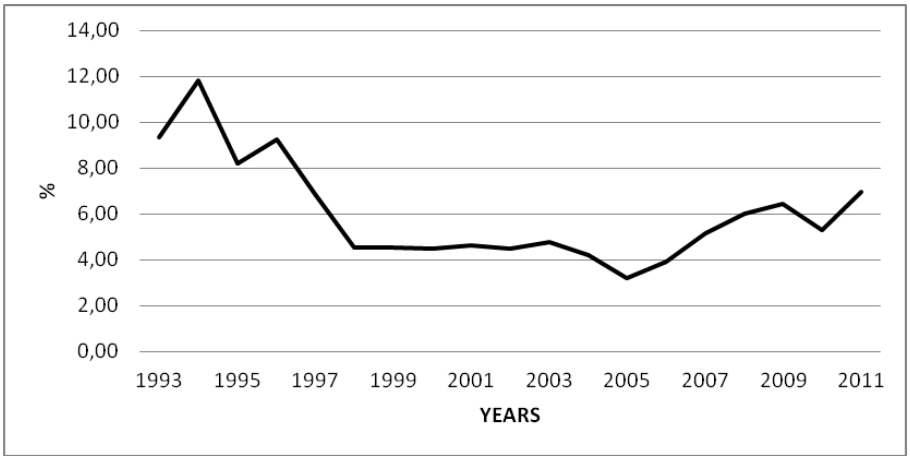

Figure 34. Share of energy wood on total deliveries of roundwood

Fig. 35 and Fig. 36 illustrate the development of shares of the main groups of roundwood assortments of the total deliveries of coniferous and non-coniferous industrial roundwood. There are significant differences in composition of coniferous and non-coniferous deliveries. Coniferous logs represent the main category of assortments with the share reaching up to 70 %, while a share of non-coniferous logs on the total deliveries of industrial roundwood

is up to 40 %. The volume of deliveries of other industrial roundwood decreases with the increasing volumes of delivered logs.

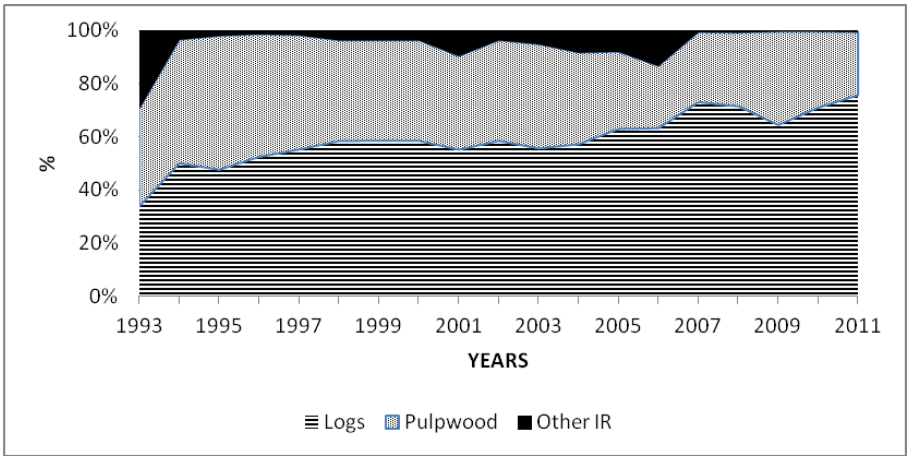

Figure 35. Share of assortments on total deliveries of coniferous industrial roundwood

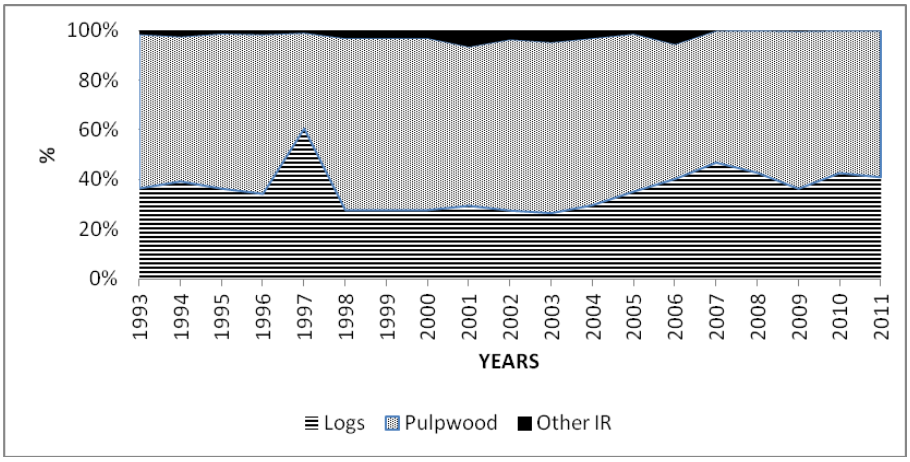

Figure 36. Share of assortments on total deliveries of non-coniferous industrial roundwood

Pulpwood is the main non-coniferous assortment produced and supplied to the market. Its share on the total non-coniferous roundwood accounts for about 60 %. Due to the strong demand from domestic pulp and paper industry as well as very low demand for beech logs, it

can be assumed that a certain part of industrial roundwood is used for the production of pulpwood even if it meets the qualitative and dimensional requirements for logs.

4.5. STRUCTURE OF ROUNDWOOD DELIVERIES

The above analysis shows the development of deliveries of various roundwood assortments in Slovakia during the period of 1993-2011. It is important to notice that figures 2-5 illustrate development of selected relative indicators without taking into account the fact that the volumes of total deliveries has been changing (increasing) during the monitored period due the influence of various factors, which may have caused variations in the structure of assortments. In the years 2000-2011 an average share of volumes of coniferous logs on total deliveries was 60.9 %. Due to the increasing demand for coniferous logs this share increased from 55.7 % to the present 71.1 %. This growth occurred at the expense of gradual decrease of the share of other industrial coniferous roundwood (change from 4.5 % to 0.7 % share). Similarly, a slide decrease in a share of coniferous pulpwood was recorded when it has presently dropped by 8 % compared to its long-term average.

In value terms, a share of coniferous logs on total value of coniferous roundwood deliveries was 83.8 % (more by 12.7 % compared to its volume share). This difference, of course, is reflected in value shares of lower quality assortments such as pulp wood and energy wood. Generally, the proportion of value of coniferous pulpwood (12.5 %) and other industrial roundwood (2.8 %) on total value of roundwood deliveries is approximately one half of their proportions on volumes. An average share of coniferous energy wood on total volumes is 4.5 % (varying from 2.4 % to 8.5 %), while its value share in only 0.9 % (Fig. 37).

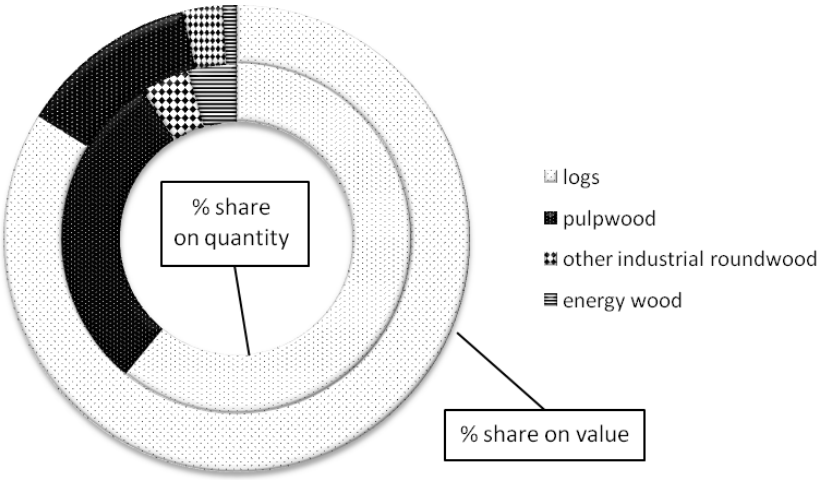

Figure 37. Average volume and value shares of coniferous roundwood assortments on total coniferous roundwood deliveries

The volume and value structure of non-coniferous roundwood deliveries differs compared to the coniferous ones. As a result of natural and growing conditions of broadleaved tree species the average share of non-coniferous pulpwood on total deliveries was 58.7 %. Despite of the strong demand from the concentrated pulp and paper industry for wood fibres this development has shown a decreasing trend when pulpwood represented 66.4 % in 2000 and declined to 54.2 % in 2011. A share of other non-coniferous industrial roundwood was only 2.2 % and logs accounted for 33.2 %, showing a slight increase during the monitored period. The most significant changes occurred in shares of non-coniferous energy wood when deliveries have doubled from 4.3 % to 8.5 % (average 5.9 %) during the monitored period. However, due to a lower value of energy wood compared to value of industrial wood, a share on total value is only 2 %. The biggest value share is represented by logs (72.5 %), while pulpwood, thought it represents over a half of total volumes, accounts only for 24.3 % (Fig. 38).

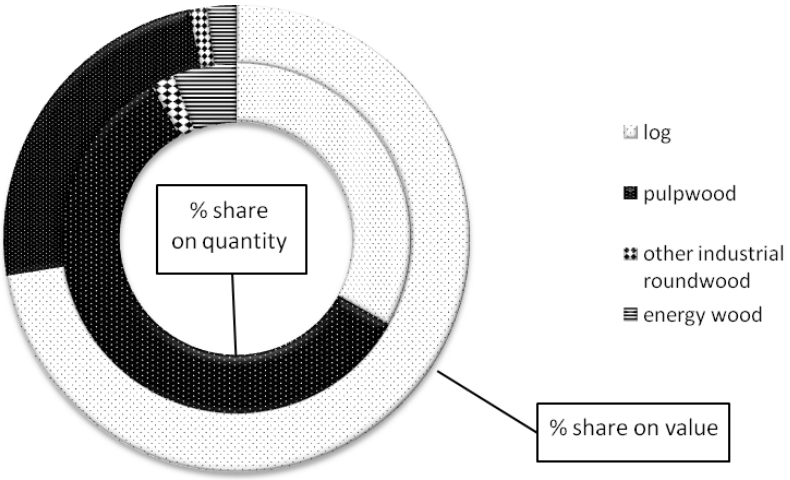

Figure 38. Average volume and value shares of non-coniferous roundwood assortments on total non-coniferous roundwood deliveries

The analysis carried out above proved that there is an increasing trend in volumes of energy wood supplied to the market. Due to the rising prices of fossil fuels in recent years and also due to the promotion of use of renewable energy sources in Slovakia there has been an increasing interest in the use of wood for energy purposes. Wood biomass is the most important renewable energy source in Slovakia and is used for heating and, in a lesser extent, for power generation. People living in rural areas and smaller cities use wood as a fuel for heating in their houses. For this purpose, a part of wood residues from wood processing industry is used too. According to UNECE (2012) in 2010, the population consumed approx. 850 thousand tons of wood fuel. Consumption of pellets and briquettes is due to their high prices very limited and reaches about 30 thousand tons only. The largest user of wood fuels in the form of solid and liquid wastes from the own production is pulp and paper industry with an annual consumption of 1.1 million tons for heat and power generation. Wood processing industry consumes annually nearly 400 thousand tons of wood waste and chips from its own production to produce technological heat and in small scale to power generation. Approximately 500 thousand tons of chips and wood residues were used in central heat sources and regional plants supplying cities and industrial enterprises. Forestry provided 240 thousand tons of fuel chips to these consumers. On the other hand, faster and more efficient development of use of wood for energy

purposes is limited by high investment costs, lack of financial sources and lack of coordination in promotion of production and use of wood for power generation. In 2010, Slovakia imported a small amount of pellets from Ukraine. Wood chips and wood residues for energy are not imported in the current time because of their relatively high prices in neighbouring countries. Most of the production of pellets is exported, but only to the EU countries.

4.6. CONCLUSION

There have been significant changes in the development of volumes and structure of roundwood deliveries in Slovakia. Demand for energy wood has been increasing during the latest years driven by the changes in prices of fossil fuels and supporting programs of the EU with the aim to increase the use of renewable resources for energy generation. These market conditions and drivers can be considered as one of the reasons for changing structure of roundwood deliveries. Most significant changes occurred in the structure of non-coniferous deliveries characterised by the increasing share of energy wood on the expenses of other assortments. In general, it can be concluded that:

- there is an increasing trend in deliveries of coniferous and non-coniferous roundwood as a result of increasing felling and, in particular, accidental felling,
- since 2006, there has been a significant increase in the share of export of coniferous industrial roundwood on total deliveries; reaching approximately 40 % in 2011,
- a share of energy wood on total deliveries of roundwood has increased during the last years (up to 7 %),
- there are significant differences in the structure of coniferous and non-coniferous deliveries of industrial roundwood caused by the tree species characteristics themselves as well as by the changing demand conditions.

ACKNOWLEDGEMENT

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changes at timber market under the increasing demand for renewable energy sources comprehensive model of wood chain.

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5. FOREST PRODUCTS PRODUCTION AND SALE TRENDS IN CROATIA

Stjepan Posavec, Karlo Beljan

5.1. INTRODUCTION AND PROBLEM MATTER

Natural resources represent common good and wealth. Their use, economic function and evaluation have to be planned directly since they represent the basis of future industrial and economic development. The influence of technological changes and innovations has resulted in lower prices of natural resources, compensating to a certain degree the effect of price increase due to the exhaustion of the resources. Forests are considered renewable natural resources, and the main characteristic of renewable natural resources is that their reserves are not permanent, and they can increase or decrease. However, a renewable natural resource cannot renew itself above the level determined by existing ecosystem's capacity. Sustainable forest management is a continuous process of exploiting increment, in part or whole. Notwithstanding, danger exists should the exploitation rate exceed the natural increase rate, in which case the renewable natural resource could easily perish. Forestry economics encompasses all know-how related to forestry, and with the activities of market elements, it observes how a man and the society act in certain circumstances and conditions. The specific features of forest management are particularly manifested (Figurić, 1996) in the long-term biomass production cycle, the forests' multiple functions and benefits, the fact that many of its values cannot be evaluated directly on the market, long period from the start of works, natural renewal, afforestation, nurture, cleaning, thinning, etc. to economic effects, which exceeds human lifetime.

Forests are important life factor since they provide people with many benefits (timber, fuel etc.). Balancing the people's needs with long-term care for forest resources is the basis of forest resources management. Maintenance of the forests' vitality is crucial for overcoming many challenges caused by climate changes, and for preserving the consistency of plant and animal species, that is, biological diversity (Figurić 1996). The forest sector has an important

influence on the rural development, contributing to poverty decrease, achieving sustainable development and providing different ecological services. The priority of the world as a whole and each country should be to develop appropriate sustainable development strategies which would include special measures for the forests' preservation, sustainability and vitality (Tipurić 2009). On the global level, 31% of the forest surface is intended for production. In Europe, 72% of total forest surface is intended for production (FAO 2011). European forests are primary wood producers in the world. Actually, 23% of industrial logs derive from Europe (excluding Russia), and the European forestland accounts for 5% of total global forest surface. In Croatia, 90% of total forest surface is made up of management forests intended for production (Forest management area plan for the period 2006-2015).

Forestry is an equally important industrial sector in Europe as it is in the Republic of Croatia. The forest sector share in gross domestic product accounted for 1.4% in 2009 (0.5% furniture industry, 0.4% cellulose and paper industry and 0.5% wood and wood product industry). Accordingly, forestry share in gross domestic product totals additional 1% (Motik et al. 2013). Total fall of the real Croatian GDP equalled -2% in 2012, with an inflation rate of 1.9% (Anon 2012).

Total land surface of the Republic of Croatia is 56 594 m², of which 42.4% accounts for forest covered surfaces, while the forests cover 47.5% of the land surface in relation to total forestland. This makes Croatia a densely forested European country (Anon 2006). According to the First National Forest Inventory in the Republic of Croatia (Čavlović, 2010), total forests and forestland area equal 2 580 826 ha, while forested areas account for 2,377,686 ha, of which 77% are state owned and 23% are privately owned. According to that, total growing stock is 552,146,000 m^3 (Čavlović, 2010). The annual cut in state forests is 7 325 000 m^3, and 1 087 000 in private forests (Posavec, S. et al., 2011). Structure of planned allowable cut per main groups of assortment for all forests in the Republic of Croatia is shown in Figure 39.

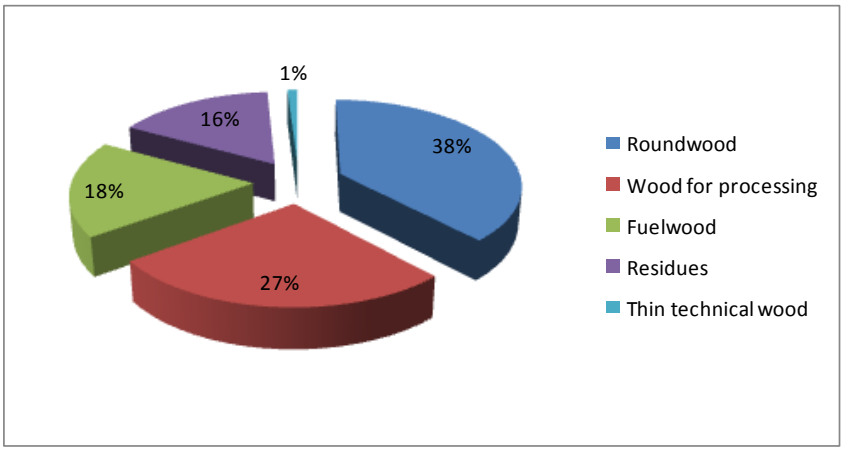

Figure 39. Structure of planned allowable cut per main groups of assortment for all forests in the Republic of Croatia (FAO 2007)

In developed economies, forestry and wood processing achieve direct and indirect multiplicative results. Considering the available forest potential, this sector has a great development potential in Europe. The added value chain consists of three main areas: forestry, consisting of cultivation, landscaping and exploitation; primary wood processing, which includes sawmills, and paper production, processing and drying of sawn timber, production of wall and floor covering; secondary processing encompasses the production of furniture and wood products with high added value. Being informed about the potential of the wood assortment production, in the sense of quality and quantity, as well as the analysis of the demand on the market of furniture and other wood products directly influences the related companies and their future business success. (Motik, 2002, 2013).

5.2. PRIMARY WOOD PRODUCTION

Croatian forests are composed predominantly of broadleaved (62.07%), then coniferous (6.45%) and mixed forests (18.58%), while the rest of forests are young plantations (12.85%). Tree species with the biggest share in growing stock are: beech – *Fagus sylvatica* L. (36.44%), oaks - *Quercus robur* L. (14.83 %) and *Quercus petrea* L. (8.35%), hornbeam – *Carpinus betulus* L. (5.34%), and fir – *Abies alba* Mill. (9.38%). The share of natural or semi natural

forests is 95%, with majority autochthonic tree species (96.35%). In terms of forest types and forest origin, most of them are high forests (57.90%) some belong to coppice (23.56%) and some to mixed forest (15.36%). There are only 0.06% of plantations and 2.65% of cultures in Croatia. The average growing stock in Croatia is 232.22 m^3/ha, in state forests it is 255.84 m^3/ha and in private forests 155.84 m^3/ha. Growing stock for the main forest species and their share is shown in Table 11.

Table 11. Growing stock for the state forests managed by Hrvatske šumeLtd. (Čavlović 2010)

Tree species	**mil. m^3**	**share %**
Pedunculate oak	68,36	14,61
Sessile oak	39,39	8,42
Common beech	174,8	37,35
Ash	17,43	3,73
Common hornbeam	38	8,12
Fir	33,95	7,25
Spruce	12,43	2,66
Other species	83,67	17,77
TOTAL	468,04	100

Croatian forests Ltd. have been FSC certified since 2002. This means the forest is managed in compliance with strict ecological, social and economic standards. This certificate represents internationally acknowledged and certified method of forest management within Croatian forests Ltd. in compliance with strict norms. This is huge recognition for the Croatian forestry as a profession that has been responsibly managing this extremely significant national resource. In the forests they manage, the annual cut of Croatian forests Ltd. is below increment, which ensures sustainable management. The annual cut of Croatian forests Ltd. is 5.5 million m^3 on average, which represent considerable potential for obtaining heating and electric energy from the biomass. Wood, as raw material, is obtained as a sequence of interconnected and mutually dependent actions, that is, cutting and manufacture (phase I) and wood transport (phase II and III). There are three main components: biological, technical and economic. Table 2 shows the produced quantities of wood assortments for the main industrial species for the period 2008-2012.

Table 12. Wood assortments production by species and quantities

	Year				
	2008	2009	2010	2011	2012
SPECIES	**ROUNDWOOD [m³]**				
Pedunculate oak	488.884	455.030	420.496	458.748	451.903
Sessile oak	169.035	161.231	137.478	161.629	171.452
Common beech	802.729	731.707	707.486	852.783	863.014
Ash	130.514	85.580	115.675	132.158	111.149
Common hornbeam	56.878	46.149	77.091	90.776	75.404
Fir/Spruce	374.800	365.209	326.129	422.197	419.076
Other species	234.033	172.609	207.186	205.426	167.803
TOTAL	2.256.873	2.017.515	1.991.541	2.323.717	2.259.801
	THIN TECHNICAL WOOD [m³]				
Oak	6.870	2.975	2.185	3.091	4.159
Common beech	3.640	1.525	1.814	6.674	7.155
Conifers	2.779	3.563	3.163	4.386	2.144
Other species	12.653	6.950	9.100	36.928	21.821
TOTAL	27.666	15.013	12.263	51.079	35.279
	WOOD FOR PROCESSING [m³]				
Oak	125.460	133.065	145.926	111.373	126.766
Common beech	420.766	357.938	409.641	445.973	419.583
Conifers	221.309	187.340	194.465	200.186	177.998
Other species	272.471	239.894	294.299	332.494	278.169
TOTAL	1.040.006	918.237	1.044.331	1.090.026	1.002.516
	FIREWOOD [m³]				
	1.032.016	1.223.391	1.247.314	1.467.708	1.428.436
TOTAL	4.356.561	4.174.156	4.295.449	4.932.530	4.726.032

The wood processing carries the potential of advanced technology use at proper knowledge transfer. It carries the fundamentals for the profitability of forestry. It finds its role in a market economy of material circulation within the over-all view energy-environment-economy-market (Jelačić et al. 1999, UNECE 2012).

The annual cut plan for 2012 was executed within the set framework, achieving 102.3% with increased realisation of cordwood in relation to the plan. The business year 2012 did not bring any significant changes in the production of wood assortments in relation to the year before. Total production stood at 4.823.785 m³, slightly less compared with 2011, the record year of Croatian forests Ltd. since their foundation. It is presumed that every year sustainable management will achieve income from cutting and income from thinnings, and afforestation will be invested in every year, with other administrative and similar costs arising. (Posavec 2002, 2006, 2011).

5.3. WOOD ASSORTMENTS SALE

The market price of wood and cost increase is a significant indicator from the point of view of the long-term horizon of forest production, and consequently long-term planning. The price range in the trade of wood and wood products depends on seasonal and multiannual fluctuations of offer and demand. Forest companies are limited by regulations and time dynamics of cultivation and exploitation in the forest. For this reason, the wood assortment production is of a seasonal character and it cannot meet the increased demand in certain parts of the year. In international trade, forest companies are faced with competition and offer of wood from other parts of the world, which causes price decrease. The global energy crisis has reinstalled the wood's position as an important energy product, which will increase the demand and prices. A more expensive price of the workforce is another significant limiting factor, however, productivity increase, as a response to higher expenses, is limited by biological laws of the forest growth as well as disposal and ownership right. Table 3 shows average prices for basic wood species for the period 2008-2012.

In 2012, Croatian forests Ltd. sold 4.726.032 m³ wood assortments, the total value of HRK1.497.604.367, which is 105.96% in relation to the sales plan. The majority of the logs were sold according to contract, 2.121.581 m³, which accounts for 93.88% of total sale of logs. In relation to total sale of logs, a total of 9.560 m³ or 0.42% was sold at local auctions. At international auctions, the result was 80.329 m³ or 3.55%. A smaller share of logs 48.331 m³ or 2.14% was sold at the cash-desk. Implementation and monitoring of selling wood assortments to the foreign market is performed by the Committee for Implementation of the Directive on

Auctions of Specific Wood Products, consisting of the Representative of the Ministry of Economy, Labour and Entrepreneurship, Customs and Representative of Croatian forests Ltd.

Table 13. Wood assortments sale in average prices by species

	Year				
	2008	2009	2010	2011	2012
SPECIES	**ROUNDWOOD [Eur]**				
Pedunculate oak	130,46	125,3	118,01	125,56	122,78
Sessile oak	80,79	76,82	69,27	74,3	74,7
Common beech	47,81	40,93	40,53	41,46	42,91
Ash	96,29	78,54	75,36	84,77	83,58
Common hornbeam	28,34	27,55	27,28	27,28	27,55
Fir/Spruce	53,11	50,46	49,8	49,93	50,2
Other species	50,73	49,4	52,72	49,4	53,64
TOTAL	70,73	66,23	63,97	64,5	64,9
	THIN TECHNICAL WOOD [Eur]				
Oak	31,66	31,26	31,39	31,26	31,92
Common beech	29,4	30,99	30,33	30,73	29,54
Conifers	47,81	55,1	58,28	52,85	57,09
Other species	27,95	28,08	27,95	29,93	30,73
TOTAL	30,2	31,26	30,86	32,05	32,19
	WOOD FOR PROCESSING [Eur]				
Oak	22,65	21,85	22,65	23,97	21,46
Common beech	32,98	31,39	30,73	30,99	29,4
Conifers	17,09	16,56	18,15	19,74	19,6
Other species	23,44	23,18	23,84	23,97	23,18
TOTAL	25,83	24,77	25,3	26,09	24,9
	FIREWOOD [Eur]				
	16,56	15,89	15,23	16,56	17,75
TOTAL	45,83	41,85	40,66	41,46	41,99

With the purpose of organising and regulating the relations with the wood-processing sector, Croatian forests Ltd. and the representatives of the wood industry with the Croatian Chamber of Economy, with the agreement of the Ministry of Economy and Ministry of

Agriculture, initiated manufacture and organisation of a new sales model of logs. With mutual understanding of the economic momentum and problems affecting the competitiveness of the wood industry, a consensus was reached, which resulted in signing the Letter of Understanding in December 2012. This set a framework which defines the method, conditions, criteria and discount policy of selling logs through multiannual framework (up to 10 years) and annual contracts. Pursuant to the mentioned agreement, imbedded in Articles 20 and 21 of the Price List of the Main Forest Products, Croatian forests Ltd. published the Public Tender for Selling Logs on December 22. This way a new business policy for selling logs was defined, and it will promote the development of the final products' production as well as ensure stable supply of the wood raw material for all interested groups wood processors, from smaller sawmills to big-sized finalists in the forthcoming mid-term period.

On home market, the higher demand was recorded for logs of common beech, pedunculate oak, fir, spruce, ash. Lower interest was recorded for the logs of poplar, hornbeam and chestnut. In the export of beech logs prices were cut and they were higher for the logs of oak and ash. Wood assortments are mainly exported to Italy, Slovenia, Austria, Germany, and some minor volumes into Egypt, and Bosnia and Hercegovina (Motik et al. 2013).

5.4. PRODUCTION PRICES AND TRENDS IN FORESTRY

Production trends during the past decade clearly show a growing trend in the production of roundwood and cordwood, while average prices are in decline (Figure 40). The production growth resulted in larger quantity of goods on the market and changes in the offer and demand relation, which led to lower individual sale price of roundwood and cordwood. The trend of the wood assortments production refers to the increase in the annual cuts on the state level (currently ranging around 5.5 million m³), which will have a strong impact on the assortments' price. It is important to note that the average price of wood in the Republic of Croatia totals €41.4, given the fact that technical wood reaches an average price of €65.6, and cordwood €25.2. Equal ratio of the produced roundwood and cordwood conditions equal average price on the level of Croatian forests Ltd.Table 14 shows the production of wood assortments for the past five years, while Figure 40 shows the production trend of the past decade.

Logs and thin roundwood are presented together in Figure 2 as Roundwood, than cellulose wood and firewood are joined in Cordwood.

Table 14. Wood assortments production from 2008 to 2012 in m³

Year	Logs	Thin roundwood	Cellulose wood	Firewood	Total
	m³				
2008	2.194.752	62.914	1.040.006	1.115.623	4.413.295
2009	2.128.740	68.116	854.774	1.122.526	4.174.156
2010	1.991.541	12.263	965.528	1.326.117	4.295.449
2011	2.323.717	51.079	1.090.026	1.467.708	4.932.530
2012	2.280.167	15.326	1.002.516	1.428.436	4.726.445

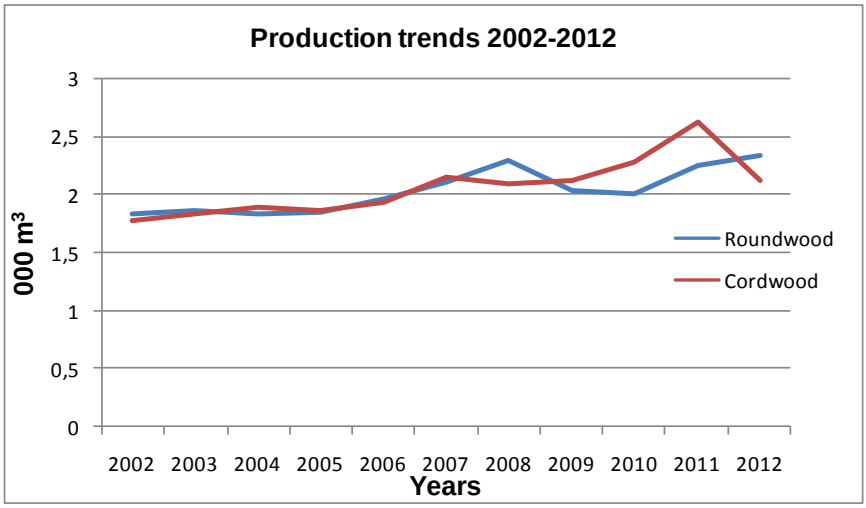

Figure 40. Production trend for roundwood and cordwood

Since the result of cutting (according to the former management basis) for the period 1996-2005 is only 57% of the prescribed cut, and since the demand for firewood ranges from 100 000 to 200 000 m³ per year, and since the long-term management programme for the period 2006-2015 increases the production of cordwood (mainly firewood, branches and residues from cutting and manufacture) by 1.2 million m³ per year, it is estimated that the quantity of the wood biomass as an energy product will total over 2.6 million³ in state forests only. The mentioned quantity should be added up with the biomass in the forests for special purposes, biomass for energy of forests on karst, biomass from the recovery of fire areas on

karst (on average around 70 000 m³ per year), additional investment in degraded forests and raising new cultures for energy purposes, which is envisaged by the development programme of Croatian forests Ltd. 2025. 60% of the estimated quantity of the forest biomass as an energy product can still be used as firewood, and chopped wood as a new product, while 40% (1.0 million m³) of the chips production can be used for energy. Table 5 shows total sales value of the main wood assortments for the past five years, and Figure 3 shows the trend of the sales prices for the past 10 years.

Table 15: Sales value by groups of wood assortments from 2008 to 2012

Year	Logs	Thin roundwood	Cellulose wood	Firewood	Total
	EUR				
2008	155.196.539	1.902.548	26.925.556	18.433.195	202.457.838
2009	137.099.315	2.408.870	20.129.645	17.841.473	177.479.303
2010	123.712.944	438.544	23.300.557	22.355.817	169.807.862
2011	149.888.709	1.639.369	28.420.753	24.325.987	204.274.819
2012	146.793.596	1.137.752	24.994.907	25.431.938	198.358.194

Average prices for the long term period (10 years) have strong variations due to the problems with demand during the last 6 years.

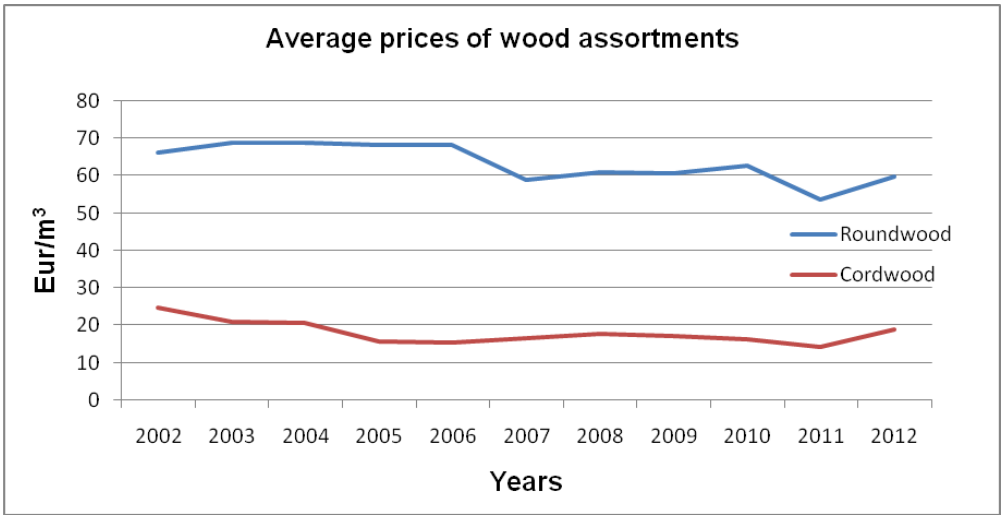

Figure 41. Trends for wood assortments prices for years 2002 - 2012

Even though the value of total sales of wood assortments was high in 2008, the price of the roundwood plummeted in 2007 as a result of the global recession, with a slight recovery visible afterwards, followed by another fall of average prices and increase in total value in 2011. The removals of industrial roundwood in the UNECE region increased by 2.4% in 2011, reaching 970 million m³, recording a higher percentage increase in hardwood logs than softwood logs. Higher demand for logs by sawmills in the UNECE region and a substantial increase in log exports to China, from Europe, North America and the Russian Federation, all contributed to bigger harvests in 2011. Nevertheless, the rate of harvest throughout the region is well below the rate of forest growth. Removals in 2012 and 2013 are expected to remain at the same level. ECE/TIM/2012/

5.5. DISCUSSION AND CONCLUSION

There is no doubt that the Forestry and Wood Processing Sector in the Republic of Croatia certainly has high growth potential and the possibility for creating new work positions, especial in rural areas with the highest unemployment rates. The number of the employed in the Forestry and Wood Processing Sector in the Republic of Croatia totalled around 30 000 in 2009, which is 1.9% of total number of the employed. There are around 9000 people working in forestry, mainly in the state-owned company Croatian forests Ltd. The industries in the EU countries based on forestry represent one of the most important industrial sectors, with an approximate 10% share in creating new added value, that is, employment.

Consumption of forest products in 2011 remained flat in most of the UNECE region, 10% lower than before the global financial crisis. But in the Russian Federation, consumption grew by 9%. In spite of the continuing uncertainty and the difficult economic conditions, the consumption of some forest products showed slight growth in 2011. Forecasts of consumption are for further weakness in 2012 (-0.9%) with a slight uptick in 2013 (0.5%), led by North America (UNECE Timber report 2012)

The industrial wood processing in Croatia has significant comparative advantages. The availability and accessibility of quality raw material, particularly quality oak and beech wood, as a century old tradition in the industrial wood processing, are usually considered as the main comparative advantages of this sector.

The sale of wood raw material has to have the function of finalising wood products. Croatian producers of final wood products have a priority in continuous purchasing of the wood raw material determined by multiannual contracts, considering that they exercise their right proportionally to the finalisation level. Croatian forests Ltd. are obligated to offer the remaining quantities of the raw material for local bidding, while the assortments which lack processors or any interest of the local industry must be offered on an international level.

Wood processing and furniture production of the Republic of Croatia developed on a highly valuable forest raw material, and their work is based on its exploitation, long tradition of wood processing and quality human resources. Therefore, this activity is an important segment of Croatia's economy (Pirc et al.2010). New trends in furniture design and production will cause changes in the demand of certain wood species. Due to predetermined management regulations, conditioned by biological characteristics, forestry companies are unable to give a timely response to the demands of certain trends.

To strengthen the competition and placement on the local as well as international market of the industrial wood processing of the Republic of Croatia, professional help of all interested parties will be crucial. Professional help also includes the related institutions adopting priority development documents.

Contemporary forest systems of developed countries and interconnected systems for wood processing, furniture production, paper production and processing, wood and wood products trade are the generators of complex and cumulative effects of high multiplicative force, significant for economic development.

According to the Forest Resources Assessment (FRA 2011), linkages between the forest industry and the energy, chemicals and food sectors are becoming more evident, while policies that drive renewable energy, climate change mitigation and food security all influence the forest industry, both directly and indirectly.

In the economy of the Republic of Croatia, the significance and role of forestry, wood processing, furniture production, paper production and processing, wood and wood products trade is insufficiently highlighted only with data on their quantitative share. The connection and mutual dependence, especially with chemical industry, metal processing, production of tools and machines for wood processing, as well as transport on the entry side, and construction, trade, science, infrastructural institutions, investment and personal spending as well as export

on the exit side show this economic activity is an important factor of the economic development of the Republic of Croatia.

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6. TRENDS IN FOREIGN TRADE OF THE PRIMARY AND SECONDARY WOOD PRODUCTS

Maja Moro, Darko Motik, Ksenija Šegotić, Andreja Pirc Barčić

6.1. INTRODUCTION

Wood processing is one of the most significant segments in Croatian wood industry. On the basis of established values for period 2000 - 2011, we discuss a possibility to predict future trends in foreign trade of primary and secondary wood products. The data of import and export values through analyzed period are gathered from Croatian Bureau of Statistics and include the main countries for foreign trade activity with Croatia.

The key to survival and growth of an organization is in ability to adapt its strategy to rapidly changing enviroment (Kotler, 2001). According to Samuelson and Nordhaus (2003), economic theories are dynamic by nature and now we are witnessing almost everydays changes that are caused by the penetration of IT and computer science revolution. In this new and dynamic conditions it is necessary to strive for a new standards using economic theory for the qualitative and quantitative analysis of markets.

Interpreting economic data and forecasting the future economic values are under the influence of environment and government policies, starting from the basic economic theories that operate in the market (Fair and Case, 1989). According to Lovrinčević (2001), specific developments in some key macroeconomic variables, such as employment, production, imports, exports, the exchange rate of national currency, etc., characterize different turbulent periods of Croatian history. Knowledge of the market situation with primary and secondary wood products directly affects on all companies in the sector, their development, growth and business success in the future (Motik, 2010.).

We performed the dynamic economic analysis of time series data and discuss a predicted future export values and future import values of primary and secondary wood products on the basis of established values in the period 2000 - 2011. Because of a turbulences in this market, as well as a length of the analyzed time series, prediction is limited to the year 2017.

6.2. MATERIAL AND METHODS

Analysis of Croatian wood processing foreign trade follows the time course of two key macroeconomic variables, export of primary and secondary wood products from Croatia and import of primary and secondary wood products to Croatia for period 2000 - 2011. The data had been gathered from the database of Croatian's State Bureau of Statistics (DSZ), Ministry of Finance and Financial Agency (FINA). The data are shown in Tables 16 and 17.

Table 16. Export of Croatian primary and secondary wood products for period 2000 - 2011

International State Code	Export (mil. EUR)											
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
AUT	20,9	16,8	17,1	17,3	17,6	18,8	22,5	31,1	29,2	28,2	32,3	39,8
BEL	6,1	6,5	4,9	5,2	6,9	7,4	5,1	7,6	6,3	5,0	5,8	7,0
BIH	6,4	5,8	8,0	8,2	9,4	12,1	13,0	21,6	24,7	17,4	19,0	19,5
CHN	0,8	0,9	0,8	0,4	0,3	0,4	1,2	1,0	1,7	0,7	1,5	6,6
CZE	0,8	1,0	1,0	1,5	1,3	1,5	1,5	2,0	1,8	2,1	2,8	3,2
EGY	6,7	6,9	7,9	8,5	8,0	11,2	18,2	22,5	34,7	32,5	34,1	34,1
ESP	5,5	8,6	8,8	8,3	7,6	7,6	9,7	9,2	7,1	4,8	3,6	2,4
FRA	3,1	3,6	4,2	5,3	4,2	3,6	5,3	4,3	5,1	4,0	5,1	6,7
GER	26,0	20,4	16,5	19,0	17,6	15,3	17,9	27,0	29,2	27,4	30,3	38,2
HUN	1,1	1,9	3,6	3,2	3,3	3,9	3,5	8,5	10,2	7,8	11,4	16,6
ITA	112,5	107,9	111,5	115,7	119,1	122,1	135,0	151,6	137,4	115,3	137,0	145,8
SLO	29,5	25,8	30,1	31,9	35,8	40,0	42,4	45,2	44,4	36,6	40,4	51,7
SRB	-	-	-	-	-	6,0	11,0	14,0	16,8	12,6	10,2	7,9
SUI	3,3	4,2	3,6	6,4	10,2	10,4	10,6	9,7	11,1	10,2	10,6	9,8
SWE	5,6	5,3	3,0	4,5	4,8	6,1	5,3	6,0	4,7	4,7	4,4	4,8
Others	17,0	14,5	14,4	18,5	25,1	25,7	30,6	41,6	36,9	24,6	28,3	45,7
Total	**245,3**	**230,1**	**235,2**	**253,9**	**271,2**	**292,2**	**332,9**	**402,9**	**401,1**	**333,8**	**376,8**	**439,8**

The analysis involved 16 countries that were included in both, export and import of primary and secondary wood products in period 2000 - 2011, and according to share of that trade in total amount. Only exception are Poland were we analyzed only export and Egypt were

we analyzed only import of primary and secondary wood products, because the values of import from Poland and export in Egypt were marginal.

Table 17. Import of primary and secondary wood products in Croatia for period 2000 - 2011

International State Code	Import (mil. EUR)											
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
AUT	12,3	19,3	26,3	29,5	31,0	32,7	39,2	49,0	48,8	36,8	33,6	34,6
BEL	1,0	1,3	1,8	1,5	1,8	2,2	2,7	1,7	1,8	1,5	1,1	2,5
BIH	14,9	24,1	28,3	34,9	36,0	28,0	34,7	38,2	33,9	23,2	23,2	24,2
CHN	0,4	0,8	1,6	2,0	3,7	6,4	7,5	12,3	12,8	7,5	6,4	6,7
CZE	2,5	3,5	3,2	4,1	4,3	4,2	6,6	8,2	8,7	5,9	5,6	6,7
ESP	0,1	0,3	0,6	0,5	0,8	0,5	0,6	0,6	0,6	0,4	0,6	0,4
FRA	0,7	1,1	1,0	1,5	1,4	1,2	1,9	2,0	1,7	1,1	0,8	1,4
GER	12,2	14,3	16,7	19,4	21,4	18,9	22,7	24,8	25,0	24,9	20,2	22,3
HUN	7,1	6,4	7,1	7,3	8,3	8,6	7,3	7,2	7,9	6,0	6,2	6,3
ITA	8,4	9,1	12,1	13,4	14,6	17,2	20,2	22,4	25,9	19,6	15,4	16,4
POL	0,9	2,9	4,8	6,2	7,8	9,0	8,1	7,5	7,6	6,7	5,1	4,9
SLO	32,0	37,2	42,7	46,6	43,4	47,3	53,6	54,3	58,8	37,4	29,0	26,5
SRB	-	-	-	-	-	2,5	4,2	4,7	5,6	3,3	4,6	4,0
SUI	2,2	1,1	1,0	0,9	0,4	1,2	0,8	0,6	0,4	0,4	0,4	0,2
SWE	0,8	0,8	0,6	1,2	1,0	1,2	1,0	0,6	0,5	0,6	0,7	1,5
Others	10,6	12,8	14,1	18,9	19,7	18,7	20,3	25,9	24,4	17,0	14,0	12,9
Total	**106,2**	**135,0**	**161,9**	**187,9**	**195,7**	**199,8**	**231,3**	**259,9**	**264,4**	**192,4**	**167,0**	**171,5**

For the purposes of forecasting future trends in the indicators of market conditions (export and import of primary and secondary wood products), the dynamic economic analysis of time series data was performed. Three types of time series models were built: models based on average rates of change (models A), linear trend models (models B) and logarithmic trend models (models C).

According to Rozga and Grčić (2000), by using models we got a picture of what happened in the (near) past, what is the current situation, and planned and future course of events, i.e. the movement of each indicator in the near future. It is known that future projections of development can not predict the detail movement of market indicators, they are only a rough

indication of the future course, assuming that the macroeconomic policies won't change significanty (Hanke and Reitsch, 2001).

6.3. RESULTS AND DISCUSSION

The main import-export markets are Italy, Slovenia, Austria and Germany in which it were achieved almost 65% of total value of import and export of a primary and secondary wood products for period 2000-2011. In Italy it was achieved 28%, in Slovenia 15,8% and 11,2% in Austria, while other states participated with less than 10% in total amount of export-import trade (Germany 8,7%, Bosnia and Herzegovina 8,4%, Egypt 3,7%, Hungary 2,6% etc.). Shares of export and import foreign trade of a primary and secondary wood products according to countries are shown in Figure 42.

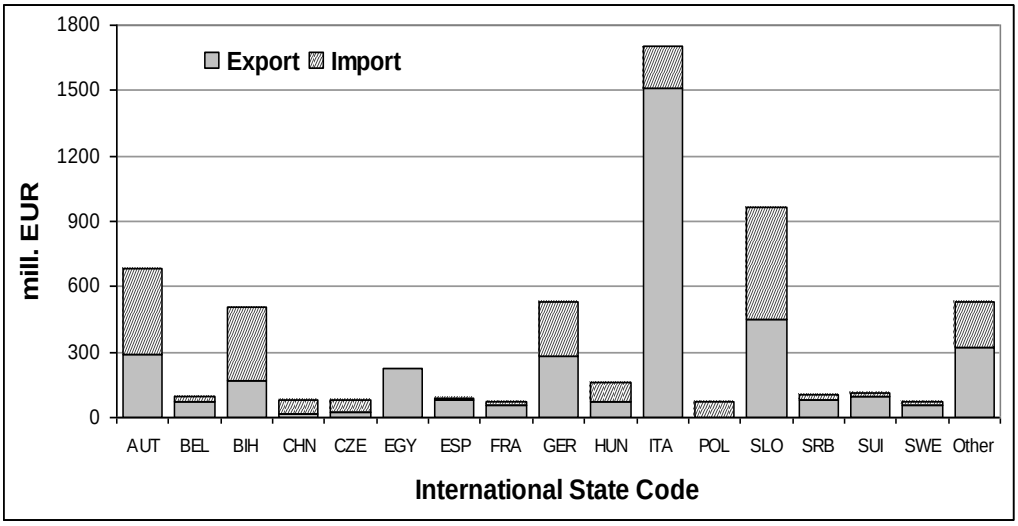

Figure 42. Shares of export and import foreign trade according to countries for period 2000 - 2011

Descriptive statistics were determined for total values of export and import of a primary and secondary wood products according to countries on the basis of established values in the period 2000 - 2011. Average rate of total total foreign trade value of a primary and secondary wood products for period 2000 - 2011 was 507,4 mil.€. In Italy it was achieved 142,2 mil.€, in

Slovenia 80,2 mil.€ and 57,1 mil.€ in Austria. All results of descriptive analysis are given in Table 18.

Table 18. Descriptive statistics for export and import foreign trade according to countries for period 2000 - 2011

International State Code	Export and Import (mil. EUR)								
	Valid N	Sum	Minimum	Median	Maximum	Mean	Std.Dev.	Conf.-95%	Conf.+95%
AUT	12	684,7	33,2	56,6	80,1	57,1	16,1	46,9	67,3
BEL	12	94,5	6,5	7,8	9,6	7,9	1,1	7,1	8,6
BIH	12	508,9	21,3	42,7	59,8	42,4	10,7	35,6	49,2
CHN	12	84,3	1,2	7,3	14,5	7,0	4,8	4,0	10,1
CZE	12	84,0	3,2	6,9	10,5	7,0	2,5	5,4	8,6
EGY	12	225,3	6,7	14,7	34,7	18,8	12,1	11,1	26,5
ESP	12	89,1	2,8	8,2	10,4	7,4	2,4	5,9	8,9
FRA	12	70,3	3,8	5,8	8,1	5,9	1,2	5,1	6,6
GER	12	527,7	33,2	39,8	60,5	44,0	9,3	38,1	49,9
HUN	12	160,6	8,2	12,0	22,9	13,4	4,4	10,6	16,2
ITA	12	1705,9	117,1	137,1	174,0	142,2	18,7	130,3	154,1
POL	12	71,5	0,9	6,5	9,0	6,0	2,4	4,5	7,5
SLO	12	962,8	61,5	78,4	103,2	80,2	13,7	71,5	88,9
SRB	12	107,2	0,0	10,2	22,4	8,9	8,6	3,5	14,4
SUI	12	109,6	4,6	10,4	11,6	9,1	2,7	7,4	10,8
SWE	12	69,5	3,6	5,9	7,2	5,8	0,9	5,2	6,4
Others	12	532,2	27,2	43,3	67,5	44,3	13,3	35,9	52,8
Total	**12**	**6088,3**	**351,5**	**509,1**	**665,4**	**507,4**	**107,7**	**438,9**	**575,8**

6.3.1. Export of Croatian primary and secondary wood products

Nearly 40% of total value of export of Croatian wood processing is realized in the Italian market, followed by Slovenia (12%), Austria (8%) and Germany (8%), Egypt (6%) and other countries with less than 5% of total export value. Distribution of export of a primary and secondary wood products from Croatia according to main export markets for period 2000 - 2011 is shown on Figure 43.

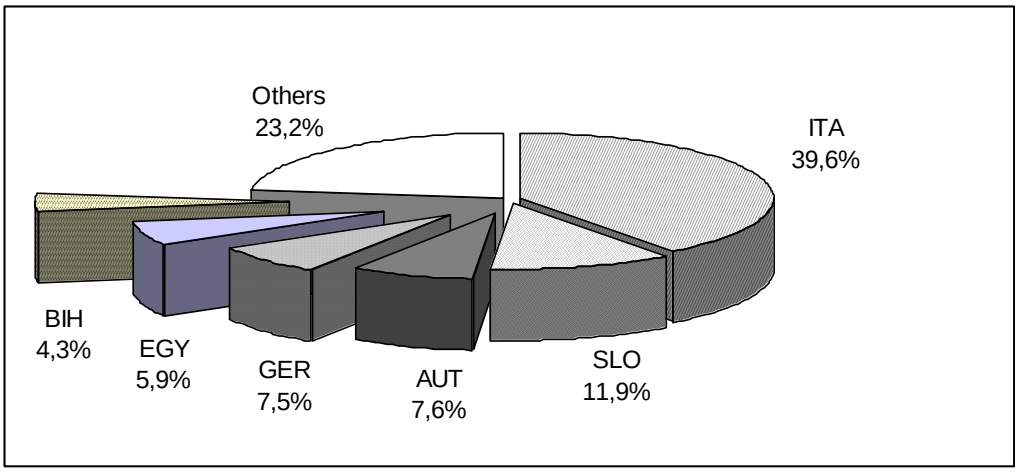

Figure 43. Distribution of export from Croatia according to main export markets for period 2000-2011

The basic indices (I_{2008}) for the most important export markets are presented with a common reference year (currently 2008 = 100) and belonging rates of change (S* = I_{2008} - 100), also chain base index (V) and belonging rates of change (S** = V - 100). Results of these analysis for the most important export markets of a primary and secondary wood products from Croatia are given in folowing tables (Table 19. to Table 25.).

Table 19. ITALY: export indices and rates of change for period 2000 - 2011

Year	mil.€	I_{2008}	S*	V	S**
2000	112,5	81,9	-18,1	-	-
2001	107,9	78,6	-21,4	95,9	-4,1
2002	111,5	81,1	-18,9	103,3	3,3
2003	115,7	84,3	-15,7	103,8	3,8
2004	119,1	86,7	-13,3	102,9	2,9
2005	122,1	88,9	-11,1	102,6	2,6
2006	135,0	98,3	-1,7	110,6	10,6
2007	151,6	110,4	10,4	112,3	12,3
2008	137,4	100,0	0,0	90,6	-9,4
2009	115,3	83,9	-16,1	83,9	-16,1
2010	137,0	99,8	-0,2	118,8	18,8
2011	145,8	106,1	6,1	106,4	6,4

Average annual rate of change for export of a primary and secondary wood products from Croatia to Italy in the years 2000 - 2011 was positive, $\bar{S} = 2,38\%$.

Table 20. SLOVENIA: export indices and rates of change for period 2000 - 2011

Year	mil.€	I_{2008}	S*	V	S**
2000	29,5	66,4	-33,6	-	-
2001	25,8	58,2	-41,8	87,7	-12,3
2002	30,1	67,8	-32,2	116,4	16,4
2003	31,9	72,0	-28,0	106,2	6,2
2004	35,8	80,7	-19,3	112,0	12,0
2005	40,0	90,2	-9,8	111,8	11,8
2006	42,4	95,5	-4,5	105,9	5,9
2007	45,2	102,0	2,0	106,7	6,7
2008	44,4	100,0	0,0	98,1	-1,9
2009	36,6	82,6	-17,4	82,6	-17,4
2010	40,4	91,0	-9,0	110,2	10,2
2011	51,7	116,4	16,4	128,0	28,0

Average annual rate of change for export of a primary and secondary wood products from Croatia to Slovenia in the years 2000 - 2011 was positive, $\bar{S} = 5,24\%$.

Table 21. AUSTRIA: export indices and rates of change for period 2000 - 2011

Year	mil.€	I_{2008}	S*	V	S**
2000	20,9	71,5	-28,5	-	-
2001	16,8	57,6	-42,4	80,5	-19,5
2002	17,1	58,4	-41,6	101,4	1,4
2003	17,3	59,2	-40,8	101,4	1,4
2004	17,6	60,2	-39,8	101,7	1,7
2005	18,8	64,4	-35,6	107,0	7,0
2006	22,5	76,9	-23,1	119,5	19,5
2007	31,1	106,4	6,4	138,3	38,3
2008	29,2	100,0	0,0	94,0	-6,0
2009	28,2	96,6	-3,4	96,6	-3,4
2010	32,3	110,5	10,5	114,4	14,4
2011	39,8	136,2	36,2	123,3	23,3

Average annual rate of change for export of a primary and secondary wood products from Croatia to Austria in the years 2000 - 2011 was positive, $\bar{S} = 6,03\%$.

Table 22. GERMANY: export indices and rates of change for period 2000 - 2011

Year	mil.€	I_{2008}	S*	V	S**
2000	26,0	89,0	-11,0	-	-
2001	20,4	69,9	-30,1	78,5	-21,5
2002	16,5	56,4	-43,6	80,7	-19,3
2003	19,0	65,1	-34,9	115,4	15,4
2004	17,6	60,1	-39,9	92,4	-7,6
2005	15,3	52,2	-47,8	86,8	-13,2
2006	17,9	61,4	-38,6	117,6	17,6
2007	27,0	92,5	-7,5	150,7	50,7
2008	29,2	100,0	0,0	108,1	8,1
2009	27,4	93,7	-6,3	93,7	-6,3
2010	30,3	103,7	3,7	110,7	10,7
2011	38,2	130,6	30,6	125,9	25,9

Average annual rate of change for export of a primary and secondary wood products from Croatia to Germany in the years 2000 - 2011 was positive, $\bar{S} = 3,54\%$.

Table 23. EGYPT: export indices and rates of change for period 2000 - 2011

Year	mil.€	I_{2008}	S*	V	S**
2000	6,7	19,4	-80,6	-	-
2001	6,9	20,0	-80,0	102,9	2,9
2002	7,9	22,6	-77,4	113,3	13,3
2003	8,5	24,4	-75,6	107,6	7,6
2004	8,0	23,1	-76,9	94,7	-5,3
2005	11,2	32,4	-67,6	140,5	40,5
2006	18,2	52,6	-47,4	162,3	62,3
2007	22,5	64,8	-35,2	123,2	23,2
2008	34,7	100,0	0,0	154,3	54,3
2009	32,5	93,6	-6,4	93,6	-6,4
2010	34,1	98,3	-1,7	104,9	4,9
2011	34,1	98,3	-1,7	100,0	0,0

Average annual rate of change for export of a primary and secondary wood products from Croatia to Egypt in the years 2000 - 2011 was positive, $\bar{S} = 15,88\%$.

Table 24. BOSNIA AND HERZEGOVINA: export indices and rates of change for period 2000 - 2011

	mil.€	I_{2008}	S*	V	S**
2000	6,4	25,9	-74,1	-	-
2001	5,8	23,4	-76,6	90,5	-9,5
2002	8,0	32,6	-67,4	139,0	39,0
2003	8,2	33,4	-66,6	102,7	2,7
2004	9,4	38,3	-61,7	114,5	14,5
2005	12,1	49,1	-50,9	128,1	28,1
2006	13,0	52,8	-47,2	107,5	7,5
2007	21,6	87,5	-12,5	165,8	65,8
2008	24,7	100,0	0,0	114,3	14,3
2009	17,4	70,7	-29,3	70,7	-29,3
2010	19,0	77,0	-23,0	109,0	9,0
2011	19,5	79,2	-20,8	102,9	2,9

Average annual rate of change for export of a primary and secondary wood products from Croatia to Bosnia and Herzegovina in the years 2000 - 2011 was positive, $\bar{S} = 10,71\%$.

Table 25. SWITZERLAND: export indices and rates of change for period 2000 - 2011

Year	mil.€	I_{2008}	S*	V	S**
2000	3,3	29,8	-70,2	-	-
2001	4,2	38,1	-61,9	128,2	28,2
2002	3,6	32,5	-67,5	85,1	-14,9
2003	6,4	57,4	-42,6	177,0	77,0
2004	10,2	92,3	-7,7	160,8	60,8
2005	10,4	94,2	-5,8	102,0	2,0
2006	10,6	95,5	-4,5	101,5	1,5
2007	9,7	87,8	-12,2	91,9	-8,1
2008	11,1	100,0	0,0	113,9	13,9
2009	10,2	91,9	-8,1	91,9	-8,1
2010	10,6	95,8	-4,2	104,2	4,2
2011	9,8	88,8	-11,2	92,7	-7,3

Average annual rate of change for export of a primary and secondary wood products from Croatia to Switzerland in the years 2000 - 2011 was positive, $\bar{S} = 10,45\%$.
Results of these analysis for whole export market of a primary and secondary wood products from Croatia are given in table 26.

Table 26. TOTAL: export indices and rates of change for period 2000 - 2011

Year	mil.€	I_{2008}	S*	V	S**
2000	245,3	61,2	-38,8	-	-
2001	230,1	57,4	-42,6	93,8	-6,2
2002	235,2	58,7	-41,3	102,2	2,2
2003	253,9	63,3	-36,7	108,0	8,0
2004	271,2	67,6	-32,4	106,8	6,8
2005	292,2	72,9	-27,1	107,7	7,7
2006	332,9	83,0	-17,0	113,9	13,9
2007	402,9	100,5	0,5	121,0	21,0
2008	401,1	100,0	0,0	99,5	-0,5
2009	333,8	83,2	-16,8	83,2	-16,8
2010	376,8	94,0	-6,0	112,9	12,9
2011	439,8	109,7	9,7	116,7	16,7

Average annual rate of change for export of a primary and secondary wood products from Croatia in the years 2000 - 2011 was positive, $\bar{S} = 5,45\%$.

6.3.2. Import of primary and secondary wood products in Croatia

Over 50% of total import value makes wood products imported from Slovenia, Austria and Bosnia and Herzegovina. Distribution of import in Croatia according to main import markets for period 2000 - 2011 is shown on Figure 44.

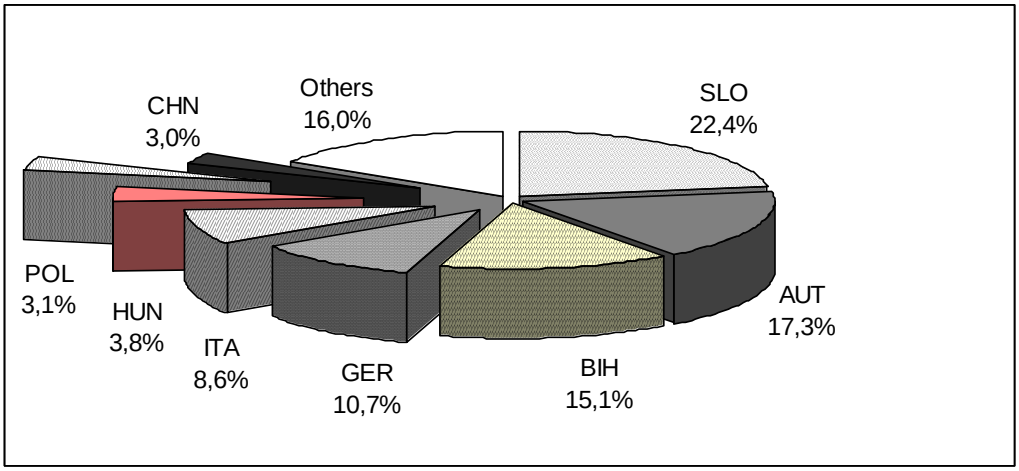

Figure 44. Distribution of import in Croatia according to main import markets for period 2000 - 2011

The basic indices (I_{2008}) for the most important import markets are presented with a common reference year (currently 2008 = 100) and belonging rates of change (S* = I_{2008} - 100), also chain base index (V) and belonging rates of change (S** = V - 100). Results of these analysis for the most important import markets to Croatia of a primary and secondary wood products are given in folowing tables (Table 27. to Table 34.).

Table 27. SLOVENIA: import indices and rates of change for period 2000 - 2011

Year	mil.€	I_{2008}	S*	V	S**
2000	32,0	54,5	-45,5	-	-
2001	37,2	63,3	-36,7	116,1	16,1
2002	42,7	72,6	-27,4	114,8	14,8
2003	46,6	79,4	-20,6	109,3	9,3
2004	43,4	73,8	-26,2	93,0	-7,0
2005	47,3	80,5	-19,5	109,1	9,1
2006	53,6	91,3	-8,7	113,4	13,4
2007	54,3	92,4	-7,6	101,2	1,2
2008	58,8	100,0	0,0	108,2	8,2
2009	37,4	63,6	-36,4	63,6	-36,4
2010	29,0	49,4	-50,6	77,6	-22,4
2011	26,5	45,1	-54,9	91,4	-8,6

Average annual rate of change for import of a primary and secondary wood products from Slovenia to Croatia in the years 2000 – 2011 was negative, $\bar{S} = -1,69\%$.

Table 28. AUSTRIA: import indices and rates of change for period 2000 - 2011

Year	mil.€	I_{2008}	S*	V	S**
2000	12,3	25,2	-74,8	-	-
2001	19,3	39,6	-60,4	157,3	57,3
2002	26,3	53,9	-46,1	136,2	36,2
2003	29,5	60,3	-39,7	111,9	11,9
2004	31,0	63,5	-36,5	105,2	5,2
2005	32,7	66,9	-33,1	105,4	5,4
2006	39,2	80,3	-19,7	120,0	20,0
2007	49,0	100,4	0,4	125,1	25,1
2008	48,8	100,0	0,0	99,6	-0,4
2009	36,8	75,4	-24,6	75,4	-24,6
2010	33,6	68,9	-31,1	91,5	-8,5
2011	34,6	70,9	-29,1	102,9	2,9

Average annual rate of change for import of a primary and secondary wood products from Austria to Croatia in the years 2000 – 2011 was positive, $\bar{S} = 9,87\%$.

Table 29. BOSNIA AND HERZEGOVINA: import indices and rates of change for period 2000 - 2011

Year	mil.€	I_{2008}	S*	V	S**
2000	14,9	44,1	-55,9	-	-
2001	24,1	71,1	-28,9	161,1	61,1
2002	28,3	83,7	-16,3	117,7	17,7
2003	34,9	103,1	3,1	123,2	23,2
2004	36,0	106,4	6,4	103,2	3,2
2005	28,0	82,7	-17,3	77,7	-22,3
2006	34,7	102,6	2,6	124,0	24,0
2007	38,2	112,8	12,8	109,9	9,9
2008	33,9	100,0	0,0	88,7	-11,3
2009	23,2	68,6	-31,4	68,6	-31,4
2010	23,2	68,5	-31,5	99,8	-0,2
2011	24,2	71,6	-28,4	104,4	4,4

Average annual rate of change for import of a primary and secondary wood products from Bosnia and Herzegovina to Croatia in the years 2000 - 2011 was positive, $\bar{S} = 4,49\%$.

Table 30. GERMANY: import indices and rates of change for period 2000 - 2011

Year	mil.€	I_{2008}	S*	V	S**
2000	12,2	48,6	-51,4	-	-
2001	14,3	57,1	-42,9	117,5	17,5
2002	16,7	66,6	-33,4	116,7	16,7
2003	19,4	77,4	-22,6	116,2	16,2
2004	21,4	85,6	-14,4	110,5	10,5
2005	18,9	75,5	-24,5	88,2	-11,8
2006	22,7	90,7	-9,3	120,2	20,2
2007	24,8	99,1	-0,9	109,3	9,3
2008	25,0	100,0	0,0	100,9	0,9
2009	24,9	99,4	-0,6	99,4	-0,6
2010	20,2	80,6	-19,4	81,1	-18,9
2011	22,3	89,1	-10,9	110,5	10,5

Average annual rate of change for import of a primary and secondary wood products from Germany to Croatia in the years 2000 - 2011 was positive, $\bar{S} = 5,67\%$.

Table 31. ITALY: import indices and rates of change for period 2000 - 2011

Year	mil.€	I_{2008}	S*	V	S**
2000	8,4	32,5	-67,5	-	-
2001	9,1	35,2	-64,8	108,6	8,6
2002	12,1	46,8	-53,2	132,8	32,8
2003	13,4	51,7	-48,3	110,6	10,6
2004	14,6	56,3	-43,7	108,7	8,7
2005	17,2	66,4	-33,6	118,1	18,1
2006	20,2	77,8	-22,2	117,1	17,1
2007	22,4	86,3	-13,7	111,0	11,0
2008	25,9	100,0	0,0	115,9	15,9
2009	19,6	75,5	-24,5	75,5	-24,5
2010	15,4	59,5	-40,5	78,8	-21,2
2011	16,4	63,1	-36,9	105,9	5,9

Average annual rate of change for import of a primary and secondary wood products from Italy to Croatia in the years 2000 - 2011 was positive, $\bar{S} = 6,22\%$.

Table 32. HUNGARY: import indices and rates of change for period 2000 - 2011

Year	mil.€	I_{2008}	S*	V	S**
2000	7,1	89,9	-10,1	-	-
2001	6,4	81,7	-18,3	90,9	-9,1
2002	7,1	90,0	-10,0	110,2	10,2
2003	7,3	92,4	-7,6	102,7	2,7
2004	8,3	104,9	4,9	113,5	13,5
2005	8,6	108,7	8,7	103,6	3,6
2006	7,3	92,6	-7,4	85,2	-14,8
2007	7,2	91,3	-8,7	98,6	-1,4
2008	7,9	100,0	0,0	109,5	9,5
2009	6,0	75,9	-24,1	75,9	-24,1
2010	6,2	79,0	-21,0	104,1	4,1
2011	6,3	79,9	-20,1	101,0	1,0

Average annual rate of change for import of a primary and secondary wood products from Hungary to Croatia in the years 2000 - 2011 was negative, $\bar{S} = -1,07\%$.

Table 33. POLAND: import indices and rates of change for period 2000 - 2011

Year	mil.€	I_{2008}	S*	V	S**
2000	0,9	11,8	-88,2	-	-
2001	2,9	37,8	-62,2	318,7	218,7
2002	4,8	63,6	-36,4	168,4	68,4
2003	6,2	82,2	-17,8	129,2	29,2
2004	7,8	103,3	3,3	125,7	25,7
2005	9,0	118,9	18,9	115,1	15,1
2006	8,1	107,3	7,3	90,2	-9,8
2007	7,5	98,8	-1,2	92,1	-7,9
2008	7,6	100,0	0,0	101,2	1,2
2009	6,7	88,2	-11,8	88,2	-11,8
2010	5,1	66,9	-33,1	75,8	-24,2
2011	4,9	65,1	-34,9	97,3	-2,7

Average annual rate of change for import of a primary and secondary wood products from Poland to Croatia in the years 2000 - 2011 was positive, $\bar{S} = 16,74\%$.

Table 34. CHINA: import indices and rates of change for period 2000 - 2011

Year	mil.€	I_{2008}	S*	V	S**
2000	0,4	3,0	-97,0	-	-
2001	0,8	6,1	-93,9	206,5	106,5
2002	1,6	12,9	-87,1	210,7	110,7
2003	2,0	15,4	-84,6	119,9	19,9
2004	3,7	29,3	-70,7	189,6	89,6
2005	6,4	50,3	-49,7	172,1	72,1
2006	7,5	58,5	-41,5	116,1	16,1
2007	12,3	96,5	-3,5	165,0	65,0
2008	12,8	100,0	0,0	103,7	3,7
2009	7,5	58,8	-41,2	58,8	-41,2
2010	6,4	49,9	-50,1	85,0	-15,0
2011	6,7	52,5	-47,5	105,0	5,0

Average annual rate of change for import of a primary and secondary wood products from China to Croatia in the years 2000 - 2011 was positive, $\bar{S} = 29,87\%$.

Results of these analysis for whole import market of a primary and secondary wood products in Croatia are given in table 35.

Average annual rate of change for import of a primary and secondary wood products in Croatia in the years 2000 - 2011 was positive, $\bar{S} = 4,45\%$.

Table 35. TOTAL: import indices and rates of change for period 2000 - 2011

Year	mil.€	I_{2008}	S*	V	S**
2000	106,2	40,2	-59,8	-	-
2001	135,0	51,1	-48,9	127,1	27,1
2002	161,9	61,3	-38,7	120,0	20,0
2003	187,9	71,1	-28,9	116,0	16,0
2004	195,7	74,0	-26,0	104,1	4,1
2005	199,8	75,6	-24,4	102,1	2,1
2006	231,3	87,5	-12,5	115,8	15,8
2007	259,9	98,3	-1,7	112,4	12,4
2008	264,4	100,0	0,0	101,7	1,7
2009	192,4	72,8	-27,2	72,8	-27,2
2010	167,0	63,2	-36,8	86,8	-13,2
2011	171,5	64,9	-35,1	102,7	2,7

6.3.3. Models for predicting the future export and import values of primary and secondary wood products

According to Blažević (2007), when the rates of change in successive time periods are approximately equal, and assuming that the average rate of change will not change, with the average rate of change can be predict variable values in future period. Based on the average rates of change for export (5,45%) and import (4,45%) of a primary and secondary wood products in the observed period models A for prediction of future values of exports $\hat{E}_A(t)$ and imports $\hat{I}_A(t)$ were developed.

Correlation analysis to determine the degree of correlation between the values of export and import as dependent variables and time (*t*) as independent variable was used. We found that the direction and strength of the correlation relationship was positive and high in both cases, so we developed linear trend models (models B) and logarithmic trend models (models C) for prediction of future values of exports $\hat{E}_B(t)$, $\hat{E}_C(t)$ and imports $\hat{I}_B(t)$, $\hat{I}_C(t)$.

In all models, *t* is mark for the *time*, where *t* = 1 compared to year 2000, *t* = 2 for year 2001; ... , *t* = 14 to year 2013, etc. Units for predict values of import and export are one million €. Constructed models A, models B and models C for predicting the future values of exports and imports of a primary and secondary wood products are shown in Table 36.

Table 36. Models A, models B and models C for calculating the future export and import values of a primary and secondary wood products

Models	Export (mil. €)	Import (mil. €)
model A	$\hat{E}_A(t) = E_1 \cdot 1,0545^{t-1}$	$\hat{I}_A(t) = U_1 \cdot 1,0445^{t-1}$
model B	$\hat{E}_B(t) = 18,61 \cdot t + 196,99$	$\hat{I}_B(t) = 6,38 \cdot t + 147,93$
model C	$\hat{E}_C(t) = 80,71 \cdot \ln(t) + 97,03$	$\hat{I}_C(t) = 41,37 \cdot \ln(t) + 120,51$

Calculated predicted values by model A, model B and model C for export of Croatian primary and secondary wood products for period 2000 – 2017 are shown in Table 37.
Comparison of existing and calculated predicted values by model A, model B and model C for export of Croatian primary and secondary wood products is shown in Figure 45.

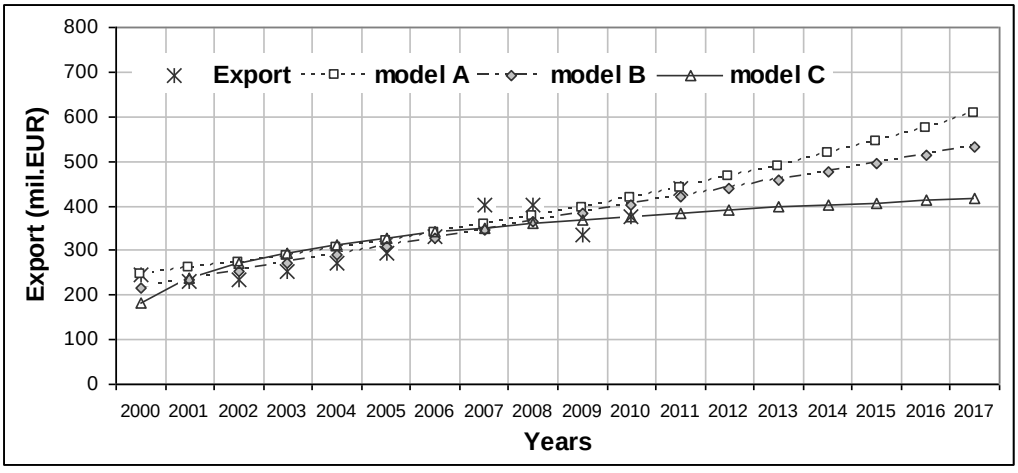

Figure 45. Existing and predicted export values of a primary and secondary wood products till 2017

Table 37. Predicted export values of a primary and secondary wood products for period 2000 – 2017

Year	Predicted export values (mil.€)		
	model A	model B	model C
2000	245,3	215,6	183,5
2001	258,6	234,2	239,4
2002	272,7	252,8	272,2
2003	287,6	271,4	295,4
2004	303,3	290,0	313,4
2005	319,8	308,6	328,1
2006	337,3	327,2	340,6
2007	355,7	345,8	351,3
2008	375,0	364,5	360,8
2009	395,5	383,1	369,4
2010	417,1	401,7	377,0
2011	439,8	420,3	384,1
2012	463,8	438,9	390,5
2013	489,1	457,5	396,5
2014	515,7	476,1	402,1
2015	543,9	494,7	407,3
2016	573,5	513,3	412,2
2017	604,8	531,9	416,8

Calculated predicted values by model A, model B and model C for import of primary and secondary wood products in Croatia for period 2000 – 2017 are shown in Table 38.
Comparison of existing and calculated predicted values by model A, model B and model C for import of primary and secondary wood products in Croatia is shown in Figure 46.

Table 38. Predicted import values of a primary and secondary wood products for period 2000 – 2017

Year	Predicted import values (mil.€)		
	model A	model B	model C
2000	106,2	154,3	120,5
2001	111,0	160,7	149,2
2002	115,9	167,1	166,0
2003	121,1	173,5	177,9
2004	126,4	179,8	187,1
2005	132,1	186,2	194,6
2006	137,9	192,6	201,0
2007	144,1	199,0	206,5
2008	150,5	205,4	211,4
2009	157,2	211,8	215,8
2010	164,2	218,1	219,7
2011	171,5	224,5	223,3
2012	179,1	230,9	226,6
2013	187,1	237,3	229,7
2014	195,4	243,7	232,5
2015	204,1	250,1	235,2
2016	213,2	256,4	237,7
2017	222,7	262,8	240,1

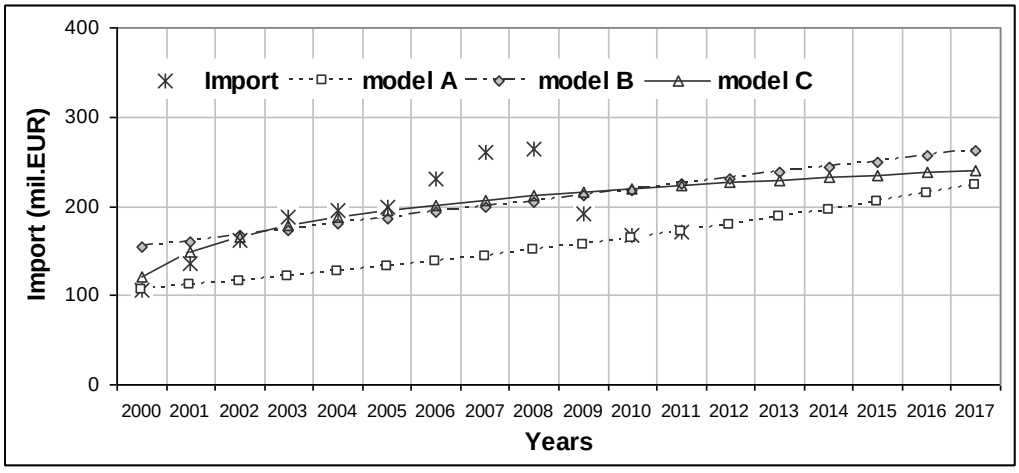

Figure 46. Existing and predicted import values of a primary and secondary wood products till 2017

According to the linear trend models (models B), the expected linear increase in the annual export value of Croatian primary and secondary wood products is 18,6 million € and expected linear increase in the annual import value is 6,4 million €. According to constructed logarithmic trend models (models C), we expect 232,5 mil.€ for the value of import in year 2014, while the value of export of a primary and secondary wood products will raise to 402,1 mil.€ .

6.3.4. Models for predicting the future export values of primary and secondary wood products for the most important export markets

Italy is the most important market for export of Croatians primary and secondary wood products. Based on the average rate of change for export of a primary and secondary wood products in Italy (2,38%) in the observed period 2000 – 2011, model A for prediction of future values of export in Italy was developed: $\hat{E}_A(t) = E_1 \cdot 1,0238^{t-1}$. Following the correlation analysis we developed linear trend model (model B) and logarithmic trend model (model C) for prediction of future values of exports in Italy, $\hat{E}_B(t) = 3,05 \cdot t + 106,08$ and $\hat{E}_C(t) = 13,95 \cdot \ln(t) + 102,69$. Comparison of existing and calculated predicted values by model A, model B and model C for export of Croatian primary and secondary wood products in Italy for period 2000 – 2017 are shown in Table 38.

Slovenia is the second most important market for export of Croatians primary and secondary wood products. Based on the average rate of change for export of a primary and secondary wood products in Slovenia (5,24%) in the observed period 2000 – 2011, model A for prediction of future values of export in Slovenia were developed: $\hat{E}_A(t) = E_1 \cdot 1,0524^{t-1}$. Following the correlation analysis we developed linear trend model (model B) and logarithmic trend model (model C) for prediction of future values of exports in Slovenia, $\hat{E}_B(t) = 1,797 \cdot t + 26,14$ and $\hat{E}_C(t) = 8,32 \cdot \ln(t) + 23,95$. Comparison of existing and calculated predicted values by model A, model B and model C for export of Croatian primary and secondary wood products in Slovenia for period 2000 – 2017 are shown in Table 39.

Table 38. Existing and predicted export values of Croatian primary and secondary wood products in Italy for period 2000 – 2017

Italy		Existing export values (mil.€)	Predicted export values (mil.€)		
Year	*t*		model A	model B	model C
2000	1	112,5	112,5	109,1	102,7
2001	2	107,9	115,2	112,2	112,4
2002	3	111,5	118,0	115,2	118,0
2003	4	115,7	120,8	118,3	122,0
2004	5	119,1	123,6	121,3	125,1
2005	6	122,1	126,6	124,4	127,7
2006	7	135,0	129,6	127,4	129,8
2007	8	151,6	132,7	130,5	131,7
2008	9	137,4	135,8	133,6	133,3
2009	10	115,3	139,1	136,6	134,8
2010	11	137,0	142,4	139,7	136,1
2011	12	145,8	145,8	142,7	137,3
2012	13	-	149,3	145,8	138,5
2013	14	-	152,8	148,8	139,5
2014	15	-	156,4	151,9	140,5
2015	16	-	160,2	154,9	141,4
2016	17	-	164,0	158,0	142,2
2017	18	-	167,9	161,0	143,0

Table 39. Existing and predicted export values of Croatian primary and secondary wood products in Slovenia for period 2000 – 2017

Slovenia		Existing export values (mil.€)	Predicted export values (mil.€)		
Year	*t*		model A	model B	model C
2000	1	29,5	29,5	27,9	24,0
2001	2	25,8	31,0	29,7	29,7
2002	3	30,1	32,6	31,5	33,1
2003	4	31,9	34,3	33,3	35,5
2004	5	35,8	36,1	35,1	37,3
2005	6	40,0	38,0	36,9	38,9
2006	7	42,4	40,0	38,7	40,1
2007	8	45,2	42,1	40,5	41,3
2008	9	44,4	44,3	42,3	42,2
2009	10	36,6	46,7	44,1	43,1
2010	11	40,4	49,1	45,9	43,9
2011	12	51,7	51,7	47,7	44,6
2012	13	-	54,4	49,5	45,3
2013	14	-	57,2	51,3	45,9
2014	15	-	60,2	53,1	46,5
2015	16	-	63,4	54,9	47,0
2016	17	-	66,7	56,7	47,5
2017	18	-	70,2	58,5	48,0

6.3.5. Models for predicting the future import values of primary and secondary wood products in Croatia from the most important import markets

Over 1/5 of total import value makes wood products imported from Slovenia. Based on the average rate of change for import of a primary and secondary wood products from Slovenia (-1,69%) in the observed period 2000 – 2011, model A for prediction of future import values from Slovenia were developed: $\hat{I}_A(t) = I_1 \cdot 0,9831^{t-1}$. Following the correlation analysis we

developed linear trend model (model B) and logarithmic trend model (model C) for prediction of future import values from Slovenia, $\hat{I}_B(t) = -0,25 \cdot t + 44,02$ and $\hat{I}_C(t) = 1,97 \cdot \ln(t) + 39,13$. Comparison of existing and calculated predicted values by model A, model B and model C for import of primary and secondary wood products from Slovenia for period 2000 – 2017 are shown in Table 40.

Table 40. Existing and predicted import values of primary and secondary wood products from Slovenia for period 2000 – 2017

Slovenia		Existing import values (mil.€)	Predicted import values (mil.€)		
Year	*t*		model A	model B	model C
2000	1	32,0	32,0	43,8	39,1
2001	2	37,2	31,5	43,5	40,5
2002	3	42,7	30,9	43,3	41,3
2003	4	46,6	30,4	43,0	41,9
2004	5	43,4	29,9	42,8	42,3
2005	6	47,3	29,4	42,5	42,7
2006	7	53,6	28,9	42,3	43,0
2007	8	54,3	28,4	42,0	43,2
2008	9	58,8	27,9	41,8	43,5
2009	10	37,4	27,5	41,5	43,7
2010	11	29,0	27,0	41,3	43,9
2011	12	26,5	26,5	41,0	44,0
2012	13	-	26,1	40,8	44,2
2013	14	-	25,6	40,6	44,3
2014	15	-	25,2	40,3	44,5
2015	16	-	24,8	40,1	44,6
2016	17	-	24,4	39,8	44,7
2017	18	-	24,0	39,6	44,8

Austria is the second most important market for import of primary and secondary wood products in Croatia. Based on the average rate of change for import of a primary and secondary wood products from Austria (9,87%) in the observed period 2000 – 2011, model A for prediction

of future import values from Austria were developed: $\hat{I}_A(t) = I_1 \cdot 1,0987^{t-1}$. Following the correlation analysis we developed linear trend model (model B) and logarithmic trend model (model C) for prediction of future import values from Austria, $\hat{I}_B(t) = 2,12 \cdot t + 19,01$ and $\hat{I}_C(t) = 11,71 \cdot \ln(t) + 13,25$. Comparison of existing and calculated predicted values by model A, model B and model C for import of primary and secondary wood products from Austria for period 2000 – 2017 are shown in Table 41.

Table 41. Existing and predicted import values of primary and secondary wood products from Austria for period 2000 – 2017

Austria		Existing import values (mil.€)	Predicted import values (mil.€)		
Year	*t*		model A	model B	model C
2000	1	12,3	12,3	21,1	13,3
2001	2	19,3	13,5	23,2	21,4
2002	3	26,3	14,8	25,4	26,1
2003	4	29,5	16,3	27,5	29,5
2004	5	31,0	17,9	29,6	32,1
2005	6	32,7	19,7	31,7	34,2
2006	7	39,2	21,6	33,8	36,0
2007	8	49,0	23,8	35,9	37,6
2008	9	48,8	26,1	38,1	39,0
2009	10	36,8	28,7	40,2	40,2
2010	11	33,6	31,5	42,3	41,3
2011	12	34,6	34,6	44,4	42,3
2012	13		38,0	46,5	43,3
2013	14		41,8	48,6	44,2
2014	15		45,9	50,7	45,0
2015	16		50,4	52,9	45,7
2016	17		55,4	55,0	46,4
2017	18		60,9	57,1	47,1

6.3.6. Terms of trade for primary and secondary wood products

Terms of trade (TOT) is a single number that represents the ratio of a particular country's exports and imports. Specifically, this number represents the relationship between the price a country receives for its exported goods and the price it pays for imported items. In general, these terms are considered to be more favorable when the price of exports exceeds the price of imports. Descriptive statistics were determined for export / import ratio (TOT) of a primary and secondary wood products on the basis of established values in the period 2000 - 2011. The results of descriptive analysis are given in Table 42.

Table 42. Descriptive statistics for export / import ratio for period 2000 - 2011

Valid N	Sum	Minimum	Median	Maximum	Mean	Std.Dev.	Conf.-95%	Conf.+95%
12	20,73	1,35	1,53	2,56	**1,73**	**0,41**	1,46	1,99

Correlation analysis to determine the degree of correlation between the values of export / import ratio as dependent variable and time (*t*) as independent variable was used. We found that the direction and strength of the correlation relationship was positive and high, so we developed ploynomial trend model in 2nd order for prediction of future values of exports / import ratio: $\hat{R}_{E/I}(t) = 0,0337 \cdot t^2 - 0,3989 \cdot t + 2,4969$. In this model *t* is mark for the *time*, where *t* = 1 compared to year 2000, *t* = 2 for year 2001; ... , *t* = 14 to year 2013, etc. Comparison of existing export / import ratio and calculated predicted values by model $\hat{R}_{E/I}(t)$ is shown in Figure 47.

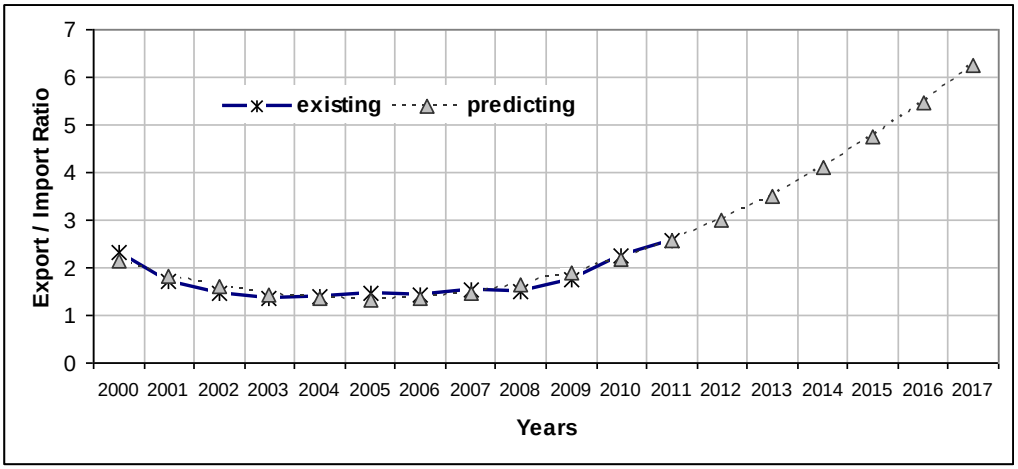

Figure 47. Export / Import ratio for a primary and secondary wood products for period 2000 - 2011

6.4. CONCLUSION

The overall progress of the national economy and its branches, including the Croatian wood industry is of great public interest. Different turbulent period of Croatian history, among other things, are marked by developments in some key macroeconomic variables such as employment, productivity, and foreign trade activity in the market of wood products. Uniqueness of Croatian geostrategic position, economic and historical processes had major implications on the long-term development of the Croatian wood industry.

Applying methods that have not been traditionally used could be help at the strategic, tactical and/or operational planning level and decision making in the managing of a wood sector, and businesses entities of our wood industry. An increase in the terms of trade can mean the overall welfare of the country has improved, but not always. This often depends on the reason for the change in prices. The ratio can change based on several internal and external factors affecting a particular country, including supply and demand for the products that are imported and exported, as well as local and international economic health. A sudden TOT change can trigger balance of payment problems if the country depends on export receipts to pay for its imports.

Assuming that the macroeconomic policies will not be altered, and assuming that the models for predicting future values of export and import of a primary and secondary wood products satisfy all statistical and theoretical terms, constructed models A, models B and models C could become a great help for a future actions.

By applying models companies that deals with a primary and secondary wood products will be able to define the future business strategy.The paper could also help to research institutions for decision-making and strategy development.

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7. CONSUMPTION OF SELECTED WOOD PRODUCTS IN CROATIAN AND INTERNATIONAL MARKETS

Darko Motik, Andreja Pirc Barčić, Maja Moro

7.1. INTRODUCTION

In the recent years market of wood and wood-based products has going through turbulent times on the global and European level, and also in Croatia. With regard to the economic problems, a decline in consumption of wood product was expected. In days of crisis, when purchasing power of the population decrease, products such as wood based products are not on demand priority list. According to the Croatian Chamber of Economy, in 2009 the intensity of the global crisis was shown by the fact that the world economic activity achieved a decline first time in more than half of the century. In four of the world's five largest economies, which represent four to five percent of global GDP, there was a significant decrease, while only China withholds a growth rate. In 2012 the world growth was forecast to be 3.5%, a slight decline from 2011, but a minor increase is expected in 2013. During the past years, the eurozone has been moving from one crisis to another. In the European Union, which presents the biggest Croatian economic partner, an economic decline of 4, 2% was note in 2009, which continued also in 2010. In the EU and South-East Europe, real GDP is still below the pre-crisis levels and industrial production is 12% below its mid-2008 peak (UNECE/FAO, 2012). Also according to the same source, UNECE/FAO (2012), the transition countries were the worst affected region of the world during the 2008-2009. As well in Croatia, according to the Central Bureau of Statistics data, economic growth was slowed down with the total decline in GDP of 6,9% in 2008 and followed in 2009. In overall a decline of Croatian economic activity, is affected by disruption in the global market, on the one hand and on the other by perennial structural problems in Croatian economy. Also in 2010 Croatian economic activity was decreasing, which was continued in 2011 and 2012.

Consumption is the physical use, or the use of products and services for the purposes for which they are intended. Consumption satisfies the needs which have caused the purchase

of these same products in the first place (Grbac and Meler, 2007). There are three methods of calculating the consumption of wood and wood products. The first is based on the data collected from wood and wood products sellers on the quantity of wood and wood products sold on the certain market over a specified time period. The second involves surveying wood and wood products consumers using generally accepted consumer survey methods. The third involves calculations with so-called apparent consumption.

The aim of this work is to determine the consumption of selected wood products – round wood, sawn wood, and wood-based panels in some international markets and in the Republic of Croatia by applying the third method of calculating consumption.

7.2. MATERIALS AND METHODS

In the article data on consumption of selected wood products (round wood and sawn wood) per capita were taken from the annual statistical reports of United Economic Commission for Europe (UNECE) and Food and Agriculture Organization of the United Nations (FAO) for the period 2001 to 2010. Paper analysis enclosed consumption per capita and average consumption per capita for: the World, the Europe, the European Union, countries of South-East Europe, selected European countries (Austria, Finland, Italy, Germany, Poland, and Slovakia), and Croatia for period from 2001 to 2010.

Population of the European Union (EU-27) for the purpose of calculation of selected wood products per capita in EU was taken from the official *web-site* of EU. The total of EU population is 501.259.840.

Type of consumption analysed in this article was calculated using so-called 'apparent consumption'.

The obtained results are expressed in quantitative (m^3) values.

7.3. RESULTS AND DISCUSSION

According to the data shown in Table 43 and Figure 48 the world average consumption of round wood per capita was about 0,49 m^3 in the observed period from 2001 to 2010. The highest consumption was achieved in 2005 and 2007 (0,51 m^3 per capita) and the lowest in

2001 and 2009 (0,49 m^3 per capita). At the European level, the average consumption of round-wood per capita (in the observed 10-year period) was about 40% higher in comparison to the global consumption of round-wood (amounted 0,84 m^3). In the Europe the highest consumption of round-wood per capita was reached in 2007 (0,95 m^3) and the lowest was noted six years earlier (in 2001). In addition, in the observed period (2001 – 2010) a relationship between annual round-wood consumption per capita in the Europe and the European Union (EU-27) was almost equal. 2007 both in the Europe and in the European Union was the year with the highest consumption of round-wood per capita with amount of about 1,23 m^3. In the EU-27 the average consumption of round-wood was 0,87 m^3 per capita in the period from 2001 to 2010.

In the Southeast European countries the average consumption of round-wood per capita was almost at the European level of consumption. The lowest level was generate in 2001 and the highest in 2006 (0,72 m^3). Regarding the average consumption of round-wood per capita in the ten- year period it can be noted that consumption of round-wood in the area of Southeast Europe is higher in comparison to the world average round-wood consumption, but is below the European and the European Union average consumption (Figure 48).

Considering and comparing the consumption of round-wood due to the population between European countries, Finland is outstanding particularly. In Finland, in the observed 10-year period, the average consumption of round-wood per capita was about 13 m^3, which is 26 times more in comparison to the world and 15 times more in comparison to the European and EU-27 average consumption of round-wood per capita.

In the average round-wood consumption per capita among the major European countries, an accent is also put on Austria with an average consumption of about 3 m^3. In Austria the highest consumption of round-wood per capita was achieved in 2007 (3,51 m^3) and the lowest in 2001 (2,41 m^3). Also, 2007 was indicated as the year with the highest round-wood consumption per capita in Finland (Table 43 and Figure 48). Hereafter, in Slovakia consumption of round-wood was above 1 m^3 on the annual level (excluding 2002 and 2003); the highest amount was reached in 2008 and the lowest was noted in 2002. The average consumption of round-wood per capita was 1,22 m^3

Table 43. Round-wood consumption per capita from 2001 to 2010 (in m^3)

category	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	Consumption per capita (in m3)									
WORLD	0,47	0,48	0,48	0,49	**0,51**	0,50	**0,51**	0,49	0,47	0,49
EUROPE	0,74	0,78	0,80	0,82	0,91	0,87	**0,95**	0,87	0,77	0,87
EU-27	0,77	0,78	0,82	0,83	0,94	0,88	**1,23**	0,86	0,77	0,85
SE Europe	0,51	0,63	0,66	0,67	0,70	**0,72**	0,65	0,69	0,60	0,60
Austria	2,41	2,55	2,85	2,93	2,92	3,32	**3,51**	3,41	2,93	3,04
Finland	12,04	12,39	12,61	12,64	12,59	12,25	**13,03**	11,99	8,63	10,73
Germany	0,47	0,49	0,6	0,63	0,66	0,72	**0,91**	0,67	0,6	0,71
Italy	0,23	0,21	0,22	0,23	**0,24**	**0,24**	0,22	0,21	0,19	0,19
Poland	0,67	0,71	0,8	0,86	0,88	0,89	**0,99**	0,94	0,93	0,95
Slovakia	1,07	0,85	0,98	1,16	1,41	1,30	1,29	**1,44**	1,29	1,42
Croatia	0,67	0,71	0,76	0,75	0,79	0,81	0,77	**0,84**	0,79	0,82

Source: FAO/UNECE, 2005, 2006, 2007, 2008, 2009, 2010; FINA; DZS; Motik et al., 2012

In Germany and Poland, the average consumption of round-wood was 0,65 m^3 and 0,86 m^3 per capita. Observing an annual round-wood consumption in Italy it would be expected that consumption of round wood per capita was on the higher level, but it can be noted that the average consumption of round-wood per capita amounted only 0,22 m^3 in the observed period.

Comparing the consumption of round-wood in Croatia with other research countries and areas, it can be noted that the Croatian consumption of round-wood per capita per year was a higher than world's average and the average of Southeastern Europe, but it was not higher in comparison to European and EU-27 average. In Croatia, round-wood consumption per capita was on the highest level in 2008 (observing the period from 2001 to 2010) – 0,84 m^3, and the lowest consumption was noted in 2001 (0,67 m^3 per capita). The Croatian average round-wood consumption per capita was 0,77 m^3, which is less then is some Southeastern Europe countries, e.g. Slovenia (1,26 m3) and Bosnia and Herzegovina (0,97 m^3).

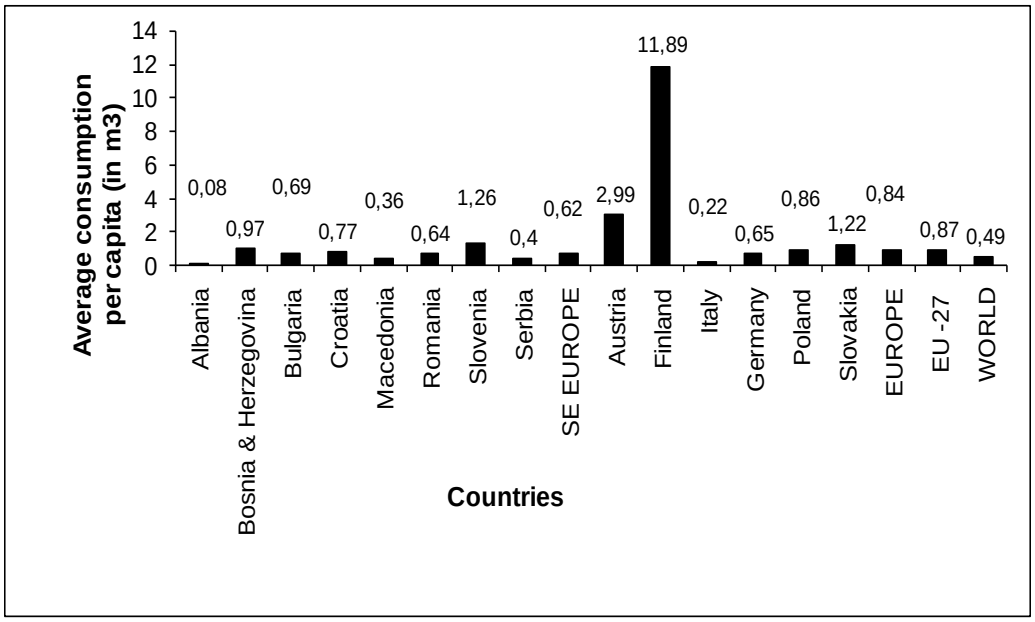

Figure 48. Average consumption of round-wood per capita for 10-year period (2001 – 2010)

Table 44. Sawn-wood consumption per capita from 2001 to 2010 (in m^3)

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
category	Consumption per capita (in m3)									
WORLD	0,054	0,056	0,057	0,061	0,062	**0,063**	**0,063**	0,056	0,051	0,056
EUROPE	0,16	0,16	0,16	0,16	0,16	0,16	**0,17**	0,15	0,13	0,15
EU-27	0,19	0,19	**0,36**	0,20	0,20	0,21	0,22	0,18	0,24	0,18
SE Europe	0,026	0,062	0,072	0,062	0,068	0,069	0,081	0,038	0,065	**0,094**
Austria	0,65	0,64	0,61	0,62	0,63	0,66	**0,68**	0,63	0,53	0,63
Finland	0,92	1,03	**1,11**	1,07	0,96	0,95	1,13	0,82	0,65	0,80
Germany	0,21	0,21	0,22	0,23	0,24	0,26	**0,27**	0,15	0,22	0,24
Italy	0,15	**0,16**	0,15	0,15	0,15	**0,16**	0,15	0,13	0,11	0,12
Poland	0,07	0,08	0,07	0,09	0,09	0,09	**0,12**	0,11	0,11	**0,12**
Slovakia	0,23	0,08	0,15	0,27	0,35	0,24	0,33	**0,47**	0,35	0,36
Croatia	0,10	**0,15**	0,14	0,13	0,12	0,13	0,09	0,14	0,1	0,08

Source: FAO/UNECE, 2005, 2006, 2007, 2008, 2009, 2010; FINA; DZS; Motik et al., 2012

The world average consumption of sawn-wood per capita was 0,06 m^3 (in the observed 10-year period), while the highest values were achieved in 2006 and 2007, and the lowest was noted in 2009. At the European level the average consumption of sawn-wood per capita was for about 2,5 times higher (was amounted 0,16 m^3), while in the European Union territory compared to the global average consumption of sawn-wood was approximately 3.5 times higher (was amounted 0,22 m^3).

In the European area the highest sawn-wood consumption was noted in 2007 (0,17 m^3), and the lowest in 2009 (0,13 m^3). The European Union's highest consumption of sawn-wood per capita amounted 0,36 m^3 and was conducted in 2003, while the lowest value was noted five (2008) and seven (2010) years later. In the Southeast Europe the average sawn-wood consumption per capita was about 2 or 3 times lower than the European average and the average of EU-27. 0.094 m^3 denote the highest consumption of sawn-wood per capita in Southeast Europe (Table 44 and Figure 49).

Observing consumption of sawn-wood in some European countries, Finland presents a country with the highest consumption of sawn-wood with an average of 0,94 m^3 per capita, which is about 16 times more than the average world consumption of sawn-wood per capita, or about 13 times more than the average consumption of sawn-wood per capita in the European countries. Although in the observed period (2001 – 2010) in the Southeast European countries the average consumption of sawn-wood per capita was only 0,07 m^3, Slovenia emphasized its sawn-wood consumption in comparison to other SE European countries. In Slovenia the average consumption of sawn-wood per capita was 0,28 m^3 what correspondents to the average consumption of sawn-wood per capita in Slovakia. Furthermore, after Finland, Austria presents a county with rather high values of the average sawn-wood consumption per capita – 0,63 m^3, followed by Slovakia (0,28 m^3), and Germany (0,21 m^3). Italy and Poland, as one of the most important European countries in wood processing industry, achieved the average consumption of sawn-wood per capita of only 0,21 m^3 (Italy) and 0,10 m^3 (Poland) in the observed 10-year period.

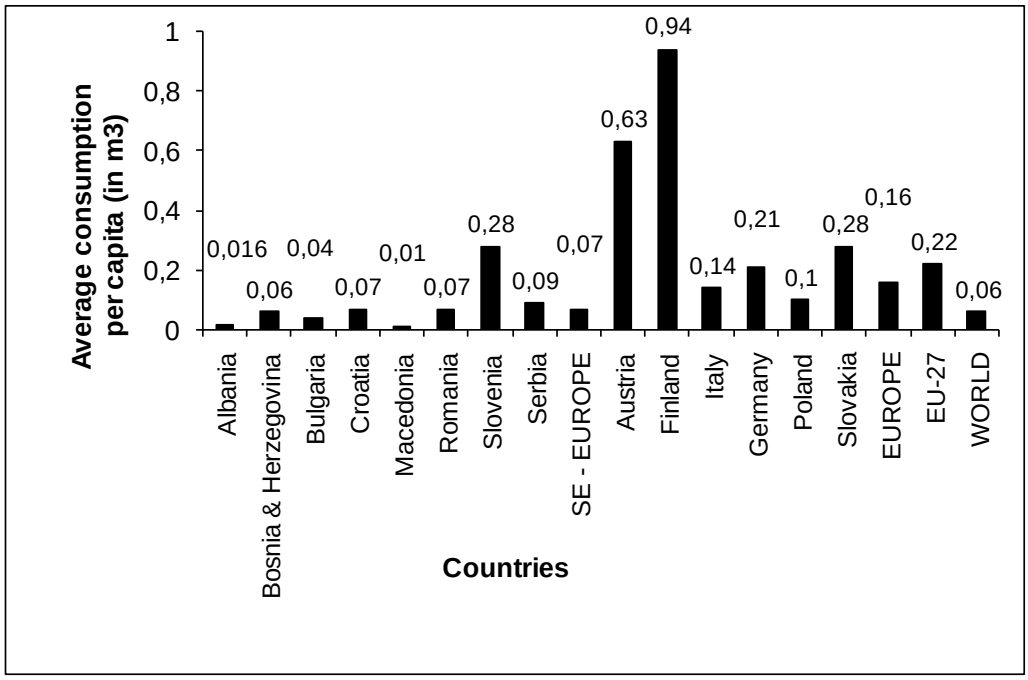

Figure 49. Average consumption of sawn-wood per capita for 10-year period (2001 – 2010)

In Croatia the average consumption of sawn-wood per capita was equal to the average consumption of SE Europe. The highest consumption per capita was achieved in 2002 (0,15 m^3) and the lowest in 2010 (0,08 m^3), what is about 3 times less in comparison to the European average consumption, or about 2 time less than the EU-27 average consumption of sawn-wood per capita (Table 2 and Figure 2).

Contemplating the data shown in Table 45 and Figure 50, the average world consumption of wood-based panels was only 0,03 m^3 per capita, in the observed 10-year period (2001 – 2010). The highest global consumption of wood-based panels per capita was achieved in 2010 (0,040 m^3), and the lowest was noted in 2001 (0,026 m3). Observing the ten-year period in the European area the average consumption per capita of wood-based panels was slightly lower than the average consumption of wood-based panels in the EU-27 (in the Europe area 0,09 m^3; in the EU-27 0,12 m^3). However, looking at the values of wood-based panels consumption per capita on the year level (2001 – 2010), 2007 was noted as the year with the highest value, both in the Europe and in the European Union. In 2007, in the Europe the

average consumption of wood-based panels amounted 0,11 m^3 and in the EU-27 the amount was 0,14 m^3.

In the South-East Europe the average consumption of wood-based panels was below the European average and amounted 0,07 m^3 per capita. Observing the average consumption of wood-based panels per capita in the SE- European countries – Bulgaria, Croatia, and Romania (denoting 0,06 m3/per capita) achieved the SE- European average consumption of wood-based panels per capita, while Slovenia emphasized European and World average consumption of wood-based panels per capita in the observed period (2001 – 2010). In that period in Slovenia wood-based panels average consumption was 0,24 m^3, which was 2 times higher in comparison to the EU-27 average, and 2,7 times higher in comparison to the World average consumption of wood-based panels per capita. In other South-East European countries the average consumption of wood-based panels per capita was below the region average consumption – Albania (0,03 m3), Bosnia and Herzegovina (0,03 m^3), Serbia (0,03 m^3), and Macedonia (0,04 m^3) in the period from 2001 to 2010.

Table 45. Wood – based panels consumption per capita from 2001 to 2010 (in m^3)

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
category	Consumption per capita (in m3)									
WORLD	0,026	0,028	0,032	0,034	0,036	0,038	0,039	0,037	0,037	**0,04**
EUROPE	0,08	0,08	0,09	0,09	0,10	0,10	**0,11**	0,10	0,09	0,10
EU-27	0,10	0,10	0,11	0,12	0,12	0,13	**0,14**	0,12	0,11	0,12
SE Europe	0,08	0,05	0,06	0,06	0,07	0,07	**0,09**	0,08	0,07	0,07
Austria	0,19	0,16	0,16	0,17	0,18	**0,20**	0,15	0,16	0,15	0,17
Finland	0,12	0,12	0,12	0,13	0,14	0,15	**0,16**	**0,16**	0,12	0,14
Germany	0,15	0,14	0,15	0,17	0,17	0,18	0,18	0,14	0,14	**0,19**
Italy	0,10	0,10	0,11	0,11	0,11	0,11	**0,12**	0,11	0,09	0,11
Poland	0,10	0,11	0,13	0,15	0,15	0,18	**0,21**	0,20	0,19	0,20
Slovakia	0,08	0,08	0,07	0,09	0,11	0,18	**0,19**	0,18	0,15	0,13
Croatia	0,04	0,05	0,06	0,06	0,07	0,06	**0,08**	**0,08**	0,06	0,06

Source: FAO/UNECE, 2005, 2006, 2007, 2008, 2009, 2010; FINA; DZS; Motik et al., 2012

According to the data shown in Table 3 the average consumption of wood-based panels per capita is some selected European countries (Austria, Finland, Germany, Italy, Poland, and Slovakia) Austria was noted as a country with the highest average consumption of wood-based panels, with an amount of 0,17 m^3/per capita in the observed period. In Austria 2006 was noted as the year with the highest average consumption of wood-based panels (0,20 m^3 per capita), while 2009 was the year with the lowest average consumption (0,15 m^3 per capita) in the 10 year period. In Germany the average consumption of wood based panels was 0,16 m^3 per capita what correspondents to the average consumption of wood-based panels in Poland, followed by Finland (0,14 m^3 per capita), Slovakia (0,13 m^3/capita), and Italy (0,11 m^3 per capita). 2010 was noted as the year with the highest consumption of wood-based panels per capita in Germany (0,19 m^3), while 2007 represented the year with the highest consumption of wood-based panels per capita in Poland (0,21 m^3), followed by Slovakia (0,19 m^3), and Italy (0,12 m^3).

In Croatia, in the observed ten year period, the average consumption of wood–based panels per capita was 0,06 m^3. The highest consumption of wood-based panels was achieved in 2007 and 2008 with an amount of 0,08 m^3, while the lowest consumption was noted in 2001 (Table 45 and Figure 50).

7.4. CONCLUSION

The world's average consumption of round-wood per capita was 0,49 m^3. The average European and the EU-27 average consumption was about 2 times higher compared to the worlds average consumption, while the SE European average consumption of round-wood was 1.2 times higher in comparison to the Worlds one. The European average consumption of round-wood per capita and the average round-wood consumption per capita were approximately equal. In the Southeast European countries the average consumption of round-wood was below the European average, although some countries in this part of Europe stand out in the average consumption of round-wood per capita, like Slovenia (1,26 m^3) and Bosnia and Herzegovina (0,97 m^3). Among European countries Finland rebounded in the average consumption of round-wood per capita in comparison to the World and European average

consumption. In Croatia the average consumption of round-wood per capita was higher than the world average and the average round-wood consumption of Southeast Europe.

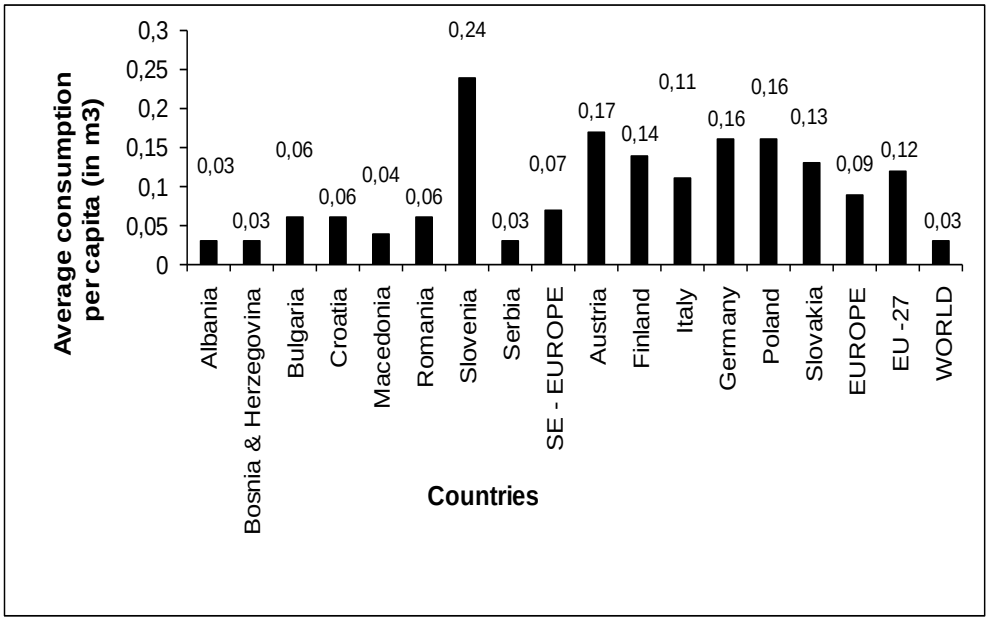

Figure 50. Average consumption of wood-based panels per capita for 10-year period (2001 – 2010)

The World average consumption of sawn-wood per capita was about 8 times lower in comparison to the World average consumption of round-wood per capita. In the Europe the average consumption of sawn-wood per capita was for about 2,5 times higher and in the European Union compared the average consumption of sawn-wood was approximately 3.5 times higher compared to the world's average sawn-wood consumption. In the Southeast Europe the average sawn-wood consumption per capita was about 2 or 3 times lower than the European average and the average of EU-27. As well as in consumption of round-wood Finland was note as the county with the highest average consumption of sawn-wood in the observed European countries considering period from 2001 to 2010. In Croatia the average consumption of sawn-wood per capita was equal to the average consumption of SE Europe.

The World average consumption of wood-based panels per capita was 4 times lower in comparison to the EU average consumption and 3 times lower in comparison to the European.

Among European countries Slovenia rebounded in the average consumption of round-wood per capita in comparison to the World, European, and SE- European average consumption. The average consumption of wood-based panels, in the observed period, amounted 0,07 m^3. Croatian average consumption of wood-based panels per capita was 2 times higher in comparison to World average, while on the other hand was 2 times lower in comparison to the EU-27 average consumption.

Croatia is still lagging behind in regard to the European average consumption and the average consumption of EU-27 countries, especially if we take into consideration countries like Finland and Austria. Although it is an undisputed fact that the consumption of wood products should increase in Croatia, it is possible to conclude that, with respect to the global consumption and consumption of surrounding countries Croatia uses wood as material in higher volumes.

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8. PROMOTION OF WOOD BIOMASS AND PELLET IN CROATIA AND OTHER COUNTRIES OF SOUTHEAST EUROPE

Ana Dijan, Marijan Kavran

8.1. INTRODUCTION

Pellet is a domestic product, made of national resource. The use of pellet brings many advantages: it replaces import of fossil fuels, balances account deficit, increases employment in rural areas and contributes to Kyoto protocol and EU strategy tasks (20:20:20).

The media campaign will include large specter of promotional activities and the goal is to popularize the pellet among general population. The Association of pellet producers will also suggest to the institutions competent for public procurement to plan the heating on pellet in the new public buildings, which should become an ecological standard. It will also suggest the horizontal aid that should encourage general population to switch on modern pellet heating systems.

The pellet and other wood biomass production become more and more lucrative business. The European Commission proposal is to maintain the EU's position as a world leader in renewable energy (Peksa-Blanchard et al., 2007). It has an important role in the forestry and wood processing industry. Wood processing industry represents an important sector and more and more investors choose wood energy projects. Forestry on the other hand, disposes with great amount of wood, thanks to the sustainable forest management.

The campaign objectives are:

- To highlight the nature and advantage of the wood pellet production in Croatia;
- To develop a better understanding of wood pellets and their increasing role in the development of renewable energy in the Croatian economy
- To explain the campaign, the necessary activities and the structure of financial funds.

Methodology

Consultation and research process was done in order to establish this document. Institutions and industry representatives were consulted in order to draw upon their knowledge and opinion of the wood pellet sector (professional associations, Croatian Chamber of Economy, experts from Forestry Faculty of University in Zagreb etc.)

Basic Data about the Association of Croatian Pellet, Briquette and Wood Biomass Producers

The Association is registered in the Register of Association of City of Zagreb and in the Register of non-profit associations (Ministry of Finance – see attachment). The main goals of this leading Croatian professional association in the field of pellet, briquette and wood biomass production is the affirmation of using RES as well as to influence on sector policies and relations with domestic pellet stove producers and producers of similar equipment.

The activities of the Association in the upcoming period

The Association of Croatian Pellet, Briquette and Wood Biomass Producers will initiate subventions of national programs and activities such as:

- Installation of small wood biomass and pellet stoves for residential heating;
- Construction of the district heating system for bigger buildings and smaller communities;
- Modernization of industrial boilers and replacement of fossil fuel cauldrons with wood biomass cauldrons.

What is pellet

Wood pellet is a type of wood fuel, generally made from compacted sawdust or other wastes from sawmilling. The humidity of the wood pellets is only 10 percent and that is the reason for high energetic efficiency of the pellet. The pellet is mostly used in North America and Scandinavia but also in Austria, Italy and Germany. It is suitable for residential and public heating and also for big industrial plants.

The Benefits of Using Wood Pellets

The whole potential of using biomass in the production of energy (electricity or heath) can highly contribute to the consumption of RES, the meeting of Kyoto goals and the rural development because the production is mostly situated in rural areas. The bigger consumption of biomass will not affect ecological balance and biodiversity because the forest management in Croatia is being organized according to the strict rules and the possible amounts of biomass are currently being exported.

In many of the rural areas the buildings for public purpose like schools, kindergartens, public libraries etc. use old energy fossil fuels systems and the unstable oil prices often increase the heating costs, which further burdens public budget of the communities.

According to the results of the research conducted by Croatian Wood Cluster, the price of the heating of public buildings that use gas, are more than 100% higher. This fact is a very good reason for the orientation toward wood energy and pellet as one of the most modern fuel.

Pellet Production as Part of Wood Processing Industry – Raw Potential Material

The main types of wood used in the Croatia are: beech, oak, fir, ash, hornbeam, alder, maple and other types of wood, mainly non-coniferous. In 2010, the wood processing sector counted 3,127 companies that employed over 25,000 workers, generating a total revenue of approximately 1 billion EUR, while the exported goods amounted to 600 million EUR. The export numbers show that wood-processing industry represents almost 8 percent of the Croatian manufacturing industry exports.

Overall Croatian potential of wood biomass in the production of energy and heat is immense and it can significantly contribute to increase of utilization of renewable energy resources (RES) in Croatia, to rural development (since most of the projects will be implemented in rural areas) and to meet the Kyoto protocol requirements. Currently most of the wood biomass raw material ends up in exports. More than 40 trucks of biomass are every day exported from Slavonia region to Slovenia, Austria, Italy and Hungary.

Most of the Croatian pellets producers are situated in the areas rich with wood: Primorsko-goranska, Vukovarsko-srijemska and Licka County. Today, 48 percent of the Croatian territory is covered with forests and forestland. The main characteristics:

- The Croatian forests are natural, which is rare in Europe nowadays;
- Total 2 million ha of the Croatian forestland holds the world famous FSC certificate;
- Forest management offers constant growth of wood reserves. Only 80 percent of annual growth gets cut down;
- Beech is dominant type of specie, with predominantly economical forests;
- The overall reserve of wood in Croatia amounts to 394 million cubic meters.

The state company Hrvatske sume d.o.o. (Croatian Forests Ltd. / CF) has been managing around 78% of the national forestland and private forest owners in Croatia possess less than 22% of all forestland today (around 460.000 ha).

RES Policy and Legal Framework of Forestry and Wood Processing Industry in Croatia

The strategy for the development of energy sector of the Republic of Croatia covers the period until 2030, focusing on improvement in energy efficiency as its primary objective. It has been estimated that the share of forest and wood biomass as potential energy source in the Republic of Croatia might range between 50 to 80 PJ by 2030. The Croatian Government has recognized the importance of renewable energy sources by adopting the industrial wood-processing development program in 2004.

Bigger consumption of wood biomass is one of the most important priorities in this program (especially pellets).

National Forestry Policy and Strategy

In 2003, the Croatian National Forestry Strategy was adopted by the Parliament. It is estimated that approximately 1.3 million m^3 of wood biomass is annually available for energy purposes, half of which is derived from the wood processing industry.

8.2. MARKET ANALYSIS

Pellet Production and Consumption on European Markets

The wood pellet market has experienced a large growth in the last five years. In 2006 the production of wood pellets was estimated between 6 and 7 million tons worldwide (not including Asia, Latin America and Australia). In 2010 the global wood pellet production reached

14.3 million tons, including the mentioned countries, while the consumption was close to 13.5 million tons[2] thus recording an increase of more than 110 percent if compared to 2006.

The European Union is still the main market for wood pellets. Between 2008 and 2010 the EU wood pellet consumption increased by 43.5 percent to reach over 11.4 million tons in 2010, equal to nearly 85 percent of the global wood pellet demand. The large increase in the demand for industrial pellets is being noticed in Northern European countries such as the Netherlands, Belgium, Denmark and Switzerland. In the segment of residential heating the main consumers are Italy, Austria, Germany and Denmark. Exactly those countries have extensive multi-annual campaigns. The result is bigger pellet consumption and that is a good example how to develop pellet market in Croatia.

Pellet Production and Consumption on Croatian Market

Croatian pellet factories produce almost 270.000 t of wood pellet annually and the market consumption amounts hardly 2.000 t.

The Role of Institutions in Promotion and Development of RES Market

- **The project "Drvo je prvo" (Wood Comes First).** In October 2007, the Croatian Chamber of Economy, in cooperation with the company Croatian Forests and the former Ministry of Agriculture, Forestry and Water Management, launched the campaign "Wood comes first!" The main goal of the campaign was to increase wood consumption in Croatia and consumer awareness about benefits of wood and wood products, also about wood biomass and pellets.
- **Grant Aid and Direct State Funding.** Once a year, the Croatian Ministry of Agriculture publishes bids in the area of strengthening competitiveness of the wood processing sector for small and medium-sized enterprises (8 million EUR). However, this funding is not available to professional associations or promotion of products or subsectors.
- **The Croatian Bank for Reconstruction and Development.** Till today, the Bank has financed projects in the wood processing industry with over 380 million EUR, mostly small and medium-sized enterprises (SMEs), also most of the pellet production plants.
- **IPARD**. The Croatian companies, which produce renewable energy from wood, may finance their programs by means of the IPARD program, placing a bid for non-refundable

funds. Areas of priority (wood energy production, distance heating systems, etc.) are defined within the measures (301 and 302) through the component of rural development.

- **Fund for Environmental Protection and Energy Efficiency.** This Fund is established for the purpose of financing programs, projects and other activities in the field of environmental protection, energy efficiency (EE) and renewable energy sources (RES). Many wood processing companies have already used the Eco Fund sources for financing projects regarding environment and wood energy exploitation.
- **Faculty of Forestry Zagreb.** The Faculty has the laboratory and equipment for biomass research.
- **Croatian Forestry Institute.** The Institute participates in many European projects, like RoK-FOR, that analyses the potential of forestry in using RES.
- **Wood Cluster.** There are three wood clusters in Croatia: Croatian Wood Cluster, Wood Cluster of North-western Croatia and Wood Cluster of Vukovarsko-srijemska county. All cluster participate in EU projects, like ID WOOD, ECOMOVEL etc

Why does Croatia Need a Promotional Campaign

According to Peksa-Blanchard et al. (2007), wood fuels (including wood pellets) are the most readily available biomass form in most of the European countries and they will play a crucial role in achieving the 2020 objective. Countries such as Austria, Germany, Latvia and Poland exports a large share of their wood pellets production, while countries such as Denmark, Netherland and Belgium are major wood pellets importers in the EU (Sikkema et al., 2011).

The general public in Croatia doesn't still recognize all the benefits, advantages and potentials of using RES and pellet heating systems. The wood biomass and pellets as possible district heating fuel have many advantages like the environment protection and the safety supply. It also contributes to the development of local economy and to creating of new jobs.

The promotional campaign presented in this document should be implemented during 2013 (01.01. - 31.12.2013). However, in long-terms the goals can be achieved only with continuous campaign and the intensity of the activities and the structure of the short-term goals will depend on current market situation and the state of mind of the potential and existing pellet users.

8.3. THEMES AND GOALS

Themes

The promotional campaign on wood pellet in 2013 is about expanding of traditional knowledge of wood use according to the following topics:

- Savings in regard to fossil fuels
- Environmental protection
- Biomass and sustainable forest management
- Smaller emissions of CO_2
- Socially responsible public procurement
- Adjustments to the EU legislation.

8.4. PROPOSALS FOR ACTIVITIES AND COMMUNICATION CHANNELS

Tools

In order to implement the proposed action, the use of the following tools is provided (depending on the target group and the message):

- Creating websites and profiles on the social networks and forums

Web sites today are the ID cards, regardless of whether the company, association, institution, etc. Web site must be informative and the amount, level and type of information should be specifically designed for each target group. It is important to regularly fill the website with new information. Also, the presence on social networks is becoming an increasingly important tool in terms of the presence of the public, and it is not to be ignored, especially when it comes to children and young people as a target group;

- Designing and production of audio-visual materials and attachments

Radio jingles, TV spots, short informational films etc. are traditional marketing media tools; despite the Internet, they are not losing on popularity and they still have a big influence on public opinion;

- Designing and printing of information booklets, pamphlets and promotional materials

Printed marketing materials are also traditional tools with still remarkable achievement. These so-called "tangible" materials are one of the easiest ways of creating interest and sympathy among all target groups. They ensure that the messages of the campaign remain in the minds of the target audience through a physical presence.

Activities

In order to realize the set goals of the campaign the following activities are proposed:

- Market research and analysis of data (research of the initial state)

It is the first research aiming to determine the initial state of awareness among all target groups, as well as the level of knowledge on the campaign or other data that can be used to measure the success of the campaign.

- Media coverage (preparation and publishing of announcements, interviews)

Continuous appearances in the media (TV, radio, print, online) ensure the continuous presence of pellet with an emphasis on its economic and environmental benefits. If it is a professional media, the emphasis will be on specific messages depending on the target groups;

- Implementation of an educational and informative action "The Pellets Day in My Town"

The goal of this project is to demonstrate the use of pellets live, where a vehicle with a installed pellet stove visits the major Croatian cities (parking near the town square with live demonstration how the pellet stove works - information booklets, flyers and other promotional materials will be distributed).

- Organization of thematic roundtables for professionals (regionally)

Thematic round tables intended for designers, engineers, architects, hoteliers and other disciplines that aims to encourage the greater use of pellets. In order to attract as many of the participants, it is anticipated that these meetings are organized regionally (Rijeka, Split, Zagreb and Slavonski Brod).

- Organization of the 4. International professional conference on wood biomass

International professional conference is a professional gathering of the representatives of biomass production, forestry, local government, institutions, planners, media, and all who want to be informed about the latest trends, legislation, resources and opportunities ensured by increased use of pellets and wood and forest biomass

- Organization of a study tour for the media and institutions

Study tour aims to motivate the media (as creators of public opinion) and institutions (such as decision-making affecting the society as a whole). The emphasis is on ecological and economic benefits of the use of pellets as well as a better knowledge of this energy source and its characteristics.

- Internal meetings and coordination among members of the Association prepares

In order to achieve the best possible realization of the campaign activities, the Association members will continue with the regular meeting, exchange of information and coordination.

8.5. EXPECTED EFFECTS AND MEASURING OF SUCCESS

In accordance with the practices and results of similar foreign promotional campaigns, the following effects of the national campaign in 2013 are expected:

- Creation of the domestic market of pellets
- Rational and increased use of renewable energy sources
- Approaching to targets of Kyoto Protocol and EU regulations
- Greater representation of pellet stoves and pellet heating technology in the projects of new housing and public buildings
- More responsible approach to the environment, forest, wood and products from renewable sources
- Raising awareness of the relevant institutions for the problems of production and marketing of pellets in Croatia.

Measuring of Success

By conducting of the baseline researches by the Faculty of Forestry, University of Zagreb, before the start of the campaign and after the campaign, it is possible to determine the initial state and the results of the implementation of the campaign.

According to the practice of countries with developed pellet markets, it is proposed to involve in the campaign other relevant institutions and actors in the field of energy sector:

- Fund for Environmental Protection and Energy Efficiency
- Promotional campaign “Wood Comes First” (Croatian Chamber of Economy)
- Croatian Ministry of Economy; Department for Industry Policies, Energy and Mining
- Croatian Ministry of Environmental Protection
- Energy Institute Hrvoje Pozar
- HEP d.d. (Croatian Electricity Company)
- Center for Monitoring Business Activities in the Energy Sector and Investments.

8.6. CLOSING REMARKS

It is known that in the European wood processing sector in the last decade all real income derives only from the economics of wood waste as the cost of traditional wood product reached its commercial zenith, often under the impact of competition from Asian countries. At the same time increases the need for responsible approach to environment and reducing of CO_2 emissions. Therefore in Croatia the culture of using RES occupies the reasons of many investors who turn to the use of wood and biomass energy as a strategic material.

For this reason wood processing companies have the opportunity to earn much more and to develop socially responsible business, especially if using wood waste energy or produce energy fuels such as pellets or briquettes. On the other hand, there is great potential that the part of the heat produced from wood can be sold to the wider community through district heating systems, which has not often been the case in Croatia.

Pellet consumption in Croatia is in the beginning so manufacturers turn to pellet promotion with the support of competent institutions. To provide these activities in 2013 the Association needs funds in the amount of 102.700 EUR. The funds should be raised through membership fees and donations as well as through participation in national and European projects. The measurement of the success (carried out by Faculty of Forestry, University of Zagreb) will be parallel with the implementation of the activities, which will allow continuous monitoring of the campaign results and its improvement in future periods.

8.7. SUMMARY

In spite of good results of using pellet in EU, especially in the countries with developed wood processing industry (Austria, Germany and Italy), wood pellet and biomass is often marginalized in Croatian energy strategies and documents, as well as in other Southeast European countries, especially regarding the field of renewable energy sources (RES). This results with a symbolic interest of media in promotion of this ecological fuel. Croatian biomass and pellet producers (Association of Croatian Pellet, Briquette and Wood Biomass Producers) have therefore started a promotional campaign, with the help of domestic pellet stove producers. The campaign emphasizes the pellet advantages for potential customers.

The campaign has been presented during the Ambienta fair 2012, and the pellet producers donated half of a kilogram of pellets to each visitor. Till autumn 2012 95% of produced quantities have been exported so this campaign aims to create and strengthen of Croatian pellet market. After only few months of promotional activities, some changes can be observed regarding pellet selling and consumption. Also, some new projects of biomass distance heating are started as a direct result of this promotion. The data and other indicators in this paper will show the real market situation and potentials in Southeast Europe.

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