INVESTMENTS TO FORESTS AND FOREST BASED PRODUCTION

ZAGREB 2014

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INVESTMENTS TO FORESTS AND FOREST BASED PRODUCTION

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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 second issue of scientific books and we agreed that the topic for this issue should be dedicated to INVESTMENTS TO FORESTS AND FOREST BASED PRODUCTION. Some of our members, but some non-members as well, who have research activites in fields of expertize related to the main topic are involved in creating this scientific book. In this issue we have 10 chapters with 27 authors from 6 Central-European countries who presented their research results in the area of investments related specifically to forestry, wood processing and furniture manufacturing.

Main goal of this scientific book is to stress the problems that forestry, 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 second scientific book issued by WoodEMA, i.a. to help 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.

Editor-in-chief

Denis Jelačić

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CONTENTS

1. SUBSTANCE OF INVESTMENT PROJECTS

Josef Drabek, Denis Jelačić, Martina Merkova

1.1. INVESTMENT PROJECTS AND THEIR PRE-INVESTMENT PREPARATION

Pre-investment preparation of investment projects is the main condition for successful realisation of those projects and their functions. It consists of demands of different technical and financial factors (marketing, evaluation of risks, financial analysis, technical and technological characteristics of projects, etc.), as well as their mutual co-ordination.

The goal of pre-investment preparation is to identify individual investment projects, from the point of appropriates of investments for enterprise, predictions of market demands, current use of enterprise assets, from the point of risks (predictions of income and return of invested capital), from the point of effects of technical development, etc. It means that enterprise gradually identify and evaluate individual investement projects and selects the most effective ones which are nominated as investment goals of the firm, i.e. maximize the net value of the project and increase the competitivness and market value of the enterprise at the same time.

Investment project should plan and analize goals from investment idea (in the certain area of activities), until the time when enterprise is returning invested assets, i.e. when assets involved in development of enterpreneueral activities start to make income. Unrelalted to how much enterprise invested, but how much income is to be expected from those investments, i.e. how will the invested be ennobled. The success of enterpreneuership lays on investing the capital to the right industrial branche and, especially, to its effective ennoblement.

Investment projects are made by enterprises:

- First of all, for themselves, because by making them (or their alternatives), the time and space are used in a complex way in a given enterpreneueral activity, evaluating the risk, and preparing different corrective actions connected to fullfilment of the project goals,
- As an assurence in a process of project realisation, i.e. of complete management of enterpreneueral activities – as a document for business management,
- For successful approach to market, i.e. to improve current position of an enterprise,

- For enterprise presentation while asking for financial assets in a form of credit, grants, donations (looking for investors).

Speaking of reasons, enterpreneuer has to decide is the documented preparation of investment project strictly administrative (lost of time and assets). Therefore, preparation of a project should be approached carefully, because serious and quality prepared investment project are those who have the ability to avoid weak spots and to create presumptions for long-term success of the enterprise and its development.

In nowadays theory and practice one can find a different level, volume and quality of designing the investment project. More complex made project should fullfil certain criteria which are shown in table 1.1.

Table 1.1. Investment project criteria

	Criteria	Criteria characteristics
1	Expertise	➢ Maximum 50 A4 pages ➢ Quality data on investment activities
2	Clearness	➢ Complexed design of project – by computer ➢ Summary of text, tables and graphs
3	Uniques	➢ Not too much of technical details
4	Reality	➢ Show data with high level of reality
5	Credibility	➢ Openly evaluate the project ➢ Logical sequence of data ➢ Document and address presumed data
6	Orientation toward future	➢ Less detailed info on former successes ➢ Orientation on activities or goals enterprise wants to achieve in future ➢ Give forcast and alternatives of a project
7	Result presentation	➢ Result analysis for customer
8	Optimism in a project	➢ Too much optimism decreases the confidence in project reality from market point of view
9	Pesimism in a project	➢ Lack on confidence in yourself or in project decrease atractivness to investor
10	Revealing of a weak spot	➢ Openly show weak spots and give solutions
11	Risk quantification	➢ Analize sources and types of risks ➢ Give possibilities of decreasing the risk
12	Emphasising of strong sides	➢ Show concrete results of the project ➢ Show high quality of management – abilities and professional skills of the management team ➢ Show trend of strenght of a project or enterprise
13	Return of invested assets	Show investor: ➢ Abilities to return interest and expenses ➢ Evaluation of assets and their return
14	Formal page	➢ Quality design of a project and formality ➢ Don't forget the presentation and information of a front page
15	Address	➢ Project meets specifications given by investors

If given criteria for project preparation are fullfiled, it is a guarantee that potential investor will see one prepared a complex project which enable positive results of invested capital.

Reasons for differences in range and volume of creating a project are in following:

- Differences in markets and enterpreneueral activities (different project structure of production enterprises and service enterprises),
- Differences in influence of investors on form, structure and volume of the project (to respect different demands of invstors).

Given suggestion of a project shows the complex approach to volume and structure of a project, which answers to demands and criteria of different investors. Suggested structure of a project and its analysis is given in table 1.2.

Table 1.2. Suggested investment project strucutre

I.	Contents
II.	Summary
III.	Main part of the project
	1. Enterprise characteristics and goals 2. Management organisation and management team 3. Market analysis and cometition 4. Marketing strategy 5. Production program 6. Requirements for material and energy 7. Size and location of production plant 8. Technical-technological needs of a project 9. Personel 10. Implementation plan 11. Risk analysis of a project 12. Financial-economical analysis 13. Guarantees 14. Influence on environment
IV.	Conclusion
V.	Appendix

1.2. INVESTMENT PROJECT STRUCTURE

To closely analize given differences to indivual approaches to the problem, suggested structure of investment projects (table 1.2.) will be analized in details. According to given structure it is possible to design concrete investment projects for certain area of use and fo different investors with specific areas of investing (branches, enterprises, production processes).

I. CONTENTS

At the begging of every quality project there has to be a Contents which assures the clearness of a document, enables quick orientation through project and judgement of fullfilment of individual parts. Suitable analysis decreases the time used by potential investor or enterprise manager to see the realisation process of a project.

II. SUMMARY

Summary gives emphasis to what is important in the investment project. Responsable person should know from the summary will the project give positive results (from the branche, market or enterprise point of view) and does it make any sence to consider the project more closely. Summary has to be a guide though the project which gives the basic information on enterprise goals and project, and what strategy is going to be used to reach them. Summary should mark the expertise and possibilities to achieve the goals, but designer of a project should never forget about the conclusions, remarks and informations such as:

- Enterprise name and address, phone and fax number of a contact person
- Project name and its goals
- Products (services) which are the subject of investment project, their specification and adventages compering to comeptition,
- Market list where enterprise is present with the product, definition of distribution channels,
- Branch characteristics – perspectives, development possibilities,
- Enterprise development strategy, enterpreneueral activities in 3 to 5 years,
- Evaluation of managers and quality of key employees for needs of the project,
- Analysis of financial-economical resulst of a project (needed capital, strucutre i ratio of its use etc.), and expected financial effects for enterprise and other potential investors.

As shown, the summary of a project is an introduction part of investment project which contains precise formulation. However, according to its significance, volume and pressumed abilities, it is necessary to make similar summary at the end of the whole project, i.e. Conclusion. For optimal size of the summary we can suggest 2 to 3 pages of text, tables and graphs.

III. MAIN PART OF THE PROJECT

1. Enterprise characteristics and its goals

- Achievement history of the enterprise – results of enterpreneueral activities and successes, development of financial situation (what are the results in last few years),
- Products (services) – their life cycle phase, customers, competition position, individual product design,
- Final goal – formulation of the final goal, definition of basic operative goals and their mutual conections,
- Economical and social volume of goals (effects, finances, results, social goals),
- Strategic and specific goals of enterprise – enterprise position on the market, production program inovation, production quality, growth of work productivity, enterprise effectivness, growth of own capital ratio, financial stability, organisation and management development, enterprise status in society.

2. Management organisation and management team

- Enterprise organisation structure proposition, competences and responsibilities of individual employees in management,
- Key employees characteristics – professional biography and references to prove that enterprise has quality management team to assure given entereneueral activities,
- Awarding policy in management,
- Basic approach to enterprise management,
- Current management information system characteristics, development of managerial activities and changes in information system,
- Possibilities of using outside organisations (management, promotion etc.) as a support to enerpreneueral activities of the firm.

Enterprise management quality is very important to owners and especially to investors who give adventage to less effective projects assured by qualified management (evaluation and assets return safety). It means that quality has to be emphesized, as well as ability and professional approach of mangment team which will assure realisation of a project and achieving enterprise set goals.

3. Market and competition analysis

Before quality marketing strategy there should be quality marketing research, which consists of gathering, analysis and evaluation of market, enterprise environment, competition and demand information:

- Setting the market project goals – size, structure and assumed development of market trends (market ratio, market potential),
- Market segment definition,
- Buyers structure analysis – purchase motives, references and financial abilities of buyers,
- Market competition analysis and products substitutions,
- Evaluation of own products in comparison to competition,
- Market adventages and market risks.

Result of those activities should be the forecast of selling, possibilities of products realisation or services provided in particular time. It is unavoidable for that activities to be based on quality of given infromation and their analysis quality. Given results should be the foundation of economical calculation of estimated income.

4. Marketing strategy

Based on the market analysis and competition analysis marketing strategy should be made in that part of project design (Dolansky – Mekota – Nemec, 1996). It should assure:

- Product strategy – how will products be introduced to given market (sortiments, product appendix, quality, trade mark, guarantee, service, special services, etc.)
- Price strategy – how will price policy be applied (prices, discounts, payment models and other options, etc.)
- Distribution policy – setting the most effective distribution channels with low costs to the market, i.e. marketing logistics realisation (models of selling, thickness of distribution network, distribution speed, distribution expenses, ways of purchasing, possibiities of stocking),

- Communication policy – evaluation of opinion exchange and customer information (promotion, selling support, personal selling, public relations, i.e. instruments of communication mix),
- Setting the product to market and its development (financing the development).

Makreting strategy should be made in alternatives. Given alternatives should be evlauated from the point of reaching the goals of the project, financial resources and their possible influence on enterprise functions, risks of certain strategy alternatives or certain enterprise specifics. After evaluation and selection of individual alternative combination product – price – selling support – distribution (marketing mix) should be given.

5. Production program (service providing process)

After solving previous problems, the problems of most cost-effective and economically most acceptable production of selected products should be solved – all the way from raw material and its stocking, through production and final products stocks to customer delivery. Following problems are to be solved there:

- Transformation process analysis, its phases – purchase, production, selling,
- Production capacities analysis and possibilities of their further use,
- Optimal production size analysis and sortiment production,
- Stock management analysis,
- Production quality management system assurance,
- Analysis of key factors for production process effectivness – production process specifics,

Remark: If the project is in the area of services, Production program is to be changed into Service providing proces. Of course, volume of project parts should be changed as follows:

- *Transformation process – purchase, service, service providing,*
- *Capacity analysis (installed, selling, etc.)and possibiities of their further use,*
- *Stocking, service system and their effectivness (custormer, enterprise),*
- *Service providing quality,*
- *Service providing specifics (season work).*

It is unavoidable, not to be pointed just to solve real relations, but to enlarge number of basic cost positions. Quality and clearly defined production program (service providing process)

is a foundation for production (service) evaluation, i.e. for economic calculation of expected income and expenses. It is clear that knowing the enterprise transformation process, optimal use of production capacities as well as knowing factors of production program specifics, influence significantly on estimated project effectivness, and by that, on possibilities of its realisation.

6. Material requirements and energy

Production program needs, planned technological support to production (technology), possible use of production capacities, enables to establish not just inputs for project realisation (raw material – basic, secundary, half-products, components, genuine parts, energy, etc.), but their consumption as well, i.e. establishing of their costs. Material requirements and energy consumption is defined from the point of:

- Defined quality,
- Accessibility,
- Price, along with the delivery possibilities,
- Measurements for assurance of their possible risk (especially for key inputs),
- Possiblities of substitution of certain inputs,
- Other influences (season products).

7. Size and location of production plant (unit)

Success of investment project realisation depends on the location selection (project location). Location selection should be made carefully, because very often enterprise prefers only one critera, while its location is conditioned by other factors as well. Selection is made by criteria (economical and non-economical), where we focus mostly on evaluation of factors we can gather in following five categories (table 1.3.).

Selection of enterprise location should be made systematically and analysis should be made from many points of view because they can influence on success or failure of the enterprise.

It is unavoidable to choose more flexible location which gives a wider space for realisation of given project tasks with less problems, i.e. which are compatible to enterprise development strategy. Costs related to work start of the plant should be examined complexly (in a spreadshit would be the best) and added to final evaluation of economical effectiveness of the project.

Remark: If realisation of the project already has a location (location is known and existing), it is necessary to evaluate cost-effectiveness of existing location and to give possibilities of removing negative influences.

Table 1.3. Influencing factors on production unit (plan) location

Factors	Factor characteristics
Market factors	➢ Selling market and genuine parts ➢ Work power market ➢ Competition
Enterpreneueral-economical factors	➢ Taxes on land purchase ➢ Building or reconstruction costs ➢ Costs of assurance and putting to work ➢ Income potential ➢ Customers economical power
Outside-enterpreneueral factors	➢ Legislative-legal restrictions ➢ Duties and taxes
Infrastructural factors	➢ Logistics paths, public transport ➢ Energy, gas supply ➢ Access to institutions, banks, offices
Environmental factors	➢ Sensibility of project on environment pollution ➢ Access to water and water supply ➢ Possibilities of waste management ➢ Other geological and climeate influences

8. Technical-technological assurance of the project

This part of the project defines and evaluates different alternatives of technical and technological sides of transformation process in enterprise. It is based on following:

- Selection of technology regarding access and quality of basic materila, wideness of production sortiments, access to financial effects, evaluation of additional costs (investments, technology assembly, licence duties, trade mark duties, etc); complexness of technology for personel, advanceness of technology and its influence on environment is also evaluated,
- Goal is to create optimal machine lay-out and production management system regarding reliability, precise work, capacities, productivity, conditions fullfilment, according the optimisation of investments as well as optimisation of pressumed costs.

9. Personel plan

Personel potential quality, especially their practical realisation, setts the effectiveness and fullfilment of given project conditions. When dealing with personel problems it is necessary to solve following:

- To analize quantitative and qualitative needs for work power,
- To make a personel plan for economical life cycle period of the project,
- To assume access to work power, to analize the situation on work power market (unemployed rate, averedge salleries in the region, legislative, possibilities of changing qualifications),
- To assume the possibilities of finding financial assets on given location, region, for openning new working places, which can positively influence on evaluation of economical effectivnes of suggested project,
- To calculate personel costs (salleries, health and social assurence, premiums, awards and other duties), it is important to set awards and motivation for employees good resluts – appropriate social policy of the enterprise,
- To explain methods of refreshing and searching for work power.

To create a personel plan is to establish optimum number of employees for given enterpreneueral activity, with appropriate education structure and asked qualifications.

10. Implementation plan

If we want to make a quality project and assure its realisation, it is necessary to make a time framework and financial time-line of a project – implementation plan.

Implementation plan sets time, resource and result parameters for individual project parts, and shows them in time sequences. Therefore, it is needed to pay attention to solving following plan parts:

- Overview of projec activities to be assured,
- Time of starting and finishing of individual activities,
- Persons responsible for their realisation,
- Overview of resources use (human, material, financial),
- Overview of capital costs structure and its time-line,
- Conditions for creating an implementation plan.

11. Project risks analysis

Risk is unavoidable part of any enterpreneuership, so it is very important to make its analysis, but, paradoxaly at the same time, it is one of the most underestimated parts of the project.

No matter what is the object of investment (material, non-material, financial investments), the influence on that investment during its life cycle have many factors which development can not be pressumed in advance. There are methods which enable to postpone their development to future or to model them and decrease their influence on investment. Whatever the movement on market is, it contains certain level of risk. When preparing, and especially when realizing the project, it is not possible to make things that way to avoid any risk and to work in no-risk „sterile" environment. It is not possible to work without any risk, so it is necessary to identify it, evaluate it, reduce it, and, if possible, eliminate it.

The main task in risk analysis is to increase probability of project success and to decrease risks for project which could unpleasently influence on financial situtation of a firm. Investment project risk has two sides – positive and negative. Positive side is return with hope to succeed on the market and to achieve good results. Negative side is danger not to achieve as good economical results as we planned, i.e. enterprise loss may occure, which may lead to enterprise bankrupcy. The purpose of risk analysis (Čunderlik 1996, Fotr 1992, Synek and others 1996) is to:

- Define risk factors (source),
- Define risk factors influence (expert analysis of investment sensibility),
- Define type of risks for investment project,
- Define risks (by number or indirectly),
- Evaluate risks, is it acceptable for the enterprise or not (mathematical-statistical methods, corrective methods, etc.),
- Measurement preparation for eliminating risk influence and reducing its negative results in project (for example by diversification, flexibility, risk share, phase management, assurence),
- Corrective actions plan preparation for critical situations which could occure in future and which are tightly conected to known risk factors.

Not even highest quality project preparation, not even best made risk analysis, can eliminate enterpreneueral risk in total. Analysis can help in effective project realisation, and by that to enterprise prosperity.

12. Financial-economical analysis

That part of investment project should emphesize clear information not just regarding financial-economical sides of the project, but the whole enterprise as well, i.e. it should give the overview of project influence on financial stability of an enterprise.

Financial-economical analysis has integration role in investment project. It reflects all parts of the project in financial form. Analysis gives the possibilities of realisation and market success of other project parts. The volume of financial-economical evaluation should contain:

- Overview of investment (capital) information structure,
- Calculation of production costs,
- Calculation of required working (revolving) capital,
- Financial assets and sources requirements balance sheet,
- Planned profits,
- Planned ratio of income and loss (plan of income and expenses),
- Planned cash-flow,
- Calculation of project economical effectivness indexes:

a) Basic indexes:

- Net present value – NPV,
- Profitability index – PI,
- Internal rate of return – IRR,
- Discount payback period – DPP,

b) Additional indexes:

- Investment profitability – IP,
- Calculation of return point – CRP,
- Commercial project life cycle – CPLC,

c) Financial analysis indexes (for example active, liquidity, profitability, debt) and their financial increase measurement

- Evaluation of investment project influence on effectiveness, prosperity and stability of a firm.

13. Project guarantees

If enterprise has no capital to realise the project, it is necessary to assure certain amount of outside assets to make the project work, i.e. it has to persuade potential investor to invest into the suggested project. If that project is not balanced financially (pressumed volume of resources, use structure, time points), it is not to be expected certain income, so it is not to be expected that invested assets would be ennobled as planned.

According to experiences reagarding project realisation we suggest the project to contain proposed types of guarantees (with certain financial evaluation) for required resources, which will make the process of getting the credit more quickly.

Financial institutions ask return of the credit assurence by different types of guarantees, among others there are:

- Bank guarantee,
- Financial guarantee,
- Financial guarantee of the third person (physical or legal),
- Mortgage rights to real estate or movable assets,
- Right to block foreign currency income.

Banks also require for assurance of property which are subject of Mortgage rights. Property value has to evaluated by expert procedure by independent legal evaluater.

Investors evaluate these five elements while evaluating acceptability of credit return:

- Project – its quality, design by investors instructions, clearness, reality, safety, production selling ratio possibilities,
- Menagment team – abilities, references,
- Own capital ratio – invested in project, project guarantees,
- Projected cash-flow – cash-flow during the quarantee period,
- Evaluation of project risk – influence on cash-flow (possibilities of risk decrease).

14. Investment influence on environment

Investment project – its realisation, i.e. changes in technology, should not have any influence on environment. Therefore it is necessary to analize those influences, evaluate their values and influences from the point of environment protection. If there is any kind of negative influence, it is necessary to make some alternatives which will eliminate that influence, i.e. which will minimize it to the level which will not endanger the quality of the environment (according to environment standards).

Each project should contain information about:

- Influence of production to environment – or its individual parts,
- Level of possible pollution,
- Ways, abilities, possibilities of decrease or elimination of the source of pollution,
- Activities on demage removal,
- Duties structure for prevention and eilimination of possible project consequences

IV. CONCLUSION

Final part should document applicability, economic efficiency and realisation possibility of the project. Volume of Conclusion should be the summary of achieved results in individual parts of the project, where attention should be placed at:

- Strategic direction of investment project – strategic goals from the point of enterprise future (document on development and management of the enterprise),
- Explanation of pressumed success of the project – point of its applicability, need for it and its efficiency (document for investors – capital evaluation),
- Setting the mode for required capital assurance,
- Realisation schedule, time points of financial assets investment,
- Evaluation of the risk on efficiency and project realisation possibilities,
- Evaluation of acceptabilities or non-acceptabilities of project realisation (according to enterprise goals).

Conclusion should be clear and understandable on total income of the project for co-operation, possible investors, other institutions, funds, etc.

V. APPENDIX

Appendix to the project gives additional information mentioned in the project – more details and more accuracy on given problems. Appendix should contain information which would make project itself more interesting, especially regarding project volume, i.e. some information and documents regarding project budget.

Appendix could show information regarding justifying given project realisation, such as trade approval, concession, enrolment to trades register and other document regarding enterpreneueral activities.

It should also contain documents which prove information given in the project, such as photographs, product skatches, production technological schemes, market research results, different project calculations, biographies and references of the key persons, etc.

1.3. CALCULATION OF FINANCIAL INCOME

Modern methods of investment project efficiency evaluation lean on estimation of capital resources and pressumed financial income out of the investment. Total amount of investment is known as Cash-flow of investment. The task of estimating pressumed cash-flow of investment is the most complex and the most difficult task of capital planning and investment decision making. Certain cash-flow of investment project, or certain alternative, is not unique, especially form the point of all factors influence on income and expences. The goal of decision making on best project alternative selection is probably inaccurate if every single factor is not taken in consideration and if only self-sufficient mathematical-statistical methods should be used.

Importance of estimating cash-flow of investment influences from two main points:

1. From the point of expected – during the project economical life cycle,
2. From the point of capital expences expected out of financial income, of which full and safe prediction depends on factors hard to estimate on long-term basis (interest rates development, daily shifts, change of values, etc.); changes of certain factors can change whole project evaluation significantly.

Therefore, in given circumstances in investment decision making process it is necessary to respect the time factor as a risk factor (whole enterprneueral risk) while planning capital expences and financial income out of project investments.

1.3.1. Identification of capital expences

Capital expences are money expences which are put into investments (their realisation), which return is longer then one year. While talking on enterpreneural investments, i.e. investments connected to material assets, capital expences contain:

1. Expences to attract new investments, taking into consideration expences for logistics, installation – assembly, expences for project documentation preparation. If expected investment includes certain research-development activities, then those activities and expences should be included to expences for attracting new investments,
2. Expences for long-term growth of turn assets of the enterprise which is set for new investment. Growth of turn assets is unavoidable condition for effective function of investment. As known, growth of turn assets enables growth of short-term passive (duties to suppliers), so it is better if we calculate the constant income of net turn capital as well, i.e. the difference between growth of turn assets and growth of short-term passive. We count on turn assets constant growth expences in development projects firstly – growth of fix enterprise capital, while projects of renewal or reconstruction practically make no growth of turn assets.

Mentioned capital expences for maintaining long-term investment assets can change (increase, decrease) if, for instance:

- New investment replace existing long-term assets, so the income from selling the liquidated assets decrease those capital expences,
- When talking about selling liquidated assets we talk about tax effects, i.e. those effects decrease or increase capital expences. For instance, if enterprise sell liquidate assets, and gains some profits out of it (market price is bigger than the rest of the price after amortization), then enterprise can pay some taxes which will increase capital expences. On the other hand, if there is some loss while selling liquidated assets (losses decrease tax obligations for future years), then enterprise gain some tax benifits.

Capital expences can be shown as follows:

$$CE = NI + TC – I +/- T \qquad (1)$$

where:

CE - capital expences

NI - expences for attracting new investments

TC - expences for long-term growth of net turn capital

I - income from selling existing liquidated investment assets

T - tax effects (positive, negative)

1.3.2. Identification of money income

In theory and in practice they say that it is harder to calculate estimated money income out of investment then certain capital expences. Some capital expences in a form of machines, appliences, etc. can be calculated easily. Therefore, calculation of estimated money income is taken as critical, as a main point in a process of capital planning and investment decision making. Hard circumstances are as follows:

- Investment life cycle is longer then a process of getting investment,
- Time factor has bigger influence on decision making, evaluation, return of assets,
- Amount and time definition of estimated income are limited by more factors (especially expences like), then capital expences,
- Level of enterpreneueral risk can influence on the difference between real and estimated income, i.e. keeping the proposed time line and level of returning the foreign capital.

According to those factors for annual money income out of the investment – investment projects, during their life cycle it is important to pay attention to:

1. Income by feeling – net profit which we achieve from project annually,
2. Amount of annual amortization – according to amortization plan in the enterprise.

Those two elements make the crucial amount our of the investment which can be presented as net profit + amortization = cash-flow. That amount is possible to use while evaluate the project using dynamical methods – cash-flow indexes.

However, for total evaluation it is important to keep an eye on two more elements:

1. Changes in turn assets (net turn capital), which depend on investment project and its life cycle (growth decrease income, loss increase income),

2. Income gain from selling investment assets after its life cycle, income prepared for taxes.

Each of those four elements makes estimated income out of the investment. It means that, if we calculate trade volume correctly – trade growth, as well as the growth of estimated expences connected to investment, we have elements to evaluate effectiveness and project realisation possibilities.

When evaluating the project it is common to meet the problem weather or not to place payed interests on a credit (or some other form of foreign capital) into estimated expences regarding that specific investment.

Argument for leaving those interests on a credit out of estimated expences are:

1. Each new investment project, from the point of financial stability, should be taken into financing in the same capital structure as usually used in enterprise or in whole. It means that decision on capital structure should be independent on project acceptance decision.
2. While evaluating investment project effectiveness, income should be discounted to find some comparing values, because those values can be calculated mutually. If income is discounted, discount rate (capital expences) already contain capital expences used to finance the project. It means that double interest calculation could take place – once in expences estimation, and then again in discounting project estimated income.
3. Most appropriate way of dealing with the problem, similar to the possiblity of double interest calculation, is the way to calculate the interest in expences estimation, i.e. to decrease the profits before taxing, but after the calculation of duties out of income, i.e. to calculate tax on interests out of net profit.

Similar problem and approach we can find with amortization.

Annual amortization – their amount can positively fullfill the estimated income out of investment as well. It is clear that level of full amortization during the economical life cycle is equal. However, used method of amortization fills the amount of annual amortization. If quick method of amortization is used, and full volume of production on the market is realised, opossing to the linear amortization method, there is a possibility of higher amortization in shorter time, which will have influence on evaluation, i.e. free assets can be used for other investment activities.

Estimated money income can also be presented as the exchange of net turn capital. Changes can be shown:

- As a part of capital expences – growth in investment results,
- During project life cycle – growth decreases money income, or loss increase money income,
- At the end of ecnomical life cycle full net turn capital defined by investment project transforms to cash (stock selling), which increase estimated money income again.

Income and selling of investment assets of an enterprise at the end of economical life cycle, which is presented as income taxes, is most of all dependable on market price of the investment, its left value and tax regulations which influence on management of investment assets of the plant.

Estimated money income (MI) out of invstment project can be calculated as follows:

$$MI = NP + A +/- NTC + SA +/- T \qquad (2)$$

where:

MI - full annual money income out of investment project

NP - annual growth of net profit achieved by project (credit interests are not calculated in expences)

A - annual growth of amortization according to project realisation

NTC - exchange of net turn capital according to investment during economical life cycle: (+) loss, (-) growth

SA - salled investment assets income at the end of life cycle

T - tax effects on salling investment project assets

As influence of presented approach to investment money income quantification, the quality of established full cash-flow can assure estaimated value of capital on one hand, and show the negative project perspective, such as loss of invested capital, on the other hand.

1.4. EVALUATION OF INVESTMENT PROJECTS EFFECTIVENESS

Only complex evaluation of investment project can assure fullfilment of enterprenueral goals – increase of production abilities, cost decrease, ennobling of invested capital, i.e. increase of the enterprise market value. If investment basis is placed correctly and investment projects properly prepared, it is necessary to evaluate them equally well.

Economic evaluation of investment projects is a sum of large number of different characteristics which enable complex overview of projects possible realisation. Those are main indexes pulled out from cash-flow and safely selected individual indexes which give basic starting analysis of capital expences adn estimated project income. Basicly, we recognize two main groups: statistical methods and dynamical methods.

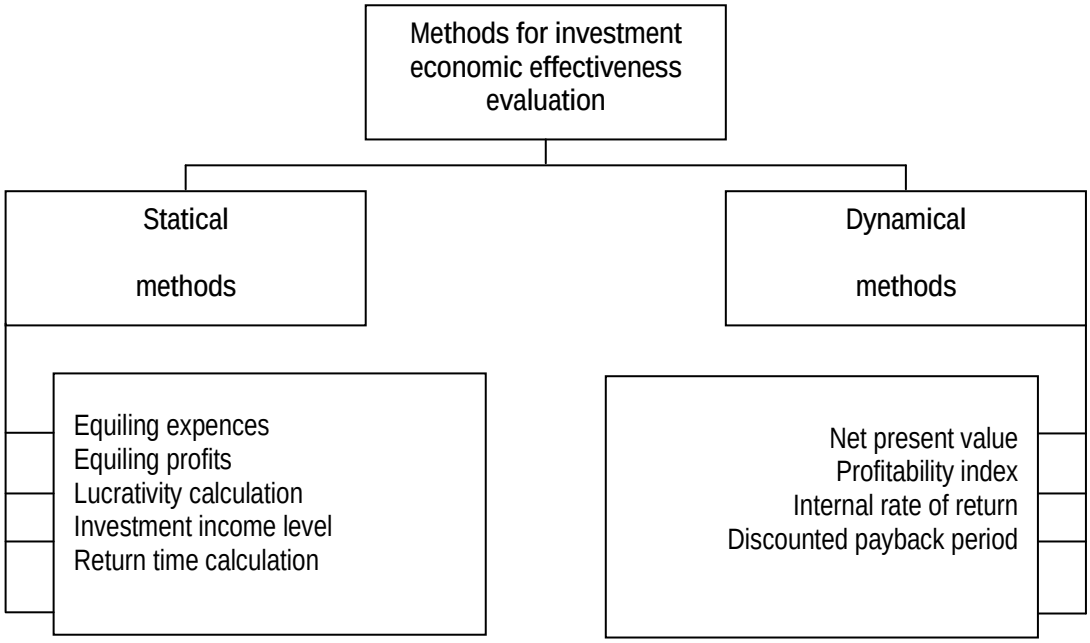

Figure 1.1. Methods for project effectiveness evaluation

1.4.1. Statistical methods of investment project evaluation

Statistical methods are useful for short-term evaluation of project effectiveness. Countries with developed market economy don't use those methods as relevant because they don't use the so called time factor into consideration. Therefore, those methods are additional methods. Mainly, we talk about following methods:

a) Equailing expences method

b) Equiling profits method

c) Lucrativity calculation

d) Investment income level

e) Return time calculation

Statical methods are more described and characterized in literature (for example Drábek, 1998, Drábek, Jelačić, 2007, Vlachynský et al., 1996, Vysušil, Fotr, 1994 and others). However, these methods in nature are not dominant in investment effectiveness valuation and in the next section we focused on the main group - dynamic methods.

1.4.2. Dynamic methods for investment project evaluation

Dynamic methods for investment project evaluation remove faults of previously mentioned statistical methods. In the process of quantification of choosen criteria they take time factor into consideration. In economical life time factor makes things more serious, it enables the change of money evaluation. If that change was taken wrongly, it would be possible to make a wrong decision which would have significant influence on project effectiveness, enterprise stability. Suggested financial-mathematical methods of dynamic character consider time changes of money values, and they take two basic rules of financing into consideration:

1. Value of one money unit today is bigger then the value of one money unit tomorrow, because todays money unit can be invested and it could earn on interest. It means that income to come in future has lass value for us. Therefore, it is necessary to calculate estimated income with current (todays) value (CVCF), i.e. on the same time basis we usually observe time from introducing the project to realisation. Only on the base of CVCF it is possible to estimate project effectiveness correctly and to make the right decision about its realisation..
2. Safe money unit has greater value then risky money unit. Most investors go away from the risk, totaly if possible, so they sacrify some profit because of it. During the realisation of investment projects it is impossible to avoid the risk. That risk is necessary to identify

properly, evaluate it, estimate its influence on enterprise economical results and to find the way to decrease the enterpreneueral risk (market, economical, social, working, etc.).

Based on analysis of individual approaches to economical effectiveness evaluation, their abilities, dynamic abilities and estimation on capital expences and investment project income in whole, such as evaluation of influence of project realisation on enterprise management and development, we recomend following methods for investment project economical effectiveness evaluation:

1. Net present value - NPV
2. Internal rate of return - IRR
3. Profitability index - PI
4. Discounted payback period - DPP

As additional indexes following methods can be used:

- Investment lucrativity
- Return point analysis.

Beside previously mentioned methods (mostly used in theory and practice), it is good to use following two methods (quality increase in enterprise investment decision making):

- Method of project commercial life cycle
- Method of final value.

a) Net Present Value

In modern management this method is used as most accurate and most reliable, and also as a basic method of project evaluation. It is defined as a difference between discounted money income from investment (investment income) and capital expences. Under the term investment income we understand estimated value of the cash-flow (i.e. net profit + amortization). Mathematically is possible to show this phrase as follows:

$$NPV = CVCF - IC \qquad (3)$$

where:

NPV - net present value

CVCF - current value of cash-flow

IC - invested capital

Rules of NPV are:

NPV > 0 - to invest (project is good, it increase the market value of enterprise)

NPV < 0 - not to invest (project is not good, it doesn't give estimated income rate)

NPV = 0 - investment is not to be recomended nor declined

CVCF is calculated in a way to discount estimated future project income ratio which are offered by equal investment possibilities. That income ratio (k) is marked as discount ratio (measure) or as alternative capital expence.

$$CVCF = \frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + \frac{CF_3}{(1+k)^3} + ... + \frac{CF_n}{(1+k)^n} \qquad (4)$$

or

$$CVCF = \sum_{i=1}^{n} \left[CF_i / (1+k)^i \right], \quad i = 1, 2, 3, \ldots n$$

where:

CF_i - annual investment income during the project time of economic life cycle (estimated CF)

k - discount ratio (measure)

n - time of project life cycle

Calculation of CVCF is based on estimation of future money income and expences at the same period of time, which is usualy the year of beginning of the project realisation.

Results of project evaluation by method of Net present value (NPV) depends mainly on two factors:

- Estimated money flows – cash-flow
- Actualisation interest rate, i.e. used discount rate.

Given problem is shown on figure 1.2.

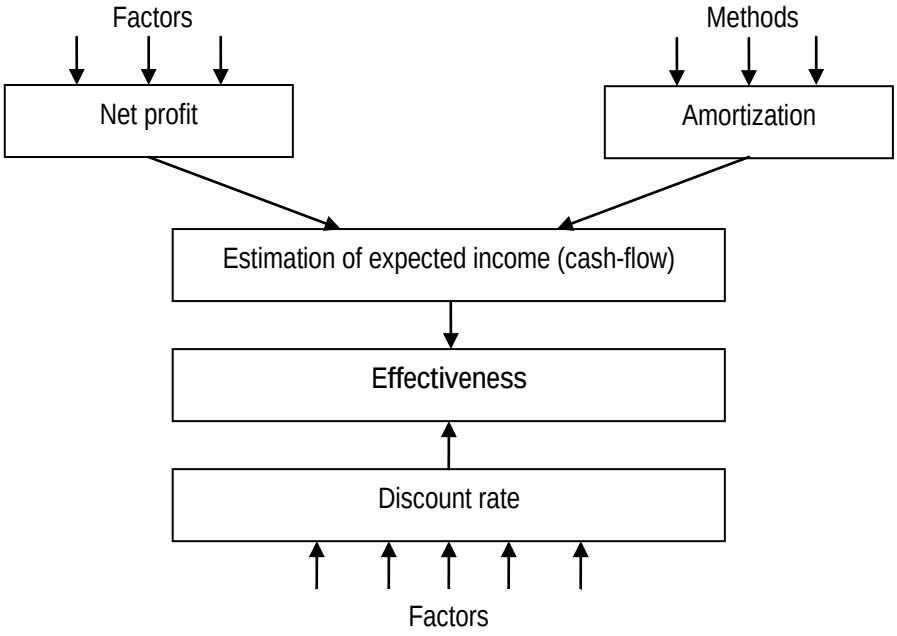

Figure 1.2. Factors which influence on investment project effectiveness

b) Internal Rate of Return

Internal rate of return method is based on the concept of net value, i.e. respects net value of money. Given method is presented in reqiured discount rate which will eqiuilize net value of estimated investment income (cash-flow) with net value investment expences. IRR, in comparison to NPV could be defined as follows – it is market interest rate (measurement) where NPV is equal to 0. That rate gives the real investment lucrativity, i.e. capital lucrativity, and current percentage of highest possible interest burden on a firm.

Oposing to NPV with this method we practicaly look for discount rate where:

$$CVCF = IM, \quad \text{or} \quad CVCF - IM = 0 \qquad (5)$$

Practical calculation is made mostly by method of tries and errors (iterrative approach), and then by method of linear interpolation:

$$IRR = d_1 + \frac{NPV_1}{NPV_1 - NPV_2}(d_2 - d_1) \qquad (6)$$

where:

d_1 - discount rate where NPV > 0

d_2 - discount rate where NPV < 0

NPV_1 - positive NPV, at discount rate d_1

NPV_2 - negative NPV, at discount rate d_2

k - enterprise discount rate (required effectiveness measure)

Rules IRR:

IRR > k - to invest

IRR < k - not to invest

c) Profitability Index

Profitability index or ratio between money income and capital expences, shows the relations between current net values of pressumed future cash-flows (SHCF) and investment capital.

$$PI = CVCF / IM \qquad (7)$$

PI rule is:

PI > 1 - to invest

PI < 1 - not to invest

PI = 1 - investment can not be accepted or declined.

Profitability index is mostly connected with NPV method and usualy leads to the same decision as NPV. When net present value is equal to 0, profitability index is equal to 1. From that point of view, if PI > 1, project achieves positive net present value and enterprise can accept it, i.e. the higher profitability index the more economicaly successful project.

Profitability index is conveniant criteria for investment project alternative selection, if we have to decide among several projects and have limited capital sources. It means that we can evaluate such investment projects and graduate them according to their falling values of PI to easily achieve maximum net present value with limited sources of assets. WIth that procedure we can reach maximum net present value for given project selection, i.e. chosen projects contribute to increasing of enterprise market value in maximum.

d) Discounted Payback Period

It is traditional and often used method of project evaluation, especially form the point of investor, forn instance bank. Method gives an answer to question how minimally long can project be alive and able, i.e. how many periods of time it has to bring income to be acceptable from the point of net present value. DPP gives time periods in which through discounted cash-flow returns equally invested capital. The shorter the time of return in comparison to life cycle, the more acceptable project for the enterprise.

$$DPP: \sum_{i=1}^{DDS} \frac{CF_i}{(1+k)^i} = IM \quad ; \qquad i = 1, 2, 3, \ldots DPP \qquad (8)$$

DPP rule is:

DPP < t - to invest

DPP > t - not to invest

t – pressumed time of projects economical life cycle

Oposing to un-discounted payback period given method respects implemented rule of financing, which is that money unit has greater value at the beginning of payback period then the same money unit at the end of payback period. But, un-discounted payback period method, as well as DPP ignores all cash-flows after the return period.

1.4.3. Additional methods for investment evaluation

Previously given methods, NPV, PI, IRR and DPP, can be nominated as the basic dynamical investment projects evaluation methods. Given methods could be additionally improved with evaluation by investment lucrativity, thumb rules and return points. Mentioned methods could increase the investment decision making process quality.

Investment lucrativity

Investment lucrativity shows how big is the annual profit made on one money unit of invested capital. It can be shown in ratio of annual profit and invested assets.

$$IL = \frac{profit}{IM} \cdot 100 \qquad (9)$$

In investment decision making for project selection we choose the alternative with maximum lucrativity rate. Calculated values of individual projects we equilize with interest rate, i.e. with the minimal interest rate, and we recomend for realisation the project whose IL is bigger then the interest rate. Of course, investment project lucrativity should be high at least as net present income of enterprise in total.

Calculation of investment lucrativity index confirms the project income, where given project reaches the estimated lucrativity level, such as pressumed income measure. If we equilize lucrativity index with the current interest rate (i = 10%) we can say the project is to be realized.

Thumb rule

This rule can be found in many forms, it shows in which period, with given interest rate, can our capital be doubled. In investment projects, thumb rule gives answer is it better to put money into a bank or to invest it into a project. It depends on the life cycle of a project, that number is devided with interest rate on deposits (with calculated intrest on intrest) which can be accumulated if money is put in a bank (for instance, 5 %), and you get the number of years during which invested money will be doubled.

Return point

Return point analysis gives an answer to questions of many enterprise managers:

- What minimal amount of products assures lucrative production
- What minimal usage of production capacities makes no loss in production
- What are the maximum production expences for product which make no loss
- What production volume makes maximum profits to enterprise
- What is the financial assets volume (profit) which are able to be assured in given production capacities for enterprise investment activities (of course, realisation possibilities given on the market).

Return point analysis gives the opportunity to look for reserves in the area of enterpreneueral transformation proces, and it enables (accurately) looking for investment

decision making about the realisation of suggested investment project. For the return point analysis it is very important to make very highly precise costs identification – fix and variabile. In investment decision making, i.e. at preparation of concrete investment project, we recomend to find the expert qualification of fix and variabile costs, which will increase the quality (precision) of investment calculations.

Return point will define the amount of production at which enterprise will start to make profits, it is the way of determining the production volume which is to be reached for enterprise not to make losses, i.e. where income is equilized with expences. Return point is the critical spot which can also be called the threshold of profit. In calculation we reach it by equilizing two basic formulas – selling income and expences. For simplicity, we used the phrase for income and expences development by linear curves.

$$T = p \cdot x \qquad (10)$$

$$N = a + b \cdot x \qquad (11)$$

$$x_{BZ} = \frac{a}{p-b}, \quad \text{or} \quad x_{BZ} = \frac{a+z}{p-b} \qquad (12)$$

where:

a	- fix expences	p	- price of a product
b	- variabile expences	x	- production volume
z	- minimal established profit	x_{BZ}, p_Z	- return point, threshold of profit

Given relations, as well as other used analyses of return point in enterpreneueral decision making can be found in the literature. For given problems in investment decision making it can be drawn as follows:

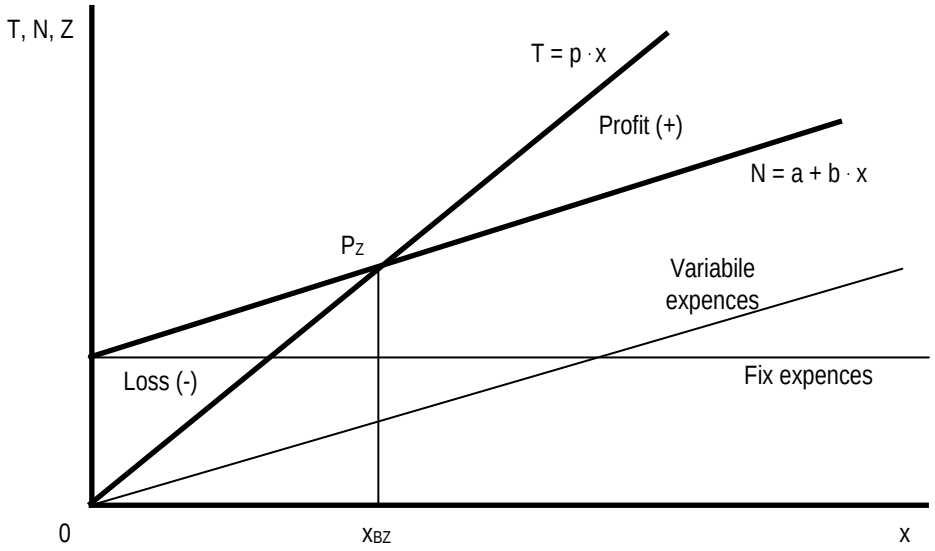

Figure 1.3. Graphical solution to return point

Table 1.4. Significance of investment project evaluation methods

NPV	Precedence, deciding and most efficient method
PI	Method which confirms decisions made by NVP
IRR	Measurement of profit possibilities, not to underestimate the traps
DPP	More or less informative character, makes decisions based on estimation rules
IL, TR, RP	Additional methods to support investment decision making

In evaluation of investment projects next rules should lead you to success:

- Assure that every investment project (from the point of equality) contains basic economic prametters,
- Assure real input data which enable evaluation analysis, calculations and forecasts,
- Document the cash-flow of a project from the point of time periods (cash-flow),
- Correctly estimate the amount of enterprise discount rate,
- Choose suitable evaluation method which enables complex judgment on a project – its life cycle,
- When calculating use the computer support which enables clear and quicker processing of individual alternative solutions,
- Do not underestimate preparation phases, i.e. technical-economical analysis of individual investment projects.

1.5. CONCLUSION

Every subject which invests certain financial assets with the goal to ennoble them in a form of real investments enters in a certain risk which influence on the whole enterprise investment process. The subject that steps in to given investment process responsibly, i.e. respects investment evaluation in enterprise with complex decision making process, fully uses and evaluates accesseble information, or their effects on enterprise should reach the success in enterpreneuership.

Success of enterprise investment activites is closely depended on preparation quality, evaluation, and individual realisation of individual investment projects.

Important role, not just in project evaluation, but in total enterprise goals as well, plays the price of capital, i.e. capital costs and it influence on investment and total economical activities of enterprise.

Problem of preparation and evaluation of projects, capital expences, and mutual connections we consider significant factor of success in enterprise investment activities.

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2. THE REGIONAL INNOVATION PARADOXES OF FORESTRY CONTRACTORS FIRMS IN SLOVAKIA

Martina Štěrbová, Erika Loučanová, Jaroslav Šálka, Hubert Paluš

2.1. THEORETICAL BACKGROUND

Forestry has traditionally been perceived as an economic activity, which aims are to establish and cultivate forest to produce timber. In recent years, the overriding role of forestry is associated with the provision of a wide range of services. These services are are provided by a community of forestry contractors' consisiting mostly of small and medium-sized enterprises that don´t own and use forest lands, but only provide and ensure the full range of forestry services. Nowdays, the main part of the extraction and transport of timber is providing by these business entities (bouriaud et al. 2011).

In general, the emphasis in the process of providing forestry services has been put on quality. The basic element of success are the innovations, that leads to the use of specific technologies, which providers understand as their competitive advantage. A strong competition on the forestry service providers' side is partially forcing entrepreneurs to invest money in new advanced technologies. It is quite obvious that firms with modern technologies are able to obtain employment contracts (paluš et al., 2011).

However, innovations are the result of the institutional process, which means that the entrepreneur is not the only one who is responsible for the innovation activity of the company. The integration into the system of institutions that can support innovations is really important. The innovation systems represent a set of different institutions and actors who influence innovation processes in a given territory and they have been categorized into the national, regional and sectorial innovation systems. The innovation system of the forestry service sector has an influence on competition and cooperation, which is necessary for the implementation of innovation activities. The ability of contractor firms to generate innovations currently depends not only on the activity of individual subjects, but also on the ability to work and interact as a part of the system. The basic functions of that innovation system in the forestry service sector are

cooperation between the various actors, exchange of information and reducing uncertainty, management of conflict and risk, creating new innovations, and their dissemination and use.

The present time is typical for its permanent tension and chaotic changes. In these situations it is not resonable to lose power in the fight with each other. If possible, it is appropriate to forget sharp disputes with competitors and join forces by the integration of enterprises into clusters. The purpose is not only to avoid the "bleeding in the competitive struggle", but also strengthen own position compared to other competitors by cooperation, as well as to intensify the process of learning from entities who are partners today, but they can become the competitors tomorrow. It represents the ability to replace "the negative cooperation" (fighting, rivalry, competition) by "positive cooperation" (cooperation, alliances, clusters), or the least to avoid competitive scrambles (neutral cooperation). However, it is assumed that cooperation with competitors may also partially include fights or "positive cooperation" may to change into the "negative cooperation" and vice versa after a period of time (Trnka, 2004).

Porter (1998) defines a cluster as *a „geographical proximate group of interconnected companies, specialized suppliers, service providers and associated institutions in a particular field, linked by commonalities and externalities, which together compete but also cooperate.“*
The cluster of small and medium-sized enterprises represents an organisational links of small and medium-sized enterprises that are legally separated entities linked in a cooperative and relatively stable relationship, and that jointly provide certain business activities or operational functions in order to carry them out more economically and profitably, thus increasing the possibility to solve problems and further develop the enterprises participating in the cluster. As a rule, in thise type of clusters (network), new products and services as well as production and marketing are developed together. Except of production units, there can also be other network actors included in the cluster, such as research institutes, consultants, financial institutions, etc. (Loučanová, 2007). According to Porter (2000), geographically concentrated, interconnected companies and institutions are the engine of national, regional and local development.

In the market of forestry services clustering is in its begining and enterprises merge together and work as partners mainly on an informal level. These informally organised cooperations allow different information exchange on various degrees of institutionalisation. In general, we can identify the following forms of innovation cooperation:

- cooperation with suppliers and customers within a value-added chain,

- cooperation with state and public institutions,
- cooperation with scientific and educational institutions,
- transfer systems of public research facilities,
- technology centers and incubators,
- operators of mass actions such as exhibitions, conferences and seminars,
- creation of a complex innovation networks.

The innovation system with innovation networks such as clusters, education, information infrastructure, economic and institutional framework, is one of the basic pillars of the knowledge economy. It also represents an effective system for promoting innovation. Its principle is based on the synergic effect of the national economy, the regional economy, the performance of individual enterprises and supporting institutions to generate innovation. The innovation systems represent a set of institutions affecting innovation processes on various levels - European, national, regional and sectoral. The latter one is base on an informal cooperation within innovation networks. This principle is maintained in all sectors of the economy and differs only at the organisational level of a sector, which is given by its specific character.

The enterprises in the forestry-wood chain have the opportunity to use all the tools of the innovation system of the Slovak Republic (Figure 2.1). On the sectoral level they are supported by institutions typical for the sector, such as forestry education, research and development or supporting institutions (Technical University in Zvolen, National Forest Centre, Association of Wood Processors, etc.) that create so-called soft infrastructure innovation network - the cluster (Paluš, Loučanová, 2014).

The Association of Entrepreneurs and Tradesmen Working in the Forestry Service Sector of the Slovak Republic has a characteristic function within the cluster and aims to create the best conditions for the development of small and medium-sized enterprises in the forestry sector in each region of the Slovak Republic. The association seeks to promote the professional and economic interests of its members in the course of their profession as well as ensuring fair competition between the economic entities. However, the actors from other sectors have also an important role (Zaušková et al., 2009).

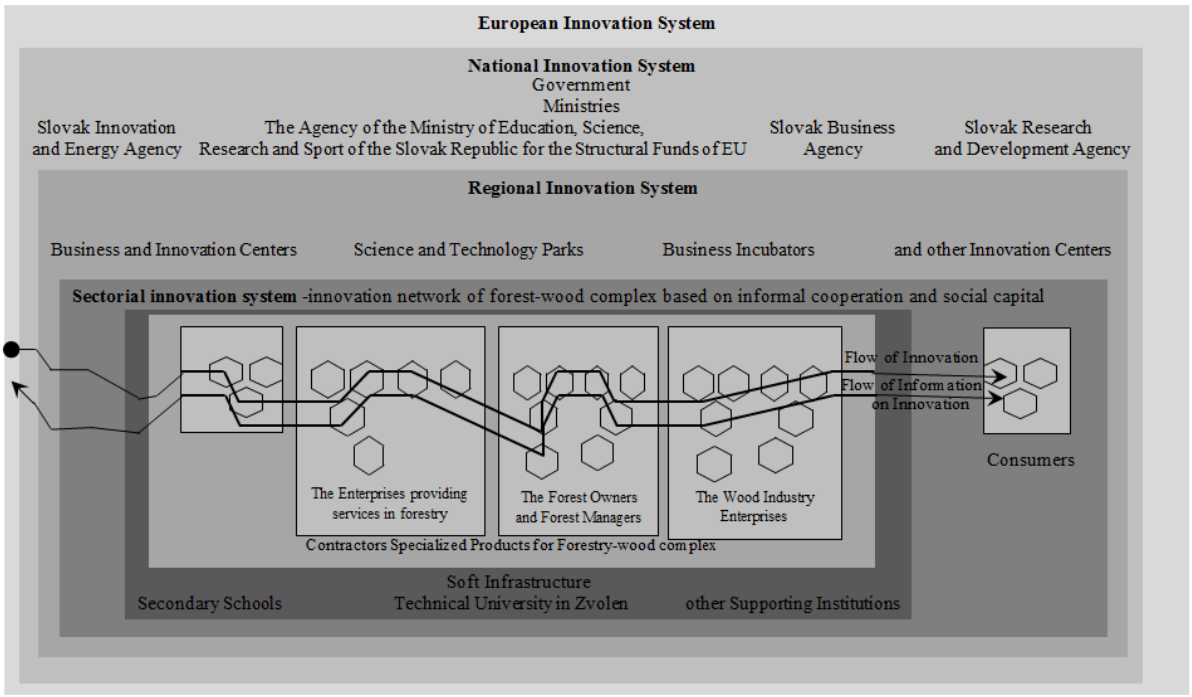

Figure 2.1. Innovation system of forestry-wood chain in Slovakia

Source: Paluš, Loučanová, 2014

The innovation system is divided into four levels: institutional, business to business (b2b), firm and personal levels. The innovative system of potential clusters, in particular for forestry services sector may take the following form (Figure 2.2).

In terms of innovation activities of the firms providing forestry services, participation of a firm in the cluster has a great importance and brings many benefits. The aim of the support of innovation in the cluster is to develop products with higher added value. The firms in the cluster perceive faster and more clearly new technologies, operational and supply opportunities and new customer needs as well. By the constant contact with each other, companies are able to get very quickly a lot of information about evolving technologies, available parts, machines, new services and marketing concepts. There can be more enterprises working together in innovation creating process and they can also share the costs necessary for the development of new products and technologies. This creates strong networks between the firms and scientists, researchers and developers. There is a mutual inspiration and often in connection with the cross-cutting cluster "spill-over" effect, when technology from one field or industry can be used in supplementary or completely different industrial fields.

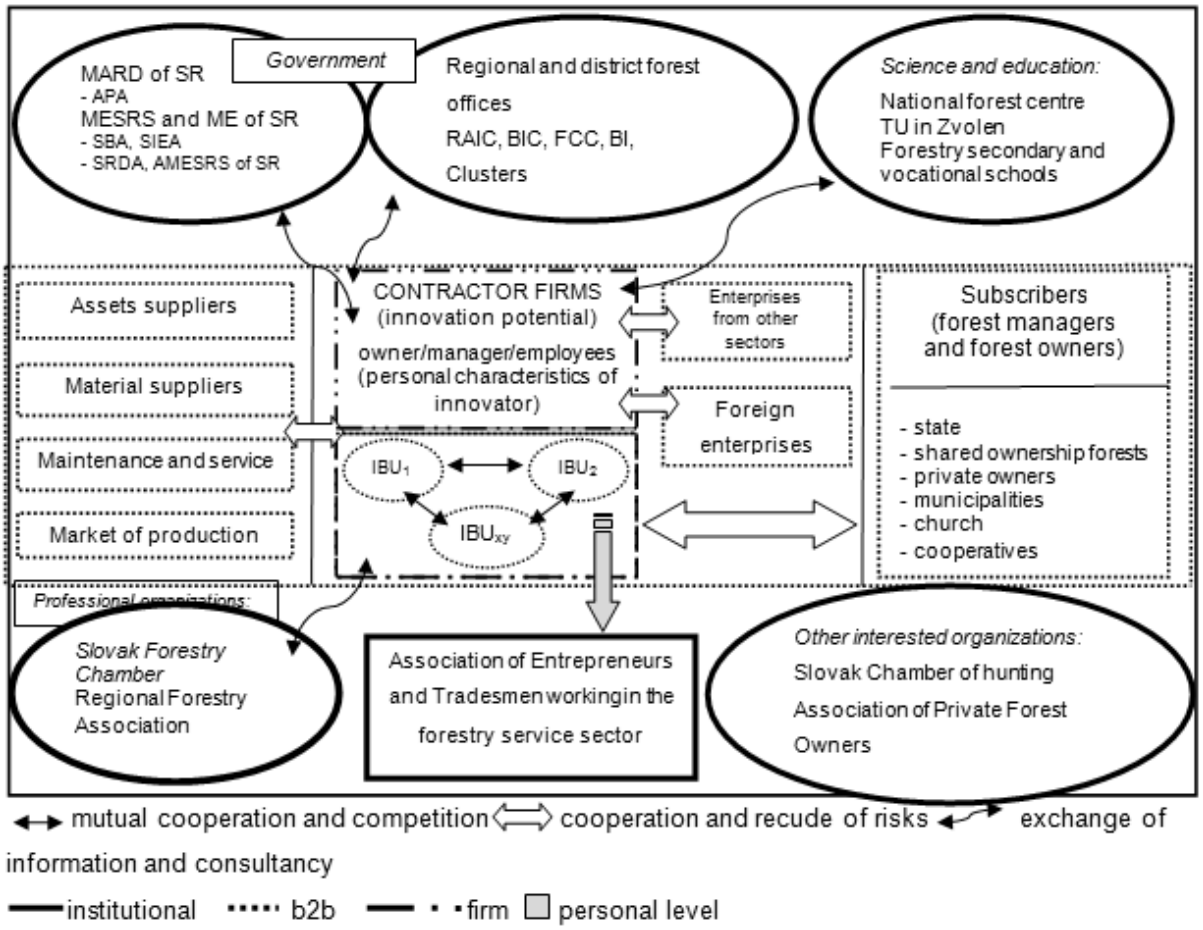

Figure 2.2. Innovation system of the forestry service sector in Slovakia

Source: Šálka, Štěrbová, Paluš, 2014

The pressure on innovation increases and members of the cluster can respond to this situation by pumping the internal potential of the cluster consisting of young talent, relationships with universities, research institutions, accumulated information, suppliers and infrastructure, access to grant financing and the sharing of the risk with partners (Průmyslové klastry, 2005).

The aim of this work is to identify the regional paradoxes within the enterprises providing services in forestry sector on the regional level in the Slovak Republic, in the area of potential clusters - innovation networks representing an effective system for promoting innovations based on the principle of synergistic effect.

The possibilities of identifying innovative paradoxes

We used analytical and synthetic methods that connect approaches to the issue of innovation systems in the forestry service sector. Through the analysis of phenomena and processes we analyzed the issue of innovations and innovation system, following the grouping and cooperation in the context of potential clusters in the forestry service sector on regional level in the Slovak Republic. We analyzed this issue by individual parts using the the descriptive method; we described their relationships to identify innovative paradoxes on the observed level. The classification of contractor firms in forestry service sector was based on the data collected and on the analysis of relevant information from the Register of Financial Statements of the Ministry of Finance of the Slovak Republic. We created a database of information through the following search criteria: 8 different regions of the Slovak Republic and numeric codes of subclasses, which consisted of contractor firms according to the statistical classification of the character of their economic activities. The Statistical Classification of Economic Activities in the European Community (NACE) is a standardised classification system in the European industry, which is obligatory in the European Union. It was established by the Regulation in 1990 (NACE Rev. 1), modified by the Regulation in 2002 (NACE Rev. 1.1) and then significantly changed in 2008 (NACE Rev. 2).

At first, there was a Slovak implementation of NACE in the Slovak Republic called The Industrial Classification of Economic Activities. Since 2003 it has been publicly known as The Statistical Classification of Economic Activities. The implementation called The Statistical Classification of Economic Activities SK NACE Rev. 2 has been valid in Slovakia since 2008. This revised classification is fully harmonized with the European version of NACE Rev. 2 issued by The Regulation of the European Parliament and of the Council number 1893/2006. The reason for such a wide-ranging review was an effort to include technological and structural changes in the economy, as well as to ensure the comparability of economic statistics on the European and also international level. Therefore, the development of this new classification was coordinated by The United Nations Statistical Commission and by the statistical office of the European Union on the European level.

The Statistical Classification of Economic Activities SK NACE divides economic activities by numeric codes into various sections, divisions, groups, classes and subclasses. The contractor

firms in forestry service sector belong to the Section A - Agriculture, forestry and fishing, and can be disaggregated into 5 subclasses:

- 02200 Timber harvesting (Logging)
- 02401 Services related to forestry
- 02402 Services related to timber harvesting (logging)
- 02409 Other services in forestry
- 02100 Forestry and other activities in forestry

Based on the gained data (number of the contractor firms in forestry service sector in individual regions in Slovakia and the total number of enterprises in the regions and in Slovakia) we calculated the Coefficient of Localization (LQ). This is also known as the index of concentration, which measures the degree of concentration of the contractor firms in forestry service sector over a set of regions. The LQ coefficient is then the sum either of the positive or negative deviations of the regional percentage of firms in the given region from the corresponding regional percentage of all enterprises in this region. We identified the regions with LQ higher than the state average, to identify regions which play the key role in grouping of the contractor firms in forestry service sector. Porter (1998) defines the formula for calculating the LQ modified for the number of enterprises:

$$LQ = \frac{x_i / X}{y_i / Y} \qquad (13)$$

where:

LQ - coefficient of localization in the region,

X_i - number of contractor firms in the forestry service sector in the region,

X - total number of enterprises in the region,

y_i - number of contractor firms in the forestry service sector in Slovakia,

Y - total number of enterprises in Slovakia.

Regional clusters potentially exist in the regions, where groups of related industries with LQ higher than 1 are located. It indicates regions with a particularly large representation of selected enterprises. A value of 0 would indicate that the contractor firms are distributed very evenly over the region. A value of 1 indicates an extreme concentration of firms in one region

within the country, but there can be more than one region with LQ higher than1 in the same country. Subsequently, we identified the key regions suitable for the cluster in the forestry service sector.

To identify the most preferred legal form of enterprises in the forestry service sector in 8 regions of the Slovak Republic and in individual subclasses of classification of economic activities by SK NACE we collected data from the Register of Financial Statements of the Ministry of Finance of the Slovak Republic using the search criteria "legal status".

Further on we focused on mapping the innovation activities of Limited Liability Companies in forestry service sector during the financial year 2012. We identified the regions with the highest and the lowest innovation activity in the field of investment innovations in this year. The assessment of innovation activities was based on the theoretical background of innovation, where innovation is defined as a quantitative or qualitative changes in the system of enterprise, relating to any area of its activity, that will benefit based on the assumption that entrepreneurs do not invest money in material equipment without subsequent benefit, so each one euro invested represents an investment into the innovations. This information about innovation investments was drawn from the Register of Financial Statements of the Ministry of Finance of the Slovak Republic. From the balance sheets published by various entities we found the value of assets for the financial years 2012 and 2011 and calculated the annual changes. This demonstrated the innovation activity in the category of investment innovations of these entities in the selected period. Our conclusions were based on the finding that the positive change demonstrated the positive innovation activity in the company. A negative change (assets were higheer in 2011 compared to2012 accounting period, the amount of accumulated depreciation exceeded the amount of capital investment in investment innovations) indivated that that the entity did not implement innovations.

To fulfill the objective of this work we finally used the method of comparing the value of investment in innovations of Limited Liability Companies within the individual regions and the concentration of these companies within the sector.

The actual synergic effect of innovation networks - clusters, representing an effective system for promoting innovations, was observed by the integral indicator of pragmatic value of innovation activity within the regions, where these companies are located, and the

concentrations of these companies in the sector, as well as the forest cover of regions. The final evaluation was done by summing and ordering the individual values.

The identification of contractor firms in forestry service sector by SK NACE classification

There are totally 21,694 firms providing services in forestry in Slovakia. Most of them (12,744 firms) belong to the category 02409 Other services in forestry. The second largest is the category 02401 Services related to forestry (3,534 firms), followed by subclasses 02100 (2,656 firms) and 02200 (1,685 firms). The fewest number of firms are classified within the subclass 02402 Services related to timber harvesting (logging). Detail numbers of enterprises in individual subclasses are shown in Figure 2.3.

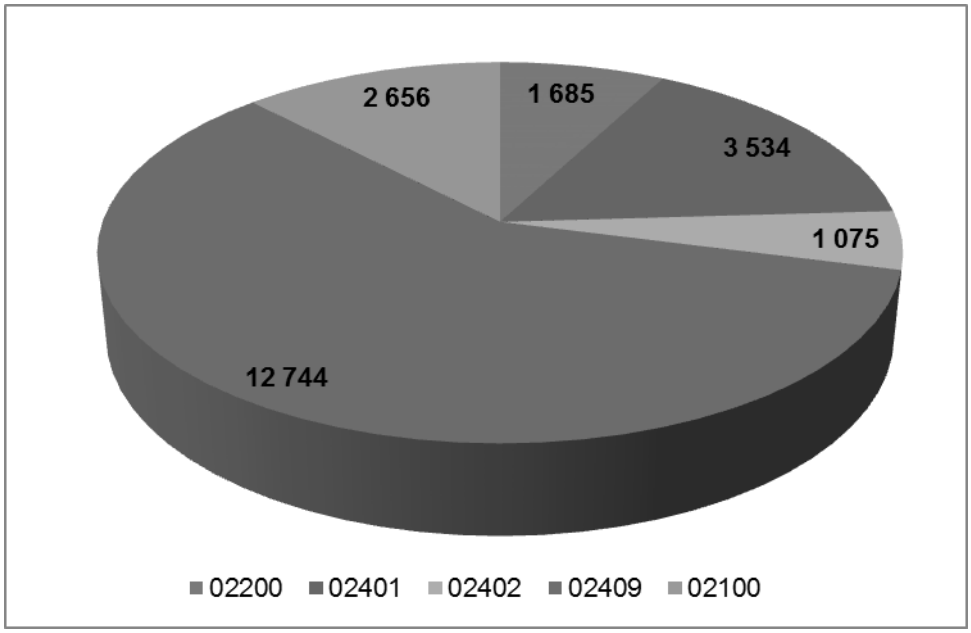

Figure 2.3. The classification of the contractor firms in the forestry service sector according to subclasses of SK NACE

The SK NACE classification allows clasification of the firms in the forestry service sector according to the regions of Slovakia. It provides the ability to find regions with the higest and smallest number of business entities.

In the Slovak Republic most of the contractor firms is situated in regions of Prešov (PO) and Banská Bystrica (BB). This is connected to the fact, that these regions are characterised by the largest forest area inSlovakia. A relatively large number of firms can be also found in the

regions of Košice (KE), Žilina (ZA) and Trenčín (TN). The fewest number of enterprises is present in the regions of Nitra (NR), Trnava (TT) and Bratislava (BA). This can also be attributed to the total area of forest land, which is the lowest in these regions of Slovakia (Figure 2.4).

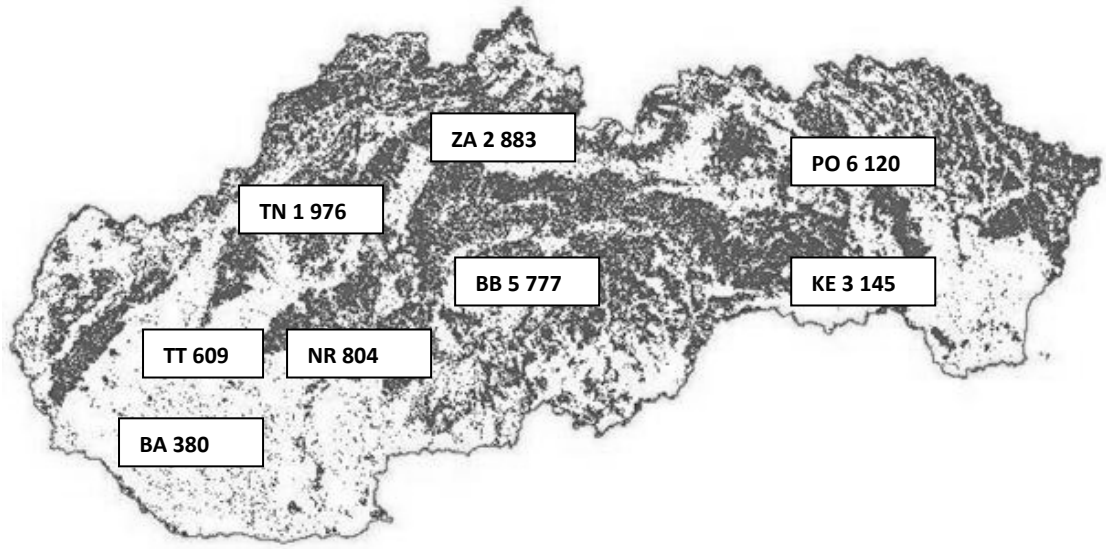

Figure 2.4. The classification of contractor firms in the forestry service sector according to regions of Slovakia

The concentration of the contractor firms according to subclasses of SK NACE in the different regions:

- sections 02200 and 02402 - the largest number of companies is registered in the region of Banská Bystrica,
- subclass 02409 Other services in forestry and 02100 Forestry and other activities - most of companies were registered in the region of Prešov,
- category 02401 Services related to forestry – most entities registered in the region of Košice.

These data confirm the facts, that the concentration of firms according to subclasses of SK NACE is also connected to the size of forest area and forest cover of the total territory of the Slovak Republic.

The identification of key regions for the cluster in the forestry service sector

We used the database of contractor firms in different regions of Slovakia from the Register of Financial Statements of the Ministry of Finance to identify key regions appropriate for the cluster in the forestry service sector.

Based onthese data the localization coefficient was calculated. It is used to indicate regions, where the groups of related enterprises (LQ higher than 1) or potential clusters in Slovakia within the individual regions can be found (Table 2.1).

Table 2.1. The coefficient of localization for different regions of Slovakia in the forestry service sector

Region	BB	BA	KE	NR	PO	TN	TT	ZA
LQ	2,42	0,09	1,32	0,31	2,19	0,92	0,28	1

Base on the LQ values shown in Table 1 we can determine the regions with the highest concentration of contractor firms and thus state that the regions of Banská Bystrica, Poprad and Košice can be considered as a preferred potential regions for the creation of forestry contractors cluster (Figure 2.5).

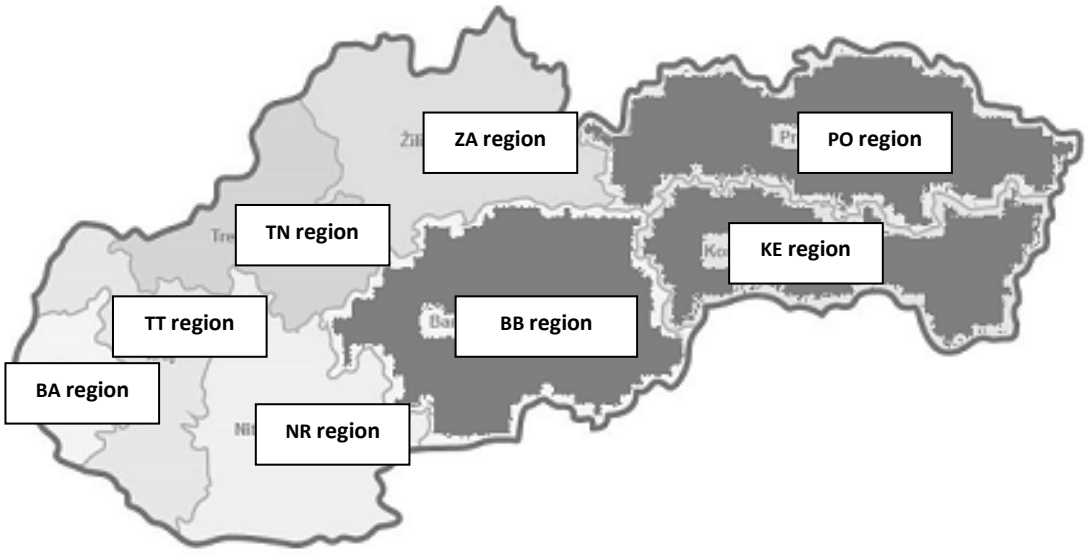

Figure 2.5. The key regions of the potential clusters in the forestry service sector

However, the coefficient of localization does not specify which of these regions has the highest mportance for the forestry service sector. It shows only the actual, static status of each sector.

Legal form of the contractor firms in forestry service sector

Some 96% of the contractor firms in Slovakia are micro-enterprises. It means that these enterprises employ fewer than 10 people and their annual turnover does not exceed 2 million EUR. The small (up to 50 employees) and medium-sized (up to 250 employees) enterprises accounted for 3.9% and large enterprises for only 0.1% of the total number of enterprises. The structure the market of forestry service sector is related to this general distribution of enterprises. In terms of the size of enterprises and the related legal form, this market is characterised by a large number of micro-enterprises. There are also small and medium-sized enterprises, but the number is absolutely low. Therefore, based on the overview in Tables 2.2-2.6 it can be stated that micro-enterprises account for the majority in this sector according to the characteristic of economic activity represent by subclass distribution by SK NACE, as well as according to the classification by regions of Slovakia.

Table 2.2. Classification of enterprises by legal form – subclass 02200

02200 Timber harvesting (Logging)								
Legal form	Region							
	BB	BA	KE	NR	PO	TN	TT	ZA
Sole Proprietorship	381	32	25	24	71	40	35	97
Sole Proprietorship in Business Register	0	0	0	1	0	0	0	0
Sole Proprietorship and Self-employed Farmer	22	4	0	1	21	0	0	14
Sole Proprietorship and Self-employed Farmer in Business Register	0	0	1	0	0	0	0	0
Sole Proprietorship and a Freelance Occupation	0	0	0	0	1	0	0	0
Self-employed Farmer	35	8	159	1	51	5	5	38
Shared ownership forests	68	5	67	29	111	62	20	94
State-owned Company	1	0	0	0	1	0	0	0
Foreign Enterprise - legal person	1	0	0	0	0	1	0	0
Allowance Organization	0	1	0	0	1	0	0	0
Limited Liability Company	37	16	23	9	27	15	7	12
Company limited by Shares	0	1	0	0	0	0	0	0
Public Company	0	1	0	0	0	0	0	0
Cooperative	0	0	0	0	2	0	1	0

Table 2.3. Classification of enterprises by legal form – subclass 02401

02401 Services related to forestry								
Legal form	Region							
	BB	BA	KE	NR	PO	TN	TT	ZA
Sole Proprietorship	457	33	977	169	932	296	63	280
Sole Proprietorship in Business Register	0	0	0	0	2	1	0	0
Sole Proprietorship and Self-employed Farmer	4	0	8	3	9	2	0	6
Sole Proprietorship and Self-employed Farmer in Business Register	0	0	1	0	0	0	0	0
Sole Proprietorship and a Freelance Occupation	0	0	0	0	1	0	0	0
Self-employed Farmer	0	0	14	5	12	0	0	21
Freelance Occupation - individual person	0	0	1	0	0	0	0	0
Limited Liability Company	27	18	37	22	49	15	17	47
Company limited by Shares	0	0	1	0	0	0	0	0
Limited Partnership	0	1	0	0	0	0	0	0
Cooperative	0	0	0	0	2	1	0	0

Table 2.4. Classification of enterprises by legal form – subclass 02402

02402 Services related to timber harvesting (logging)								
Legal form	Region							
	BB	BA	KE	NR	PO	TN	TT	ZA
Sole Proprietorship	470	23	49	34	159	98	8	90
Sole Proprietorship and Self-employed Farmer	14	0	7	4	15	3	0	13
Self-employed Farmer	5	2	10	1	3	0	1	10
Foreign Enterprise - legal person	1	0	0	0	0	0	0	0
Limited Liability Company	31	2	1	3	3	0	2	12
Cooperative	0	0	0	0	1	0	0	0

Table 2.5. Classification of enterprises by legal form – subclass 02409

02409 Other services in forestry								
Legal form	Region							
	BB	BA	KE	NR	PO	TN	TT	ZA
Sole Proprietorship	3312	132	1248	333	3741	1045	341	1420
Sole Proprietorship in Business Register	1	0	0	0	1	2	0	2
Sole Proprietorship and Self-employed Farmer	77	6	30	13	62	25	8	34
Sole Proprietorship and Self-employed Farmer	0	0	1	0	3	0	0	7
Self-employed Farmer	104	20	87	8	60	11	20	182
Self-employed Farmer in Business Register	0	0	0	0	1	0	0	0
Foreign Enterprise - individual person	0	0	0	0	0	2	0	1
Foreign Enterprise - legal person	0	0	0	0	0	0	0	1
Allowance Organization	0	0	2	0	0	0	0	0
Freelance Occupation - individual person	3	1	1	2	5	7	1	15
Limited Liability Company	98	17	34	18	78	42	18	49
Company limited by Shares	1	0	0	0	1	0	0	1
Cooperative	0	1	0	0	8	0	0	0

Table 2.6. Classification of enterprises by legal form – subclass 02100

02100 Forestry and other activities in forestry								
Legal form	Region							
	BB	BA	KE	NR	PO	TN	TT	ZA
Sole Proprietorship	312	6	12	2	47	4	4	21
Sole Proprietorship and Self-employed Farmer	6	2	7	1	14	1	4	8
Sole Proprietorship and a Freelance Occupation	0	0	1	0	0	0	0	1
Self-employed Farmer	19	3	113	3	114	4	9	65
Shared ownership forests	251	29	200	113	466	281	39	306
State-owned Company	1	1	0	0	0	0	0	0
Foreign Enterprise - individual person	0	0	0	0	0	2	0	0
Allowance Organization	1	0	1	0	2	0	0	0
Freelance Occupation - individual person	0	0	0	0	2	0	0	2
Limited Liability Company	37	14	23	5	32	10	5	31
Company limited by Shares	0	1	1	0	1	0	0	0
Public Company	0	0	0	0	1	0	0	1
Cooperative	0	0	3	0	7	1	1	2

It is necessary to mention that enterprises of forest owners were included under the category of "Shared ownership forests"' even if it is not possible to clearly determine, whether these entities provide their economic activities within the forestry service sector or not.

It follows from the tables 2-6 that the “Sole Proprietorship” (individual contractor) is the most preffered legal form. This form is represented by 16,832 firms representing 77% of the total number of enterprises providing services in forestry. This type of legal form is preffered mainly because of its simplicity, freedom and flexibility.

In all the subclasses of SK NACE, as well as in individual regions of Slovakia, we recorded a greater number of firms in the categories of Self-employed farmer and Shared ownership forests. A Limited Liability Company is the most preferred legal form in the category of capital companies (943 entities). Other types of legal forms occur rarely.

Investment innovations in Limited Liability Companies

In the next section we focused on the survey of investment innovations in Limited Liability Companies, as they are required to publish their financial statements (within their balance sheet, income statement and notes) for each accounting period. At the same time, this is the most preferred legal form of partnership in the forestry services sector in Slovakia.

All available information were collected, processed and evaluated in accordance with the SK NACE subclasses classification for Limited Liability Companies in the forestry service sector in all regions of Slovakia. The results are shown in Tables 2.7-2.11.

Table 2.7. Investment innovations in enterprises of subclass 02200 Timber harvesting

02200 Timber harvesting			
Region	The value of an asset (v €)		
	An accounting period		Annual change
	2012	2011	
BB	7 236 058	5 620 497	1 615 561
BA	1 460 161	1 497 324	-37 163
KE	7 667 214	8 182 148	-514 934
NR	2 061 424	1 519 729	541 695
PO	3 228 720	3 355 725	-127 005
TN	1 569 348	1 541 670	27 678
TT	799 750	2 059 491	-1 259 741
ZA	2 515 398	2 363 885	151 513
Total	26 538 073	26 140 469	397 604

Within this subclass the highest positive innovation activity can be defines in the region of Banska Bystrica. The investment innovations were implemented also in companies in the region of Nitra, Žilina and Trenčín, which is supported by the positive difference of values of assets. A negative difference of values of assets occured in companies located in the region of Trnava, Košice, Prešov and Bratislava. In these enterprises the amount of accumulated depreciation exceeded the amount of capital investment into investment innovations in 2012. It can be assumed, that no investment innovations were implemented in these enterprises. However, a positive innovation activity in investment innovation in total was registered in the subclass 02200 Timber harvesting.

Table 2.8. Investment innovations in enterprises of subclass 02401 Services related to forestry

02401 Services related to forestry			
Region	Value of assets (€)		
	Accounting period		Annual change
	2012	2011	
BB	227 313	150 029	77 284
BA	230 036	165 786	64 250
KE	1 244 328	888 198	356 130
NR	652 526	311 548	340 978
PO	5 190 749	2 448 204	2 742 545
TN	470 204	386 781	83 423
TT	160 519	20 619	139 900
ZA	1 215 136	193 713	1 021 423
Total	9 390 811	4 564 878	4 825 933

In 2012 a positive innovation activity was recognised in the enterprises of subclass 02401 Services related to forestry in all 8 regions of Slovakia. This is supported by positive annual changes in values of assets between 2011 and 2012.

Table 2.9. Investment innovations in enterprises of subclass 02402 Services related to timber harvesting

02402 The services related to timber harvesting			
Region	Value of assets (€)		
	Accounting period		Annual change
	2012	2011	
BB	3 387 939	1 900 089	1 487 850
BA	12 388	8 211	4 177
KE	69 360	45 543	23 817
NR	15 862	4 952	10 910
PO	287 370	173 332	114 038
TN	0	0	0
TT	182 135	212 385	-30 250
ZA	1 151 657	514 909	636 748
Total	5 106 711	2 859 421	2 247 290

With one exception of Trnava region the companies of subclass 02402 Services related to timber harvesting show positive values of annual changes, so it can be assumed that investment innovations were implemented by these enterprises during 2012.

Table 2.10. Investment innovations in enterprises of subclass 02409 Other services in forestry

02409 Other services in forestry			
Region	Value of assets (€)		
	Accounting period		Annual change
	2012	2011	
BB	5 951 317	5 992 469	-41 152
BA	1 874 845	905 607	969 238
KE	6 946 268	7 348 677	-402 409
NR	7 466 948	8 685 331	-1 218 383
PO	6 658 087	6 896 895	-238 808
TN	7 311 304	6 506 399	804 905
TT	3 540 545	2 686 470	854 075
ZA	3 725 881	3 933 871	-207 990
Total	43 475 195	42 955 719	519 476

In the section 02409 Other services in forestry we documented the positive annual changes in the companies located in the region of Bratislava, Trnava and Trenčín. In the regions of Nitra, Košice, Prešov, Žilina and Banská Bystrica the values of assets were higher in 2011 compared to 2012. It means that the amount of accumulated depreciation exceeded the amount of investment capital to innovation in these enterprises during the selected accounting period. However, in general for the whole Slovakia, even in this subclass of SK NACE classification, there was a positive innovation activity identify in the field of investment innovations.

In the subclass 02100 Forestry and other activities in forestry, there are mostly negative values of annual changes identified in connection with the investments into innovations and the regions (or companies) with negative values of annual changes in selected balance sheet´s items dominated. There was low, however positive innovative activity recorded in the regions of Nitra, Trnava and Trenčín, while in other regions there were mostly enterprises without investment innovations during selected accounting period.

Table 2.11. Investment innovations in enterprises of subclass 02100 Forestry and other activities in forestry

02100 Forestry and other activities in forestry			
Region	Value of assets (€)		
	Accounting period		Annual change
	2012	2011	
BB	18 913 650	20 145 193	-1 231 543
BA	341 730	431 096	-89 366
KE	4 318 825	4 382 403	-63 578
NR	146 969	29 231	117 738
PO	16 991 509	17 431 015	-439 506
TN	445 097	411 010	34 087
TT	1 854 351	1 788 943	65 408
ZA	3 727 857	4 308 455	-580 598
Total	46 739 988	48 927 346	-2 187 358

In general, it can be said, that Limited Liability Companies in the forestry service sector are charakterised by positive innovation activity in field of investment innovations during the selected period as indicated in nd that facts are supported by rusults shown in Table 2.12.

Table 2.12. Investment innovations in Limited Liability Companies in the forestry service sector

Subclass of SK NACE	Value of assets (€)		
	Accounting period		Annual change
	2012	2011	
02200	26 538 073	26 140 469	397 604
02401	9 390 811	4 564 878	4 825 933
02402	5 106 711	2 859 421	2 247 290
02409	43 475 195	42 955 719	519 476
02100	46 739 988	48 927 346	-2 187 358
Total	131 250 778	125 447 833	5 802 945

Within the individual subclasses of SK NACE categorization, with one exception of subclass 02100 Forestry and other activities in forestry, positive results in annual changes in assets values were achieved, so these companies implemented the investment innovations during 2012.

As shown in in Figure 2.6, the highest amount of investment into the investment innovations occured in the enterprises of subclass 02401 Services related to forestry. Negative

values, in terms of innovation activity during the selected period, were reported by the companies of subclass 02100 Forestry and other activities in forestry.

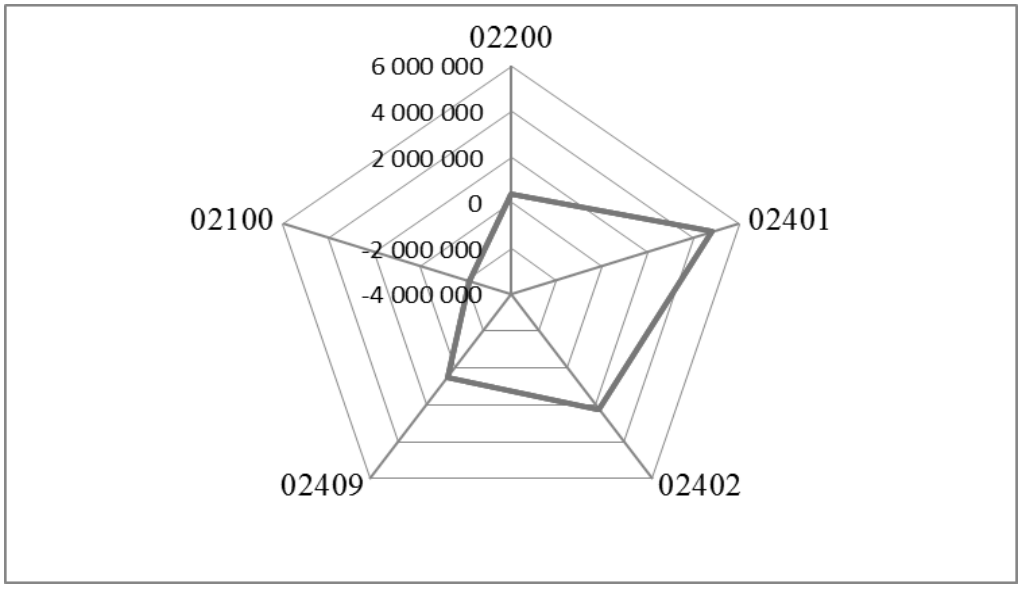

Figure 2.6. Investments of Ltd. companies into innovations by subclasses of SK NACE classification (€)

The innovation activity in the field of investment innovations of Ltd. companies according to individual regions of Slovakia are illustrated in Table 2.13 and Figure 2.7. The results show significant regional differences.

Table 2.13. Investment innovations of Limited Liability Companies by regions

Region	Value of assets (€)		
	Accounting period		Annual change
	2012	2011	
BB	35 716 277	33 808 277	1 908 000
BA	3 919 160	3 008 024	911 136
KE	20 245 995	20 846 969	-600 974
NR	10 343 729	10 550 791	-207 062
PO	32 356 435	30 305 171	2 051 264
TN	9 795 953	8 845 860	950 093
TT	6 537 300	6 767 908	-230 608
ZA	12 335 929	11 314 833	1 021 096
Total	131 250 778	125 447 833	5 802 945

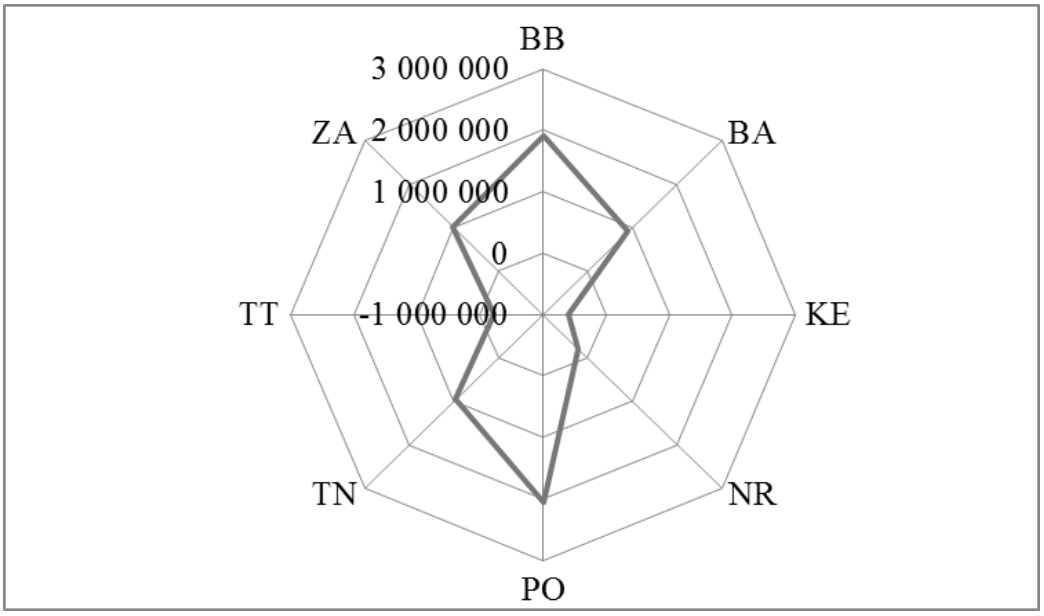

Figure 2.7. Investments of Ltd. companies into innovations by regions (€)

As shown in Table 2.13 and Figure 2.7, the highest amount of investment into innovations was spent by Ltd. companesies located in the region of Prešov and Banská Bystrica. The lowest amount was invested in the region of Košice, Trnava and Nitra.

Identification of regional paradoxes within the enterprises of forestry service sector

To identify regional paradoxes within the enterprises of forestry service sector at the regional level of the Slovak Republic in the area of potential clusters (innovation networks representing an effective system for supporting innovations based on the principle of synergistic effect), the innovation activity was compared with the share of sector that enterprises operating in the region hold on the the LQ state average. These represent potential clusters; virtual innovation networks of effective system for supporting innovations (Table 2.14 and Figure 2.8).

The iIdentification of regional paradoxes within the enterprises of forestry service sector at the regional level of the Slovak Republic was based on the assummtion that the regions with the higher concentration of companies into innovation networks or clusters will be the innovation leaders and the highest amount of investment into innovations will be found here.

The values obtained for the region of Košice are remarkable, as on one hand, this region is considered as a strategic area in relation to cluster formation within the sector because of the existence of a group of related enterprises, however, on the other hand, there were negative

values of investments into innovations (the lowest value among all 8 regions in Slovakia) in companies identified in this region during the observed period. In these companies the amount of accumulated depreciation exceeds the value of investment, so we can assume that investment innovations were not implemented by the companies during the selected period, or their character was not so extensive and the value of accumulated depreciation to previous investment innovations exceeded the value of capital invested into innovations.

Table 2.14. Identification of regional paradoxes within the enterprises of forestry service sector

Region	Innovation activity (mil. EUR)	LQ of Ltd. companies
BB	1.908	2.54
BA	0.911136	0.19
KE	-0.600974	1.06
NR	-0.207062	0.51
PO	2.051264	2.20
TN	0.95093	1.02
TT	-0.23608	0.56
ZA	1.021096	1.57

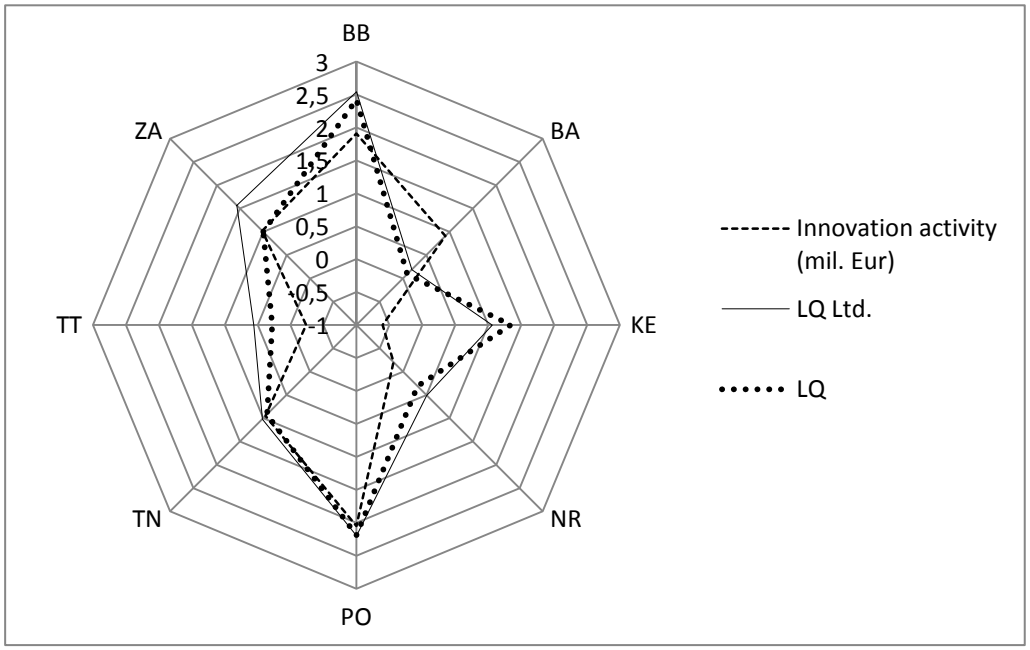

Figure 2.8. Identification of regional paradoxes

The opposite situation was in the region of Bratislava, where despite of a very small concentration of enterprises of the sector, there was a high amount of capital invested into innovations per enterprise at average. In terms of the synergic effect of supporting innovations through innovation networks – clusters, this situation can be called as the “innovation paradox“. However, in the Bratislava region it is rather a regional specific resulting from the concentration of capital in Slovakia than the "innovation paradox". In relation to concentration of capital, there are also different rules applied in this region comapred to other regions in Slovakia.

The integral indicator of value was used to determine the value of the innovation activities of contractors in the forestry service sector. As shown in Table 15, information about concentration of selected companies, their innovation activity and the forest cover within the regions of the Slovak Republic were summarised in the matrix of multicriteria evaluation to quantify this indicator.

Table 2.15. Matrix of multicriteria evaluation

Region	Innovation activity (mil. EUR)	Rank	LQ Ltd. companies.	Rank	Forest cover	Rank
BB	1.9080	7	2.5400	8	0.4910	6
BA	0.9111	4	0.1900	1	0.3660	4
KE	-0.6010	1	1.0600	5	0.3960	5
NR	-0.2071	3	0.5100	2	0.1520	2
PO	2.0513	8	2.2000	7	0.4920	7
TN	0.9509	5	1.0200	4	0.4920	7
TT	-0.2361	2	0.5600	3	0.1570	3
ZA	1.0211	6	1.5700	6	0.5590	8
Character of criterium	+ 1		+ 1		+ 1	

The value of the synergic effect of innovation networks – clusters in forestry sector (Figure 9), represents an effective system to support innovations. As shown in Table 16, the highest values occurred for the region of Prešov, Banská Bystrica and Žilina.

Table 2.16. Synergic effect of innovation networks

Region	BB	BA	KE	NR	PO	TN	TT	ZA
Integral indicator	21	9	11	7	22	16	8	20
Rank	2	7	5	8	1	4	6	3

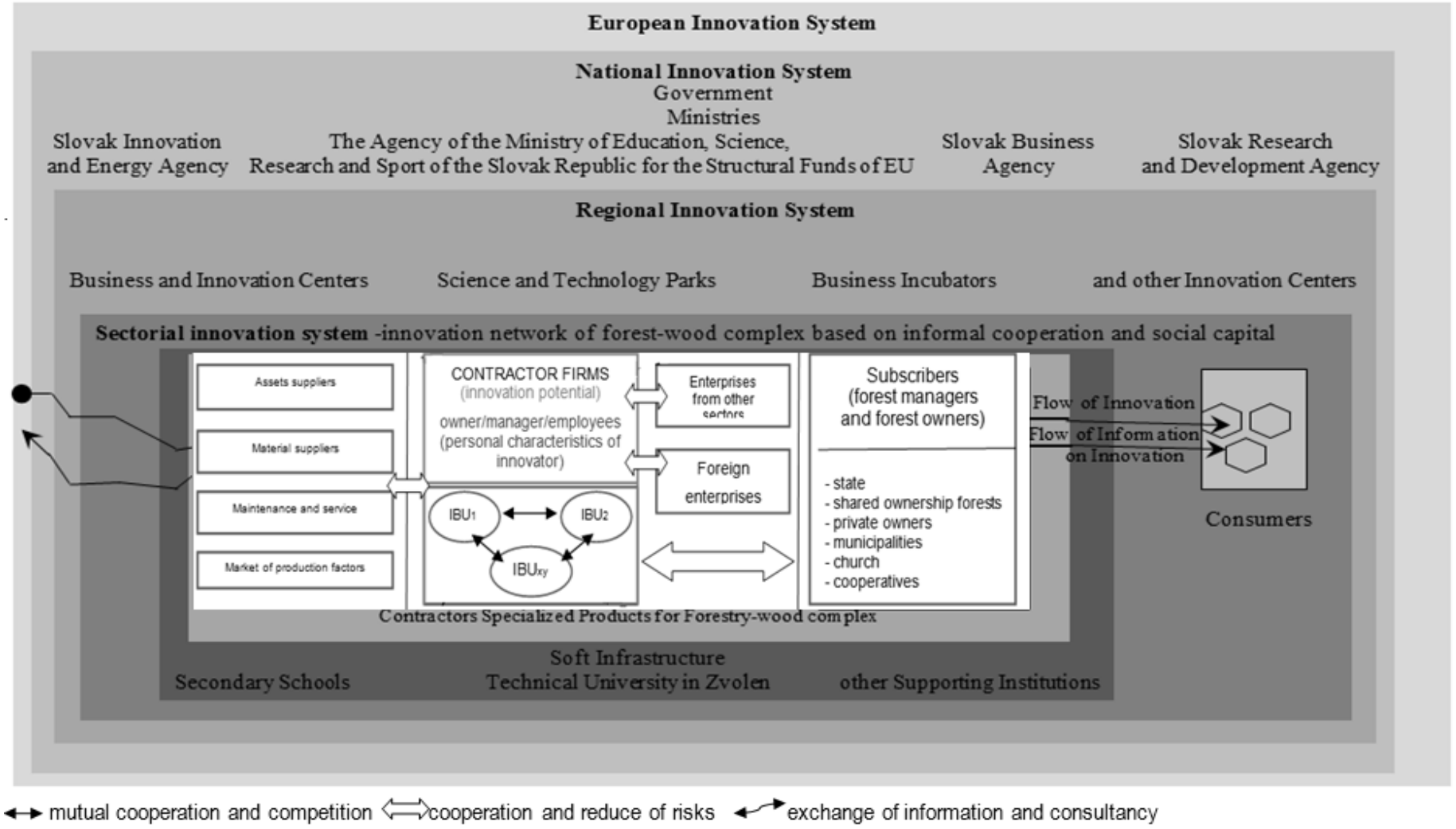

Figure 2.9. The Comprehensive innovation system of contractor firms based on the principle of informal cooperation within clusters

2.2. CONCLUSION

In the latest years, there has been a business community created and significantly expanding within the forestry sector. This community consists of firms providing services in forestry. The first part of this paper deals with the actual situation of contractor firms in the forestry service sector in Slovakia. Based on the economic activity of these entities they are devided into different subclasses according to the SK NACE statistical classification. As for regional distribution most of the enteprises can be found in the region of Banská Bystrica, Prešov and Košice. These regions are considered as the key regions for potential clusters in the sector and suitable for the mapping of relations between contractor firms in forestry service sector based on the knowledge of the general laws of development and operation in this field, as well as general laws of behavior of clusters and innovation system. In general conclusion, a comprehensive innovation system of contractor firms in forestry service sector in Slovakia was created. This system is based on the principle of informal cooperation in clusters and social capital at its individual levels. With regard to this, it can be concluded that public institutions at local, regional, national and transnational levels, as well as research and education, can be considered as the most important elements of the innovation system in the forestry service sector.

Services in forestry sector are mostly provided by micro-enterprises with the most prefered legal form that is a "Sole Proprietorship". In the category of capital partnership, the most preferred legal form is a Limited Liability Company. As paluš et al. (2011) states, it is typical for the market of forestry service sector that external companiesoutsource the main production activities (silviculture operations, logging), and not the secondary activities, which are normally outsourced in other sectors. Therefore, innovatiion activities are significantly affected by specifics of forestry production, such as seasonal silvicultural operations, random accidental felling, etc. Innovations also affect the amount of specific investments and the conditions of their implementation. They are gradually becoming the main driver of success in many business sectors and activities. They represent a long-term source of profit, business success, competitive advantage, work on the future of the company, part of its strategic management, key process in companies (Košturiak, Chaľ. 2008).

Based on the results of this study, the biggest amount of investment into innovations was implemented in the enterprises within the subclass 02401 Services related to forestry of SK NACE

clasification. On the other hand, none or little investment activies were reported in subclass 02100 Forestry and other activities in forestry. The most innovative companies were located in the region of Banská Bystrica, Prešov and Žilina. This strengthens the strategic position of these regions in relation of the cluster formation within the forestry service sector. The "innovation paradoxes" were indetified within the region of Košice and Bratislava.

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3. USE OF WOOD IN THE PERSPECTIVE OF UPCOMING ARCHITECTS

Vladislav Kaputa, Martina Kalamárová

3.1. INTRODUCTION

Wood is one of the oldest materials used by man to build. Due to its composition it has exceptional physical and mechanical properties and its effect on the human body is beneficial. Currently, there is no alternative material similar to wood properties. Wood is specific in that it has in either way different properties, it is orthotropic – anisotropic material. Despite many advantages, wood has also material defects, which are mainly due to external influences and they reduce the physical and mechanical properties. In addition, for the existing moisture wood can change shape but also volume. Therefore wood protection requires more maintenance.

Nowadays, wood begins to be perceived as a strategic resource and the share of use of wood in architecture is constantly increasing. Therefore, research and development centres in Europe and all over the world deal with essential and nano-characteristics of wood. It coves issues of flammability and fire protection, sound insulation, stability, structural systems and environmental requirements, but also issues of designing wooden buildings which meet market requirements and expectations. Here, architects play an important role.

Number of studies had been conducted regarding the role of architects in promoting wood products or aimed at the attitudes of architects (at practice) towards wood as a material for buildings. Kaputa and Paluš (2014) surveyed active architects in Slovakia and stated that wood products appointed for building purposes have recently probably the best opportunity to attract architects (besides the small architecture applications) in the field of residential buildings in Slovakia. In spite of that fact there is still undiscovered potential of wood to become much more favourite material of Slovak architects also in other categories of buildings – except of small architecture where wood is most frequently applied as garden arbours, pergolas, marquises, sheds and porches etc.

This study focuses on the perspective of upcoming generation of Slovak and Czech architects (students of architecture) to the use of wood as a constructing/building material in different types of buildings as well as for interior use.

3.2. WOOD AS A STRUCTURAL MATERIAL

The most commonly quoted sustainability criteria for selection of building materials is that the material should score well in most or all of the following areas: renewable, low energy, low CO_2 emissions, sourced locally, reusable and recyclable, minimum waste, non-polluting. The use of wood in wooden buildings fits well with most of the above criteria. Wood is characterized by exceptional physical and mechanical properties and its effect on the human body is beneficial. Currently, there is no alternative material similar to wood properties. Wood offers a number of environmental benefits over other building materials. Wood is a renewable resource, containing a large quantity of solar energy, hence requiring low amounts of fossil fuel for manufacturing and providing an independent source of energy when waste wood is burned. Wood is often sourced locally and the responsible use of wood encourages sustainable forest management. It can be recycled, but not in the extensive manner of meltable materials like metals and glass. Modern timber construction produces little waste, but that produced can be burned for energy. The production of wood is generally non-polluting at all stages (Buchanan, 2007).

The environmental benefits of using wood-based building materials became clear through research conducted by the Consortium for Research on Renewable Industrial Materials (CORRIM). The results of life-cycle analysis for wood-framed house versus steel-framed and concrete-framed house (Table 3.1) certainly show the advantages that wood building materials have within the context of environmental performance (Guiles, 2014).

Table 3.1 The results of life-cycle analysis

	Steel-framed house	Concrete-framed house
Energy use	uses 17 %more energy	uses 16 % more energy
Global warming potential	has 26 % more global warming potential	has 31 % more global warming potential
Air emissions	has 14 % more air emissions	has 23 % more air emissions
Water emissions	has over 300 % more water emissions	has roughly the same level of water emissions
Solid waste production	has roughly the same level of solid waste production	produces 51 % more solid waste
Source: own processing based on Guiles (2014)		

Many studies confirm wood offers a number of environmental benefits over other building materials (Oregon Forest Resources Institute, 2009).

In addition wood excel in properties as an insulator. As a thermal insulator it has the ability to maintain a pleasant climate in summer and winter warm. Low thermal conductivity is another positive physical, useful property. Information about thermal conductivity and the variables affecting this property is one of special interest from the standpoint of building insulation and wood use in connection with refrigeration (MacClean, 1941).

Wooden components are characterized by the ability to tensile, compressive and bending stress. They have a good strength by relatively low weight, so this ratio of properties makes wood one of the best materials. They are resistant to corrosion and are able to bear heavier loads and dampen vibration (Sedliaková et al., 2008). Wood is a highly versatile raw material in the construction industry. It is easily machinable with cutting tools. It is used in load-bearing structures and filling wooden buildings, but also in building and joinery such as wooden windows and doors, stairs, walls and also in the manufacture of furniture. A number of organizations already promote wood and proclaim its benefits as a construction material (e.g. US Green Building Council, The Canadian Wood Council, New Zealand Green Building Council, Wood Products Council or Slovak Association of Wood Processors).

Except the positive properties is necessary to mention also weak points of wood as a building material, for which the authors (as Sedliaková et al., 2008 or Chmúrny, 2009) also point and which requires appreciable maintenance. As disadvantage of wooden materials industry can be mentioned lower fire resistance than silicate materials, lower resistance to rot, fungus and mildew and against natural disasters, such as storms or hurricane.

3.3. WOODEN CONSTRUCTION SYSTEMS AND USE OF WOOD IN CONSTRUCTIONS

Wooden structure, thanks to good formability and workability of wood is well shaping material and has its application practically in all historical periods of mankind, until nowadays. Wood is used by all architectural styles and types of buildings. Wooden buildings are basically everywhere where wood was available as a building material (Štefko, Reinprecht, Kuklík, 2009).
Systems of wooden constructions can be divided into:

- Log
- Panel (prefabricated)
- Timber-frame
- Post and beam
- Half-timbered (Štefko, 2014)
- and modern Cross Laminated Timber (CLT)

Log wooden houses (together with post and beam) are the oldest construction types of wooden buildings. They are suitable for the construction in the natural environment. The distinguishing feature of this building is the corner joint walls and high labour intensity of construction and the inappropriateness of use for the multi-storey building.

However, for the construction of multi-storey buildings were widespread half timbered constructions as a notable type of timber framing, particularly in Germany and Western Europe. The classic type of timber frame construction uses a system of fitting wooden pegs into wooden holes. In this system, all parts of the wood frame, including the roof trusses, the posts and the beams interlock together. Timber-frame structure formed from slender profiles, are the most widespread in the United States and Canada, known as "two by four" system. Using a slim profile allows to build multi-storey buildings with high variability of a ground plan solution. The negative aspect of this construction is higher degree of laboriousness at the building site. If the construction is carried out directly on the building site, minimal demand on assembling means as well as lightweight building materials are the advantages of this construction type.

Post and beam construction buildings are used in large spans buildings especially for industrial purposes. This modern type of timber frame involves using metal fasteners to connect timbers together. The posts are vertical pieces of wood that support the roof. The beams are horizontal pieces of wood that connect the posts together and form the base of the roof truss.

Panel structures are characterized by rapid construction with the possibility to build a multi-storey buildings and residential buildings. The disadvantage is the lack of flexibility in implementing changes on site, significant traffic demands and the unsuitability for humid environment. There was a boom in construction systems based on wall panels in the second half of the 20th century in Slovakia using prefabricated houses called Okal or Unimobunka. Most of

negative attitudes towards wood buildings comes from this early stage are of panel constructions use.

Modern cross laminated timber (CLT) is very versatile material and can be fully combined with other building materials. Because of excellent load distribution properties in two directions, CLT presents no limitations to architectural, residential or utility building projects. It is becoming increasingly used for building detached houses and especially for multi-storey apartment buildings. Thanks to its load-bearing capacity, CLT is becoming increasingly popular in industrial and commercial constructions, e.g. for the construction of bridges, carports, small structures and wood composite ceilings.

The situation in the use of wood in the developed countries differs substantially comparing the situation in Slovakia, despite the millennial tradition of wooden houses and cottages in Slovakian mountain areas. In German-speaking countries, the share of use of wood in architecture is constantly increasing, which represents more than 50%. However, in Scandinavia and in the USA it is up to 90 %. In Slovakia, the current share of wooden houses is about 10%, while steel comprises 20%, reinforced concrete and other materials up to 70% (Štefko, Reinprecht, Kuklík, 2009).

According to current data of Slovak Association of Wood Processors (ZSDSR) is the share of wooden houses in Slovakia about 10%, which represents a significant increase over the past decade (an increase of 8,5%). Section of wooden houses of ZSDSR seeks to promote the construction of houses of wood-based and also raise awareness about the benefits of using wood for house construction (The News Agency of the Slovak Republic TASR, 2012).

Regarding the question of the utilization rate of wood comparing to competitive materials, the most important factor affecting the intentions of the architects to used wood as a building material in the construction of urban buildings is building height. Wood is used most in single-storey buildings. However, as the building height increases, the wood is used less, and the other materials are getting preferred. The opportunity to increase the use of wood as a construction material for almost all types of buildings can be find in combination of the wood with other material (Kozak, Cohen, 1999). Needless to say, the process of building materials selection is affected by the architects as well as consumers themselves. In addition, consumers' plans to use wood are definitely affected by the knowledge of physical, mechanical and environmental properties of wood as a building construction material (Bysheim, Nyrud, 2008).

3.4. EXAMINING THE ATTITUDES TO THE USE OF WOOD IN CONSTRUCTIONS

Material necessary for processing this chapter is obtained in primary and secondary research. The secondary research is based on analysis of the available scientific literature, mainly those dealt with the wood as material (highlighting its strengths and weaknesses) and characteristics of wood-framed houses and types of wooden constructions. The current situation on the wooden buildings in Slovakia and abroad is analyzed by the means of external databases and journal articles.

There are several countries where architects play a significant role in the development of wood-based buildings market or in the use of wood as interior material. Thus, architects directly contribute to the promotion of wood not only in building industry and became an object of research regarding their different importance to the use of wood number in specific countries. The attitudes of architects towards wood were reviewed in several of papers (e.g. Kozak and Kohen, 1999; O'Connor and Kozak, 2004; Bayne and Taylor, 2006; Bysheim and Nyrud, 2009; Kozak, 2009; Robichaud et al., 2009). Kaputa and Paluš (2014) presented selected results of a pilot survey based on the questionnaires carried out on the sample of active Slovak architects. Using a structured questionnaire the architects were asked to express their attitudes towards wood. The paper introduced also a typology of buildings and examined what is the role of wood as a construction material in projecting of architects as well as to their preferences towards different construction materials in projecting residential buildings.

In this study authors present results of upcoming architects' attitudes analysis. The survey focused on identifying the attitudes of the next generation of architects (students of architecture) to use wood as a building material. Used method of the primary research was a questionnaire. Those questioned were university students of architecture in Slovak and Czech Republic – Faculty of Architecture, Slovak University of Technology in Bratislava and Faculty of Architecture, Brno University of Technology. The sample consists of 96 respondents – 35 students in the age of 21-27 years (Bratislava University) and 61 students in the age of 21-28 years (Brno University) answered these questionnaires in the year 2013. Surveyed were students of all the levels of academic study – Bachelor, Master, and PhD. studies. The structured questionnaire included

questions on demographic data and questions where respondents were asked to express their preferences on the following topics:

- Typology of buildings, where respondents marked how often they would project wood as a construction material for every type.
- Preferences for different types of construction materials in projecting of residential buildings. Alternative materials (straw, clay, wood pulp, cork, and wool) were also surveyed among other/classic materials (as brick, concrete, wood).
- Preferences for different types of materials in designing an interior.
- Qualitative evaluation of different attributes of wood as a construction material.
- Preferences for using certified wood (from sustainable managed forests) in wood-based constructions.

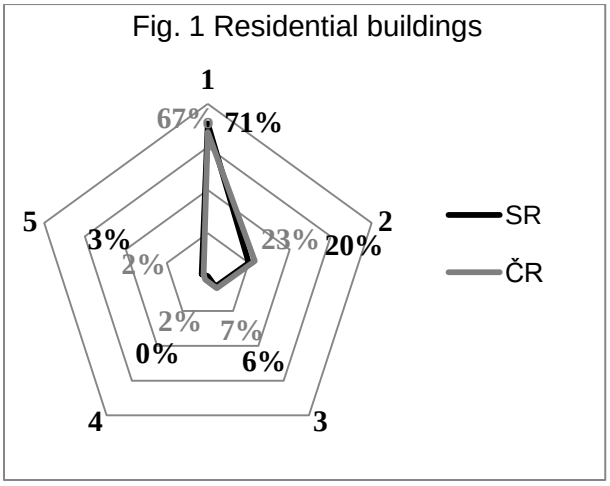
To express the preferences scaling method (Likert 5-point scale) was used. Figures used in text interpreted share of answers in percentage terms where "1" means marginal positive expression and "5" means marginal negative expression. The results regarding the attitudes of respondents towards over mentioned issues are illustrated by radar figures.

3.4.1. The use of wood as construction material in different types of buildings

The first part of survey deals with the suitability of wood as construction material for use in different types of buildings (residential, civil, technical and industrial buildings). According to the studies of Kozak and Cohen (1999), Goetzl and McKeever (1999) or Bysheim and Nyrud (2009) surveyed architects consider wood as a building construction material with many advantages, suitable mainly for the construction of residential buildings, respectively houses and construction of small architecture. The architects expressed opinion that use of wood in civil, technical and industrial buildings, is less suitable or almost excluded. General view is that wood is not suitable for use in industrial buildings, storages and larger multi-story buildings.

Regarding these findings become interesting how the upcoming generation of architects perceives wood as construction material. As Figure 3.1 shows wood as a building construction material for residential buildings is strongly preferred among responded students of architecture. Very similar views are shared by students from the Slovak Republic (SR) and the Czech Republic (CR) – 71% (SR) and 67% (CR) are definitely for wood utilization in the construction of residential

buildings. Moreover, another 20% (SR) and 23% (CR) have positive attitude too. More than half of respondents in both analyzed countries consider wood as a suitable building construction material also in civil buildings (Figure 3.2). Despite this, there appears also a vague view of the wood utilization for that purpose – 23% (SR) and 31% (CR) and furthermore 26% (SR) and 17% (CR) of respondents would not use wood as a building construction material for civil buildings.



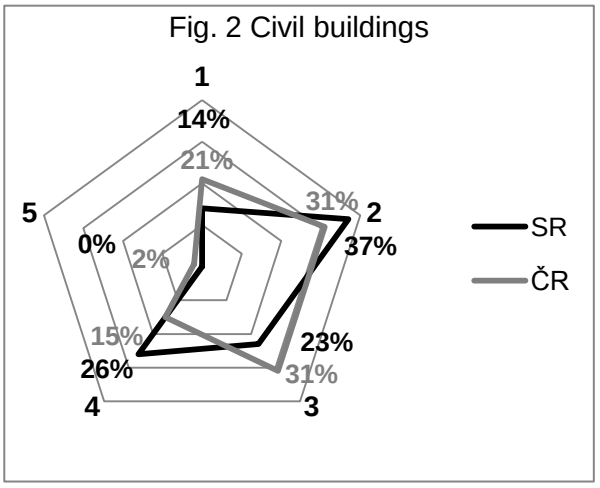
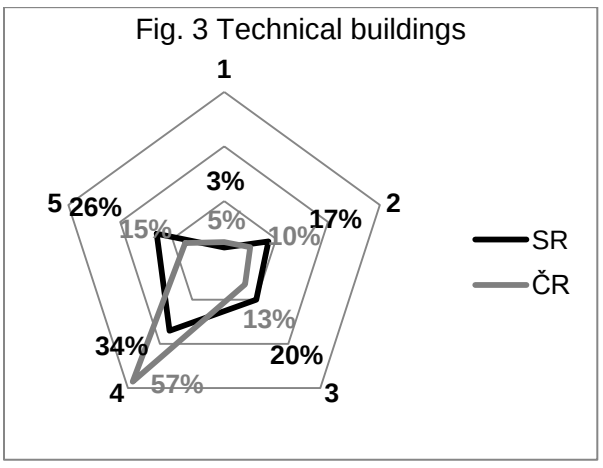


Figure 3.1. Preferences for wood as a construction material in residential buildings
Figure 3.2. Preferences for wood as a construction material in civil buildings

The majority of the respondents have negative attitudes towards the use of wood as construction material for technical (Figure 3.3) and industrial buildings (Figure 3.4), what is consistent with the results of foreign authors' studies mentioned before.



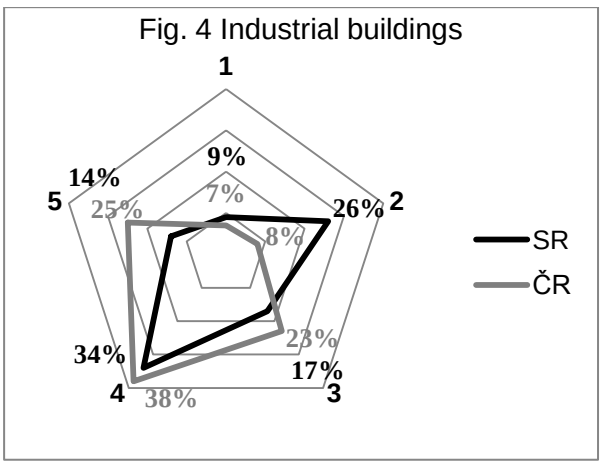


Figure 3.3 Preferences for wood as a construction material in technical buildings
Figure 3.4 Preferences for wood as a construction material in industrial buildings

In case of using wood as a building material in the construction of technical buildings, respondents inclined to a more negative attitude up to 60% (SR) and 72% (CR). 20% (SR) and 13% (CR) of respondents have not expressed their views clearly, and the remaining 20% (SR) and 15% (CR), thus corresponding smaller part, is for the use of wood at technical buildings. The majority of respondents, as well as in Slovakia and in the Czech Republic, presented the opinion that the wood in the industrial buildings construction is not appropriate. 48% (SR) and 63% (CR) is against the use of wood in the construction of industrial buildings.

3.4.2. Aspects important in projecting the buildings

There are several aspects of different importance by projecting the buildings. The most common are functional and operational aspects (in relation to housing ergonomics), environmental aspects (in relation to the environment) and economic aspects (economical housing).

Wagner and Hansen (2004) in their work indicated that architects do not perceive environmental aspects of wood as important, though American architect contrary to the Chilean architects recognize the environmental advantages of wood as positive. Many studies (e.g. Oregon Forest Resources Institute, 2009) confirmed that wood offers a number of environmental benefits (regarding energy use, emissions, waste production) over other building materials.

Bayne and Taylor (2006) introduced the view that the important factors when choosing wood as a building material are costs of construction, delivery time and business risk. Wagner and Hansen (2004) argue and do not consider the costs of construction for such an important factor.

In our study, respondents of both countries consider all three considered aspects – functional and operational (Figure 3.5), environmental (Figure 3.6) and economic aspects (Figure 3.7) – as generally important.

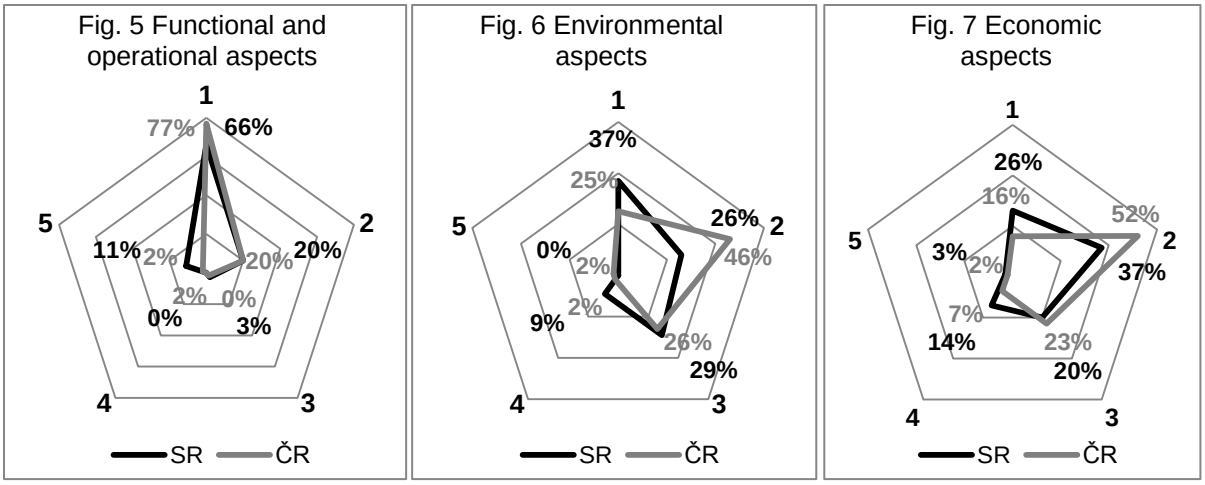


Figure 3.5. The importance of functional and operational aspects in projecting

Figure 3.6. The importance of environmental aspects in projecting

Figure 3.7. The importance of economic aspects in projecting

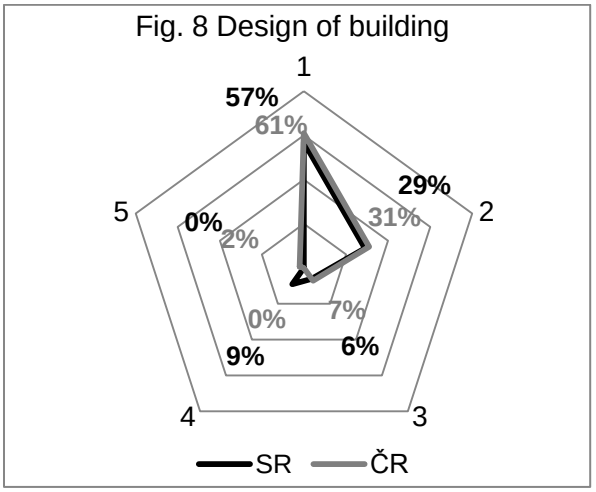
Students of architecture attached a great value to functional and operational aspects in relation to housing ergonomics (convenient and comfortable housing) – students in the Czech Republic 97% and students in the Slovak republic 86%. An important is also economic aspect (efficiency of housing) since respondents expressed a higher weight to this aspect - namely 63% (SR) and 68% (CR). Approximately two-thirds of respondents in both countries evaluated positively the environmental aspects of the wood-based construction, but there is also a significant proportion of those who had a neutral attitude, what is probably due to the lower awareness about the environmental properties of wood as a material.

3.4.3. Preferences for building material and material for interior use

The following part deals with the issue of the preference of different building materials (as wood, brick, aerated concrete/concrete or alternative materials) in the design of residential buildings, respectively houses. According to the survey carried out by Rametsteiner, Oberwimmer and Gschwandtl (2007) these materials are considered by European consumers as suitable for construction based on their properties. Choice of building materials depends on the preferences of consumers in assessing the properties of materials. Wood is most often associated with nature, comfort and friendliness to the environment. It is considered to be lightweight material, which ensures a pleasant room climate. Concrete is considered a safe and strong material that is

suitable for building. Metal as a building construction material is generally regarded as a high-tech and modern material.

In our study, respondents showed strong preferences for wood (Figure 3.8), whereas 86% of Slovak and 92% of Czech respondents expressed the positive attitude. Similar preferences have a brick (86% of Slovak and 81% of Czech respondents). In comparison with these two materials, aerated concrete/concrete (60% in Slovakia, 50% in the Czech Republic) and alternative materials are less preferred (51% in both countries). The least preferred material among respondents is a metal (46% in Slovakia, 36% in the Czech Republic). The results showed the wood and brick as the most favourite materials among the upcoming generation of architects.



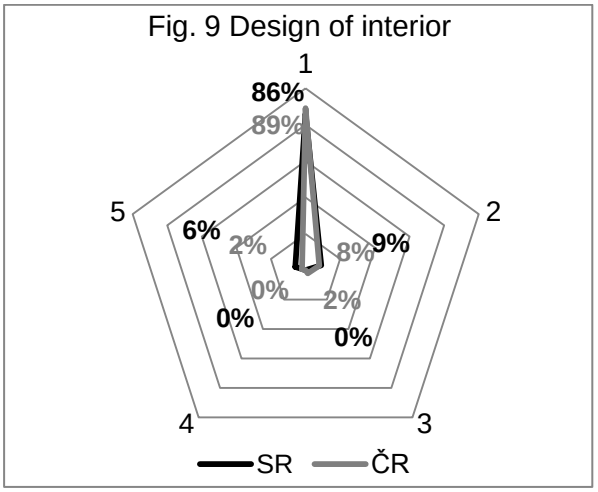


Figure 3.8 Preferences for wood and wood products in projecting of residential buildings

Figure 3.9 Preferences for wood in designing of interior

Focusing on interior designing and furnishing most preferred material among the respondents is wood (Figure 3.9) and glass (both with 95% positive preferences), following textiles (80%) while wood has the highest share of marginal positive answers (definitely yes) among these materials. Approximately half of the respondents have a positive attitude towards the metal, and around one third of the respondents' sample has this attitude to plastic as a material for designing an interior.

3.4.4. Assessment of the selected wood properties

According to number of studies (Rametsteiner, Oberwimmer, Gschwandtl, 2007; Bayne and Taylor, 2006; Wagner and Hansen, 2004; Loučanová, 2005; Kozak and Cohen, 1999) respondents have a positive perception that the wood has a beneficial effect on human beings and health. Aesthetic aspects of wood were emphasized. The wood is seen as a material which is easily adaptable to the desired size with good properties. Wood is also seen as a soft material with a unique structure. Health and safety properties and recyclability of the wooden material are considered as positive characteristics with great importance attached.

For comparison, studies indicate that architects do not match the perception of the environmental aspects of wood. Some of them do not perceive this features of the wood as important, others recognize the environmental advantages of wood as positive.

As the most disadvantageous feature is perceived fire resistance of wood and as difficult it is considered the establishment of the protection measures. Wood, on the one hand, is combustible material and wooden structure in case of fire is burning, but in contrast to concrete and steel structures it maintains a static load rating for longer time (Štefko, 2014).

Figure 3.10 shows the share of positive assessment of several attributes of wood as a construction material expressed by surveyed students of architecture. It means that the positive answers (1 and 2 on Likert scale) were counted together. Neutral (3) and negative expression (4 and 5 on scale) are not presented on the figure.

The fact that the wood contributes to creating a pleasant atmosphere and well-being of the housing was positively assessed almost by the whole samples of respondents in both countries. This fact puts wood as a natural material bringing psychological well-being to the users to the forefront in comparison to its substitutes. Aesthetic properties such as design, colour, lustre, texture and appearance of wood were similarly rated very positive (more than 90% of all respondents). Furthermore, characteristics as environmental friendliness, uniqueness, and health and safety properties were in both samples rated positively (more than 80% of respondents). The following are characteristics of a technical nature which more than half up to two-thirds of the students' of architecture evaluated positively: thermal-insulation properties, the versatility of material and sound-insulation properties of the wood.

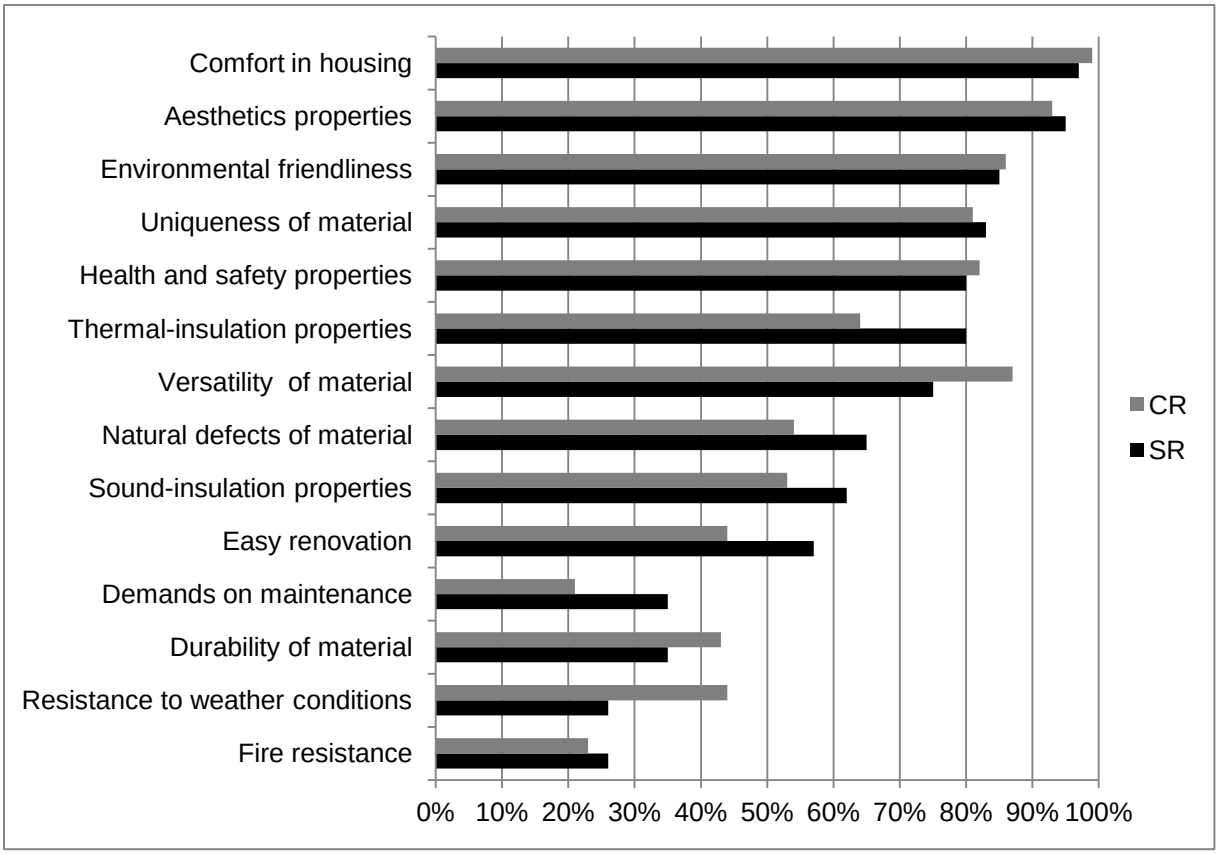


Figure 3.10. Share of the positive assessment of the different attributes of wood as a construction material

Attributes as easy renovation and demands on maintenance are more positively perceived by Slovak respondents, but respondents in both countries expressed mostly indifferent attitudes towards these attributes. Natural defects in material (defects, deformation or colour instability) were not considered as a major problem only 7% (SR) and 14 % (CR) assessed this feature negatively. Vice versa, more than half of respondents perceived it positively in both countries. Considering that fact, it could be assumed that natural defects contribute to popularity of wood as construction material until it matches safety requirements.

Mostly indifferent to negative attitude the respondents expressed about the properties as fire resistance, resistance to weather conditions, durability of material, and the demands on maintenance.

3.4.5. Preferences for the use of certified forests wood

One of the current issues is the concern of the society in the sustainable development and reducing of consumption. Environmentalists emphasize necessity of nature protection and safeguard recovery.

This study also deals with the preferences for the use of wood from forests managed in a sustainable manner (certified forests) for wood construction. As can be seen from the Figure 3.11, the majority of respondents used marginal answer "definitely yes", representing 40% (SR) and 36% (CR). Further, 23% (SR) and 28% (CR) of respondents expressed their positive attitude towards the use of wood from certified forests. Some 14% (SR) and 18% (CR) had an indifferent attitude and the remaining 23% (SR) and 18% (CR) respondents do not know to make any statement to that issue.

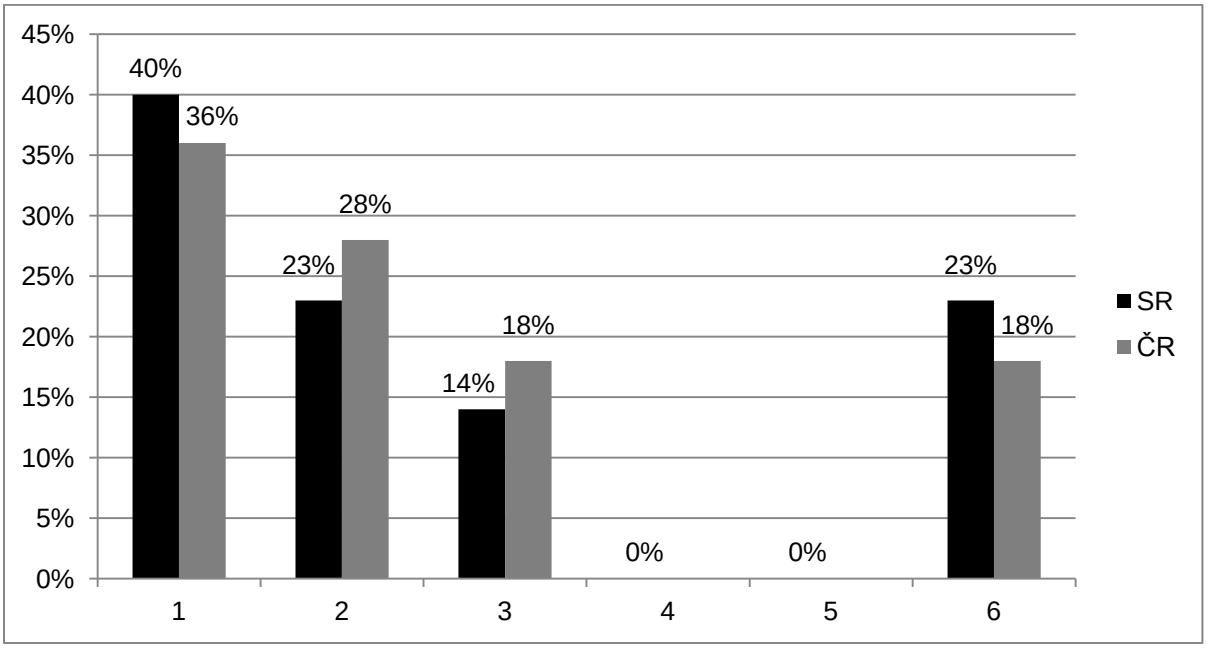


Figure 3.11. Preferences for the use of wood from certified forests
(Options on x-axis from 1-“definitely yes” up to 5-“definitely no” is Likert scale,
option 6 means “do not know to answer”)

An interesting finding is that about 20% of the sample in both countries was unable to answer this question which is a sign of lower awareness on forest certification and certified wood which comes from these forests.

3.5. CONCLUSION

Based on the carried out research, the attitudes of the upcoming generation of architects to the use of wood as a building material in the Slovak Republic and the Czech Republic are rather positive. This refers to the construction of residential buildings and small architecture or interior decorating. Another material – brick – was assessed by upcoming architects as positive as wood. With the respect to tradition and changing preferences of final consumers in Slovakia and Czech Republic, wood can be expected to have a much stronger position in building construction. It required also better approach to information and more detailed knowledge about wood as material during education of students of architecture. Based on the positive attitudes of upcoming generation of architects towards on the characteristics of wood, expected changes in the civil law, fire protection legislative and constantly strengthening promotion of wood as a building material, we can assume positive future developments in the market of wood-based buildings.

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4. WOODY BIOMASS AS BUSINESS OPPORTUNITY IN CROATIAN FORESTRY

Stjepan **Posavec, Marija Ravenšćak**

4.1. INTRODUCTION AND PROBLEM MATTER

In an unstable and unpredictable business environment it is difficult to make appropriate business decisions regarding capital investment, especially when we want to be sure the new investment will bring the company economic benefit and added value. Some big-sized state companies and small-sized private companies ventured into projects without having had assessed capital investment. In big commercial companies, owned by the Republic of Croatia, strict hierarchical structure and classical business methods still exist. Due to such complex and isolated system, as well as conservative business methods, it is necessary to develop capital budgeting process, generate investment projects, and with the help of scientific methods for financial decision making, contribute to eliminating conflicts of interest, by decreasing biased decisions on capital investing for the purpose of creating added value for companies.

Europe's growing dependence on the import of fossil oil and gas energy products, does not only jeopardize the safety of their supply, it also causes foreign currency outflow and weakens purchasing power in Europe. On the other hand, investments in energy efficiency of renewable energy sources (RES), increase competitiveness of the European economy, making huge contributions to regional development and local employment. The Croatian Government did recognize the importance of using renewables, including biomass energy by creating an encouraging legislative environment. The Croatian Government has been promoting energy biomass related projects since 2004 with additional means provided by the Environmental Protection and Energy Efficiency Fund as well as the pre-accession programmes SAPARD (2007) and IPARD (2008-2013).

According to the present Forest Management Plan (2006-2015), the Croatian wood supply totals 398 million m^3, of which 302 million m^3 is state owned and managed by Croatian Forests Ltd.. A little over 78 million m3 is owned by private forest owners and 17 million m^3 concerns state

forests used by other economic operators. Annual accrual is around 2.6% or around 10.5 million m^3, of which 8 million m^3 concerns state-owned forests, managed by Croatian Forests Ltd. Furthermore, 2.1 million m^3 is owned by forest owners. The annual cut ranges between 5.5 and 6 million m^3.

The Republic of Croatia has considerable biomass potential, but it does not exploit it for energy purposes. Due to the lacking market, use of other energy generating products we import (gas, oil – fuel oil, electricity) and absence of eco-awareness about the renewables' benefits, the use of biomass in Croatia totals only 4.3%. Besides production potential of 2.6 million m^3 of woody biomass a year, there is a possibility of increasing the production of woody biomass in state-owned forests, managed by Croatian Forests Ltd, by creating a culture of short rotations of fast-growing forest trees on a surface of 180 000 ha, in biotopes unsuitable for growing valuable types of forest trees or for agricultural production. The Republic of Croatia would have multiple socio-economic benefits from exploitation of woody biomass for energy purposes, creating a possibility for the country's rural as well as economic development.

Based on Croatia's energy development strategy (2009), the Republic of Croatia set a goal of using 15 PJ of biomass energy by 2010, and 26 PJ by 2020. In 2020, a share of this biomass will be used by many biomass power plants with a capacity of 85 MW. For the reasons of increasing energy efficiency, plants for producing electric and thermal energy in a mutual process will have the upper hand.

A synergy of development policies of several ministries is necessary for Croatia to be able to achieve its goals related to the use of biomass. These kinds of synergy policies will help Croatia transform development preconditions into stimulating measures of state, industrial, agricultural and energy policies:

- development of the Croatian wood-processing industry will be stimulated;
- forest management will be developed, and exploitation of woody biomass will be enabled;
- forestation and cultivation of short rotation cultures on woody lands will be stimulated;
- biomass power plants with electric and thermal energy cogeneration will be promoted;
- use of biomass for producing thermal energy will be stimulated.

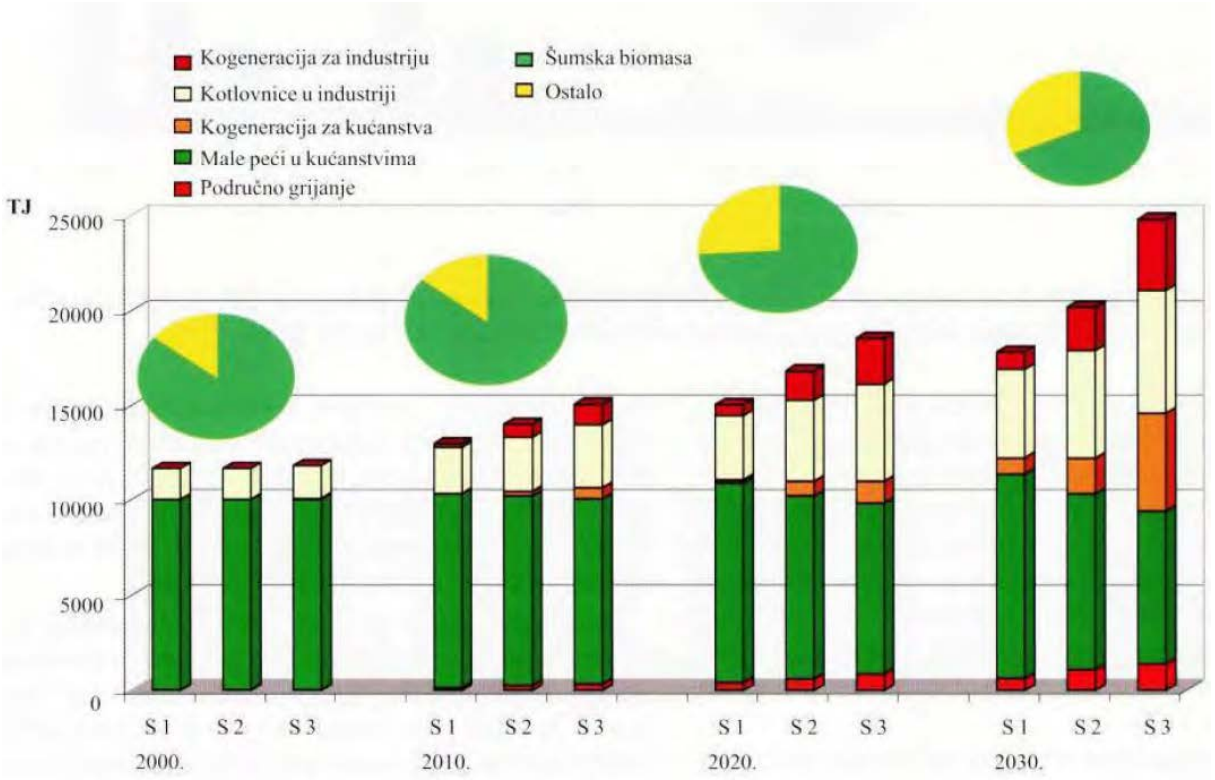

Figure 4.1: Heat production from biomass and share of forestry biomass in Croatia 2000-2030 (Domac, 1998)

The capital budgeting process will help perform the assessment of an investment project, using the example of producing thermal energy from renewable energy source – woody biomass. Upon assessing justifiability of investing in the production of biomass from fast-growing species, a model for practical use will be built. Fundamental and additional methods for financial decision making will help determine whether the project for investing in the production of biomass is profitable enough to cover financing expenses and whether the company will be worth more after a business decision is made. Development of new products and services in forestry will be analysed, such as biomass production from fast-growing species. Business analysis will help obtain the parameters pointing to an outlook of future movements, that is, the parameters based on which investment options can be selected.

4.2. MATERIAL AND METHOD

4.2.1. Object of research

Besides woody biomass, that is, wood mass obtained by cultivation, such as clearance or thinning, or what is left after cutting (branches and firewood) which can be used for obtaining energy, it is also possible to produce biomass from forest trees by intensive cultivation of fast-growing species like: willow, poplar, alder, birch, acacia and other. This method for producing biomass from forest species is known as Short Rotation Coppice or Short Rotation Intensive Culture. These fast growing trees are cultivated in abandoned areas on which agricultural production is not profitable or areas unsuitable for cultivating valuable forest species. Plantations of fast-growing trees are also called energy plantations. They are artificial plantations of forest trees with a dense planting layout. Broadleaved species are used on energy plantations more often than conifers, since broadleaved species are capable of penetrating from the trunk; they grow much faster when young and they are far more successfully in terms of photosynthesis.

Based on origin, woody biomass for energy purposes includes:

1. Forest debris (leaves, stumps etc.)
2. Various types of firewood for heating
3. Energy plantations, willows, poplars, birches or pines
4. Debris resulting from wood processing in the timber industry
5. Wood from fields, roads, parks, near canals and wood debris or urban biomass.

In average 35-40% of woody mass of a tree intended for further processing remains as debris. In the production of specific products, this percentage is higher. Therefore, in the production of parquets, this percentage climbs up to 65%. All this waste material represents huge energy potential which should be exploited. Energy cultures can preserve their vitality up to 30 years, after which it is required to renew the entire plantation. After cutting the stems to the ground level, the root stays inside the ground throughout the winter, providing a basis for the next generation or rotation. The already formed root takes in great quantities of nutritive matter, stimulating the growth of new and numerous sprouts. After the last cut, the root, which lost the ability to produce large numbers of sprouts, is taken out. The soil is then cultivated, after which cuttings are

replanted and new plantations are formed which will produce biomass during the next 30 years if ecological conditions do not change substantially. During their rotations, the cultures are machine or hand cut, depending on the surface of the plantations. The cutting machines are designed for this specific purpose and they are set according to the requirements of the clients as end-users.
The production in these cultures ranges from 10-12 t/ha of dry matter in rotations of 1-5 years. The main function of this type of culture is the production of biomass as renewable and eco-friendly energy product, but it can also serve as an alternative to agricultural cultures (in poorer biotopes). These cultures also have the function of diversifying the land, and they offer an ecologically advanced method for waste water purification or soil purification (phytoremediation). Furthermore, they serve for binding increased quantities of atmospheric carbon.

As renewable energy sources, the cultures of Short Rotation Coppice have the potential for expanding, which is a benefit for cultivators, consumers, local communities and the environment. With the goal of determining the potential of biomass production from fast-growing forest species in biotopes unsuitable for cultivating valuable forest species or for agricultural production, several test fields of fast-growing species have been planted in Croatia in various biotopes, mainly low-land Pannonian area (Dravica, Šumarija Darda in Baranja and Šumarija Čazma). The present research has determined that the clones of the tree-type willows have the greatest potential for producing biomass in short rotations of up to five years. For this reason, testing of tree-type willows continue with the goal of identifying clones with the greatest potential in biomass production, especially marginal biotopes or soils where agricultural production is abandoned or on soils inappropriate for cultivating valuable forest tree species. No nutrition measures or measures against pests were applied on these cultures, while the regulation of root vegetation was performed only in the earliest age. In these kinds of conditions the results showed relatively high biomass production of the researched clones. According to DARD testing, average production of dry biomass of the researched clones resulted in 9.3 tonnes per hectare during the third two-year rotation, at an age of 2/7 years. In Čazma's clone testing, research was conducted during the first and second two-year rotation at ages 2/3 and 2/5 years. In terms of their taxonomy, the tested clones belonged to various combinations of crossbreeds between the Chinese and white willow. Average biomass production ranged between 10.1 and 13.8 t/ha, while the perspective and most stable phenotype clones produced between 12.4 and 19.8 t/ha on average. The conclusion of the research was that for the purpose of higher clone productivity, their numbers after cutting the

sprouts, should be reduced to one or two per root, and the production on marginal biotopes could be substantially increased by applying more intensive cultivating and protective measures.

4.2.2. Method

Future investment which would increase the production of woody biomass on a surface of 100 ha during a period of 12 years is worth HRK4.8 million, and it covers the expenses of setting up and additional maintenance expenses. The expenses of setting up also include working hours of machines and cost of labour according to standard technologies determined by the Production Services of Croatian Forests Ltd.. The cost estimate does not include the value of the forests' generally useful functions. Since the selection of the discount rate is to a great extent subject to subjective opinion of the analyst, that is, the person who makes investment related decisions, it is necessary to be extra careful when selecting the discount rate, and as much as possible use objective information based on which the discount rate could be predicted. In the previous chapter of this work, the profitability index analysis conducted by Croatian Forests Ltd. showed that the return on capital during the entire analysed period is higher than the return on total assets. This confirms that the company could use a financial boost, that is, it pays off for the company to take out a loan. Therefore, in the assessment of this project, the value of the discount rate is determined as the interest rate on the loan. The Croatian Bank for Reconstruction and Development is implementing the Loan Programme for Environmental Protection, Energy Efficiency and Renewable Energy Sources, offering loans with a 6% interest rate for energy efficiency projects.

When assessing the efficiency of an investment project based on the analysed data, it is necessary to calculate a certain number of indicators based on which decisions about investing in the wood biomass production project will be made. In this part of the work, this will be achieved by applying various methods for assessing the project's efficiency. The reliability of the efficiency rate directly depends on the reliability of information and documentation, which serves as a base for a more realistic assessment of the project's cash flow.

The assessment of the project's cash flow is one of the most important parts of the capital budgeting process, but it is also the hardest. Cash flows should be evaluated by a team of unbiased experts from all parts of the company to avoid cash flows from being directed to those

justifying the investment. Each investment means a change in the company's business environment, since the company's cash flows changes after an investment117.

The logic of analysing each economic activity requires measuring its net effects, which is why the stress is on evaluating the effects during the investment process. The first step in evaluating the project of biomass production from fast-growing species (willows) is to predict future cash flows on the basis of the analysed data. The cash flow of the project for investing in increasing biomass production 2011-2021 will be shown in two versions.

4.3. RESULTS

A forestry company can increase the production of woody biomass by setting up plantations of fast-growing species. Short rotation cultures are often energy plantations of mainly willows and poplars used for obtaining thermal and/or electric energy. In order to increase the production of woody biomass by cultivating short rotation cultures, a surface of 180,000 ha of land free from growth, managed by company Croatian Forests Ltd. Zagreb is required. Furthermore, there is also the possibility to establish short rotation cultures on temporarily unsuitable soil (611.324 ha) and permanently unsuitable soil (806.648 ha), which could be used for cultivating short rotation cultures of forest species for a maximum period of 15 years.

According to the price list of works provided by Croatian Forests Ltd. Zagreb for 2009, the price of one hectare of short rotation willows is approximately HRK30.000. The price includes land preparation works (ploughing and harrowing) and the price of seedlings (cutting, 9000 piece per ha). The past research shows they are the most appropriate considering the production and cultivation on more difficult hydromorphic soils, and two cultivations during the first year of setting up the culture. The estimate of additional costs totals HRK18.000 per hectare, including 20 fees for hoeing and two inter-row rotations with the machinery. Therefore, total setting up and maintenance costs of one hectare of a short-rotation culture are estimated at HRK48.000. It is also important to note the cost estimate does not include subsidies provided by the Ministry, which total €110-€220 per hectare a year in EU countries, where it is also possible to obtain tax reliefs on land for a period of 15 years (oral statement, ASO Project). The cost of setting up short rotation cultures could be much lower, and they total around €2 thousand per hectare in the private sector. On average, with six rotations (six cuttings per two-years) and with average production of 15

tonnes of dry matter a year, total production per 1 hectare would be 180 tonnes of dry woody matter during 12 years. The price of the produced biomass would stand at HRK267 per tonne, which responds to the biomass market price of €35 per tonne (Pašičko, R. et. Al. 2009).

4.3.1. Project cash flow analysis

Cost-effectiveness of investing in biomass production from fast-growing species (willow) on a surface of 100 ha was analysed. In the first, version A, the estimated investment costs for establishing short rotation cultures total HRK4.8 million (HRK48 000 per hectare). In the second, version B, the estimated investment costs are HRK1.52 million (HRK15 200 per hectare). Both analyses took into consideration the average feasible production which totals 15 tonnes of dry woody matter per year per hectare. Total estimated production for the duration period of the project is 18 000 tonnes of dry woody matter, with total yield of HRK4.806.000 million.

The calculated cost-effectiveness in version A shows that the net present value of the project is negative, meaning the investment is not justifiable in this case. In this version, sales income barely exceeds investment expenses, and totals only HRK500 a year throughout the entire duration of the project. Net profit, after 20% tax reduction, totals only HRK400 a year. When investment is deducted, it is clear the project earns total negative cash flow of -HRK 4.795.200, and with a discount rate of 6%, the net present value of the project totals -4.884.063, meaning the project does not generate income sufficient enough to cover total business expenditure.

Table 4.1. Cash flow of the project with a 6% discount rate – version A

Period	0	1	2	3	4	5	6	7	8	9	10	11	
Year	2011	2012	2013	2014	2014	2015	2016	2017	2018	2019	2020	2021	
Production (average/year) t	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	
Price HRK/t	267	267	267	267	267	267	267	267	267	267	267	267	
INCOME	400.500	400.500	400.500	400.500	400.500	400.500	400.500	400.500	400.500	400.500	400.500	400.500	
Cultivation costs	250.000	250.000	250.000	250.000	250.000	250.000	250.000	250.000	250.000	250.000	250.000	250.000	
Additional costs	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	
TOTAL COSTS	400.000	400.000	400.000	400.000	400.000	400.000	400.000	400.000	400.000	400.000	400.000	400.000	
Profit before tax	500	500	500	500	500	500	500	500	500	500	500	500	
Tax 20%	100	100	100	100	100	100	100	100	100	100	100	100	
NETO DOBIT	400	400	400	400	400	400	400	400	400	400	400	400	
Capital investment	3.000.000	1.800.000											
Total project cash flow	-2.999.600	-1.799.600	400	400	400	400	400	400	400	400	400	400	-4.795.200
Discount rate	6%												
Discount factor	1	0,943	0,89	0,84	0,792	0,747	0,705	0,665	0,627	0,592	0,558	0,497	
Present cash flow value	-2.999.600	-1.697.229	356	336	317	299	282	266	251	237	223	199	-4.694.063
NET PRESENT VALUE	-4.694.063												

Table 4.2. Cash flow of the project with a 6% discount rate - version B

Period	0	1	2	3	4	5	6	7	8	9	10	11	
Year	2011	2012	2013	2014	2014	2015	2016	2017	2018	2019	2020	2021	
Production (average/year) t	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	
Price HRK/t	267	267	267	267	267	267	267	267	267	267	267	267	
INCOME	400500	400500	400500	400500	400500	400500	400500	400500	400500	400500	400500	400500	
Cultivation costs	85.000	85.000	85.000	85.000	85.000	85.000	85.000	85.000	85.000	85.000	85.000	85.000	
Additional costs	45500	45500	45500	45500	45500	45500	45500	45500	45500	45500	45500	45500	
TOTAL COSTS	130500	130500	130500	130500	130500	130500	130500	130500	130500	130500	130500	130500	
Profit before tax	270000	270000	270000	270000	270000	270000	270000	270000	270000	270000	270000	270000	
Tax 20%	54000	54000	54000	54000	54000	54000	54000	54000	54000	54000	54000	54000	
NETO DOBIT	216000	216000	216000	216000	216000	216000	216000	216000	216000	216000	216000	216000	
Capital investment	1020000	500500											
Total project cash flow	-804000	-284500	216000	216000	216000	216000	216000	216000	216000	216000	216000	216000	1.071.500
Discount rate	0,06												
Discount factor	1	0,943	0,89	0,84	0,792	0,747	0,705	0,665	0,627	0,592	0,558	0,527	
Present cash flow value	-804000	-268283,5	192240	181440	171072	161352	152280	143640	135432	127872	120528	113832	427.404
NET PRESENT VALUE	427.404												
INTERNAL RATE OF RETURN IRR	12%												
PROFITABILITY INDEX PI	0,28												
PERIOD OF RETURN	7 YEARS												
DISCOUNTED PERIOD OF RETURN	8 YEARS												

Version B predicts lower expenses of setting up and the net present value of the project is positive (HRK427.424). Internal profitability rate is 12%. Profitability index is 0.28%. The funds invested in the project return in the seventh year, and the discount period of the return is in the eighth year. The calculations for this version show positive net present value of the project, meaning the investment is financially justifiable.

4.3.2. Project net present value comparison (NPV)

The calculations of cost-effectiveness for version A showed that the net present value of the project is negative, meaning the investment is not justifiable in this case. The positive net present value of the project points to an increase of the company's present value (not in this case). In compliance with this criterion, this project is not acceptable since it would decrease the company's value. In this version, sales income barely exceeds investment costs, and totals only HRK500 a year throughout the entire duration of the project. Net profit, after 20% tax reduction, totals only HRK400 a year. When investment is deducted, it is clear the project earns total negative cash flow of -HRK 4.795.200, and with a discount rate of 6%, the net present value of the project totals -4.884.063, meaning the project does not generate income sufficient enough to cover total business expenditure.

In Version B, which predicts lower expenses of establishing, the net present value of the project is positive and totals HRK427.424). Internal profitability rate is 12%. Profitability index is 0.28%. The funds invested in the project return in the seventh year, and the discount period of the return is in the eighth year. The calculations for this version show positive net present value of the project, meaning the investment is financially justifiable.

4.3.3. Sensitivity analysis to price changes

Version B also includes sensitivity analysis to price changes to divert attention to changes in the project's efficiency caused by the given changes in certain key variables which form this efficiency. The key variables refer to the sales price and production volume. The purpose of the sensitivity analysis is to show what will happen with the project's efficiency when

measured with some of the criteria for making financial decisions and if the size of one of the key variables is changed in relation to the one anticipated. The following table shows calculated change in the net present value of the project's version B in relation to the price change of the woody biomass.

The sensitivity analysis of price change of wood biomass shows that the investment is sensitive to the selling price changes. When the price is reduced 10%, the net present value of the project comes down to 32.6%. With an extreme price reduction of 20%, the net present value of the project turns negative, pointing to the fact that in this case the project would not be financially efficient. When the price is increased 10%, the net present value of the project increases to 59.7%, and with an extreme price increase of 20%, the net present value of the project also increases. Production increase is limited by annual production average on a given surface. It is possible to increase production on the given surfaces by applying more intensive cultivation and protection measures, which would also increase the price of setting up. Sensitivity analysis to yield reduction on the given surfaces shows that if the yield is reduced 10%, the net present value of the project totals HRK142.695, that is, it comes down to 33.4%. If the yield decreases 20%, the net present value of the project turns negative, which means that in this case the project would not be financially justifiable. It thus becomes obvious that renewable natural resources management, especially regarding forests, is effected by many other factors that are difficult to control, pointing to a problematic long-term production and investing in forestry.

4.4. CONCLUSION AND DISCUSSION

When we regard forests as a source of well-being and capital, they could actually present a bond, deposit or goods bought with the hope it could earn more money than they were worth. Naturally, it must not be forgotten that forests are much more since they are the source of other benefits serving the common good.

From a financial point of view, many investors sell their forest land only to gain profit. However, when trees and forests are perceived as capital, there are two most important inputs in the forestry: capital and time.

The question is how to allocate them to the society's greatest satisfaction. For a successful allocation of resources, it is important to be familiar with the standard tools of financial analysis for decision making in forestry. It is also important to choose the method for managing and measuring investment profitability in forestry. Using capital budgeting methods could help us achieve the set economic goals of the management.

With a limited use of capital, a company wants to choose a combination of investment proposals that would secure the highest increase of the company's value, without exceeding the budget limit. This kind of limitation is common for companies with internal financial policy of capital expenditure. Rationalisation of capital occurs when capital expenditures in one department of a big company are allowed only to a determined budget limit, which the department loses control of when it is exceeded.

If the capital is rationalised only during the current period, the projects are selected according to a descending sequence of the profitability index, which results in a combination of projects which secures the highest increase in the company's value. When the rationalisation of capital is present during several periods or when human and production resources are limited together with the capital, it is not always possible to select, on the basis of profitability index, a group of projects that would provide maximum net present value.

A rate interest applied to forestry would mean that the land, work and capital would be invested in the production of timber only if the anticipated return rates are equal or the same as somewhere else. This would also mean that capital would not be invested that much in areas with poorer solvency, while the ones with better solvency would be nurtured more intensively. Furthermore, in the case of cultivating young trees, the forests would be cut when the value of the trees and the land would drop below alternative return rates, although this happens before the forest reaches its maximum volume growth.

If investing in the production of wood continues when the yield per each next invested HR Kuna drops below value, which could be created somewhere else, then this would be the time to terminate additional production and redirect the funds.

With this kind of approach, directed towards efficiency, the production of wood would not be maximised in commercial forest areas – and it should not be, if the goal is to maximise overall social benefits from a combination of all activities.

Based on the research conducted by Croatian Forests Ltd.., it is recommended to invest in projects for producing woody biomass as energy generating raw material.

Investing in production increase of woody biomass is justified by gaining potential economic profit, opening new vacancies and preserving old ones, increasing competitiveness of forestry, producing the cheapest heat energy source, CO2 bonding, the possibility of using degraded land, and other. Setting up plantations on large surfaces would require considerable capital which would have long-term financial effect on the company and its profitability. The risk of the demand for woody biomass is almost inexistent. The produced woody biomass has its own market– bio-energy plants – heating plants which use woody biomass as raw material for producing electric and thermal energy. Since the present problem of the local market and regional countries concerns permanent and continuous biomass supply of bio-energy plants – heating plants, it is assumed the demand for woody biomass will increase.

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5. INVESTMENTS INTO THE INNOVATIONS AND SUPPORT OF RESEARCH ACTIVITIES AT UNIVERSITIES – PART OF SUPPORT FOR FOREST BASED PRODUCTION

Renata Nováková, Andrea Tománková, Vladimír Ovsenák

5.1. INTRODUCTION

Integral part of the flourishing companies operating in the field of wood industry (forestry, as well as wood - furniture and pulp processing) is to support innovation. Innovation ensure progress and competitiveness, which is an essential part of the now saturated business area. However, every innovation and its implementation requires funding, which in many cases for several businesses manufacturing products in the wood processing industry, is unavailable. But it is not just a matter of money as such, but in many cases also lack of capacity, human sources, material or infrastructure, which would help faster adapt to innovative solutions. At EU level, serve to support small and medium business operational programs whose task is to ensure the supply of funds to those areas that are to the economy and industry of the member country key. The timber industry is an important part of the Slovak economy, but we would argue that it is also an integral part of the economies of many other countries in Europe. Therefore, investment in innovation in this area is very beneficial and can help to improve the overall economic situation in the euro area. For partial elimination of the risks of investing in innovation to create different associations and cluster initiatives, which consist of several regional as well as trans-regional institutions that have divided the functions and duties. For these reasons was founded wood clusters, whose main task is to support all activities leading to the development of the wood processing industry and creation of high-quality and competitive products. Important role in the cluster have the scientific and research institutions among which are classified as the University of the focus. Most of the clusters, in its initial stages of operation, just depends on the funds received from grant projects financed from EU structural funds.

Mechanism for obtaining funds from such sources to support investment in innovation primary production in the woodworking industry forms the main content part of this chapter.

5.1.1. The Structural Funds as an instrument of EU regional policy

The European Community includes a number of regions that have undergone different historical, cultural, social and economic development. Differences in development of European regions that within the European community existed and continue to exist, represented by the inception of the European Community obstacle to achieving the objectives of European integration. EU creates to solve individual problems it faces and which it considers necessary to address a variety of tools. To balance regional disparities within the EU was created the system of financial instruments, which is known as Structural Funds.

EU funds are for SR undoubtedly a great asset, especially at a time when lack of funds prevents not only the development, but in many cases, maintaining the functionality of certain sectors. Nowadays, which is marked by emerging market systems and new information technologies providing a number of options, puts particular emphasis on the competitiveness of firms, which constantly to struggle with the sole purpose - to attract and retain customers. This goal may bring only those companies that anticipate and satisfy the wishes, needs and requirements of its customers. From this perspective, we can also say that the market and its success is contingent suitably chosen system of marketing elements and investment funds in innovation. They then act as a whole. Unique source of competitive advantage thus becomes the area of communication in relation to target groups whose interests are forest products, as well as investment in key areas.

Before we begin to write about the various types of investment in the form of financial resources from the Structural Funds in the wood industry, we need to specify some basic concepts that can be characterized in general.

Structural Funds are intended for final beneficiaries and the help receivers (Individual reecipient).

The final recipient is an authority, organization, legal or natural person for whom the funds are for the purpose of the project for financing by the Structural Funds beyond the state aid schemes and schemes de minimis. State aid scheme can include any assistance granted

from the state budget and public sources entrepreneur, which distorts competition by favoring certain undertakings or the production of certain goods shall, in our case the basic products of wood industry and may affect trade between EU member states in this area. The notion of de minimis aid understand that the entrepreneur does not exceed the aggregate one hundred thousand euros over three consecutive calendar years. Business Journal of Slovak Republic publishes the scheme, as well as the de minimis and these are also published on the official website of Ministry of Finance of the Slovak Republic.

The beneficiary is the entity to whom the funds provided for the purpose of co-financing of projects under state aid schemes and schemes de minimis.

To obtain a general knowledge of project preparation, after its approval, but also for administrative, staffing and managing financial management of the project is to be understood that the project is a contractual relationship between the final beneficiaries (FB), or help receivers (HR) and the managing authority (MA), which is a regional or private authority responsible for managing the operational program, and the intermediate authoriry under the Managing Authority (AuMA), which means any public entity or a private service, acting under the direction of the management authority in relation to the beneficiaries implementing projects. Recipient enters into the management of structural funds and assume the obligations arising from the Treaty and European Community standards. For these reasons, the need for and purpose of the Structural Funds important knowledge of materials governing the management of the Structural Funds and the Cohesion Fund, which determine the process of implementation. Characterize their documents - National Strategic Reference Framework, Concept of the management of the Structural Funds and the Cohesion Fund for the programming period 2007 - 2013, European Structural Funding strategy and investment funds for the programming period 2014 – 2020. Knowledge of European Community law and the Slovak Republic is a condition of the project in accordance with national law and European Community law as well as the knowledge of the contract between the beneficiary and the provider and the importance of communication between them. Information and publicity is one of the areas of operation of the European Community, in accordance with the EC Regulation. 1159/2000 whose failure to comply may result in withdrawal of funds.

The aim of publicity is to raise the profile of the EU co-financing demand and national projects, the visibility of the role of governing authorities - the Ministry of Labour, Social Affairs

and Family, Ministry of Construction and Regional Development, the Ministry of Economy and the Ministry of Education, Science, Research and Sport of the Slovak Republic and to provide information the projects and their implementation.

The target groups of routing information publicity actions are beneficiaries, mandated regional authorities and institutions, employers, non-government organizations and the general public.

Slovak Republic was still a candidate country for EU membership, entitled to funding from pre-accession funds, which were ISPA, SAPARD and PHARE. Named funds have been set up by the EU to help prepare candidate countries for membership in the European Community and to familiarize them with their structural economy.

First programming period options eligible for the pre-accession funds for the Slovak Republic was a time horizon between 2004-2006. During this period, the Structural Funds finance four initiatives: EQUAL (support solutions to eliminate discrimination, inequalities in the labor market and social exclusion), INTERREG (promoting cross-border cooperation within the EU and cooperation between national and local institutions within the Community), URBAN (focused on urban renewal and promoting their sustainable development) and LEADER (networking and search for new development strategies in rural areas).

Programming period 2007 - 2013 for the Slovak Republic was the first program period in which the state was able to use resources from the EU funds throughout its duration, based on a document called National Strategic Reference Framework for the years 2007 – 2013. This strategic document has been prepared in accordance with the new European Union regulations on the Structural Funds and the Cohesion Fund and was subsequently approved by the Government on December 6 of 2006 and the European Commission on 17 August of 2007. To the second programming period entered Slovakia in the years 2007-2013 with a higher volume of several sources of Structural funds and the Cohesion Fund in comparison with drawing in the previous period.

In this programming period, the regional policy implemented through the following structural funds:

European Regional Development Fund (ERDF) - helping to reduce regional disparities within the European Union. It is funded through assistance to strengthen economic and social cohesion, and to redressing the main regional imbalances - promoting the

development and structural adjustment of regional economies, including the conversion of declining industrial regions and backward. It mainly focuses on supporting sustainable integrated regional and local development, employment, improving competitiveness and territorial cooperation. Also supports cross-border, transnational and international cooperation.

The European Social Fund (ESF) - is the oldest of the Structural Funds (established in the 1957 by Treaty of Rome forming the European Economic Community). Contribute to the priorities of the Community, enhances economic and social cohesion by improving employment. Promotes a high level of employment and to improve the quantity and quality of jobs, by supporting member states' policies, which are aimed at achieving full employment, quality and productivity. Promotes social inclusion, access of disadvantaged people to employment, and reduce national, regional and local employment disparities. Performance of the above tasks supported by the ESF priorities, aims to strengthen social cohesion, increasing productivity, competitiveness and promoting economic growth and sustainable development. ESF reflects primarily in the areas of policy development and the promotion of active labor market policies, promoting equal opportunities for all in accessing the labor market, with particular emphasis on those at risk of social exclusion, improving training, education as part of lifelong learning policy, support of a qualified and adaptable workforce, flexible work organization, developing entrepreneurship and promoting the knowledge, the development of human potential in research, science and technology. Promotes specific measures to improve women's access to the labor market and their participation in it, including the development of their careers and access to new job opportunities.

Cohesion Fund (CF) is one of the younger EU funds and arose in the 90s of the 20th century as a special solidarity fund for the least prosperous member states, which helped to join the Economic and Monetary Union. In the years 2007 - 2013 Slovakia is still type of least prosperous country with gross domestic product (GDP) per capita of less than 60%, authorized with all our regions to apply for funds from the CF. The difference between the Structural Funds is that the basic cell of it is the state. The Fund is designed primarily to support major infrastructure investments in the fields of environment and transport, including trans-european networks. This fund is part of the operational programs. Based on the investment and infrastructure needs, specific to each member state shall have the fund in the promotion of trans-european transport networks and the environment. The fund can be used even in areas

beneficial environment, such as energy efficiency and renewable energy in the transport sector outside the trans-european networks for transport by rail, river and sea transport, intermodal transport systems, management of road, sea and air transport, environmentally suitable urban transport and public transport.

Slovakia were drawn in line with the National Strategic Reference Framework of the Slovak Republic 2007 - 2013, approved by the Government in December 2006 in favor of transport infrastructure, funding of 2.30 billion € and resources for the environment in the amount of 1.57 billion €.

In the years 2007-2013, Cohesion Fund co-financed two largest operational programs (OP) of the National Strategic Reference Framework - Operational Programme Environment (1.8 billion €) and the Operational Programme Transport (3.21 billion €). Managing Authority (MA) for these programs are the Ministry of Transport, Posts and Telecommunications and the Ministry of Environment.

Just to illustrate this - in the programming period 2007 - 2013 Slovak Republic drew through 11 operational programs of more than 11 billion €.

Table 5.1. List of operational programs

	Operational programme	Managing Authority	Fund
1.	Regional operating system	MoCaRD SR	ERDF
2.	Environment	MoE SR	ERDF, KF
3.	Transport	MoTPaT SR	ERDF, KF
4.	Informatization of society	GO SR	ERDF
5.	Research and development	MoEd SR	ERDF
6.	Competitiveness and economic growth	MoEc SR	ERDF
7.	Education	MoEd SR	ESF
8.	Employment and social inclusion	MoLSAaF SR	ESF
9.	Healthcare	MoH SR	ERDF
10.	Technical help	MoCaRD SR	ERDF
11.	Bratislava Region	MoCaRD SR	ERDF

Source: National Strategic Reference Framework 2007 - 2013

The EU budget for the years 2014 - 2020 also represents an important investment tool that can greatly help in dealing with difficult economic situation in Slovakia.

In Slovakia, the budget is implemented through a strategy document of the European structural funding and investment funds for the programming period 2014 - 2020, approved by the Government Resolution in November 2013 and aims to establish a comprehensive funding strategy for determining the participation of different funding sources - the Structural Funds, the Cohesion Fund, European Fund for Marine and Fisheries, European Agricultural Fund for rural Development, the state budget, the budgets of self-governing regions and municipalities. At the time of consolidation of national budgets is one of the few tools that are available in Member States to stimulate economic growth and employment. Slovakia shall be paid € 7 billion in the period 2014-2020 to the budget, but our revenue in the same period in current prices exceed 20 billion €. Positive balance for Slovakia is the 13 billion €.

European framework programs for research and development of technologies represent one of the main instruments of the European Commission for financial support for research activities, focusing on three main objectives:

1) ensure European leadership in science,

2) leadership of the European industry in the field of innovation, such as investment in key technologies and aid to small and medium-sized enterprises,

3) solving of the societal challenges in health and demographic change, food security, sustainable agriculture, bio-economy, safe and efficient use of energy, transport, environmentally friendly and climate protection measures.

Plan of the European Commission is to facilitate the payment of expenses for research projects, reducing administration and bureaucracy in the process of research design, eliminating unnecessary controls and audits, and shortening the time between the receipt of the proposal and grant awarding. Other initiatives are aimed at linking with academia, research centers and businesses, international cooperation and funding for young scientists.

5.1.2. The scientific research activities at universities in Slovakia

EU puts emphasis on improving the conditions of the individual components of the system of science and technology, human resources in research and development, technical

infrastructure, increasing financial support for research and development as well as the introduction of indirect instruments to encourage increased investment in research and development in the various Member States. Integral part of the process of improving conditions is to know the current status of science and technology in every EU country.

The following lines describe the factors SW and OT support for science and technology in Slovakia, which is based on the conceptual and analytical documents, domestic and international research and development statistics. Takes account of consequences of the transformation of science and technology in Slovakia, as well as impacts induced by tendencies in the world, especially in the EU.

Strong points is the growing activity of the governmental authorities of the Slovak Republic to create the conditions for the entry of foreign investors in Slovakia; inflow of foreign investments into technology parks; height growth of state budget expenditures provided through public tender, which increases pressure on individual research and development organizations to greater account of the the needs of practice.

The weaknesses is the intensity of the total expenditure on science and technology in Slovakia, which has long been the lowest in the EU-27, resulting in declining share of expenditures from business resources for science and technology; minimum participation of foreign resources to support science and technology; reducing total expenditures provided for applied research, which leads to a decreasing participation of research on economic or social development of the country.

The opportunity is to focus spending state budget more striking in support of science and technology; create a basic framework rules, which the state will stimulate an increase in the participation of business resources to support science and technology in line with the Lisbon objectives; successful withdrawals from the the Operational Programme "Research and Development" and the Operational Programme "Education" create conditions for further development of science and technology in different regions.

The Dweller is a threat to the trend of low participation of the national budget to support science and technology; increasing entrepreneurial resources in promoting science and technology by creating tax incentives for entrepreneurs; inability to draw on the resources of the Structural Funds Operational Programme "Research and Development" and the Operational Programme "Education".

Education is considered as the most important factor of prosperity and better future, that has value and irreplaceable foundation. The current society is based on education, where the main accelerators of its development are science and research. Support and development of science and research at universities are considered an essential prerequisite to the quality of work in all areas, especially the guarantee of quality of education provided. If we want to provide quality education, the universities must be real pillars of Slovak science. In this environment cooperation is important in the context of the international impact of the Bologna reforms and strengthening the international dimension of the ERA, especially since the science and research are the tools of progress throughout society. Current research at universities in terms of content and focus quite diversified. It reflects the current structure of faculties, their educational and scientific-research focus. While absorbing new trends in direct or related disciplines (fields), which reflect the standard and historically the direction and mission of each university. New scientific directions and themes were developed additive, innovative, or as a reflection of direction in advanced scientific fields newly-created faculties. Orientation often determines the structure of the new scientific challenges of EU projects (eg. 6th and 7th Framework Programme, COST, EU structural funds, etc..).

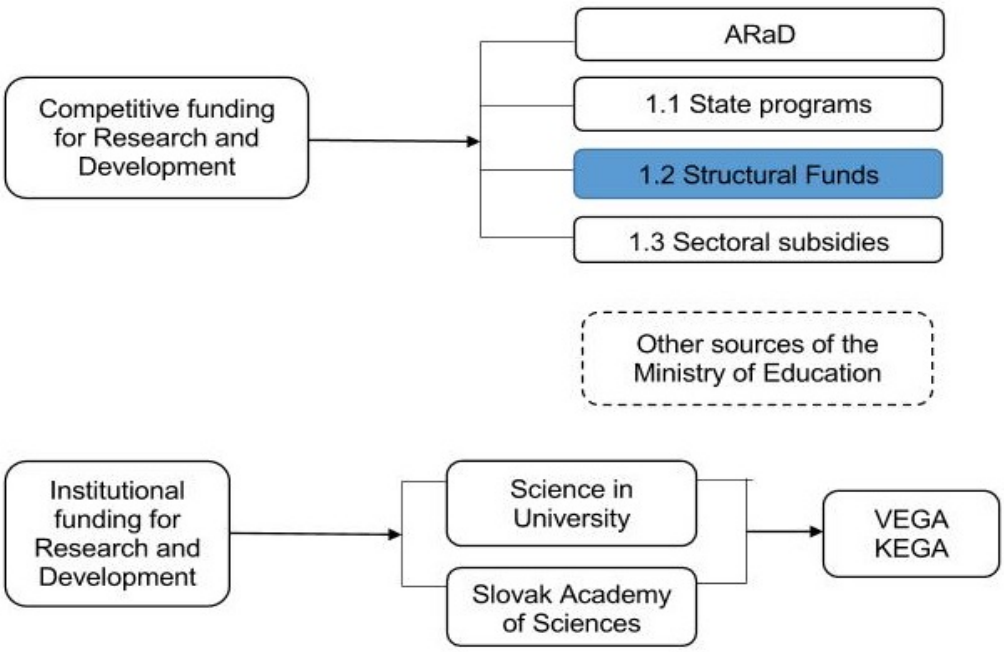

Figure 5.1. Research and development funding from the state budget

In terms of the use of financial instruments has a dominant position method of grant funding. The main advantage of grant funding mainly include the creation of a competitive environment in the project, which creates conditions for better project selection, which greatly increases the efficiency of the allocation of funds. In this context, within the programming period 2007 - 2013, may also be used funds from the EU funds.

One of the EU's Structural Funds is ERDF, which is funded through assistance to strengthen economic and social cohesion by redressing the main regional imbalances through support for the development and structural adjustment of regional economies, including the conversion of declining industrial regions and regions lagging behind and the promotion of cross-border, transnational and international cooperation. From the ERDF funds in the education sector in the period 2007 - 2013 was financed Operational Programme Research and Development (OPRaD), which covers geographically the whole territory of the Slovak Republic. Based on this program document was provided to support research and development activities and infrastructure of universities. Intermediate authority under the Managing Authority for the OPRaD is Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic for the Structural Funds of the EU.

5.1.2.1 Operational Programme Research and Development

Operational Programme Research and Development, approved by the European Commission in November 2007, is a form of the Lisbon Strategy for Slovakia, which is intended to facilitate the balanced development of research in the various regions of Slovakia. Is a precondition for improving the conditions of implementation of national and international projects. Follows the Community Strategic Guidelines, which aim at improving knowledge and innovation for growth and development of the Community, in particular, to intensify and improve investment in research and technological development and to facilitate innovation by linking academics with the application of research and development results into practice. Operational Programme Research and Development has been prepared in accordance with the strategy and priority axes of the National Strategic Reference Framework for the years 2007 - 2013, which details the strategy and objectives through research and development priorities. This

program is based on the primary strategic objective of "increasing research and development potential of Slovakia to the extent that has become the end of the program period, the driving force for the development of individual regions at the level of self".

The strategy is reflected in the spheres of reconstruction and building technical infrastructure for research and development, support networks of excellence, which are the pillars of regional development and to promote subregional cooperation, and to the research and development of knowledge and technology transfer into practice. Through the proposed interventions is expected higher prestige research, which will also lead to increased interest in the exploration of talent, higher competitiveness scientific teams, or to higher employment in this field. Will benefit new creative ideas appropriate to the needs small and medium enterprises, their closer cooperation, as well as higher interest in conducting research aimed at innovation. This research will take effect as from companies, as well as in public research institutions, universities and other research centers in Slovakia. Slovak research teams will also compete at the international level, what will entail the cooperation with foreign ground.

The global objective of the Programme Research and Development is the modernization and streamlining of support for research and improving the infrastructure of schools in order to contribute to improving the competitiveness of the economy, creation of new innovative (high-tech) small and medium-sized businesses, creating new jobs and improving the conditions of the educational process in higher schools.

Activities Operational Programme Research and development is carried out in the five priority axes:

Priority axis 1: Research and Development Infrastructure. The distinctive aim of this priority axis is "upgrading and improving the technical infrastructure for research and development to increase the capacity of research and development institutions work effectively with research institutions in the EU and abroad, as well as entities of the social and economic practices through the transfer of knowledge and technology." Priority Axis 1 will be fulfilled through Measure 1.1 Modernisation and building technical infrastructure for research and development.

Priority axis 2: Support for research and development. Investments are concentrated mostly on integrated research projects, to projects supporting networks of excellent research facilities of international cooperation projects and mobility of workers as well as projects promoting the culture of innovation in academia through virtual incubators, science projects and technology

parks, technology centers, and regional centers of competence and projects regarding the use of intellectual property. Support system has to be implemented so as to contribute to improving the competitiveness of the Slovak economy, creation of new innovative businesses, and create jobs and to reduce regional disparities.

Priority axis 3: Infrastructure of research and development in the Bratislava region. Priority 3 is of course focused on the Bratislava region, which "is not entitled to receive assistance through the Convergence objective because the application fails to meet the criteria for assistance under the Convergence priority is placed under the Regional Competitiveness and Employment". Bratislava Region is the same particularity, because it is concentrated almost 50% of research and development potential of the Slovak Republic and the structural problems in the research, development and innovation are the same here as in other regions of Slovakia.

Priority axis 4: Supporting of research and development in the Bratislava region. Research and development in the Bratislava region is an integral part of the nationwide system and the benefits of research have an impact across the board for the whole Slovakia. The focus of this priority axis is the same as in other regions of Slovakia, to solve problems related to poor quality of research and the low number, quality and innovation in the business area.

Priority axis 5: Infrastructure of universities. This priority axis covers the whole country except Bratislava region. Achieve the objective of this priority requires increased investment in the quality of education at universities including investments in physical infrastructure for the purposes of the educational process. Planned measure is to support the overall development of universities to modernize the infrastructure of education.

For the last seven years have been strongly supported the scientific research area with 420 demand-oriented projects valued at the grant by almost 845 million €. Operational Programme Research and development is one of the dominant pillars of science and research funding from EU structural funds. Financial allocation from the European Regional Development Fund for the period amounted to 1.177 billion €, which was intended for national and demand-oriented projects. Projects implemented by the Operational Programme Research and Development also contributed to the improvement of education in universities, to build ICT networks as well as to regional competitiveness. In the programming period 2014 - 2020 this program will replace the Operational Programme Research and Innovation. Its implementation known as Horizon 2020, unites all EU programs aimed at funding research and innovation. The

program simplifies the process of transforming scientific breakthroughs into innovative products and services to improve the lives of citizens and to create new business opportunities.

Operational Programme Research and Innovation (OPRaI) serves the basic assumptions and frameworks, as well as priority areas for the creation of a favorable environment for innovation and enhance the efficiency and performance of research, development and innovation in the Slovak Republic in the programming period 2014 - 2020 The need and the importance of approval and implementation OPRaI based on the necessity of increase the performance of the whole system of research, development and innovation, which was in the years 2007 - 2013 supported primarily by the Operational Programme research and Development under the auspices Ministry of Education and the Operational Programme Competitiveness and Economic Growth under the auspices of the Ministry of Economy. The main vision of OPRaI is to encourage structural change of the Slovak economy towards growth based on increasing the capacity for innovation and excellence in research and development to promote sustainable income growth, employment and quality of life. This vision will be fulfilled Slovakia focusing on the following strategic objectives:

- to deepen integration and anchoring of key industries that increase local added value through the cooperation of local supply chains and promoting their reciprocal networking,
- to increase contribution of research to economic growth through global excellence and local relevance,
- to create a dynamic, open and inclusive innovative company as one of the preconditions for improving the quality of life,
- to improve the quality of human resources for innovative Slovakia.

Science and Technology as one of the three pillars of the development of the knowledge society: education - science and technology - innovation must be at the center of political and government authorities deciding on the overall direction of development of the Slovak Republic to perform the task decisive factor developing countries. Targeted support to research and development enables access to research programs to other public organizations and the business community not only in Slovakia but also in other member states, leading to increased interaction and strengthening research and innovation, thereby increasing the impact of research on competitiveness and globalization. At the same time, the Slovak Research and

Development will strengthen the raised state, or private funding as a result of increasing demand and closer to the Lisbon strategy goals. By the words of the European Commissioner for Industry and Entrepreneurship, Antonio Tajani, it is need for more investment in enterprises, greater demand for European innovative solutions and fewer barriers for commercial diffusion of innovation. Addressing of the gender can be "New Programme for Research and Innovation Horizon 2020", which offers a new budget and can be reformed along with regional policy opportunity to promote innovation. More than 100 million € investments in the European Structural Funds will be allocated to research and innovation, digital growth, small and medium-sized enterprises and the development of clean and efficient energy sources. Helping to create strategies may be the Enterprise Europe Network, which provides services to small and medium-sized businesses comprehensive advice and support in business, investment and research.

5.1.2.2 Increasing of the investments and innovation capability of enterprises by operating in the woodworking industry through cooperation with universities

Changes in social areas are creating new conditions for business entities. Contributing factors mentioned change is the effect of the global economic crisis. In order to to the fact, that enterprises responding to the changes need to increase their competitiveness, is required performance, because the performance condition is constantly innovating products, services and processes. Innovation capacity of enterprises can effectively ensure the development of various forms of cooperation between businesses and universities. The need for increased innovation capability of enterprises is of interest to senior representatives of the European Union, but Europe is lagging behind despite the efforts of global competitors, particularly the United States and Japan. Reasons are less investment of European countries in science and research, and also the insufficient integration of the basic elements of the knowledge triangle: the business sector - higher education - research. Europe is lagging behind compared to quality research in the use of the results of his own research, which cause the following factors:

- the fragmentation of the academic and research community,
- small budget of excellent universities,
- Lack of business involvement in education and research,

- insufficient funding for research and development.

Opportunities of increased application of innovation capability of businesses dedicated to the research project was designed at the Faculty of Mass Media Communication in Trnava, entitled "Barriers to distribution channels of knowledge from universities to business environment" (VEGA, reg. No.. 1/1059/11). The project was carried out a survey on the use of various forms of cooperation between business and universities, the results of which may be mentioned the following findings on forms of cooperation:

- lead in the the final work,
- internships and excursions for students and university staff,
- joint scientific research projects of enterprises and universities,
- training company workers in universities,
- involvement of representatives of experience in teaching at universities,
- use of laboratories in enterprises for teaching students
- issuing joint publications,
- participation of business representatives at conferences or the regional governance structures,
- financial sponsorship,
- common infrastructure - laboratories, ICT facilities.

Among other subjects of cooperation may also be the grant agencies of the Ministry of Education. To secure the increase of innovation potential of businesses and subsequent use in business practice can be used implementation of innovative projects, the establishment of joint scientific and technological parks, mutual mobility of employees of enterprises and universities and the development of informal contacts, participation in the creation of university programs with a focus on meeting the requirements of practice, joint patenting, licensing of patents, spin-offs, start-up companies. Benefits of the forms of cooperation mentioned above are faster transfer of information between entities, removing barriers between scientific research and industrial innovation, increasing knowledge enterprises, the introduction of more advanced technologies and faster return on investment in research and development, which helps to increase the innovation potential not only to the region. Universities are source of knowledge and innovation and also are at the heart of innovation processes. Currently, the university is not only educational institutions that reproduce certain knowledge. Higher education plays an

important role in regional development and on a new meaning as "national, respectively an international perspectives become complementary rather than substitution in relation to regional or local perspective, placing the emphasis on their mutual alignment." Universities are a source of knowledge, information and publicity, while new marketing methods for innovation and development of small and medium-sized enterprises. We present the view that there should also be a source of information on the possibility of drawing potential investment from EU structural funds.

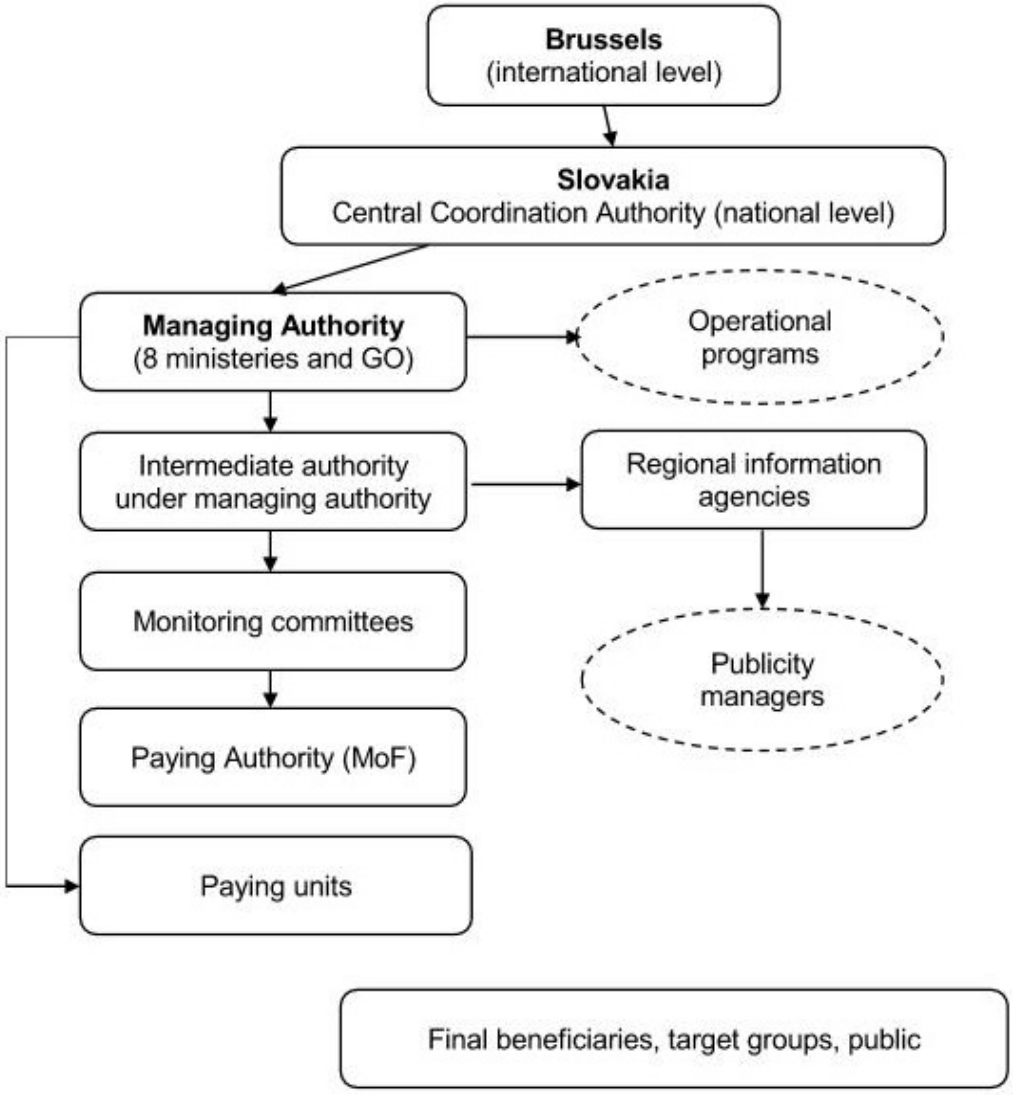

Figure 5.2. The hierarchy of coordinating development programs

The other type of survey, carried out under the grant VEGA no. 1/0107/11, whose coordinators are also the authors of this chapter, were also investigation as the capabilities and the ability to invest in the development small and medium enterprises in Slovakia. The selected portfolio enterprises were also active in the woodworking industry. The questionnaire survey was conducted electronically and the issues were also questions such as:

- Is the firm in the current situation able to invest in its development?
- If able, in which area concentrates its financial investments?
- Is company using the possibilities of cooperation with the university environment and thus the possibility of drawing subsidies from EU funds?
- What financial options are the most often used by company for their investments?

From this survey we choose answers to previous questions and to better illustration of them are presented in graphical form:

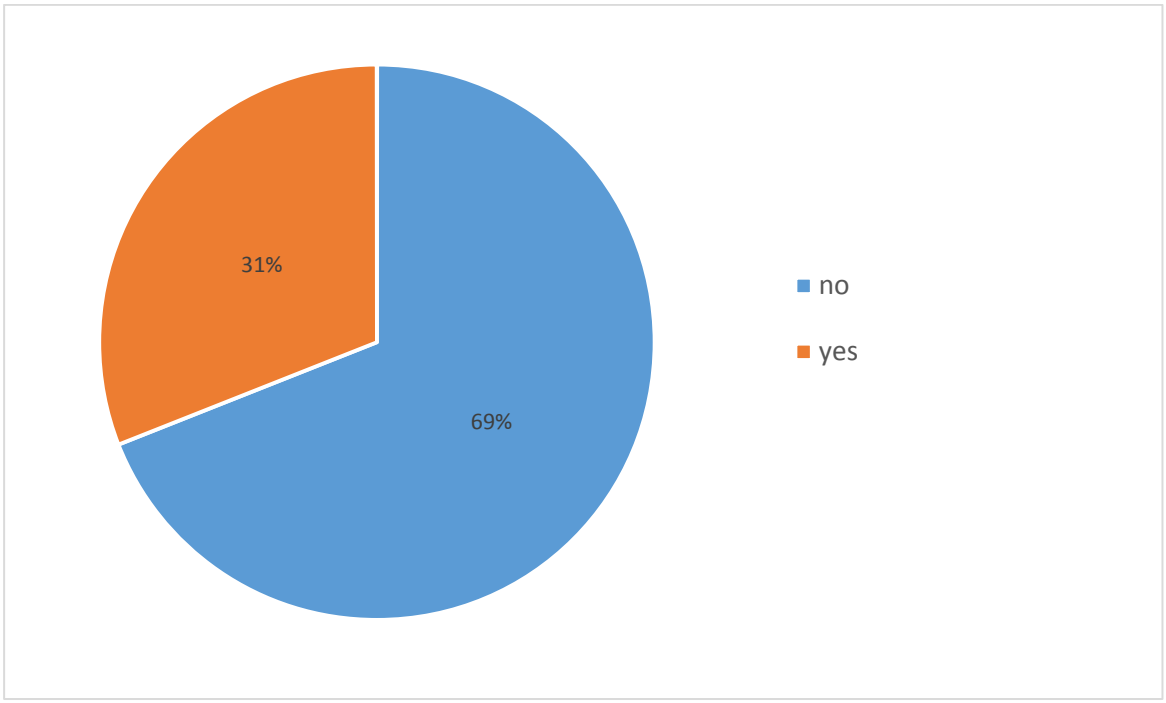

Figure 5.3. Investments to company expansion

It turned out that the total number of respondents capable to accumulate funds to invest in their development is only 31%. That's not even half of the respondents. This figure very

clearly declares the current problem of small and medium-sized companies operating in the wood processing industry of the Slovak Republic. We believe that the situation is similar in other neighbor countries.

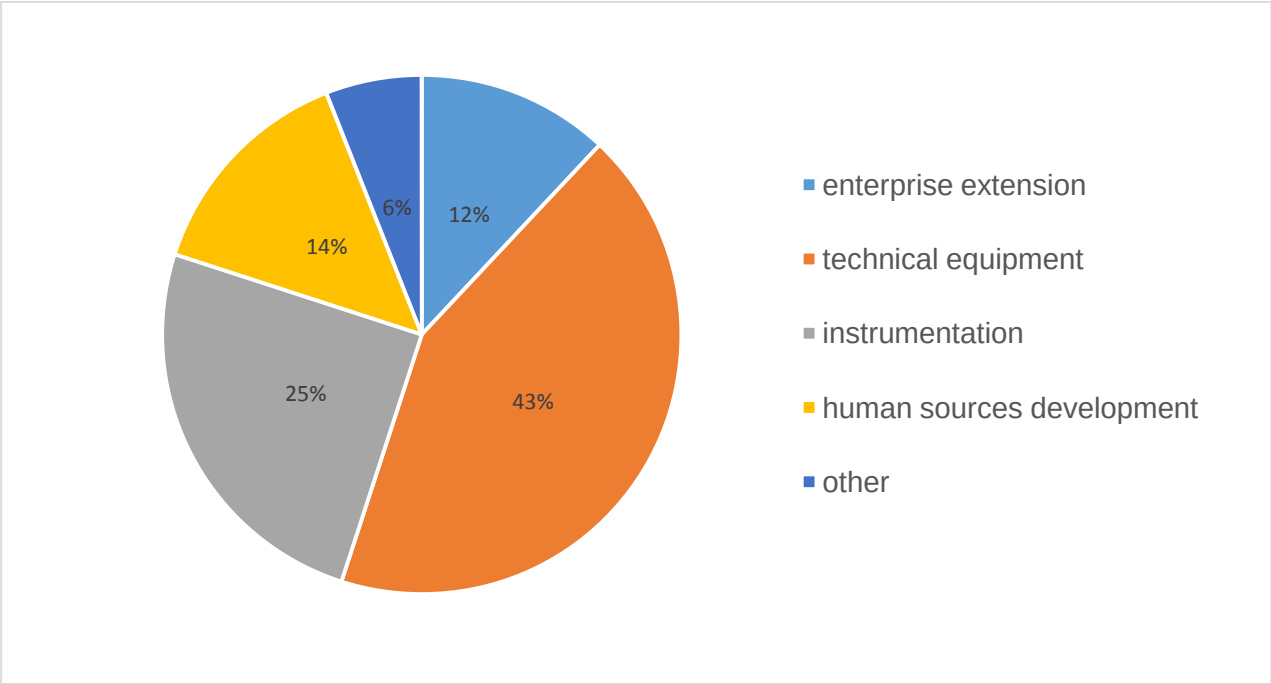

Figure 5.4. Area of financial investment in the company development

Answer to the question in which areas are most frequently targeted financial investment declared that most of the funds directed to the technical equipment and for the right thereby to the instrumentation. Devices that are used in the woodworking industry are the most important and can say that even the most expensive component of investment.

Answer to the third question confirmed that most small and medium enterprises rely on their own sources of funding, it is up to 35%, the next most important source of funding for the bank loans. Interesting is also the information that about 28% of companies use subsidies from EU structural funds and grant projects. This fact we can give the impression that this condition may be the result of a merging of entities with the same objectives and goals in the cluster and other similar initiativeswhich paves the way for the acquisition of such resources and finances, which may in turn lead to investments that are necessary for whether technical improvements, but the instrumentation.

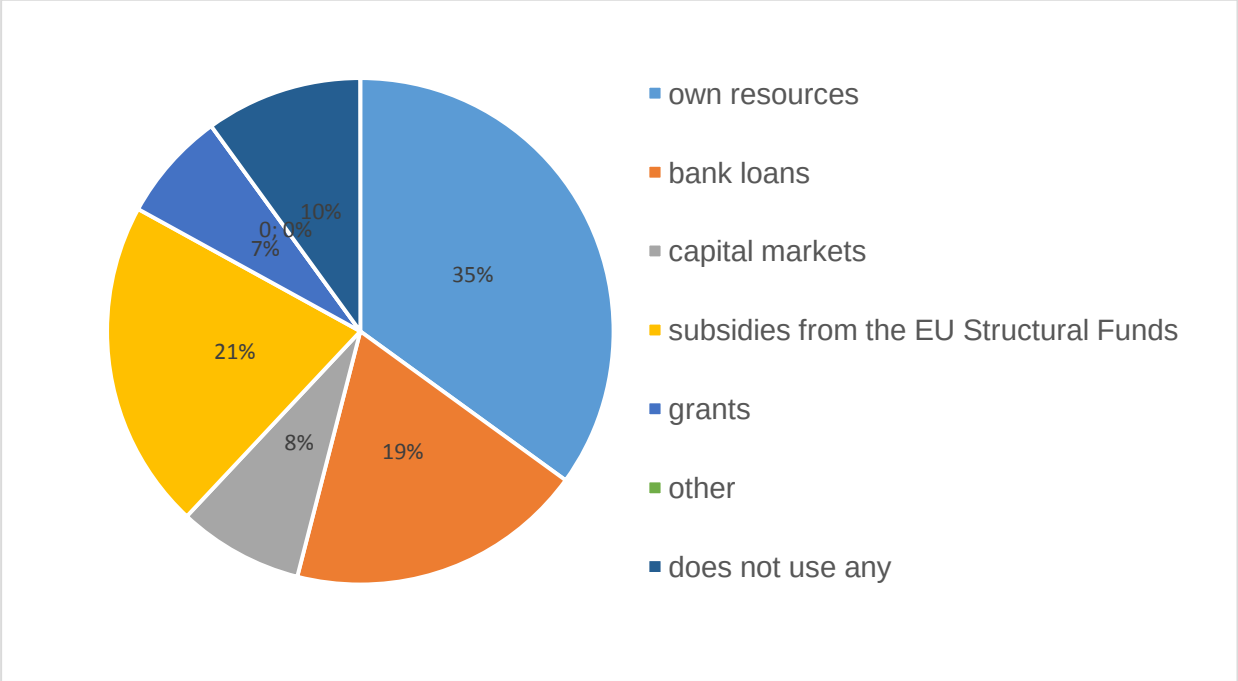

Figure 5.5. The resources used by the enterprise for innovation and development activities

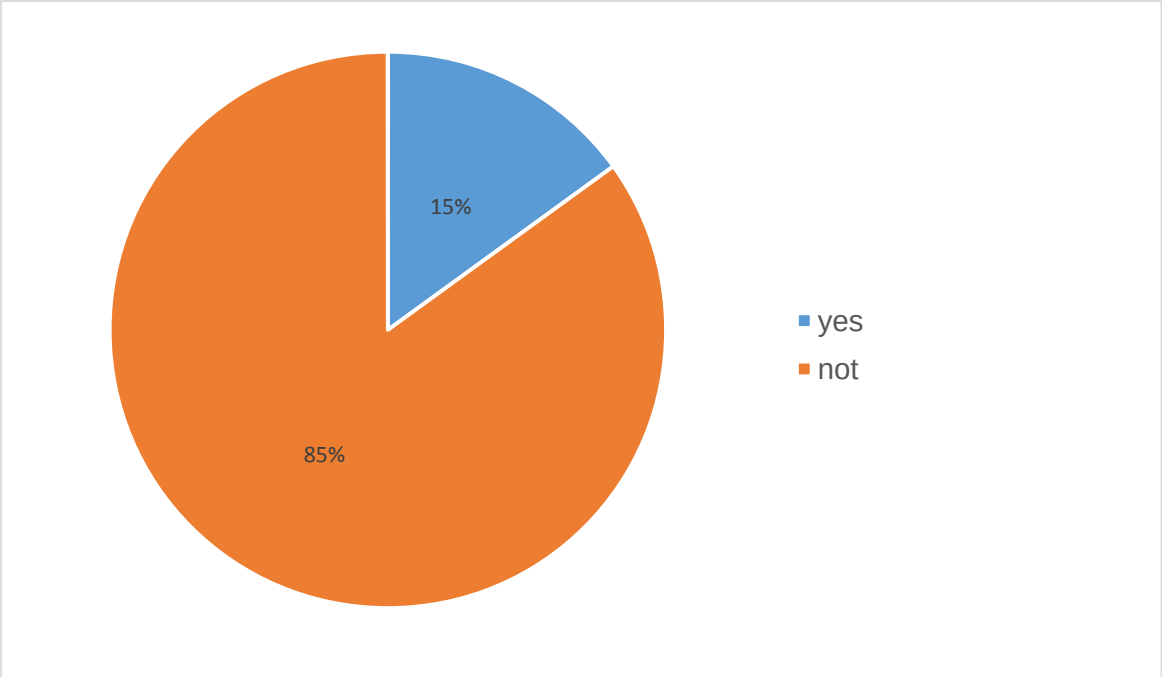

Figure 5.6. Cooperation with universities under grants from the Structural Funds through OPSaR

In this context, we therefore also interested in the fact whether small and medium-sized enterprises active in the woodworking industry cooperate actively with universities in acquiring grants from the Structural Funds. A result which is shown graphically in Figure. 5, however, is opposed by the above presumptions. 85% of survey respondents indicated that in obtaining grants from the Structural Funds through OPSaR does not cooperate with universities.

It should be emphasized that the above survey is for information only and is not completely specified. To create a picture of the possibilities and areas of investment for small and medium-sized enterprises active in the woodworking industry, such information is sufficient. It can be said that the findings that we obtain from respondents generated picture of the current situation and investment opportunities small and medium enterprises in their development. It is logical that in the woodworking industry are the largest investment and technical instrumentation. If companies want to innovate, it's just in this area. Although only 15% of respondents surveyed indicated that cooperates in obtaining grants from the Structural Funds through OPSaR with universities, 28% indicated that their innovation and development investments using subsidies from EU structural funds and grants. This figure may be partially distorted and that if the company is part of one timber associations or cluster does not need to apply for a subsidy or grant only the University, but practically all partners. The most common co-ordinators are then regional public authorities, whose main priority is to support the competitiveness of the region in which they operate and it is also in their interest to provide funding in the areas of industry, which has a tradition in their region.

In conclusion, we would like to point one more fact which of the above questionnaire survey revealed. While respondents indicated that their innovation and development activities using mostly their own resources, 69% of respondents responded to the question of investing in their own businesses negatively. That companies are in most cases able to obtain funding for their investments from other forms of financing, must, if it is necessary to use their own sources of funding, which is largely restrictive. Therefore it is not possible to carry out an investment in such areas would mean significant progress in modernizing equipment and instrumentation, the other areas do not even mention. Often invest in older machines that are not compliant and meet the requirements of health and safety at work. Unless nevertheless find ways of financial security and implement investments in modernization of production, it is not always converted and return on that investment. This leads to the production of more expensive products than

their competitors, and the company offers in most cases are not competitive. It is understandable that even in this area there are exceptions, and these can not generalize our arguments. But based on the fact that a lot of companies doing business in the woodworking industry in the so called „red numbers“, the reasons may various. This may be caused by external influences crisis, but also various changes in legislation, but also as internal influences, which are often caused by the inability of senior management to provide the necessary financial resources and invest in those areas in a company having development potential and hence competitiveness.

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6. INNOVATION PROFILES AND POSSIBILITIES OF INVESTMENTS DEVELOPMENT OF CROATIAN FURNITURE INDUSTRY COMPANIES

Andreja Pirc Barčić, Prof. Darko Motik, Maja Moro, Kristinka Liker

6.1. INTRODUCTION

Due to very dynamic and adjustable market nature it is almost impossible to find industry branch which does not include innovativeness and innovation (as a result of innovativeness) in its development, either continuous or occasional (Pirc Barčić and Motik, 2013a).

Firms should constantly scan the horizon for new opportunities to satisfy their customers, and be capable of innovating to provide solutions to changing market needs. Innovation is an important source of competitiveness, by which companies gain advantages through organizing and conducing value-adding activities in a new way.

Links between firm's innovative performance and their competitiveness are extremely complex because the intensity of innovation performance strongly depends on factors such as, involvement in exporting activity, the level of management training and skills, networking by firms, level of R&D capability, firms size, etc. (Dobrinsky, 2008).

Company's decision on investments in new/improved technologies in order to increase opportunities for innovation development are closely related to research and development (R&D) activities. Exploring the impact of R&D processes implementation of innovation development in Italian industry Parisi et al. (2006) came to conclusion that implementation of R&D processes plays very important role in innovation development and those companies that develop product innovations invest more financial resources in the R&D process than companies who direct their activities towards process innovation development. Although implementation of research and development (R&D) process for each business company presents a very complex and difficult activity, a lot of innovation is not based on R&D processes. Defining a model of *Open Innovation,* Chesbrough (2003) noted that many companies that attempt to become innovative very little invest into their internal R&D activities, because in that

case companies will very often focus their activities to internal development and will miss a large number of external opportunities and possibilities to develop innovation.

Furthermore, efforts and forces conducting R&D activities can indicate company's innovativeness capability (Hagadoon and Cloodt, 2003) and the intensity of conducting R&D activities can accelerate the concentration (level/quantity) of company's knowledge and technical capabilities (Wang et al., 2010). Except intensity of R&D activities, Mansfield (1984) noted that duration of R&D activity presents an important element in process of innovation development , because only continual R&D process activities leads to company innovativeness. The level of implementation R&D process activity is closely related to the level of technological development of the company (in broad sense of the industry). According to Mairesse and Mohnen (2004) in a low-tech industry companies innovation is more sensitive to research and development activities than in companies of a high-teach industries. Low-tech industry, including wood industry, usually require a lower level of investments in R&D activities and development is more based on knowledge and technologies application (OECD, 2005).

Organizations competitiveness and ultimate survival depends on its ability to develop and bring out new or innovative product and service (Drew, 1997). In many business sectors today, innovation has become very important tool for firm competitiveness and long-term firm success will depend on firms' abilities to be innovative (Leavengood, 2009). Nowadays, when globalization occur new possibilities of technological and business development, Croatian wood industry indicates the needs for changes in the form of application new technologies, new products and new business activities. Nevertheless, in last few years some changes have been made regarding product, process and business improvement and/or development in Croatian furniture industry. According to Pirc Barčić and Motik (2013b), in Croatian furniture manufacturing companies a one third of total revenue generated in 2008 and 2009 came from sales of new/improved products.

Given the multiplicity and heterogeneity of different measures on internal and external company factors regarding innovativeness, the aim of this paper was to define profiles (clusters) regarding innovations.

Furthermore, given that business companies usually make a decision about investing in certain segments of their business in order to carry out innovation idea into product, process,

and/or business innovation the second aim of this paper was do define investment development possibilities of Croatian furniture industry companies.

6.2. MATERIALS AND METHODS

Sample frame of 409 Croatian furniture manufacturers was randomly selected form furniture sector population. Based on research objectives a questionnaire consisted of three sections was developed and mail surveys were conducted. Only questions regarding three types of innovation (product innovation, process innovation, and business innovation) and competitiveness were focus of this work. Data collection started in March, 2010 and ended in June, 2010. Of the 409 surveys mailed, the total number of usable surveys received form furniture companies was 77. Adjusted Response Rate was 24.2%. Data were analyzed in Statistica 10.0.

After a series of preliminary cluster analysis a final solution was conducted. Internal and external company factors used for analysis are shown in table 6.1.

Table 6.1. Variables used for Cluster analysis

INTERNAL COMPANY FACTORS	EXTERNAL COMPANY FACTORS
Company revenue in 2009	Number of wood raw material suppliers
The percentage of costs in 2009 total company revenue	Number of customers
The percentage of 2009 company revenue that came from sales of new/improved products	Co-operation with customers in designing new products
The average age of company large capital item manufacturing machines	Co-operation with customers in improving design of existing products
The share of employees aged up to 30 years	Characteristics that companies advantage when choosing suppliers – delivery time; availability of material and high level of service
Categories of company's manufacturing processes	
Using computer programs in production costs planning	
Using the Internet in a variety of business activities	
Using of CNC (Computer Numerical Control) machines	
Using of CAD (Computer Aided Design) programs	
Using 3D visualization technology for product presentation to customers	

Other internal and external company factors were not included in cluster analysis because these factors didn't assure any difference between clusters.

The folowing items were used measuring investment activity process: In your company, over past three years:

a) production software has improved;
b) Information technology has improved;
c) research and development investments increased;
d) production equipment has improved.

Items used for measuring investment activity were measured using a five-point Likert items, ranging from 1 (strongly disagree) to 5(strongly agree).

6.3. RESULTS AND DISCUSSION

6.3.1. Three clusters of furniture producers

Final cluster analysis based on the above mentioned internal and external company factors distinguished there Clusters – there profile sets of furniture manufactures in Croatia. Due to lack of information's relevant for this analysis were excluded from clustering. According to table 2, thirty percent of the 71 respondents used in clustering were classified in a first type of cluster (Cluster 1). Forty five percent of the respondents were noted as part of Cluster 2, while 25% of them were classified to a third type of cluster (Cluster 3).

Table 6.2. Distribution of Clusters

Type of Cluster	Number of companies N	Percentage (%)
Cluster 1	21	29,6
Cluster 2	32	45,1
Cluster 3	18	25,4
Total in Clusters	71	100,0
Not used for analysis	6	
Total	77	

6.3.1.1. Cluster 1 – Small traditional companies

After a cluster analysis was employed results have shown that a furniture manufacturing companies which indicated affiliation to Cluster 1, generally have up to 10 employees (91%). In 2009 most of the respondents generated revenue up to a 1 million Kuna (cca. 0,1 million EUR). Seventy six companies in Cluster 1 indicated that their large capital item manufacturing machines are between 6 and 15 years old. More than 90% of companies noted that they have custom made production. In 62% of Cluster 1 companies share of total costs in company revenue (for 2009) was up to 75%. A small percentage of companies regarding Cluster 1 use CAD and CNC technology, as well as 3D technology in product presentations. Eighty six percent of Cluster 1 companies have less than 10 suppliers and 71% of them have up to 30 customers. Although, most of them have developed cooperation with customers in designing and improving products, they make it in a smaller percentage in comparison to companies belonging to Cluster 2 and Cluster 3.

6.3.1.2. Cluster 2 – Innovative companies

Furniture manufacturing companies which have shown innovative characteristic regarding internal and external company factors were represent in Cluster 2. All companies in the Cluster had up to 25 employees. Revenues in 2009th ranged up to 10 million Kuna (cca. 1.4 million EUR), although the majority of companies (51%) achieved revenue between 1 million and 5 million Kuna (cca.0,1 million and cca.1,4 million EUR. About 96% of Cluster 2 companies indicated that they have custom made production. In the production process most of these companies use CAD and CNC technology, as well as 3D product presentation technology, and 53% of them noted that their large capital item manufacturing machines are older than 5 years. Seventy eight percent of companies belonging to Cluster 2 use service of less than 10 suppliers and more than 60% of them have more than 30 customers. All companies in Cluster 2 have developed and cooperate with their customers in designing and improving products. These companies are characterized by close collaboration with named (famous) Croatian and foreign designers.

6.3.1.3. Cluster 3 – Big furniture producers

Sixty on percent of companies in Cluster 3 have more than 100 employees and half of the companies generated revenue of more than 40 million Kuna (cca.5,5 million EUR) in 2009. Eighty three percent of the Cluster noted that their large capital item manufacturing machines are between 6 and 15 years old. The same percent (83%) of the respondents belonging to Cluster 3 indicated that they have more than 15 large capital item manufacturing machines in their production process, which is quite more than in the other two clusters. Most of the companies used CAD and CNC technology, as well as 3D technology for product presentation. Companies pertaining to the Cluster 3 noted that they have more suppliers and customers in comparison to the companies in Cluster 1 and Cluster 2. Although, Cluster 3 companies have developed cooperation with customers in improving and designing products, they have made it in a smaller proportion than the companies in the Cluster 2.

6.3.2. Innovations and Clusters

According to the results of the types of innovation (product innovation $F = 3,651$, $p = 0,031$; process innovation $F = 7,168$, $p = 0,001$and business innovation $F = 4,753$, $p = 0,012$) obtained Clusters were found to be significant at $\alpha=0,05$ significance level, by applying One-way ANOVA (Table 6.3).

Companies in the Cluster 2 rebounded when regarding product innovation. These companies were significantly more innovative in comparison to companies in the Cluster 3 ($p=0,013$). The results regarding product innovation in Cluster 1 indicates no significant difference in comparison to companies in the Cluster 2 and Cluster 3 at $\alpha=0,05$ significance level.

Companies in Cluster 1 indicated a low level of process innovation. When observing process innovation the results demonstrated that companies in Cluster 1 were found to be less innovative in comparison to companies in Cluster 2 ($p=0,001$) and companies in Cluster 3 ($p=0,004$) at $\alpha=0,05$ significance level. However, no significant difference was found between

process innovation in companies pertained to Cluster 2 and Cluster 3 at α=0,05 significance level.

As shown in Table 6.3 companies belonging to Cluster 2 achieved a significantly higher level of business innovation in comparison to companies in Cluster 1(p-value 0,004).

Table 6.3. *Post-hoc* Test (LSD test) of innovation in the three defined types of Clusters of furniture manufacturing companies

Type of innovation	Group 1 (I)	Group 2 (J)	Mean Diference (I – J)	Standard Error	Significance
PRODUCT INNOVATION	Cluster 1	Cluster 2 Cluster 3	-0,44395 0,21693	0,24723 0,28277	0,077 0,446
	Cluster 2	Cluster 1 Cluster 3	0,44395 0,66088*	0,24723 0,259937	0,077 0,013
	Cluster 3	Cluster 1 Cluster 2	-0,21693 -0,66088*	0,28277 0,25937	0,446 0,013
PROCES INNOVATION	Cluster 1	Cluster 2 Cluster 3	-0,86458* -0,83333*	0,24353 0,27854	0,001 0,004
	Cluster 2	Cluster 1 Cluster 3	0,86458* 0,03125	0,24353 0,25549	0,001 0,903
	Cluster 3	Cluster 1 Cluster 2	0,83333* -0,03125	0,27854 0,25549	0,004 0,903
BUSINESS INNOVATION	Cluster 1	Cluster 2 Cluster 3	-0,59509* -0,18571	0,20152 0,23049	0,004 0,423
	Cluster 2	Cluster 1 Cluster 3	0,59509* 0,40937	0,20152 0,21141	0,004 0,057
	Cluster 3	Cluster 1 Cluster 2	0,18571 -0,40937	0,23049 0,21141	0,423 0,057

*Differences are statistically significant at α=0.05 significance level.

6.3.3. Investment development possibilities

Respondents were asked to indicate their level of agreement of disagreement about level of their company improvement regarding investment activities. Although, respondents generally agreed (mean response= 3,9; SD = ± 1.10) with the statement that production equipment in their company have been modernized in the last three years (manning years 2007, 2008, and 2009), 65% of respondents on Likert scale choose 4 or 5 which present their agreement that production equipment has been modernized in the last three years.

Furthermore, statement that in the last three years production equipment has been improved was noted with the same average level of 3,9 (SD = ± 1.18), although 69% of respondents on Likert scale choose 4 or 5. More than 60% of respondents agreed that in the last three years in their companies information technology has improved, although mean response of the statement about improvement of information technology was only 3,7 (SD = ± 1.13). Only 12% of respondents agreed that their company has increased its investments in research and development activities in last three years (meaning 2007, 2008, and 2009) with mean response of 3,0 (SD = ± 1.22) (Figure 6.1).

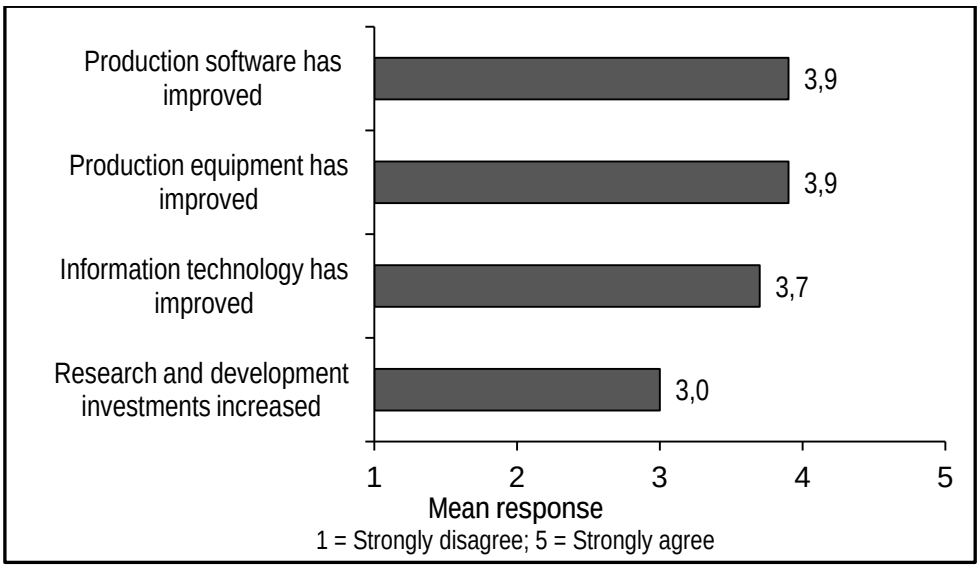

Figure 6.1. The level of improvement within furniture industry companies regarding investments (n=77)

Furthermore, respondents were asked to note the percentage of R&D activity investment of annual company income. In 2008, of the 54 respondents the lowest percentage of R&D investments of the annual company income was 0,3%, while the highest percentage was 30%. In 2008, the average percentage of investments in R&D activities of total annual company income was 6,44 % and in 2009 the average amounted 5,74%. Regarding the lowest and the highest levels of R&D investments, the lowest percentage of investments in R&D activities of total annual company income was also 0,3 and the highest was 20%.

6.4. SUMMARY

In this study three profiles (Clusters) of Croatian furniture manufacturing companies were defend. Along with small traditional companies (Cluster 1) and large furniture manufacturing companies (Cluster 2), one of three defined Clusters was characterized by innovative companies. These innovative companies have small number of employees (up to 25 people), revenue up to 1.4 million EUR. The majority of these companies have custom made production, using CAD and CNC technology and have good and close cooperation with their customers in designing new or/and improving existing products, as well as with designers.

Respondents generally agreed that production equipment in their company have been modernized, that production equipment and information technology in their companies has been improved, but only 12% of respondents agreed that their company has increased its investments in research and development activities in last three years.

This research suggests that investment development possibilities and innovative companies in Croatian furniture industry exists, but due to excessive market opportunities and possibilities, managers, directors, and executive staff still do not recognize the right way which will take them to so desired step ahead of the competition.

Limitation of the study: Given that data on investment activities of the companies change in short period of time because it depends on the current global and county economic situation, data regarding investments should be update. According to not so good economic situation in Croatian economy in general it can be assumed that situation regarding investment activities in Croatian furniture industry has not been much changed

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7. INVESTMENT BEHAVIOR AND PERFORMANCE OF WOOD PROCESSING COMPANIES IN SLOVAKIA

Martina Merková, Josef Drábek

7.1. BACKROUND AND CURRENT SITUATION OF SOLVED PROBLEMS

7.1.1. Wood processing industry in Slovakia

Wood processing industry (WPI) in Slovakia has to face recession in the current period, the development of this sector is dependent on changes in demand for production of wood products and not just in the European area. Targeted, comprehensive measures at EU level to support the growth of domestic demands, construction as well as the downstream sectors, would certainly have a positive impact on the growth of population income growth and thus its purchasing power.

Over time, more and more points to the need for the planned use of non-renewable but in the case of wood also renewable resources. And in essence that forest management is a continuous appointment as one of the few industries continuously. It is only term of improving and more effective using of a hugely valuable resource base, which have forests in Slovakia. Recent development in most enterprises suggests that the effects of the global economic crisis have a significant impact on the performance of enterprises, with direct impact on the level of economy as well as the level of investment. The development of each sector or company requires appropriate investment. Without investment cannot fully meet particularly economic objectives of the business (Merková, Drábek, Polách, 2011).

Due to the significant factors in the context of global economic crisis, the fall in demand for timber and timber products, many small businesses were lost. In general, this branch has begun to grow mainly due to the foreign direct investment. At a time when small and middle wood companies have outdated technology, falling employment, especially in domestic enterprises is reflected a higher potential for foreign investors and related effects. If in the short term will not be stimulated demand, it is clear decreasing performance of the WPI as a whole, which of course for the future (min. 5 years) will adversely affect the WPI share in the GDP of

the Slovakia, as well as balanced regional development (availability of raw materials), with negative impact on social stability of separated regions of Slovakia (Merková, Drábek, 2011). Significant competitive advantages for the WPI are wood stock as renewable raw materials and wood harvesting forecast. The wood stock in Slovak forests has been increasing continuously. From the forecast and the vision of the development of wood stock can be seen continuing their increase until its culmination in the years 2015-2020. Then, there is expected change in the development and start reducing the stock of wood caused by gradual changes in the age composition of forests. (Moravčík, 2007).

Table 7.1. Wood stock forecast in the Slovak Republic (millions m^3)

Wood Stock Forecast	2015	2020	2025	Forecast 2050
Coniferous	213	209	204	182
Deciduous	240	241	242	233
Total	453	450	446	415
Total per hectare	234	133	230	214

Source: Moravčík, 2007

Wood harvesting is also growing. The maximum annual volume of wood harvest was reached in 2005 as the result of unusually strong wind storm in 2004. The increase of harvest increases also the economic potential of Slovak forests (SARIO).

Taking into account the current age structure of forests in Slovakia in term of next 40-50 years, harvest possibilities will be better then in present time. The planned volume of total harvesting will therefore gradually increase to expected peak in the years 2040-2050. Regulation of wood harvesting can thus be about 30% higher compared with the current time (Moravčík, 2007).

Table 7.2. Wood harvesting forecast in the Slovak Republic (thousands m^3)

Wood harvesting forecast	2015	2020	2025	Forecast 2050
Coniferous	4 434	4 538	4 512	4 950
Deciduous	3 781	3 993	4 222	4 935
Total	8 215	8 531	8 734	9 885

7.1.2. Investment opportunities in Slovakia and wood processing industry

Investment opportunities in Slovakia exist in the production – companies with sophisticated production may benefit from low labor costs more than offers the business in the EU area. Slovakia also has a well established cluster of companies in the automotive industry, the country is slowly increasing production and attracting for more manufacturers. Slovakia has recently become a leading global manufacturer of cars per capita. Latest technology and skills exist in Slovakia. Opportunities are also in the information technologies market. Slovakia provides an excellent environment for outsourcing or service centers: Dell and Swiss are an example. Both initially placed only a small part of its business activities in Slovakia. Although they reduced their organizations in the past 2 years, the crisis has spread its presence in Slovakia. Slovakia has adequate sources of wood from which a significant share is exported as a raw material. Companies should benefit from the added value of the goods at home and they should effective export finished products. Drinking water and mineral springs are also rich sources for Slovakia. Businesses in the food and beverage industry, wellness tourism sector should reap the benefits of 1200 mineral springs in the country.

The government deficit exceeding 3% of GDP is not the cause for investors concerns in the current situation. But the expected economic recovery will be reflected in the re-tightening of fiscal policy, it will be a positive signal to encourage the investor confidence, underlining the government's responsible approach to meeting the commitments under the Stability and Growth Pact.

Focusing on the wood processing industry, Slovakia currently exports raw wood in large, enough wood as a renewable raw material is significant comparative advantage for the WPI SR. In case of foreign capital, which will be invested in new technologies for processing of domestic raw materials, potential effects from foreign direct investment especially reflect in a higher value added in the WPI, in the growth of the WPI share in the GDP of Slovakia.

Wood industry in Slovakia has not dominant status of automobile production, does not be put to the environmental discussion as a power sector, there is missing the advertising campaign which have chemical products and according to some opinions wood sector does not require strategic solutions, such as engineering. However, woodworking and furniture industry in

Slovakia exists and it is more than necessary. Forests and sophistically used wood constantly produced by forests are the base for the development of WPI, which may be strategic for the Slovak economy. Increased consumption of wood in the Slovak Republic and focus on domestic production can best help companies to find solutions in a difficult situation, which now face. Just because the WPI is currently in a difficult situation, there is increasing potential for any effects.

7.1.3. Investment and business performance management

Investment decision-making is one of fundamental parts in performance management of companies. However, to meet the strategic goals, a company needs to apply successful methods for management and measurement of business performance (Merková, Drábek, 2013). The allocation of available financial resources to fixed assets or investments in modernization of production technologies are possible ways when a company can ensure its prosperity.

Economists, banks analysts and investment firms note the necessary economic recovery few years after the crisis and they have to identify real possibilities and opportunities of increasing the present performance of businesses. This performance is certainly conditioned to their existing competitiveness particularly in EU markets. The competitiveness of enterprises should be considered as a general condition for business success. One of the main competitive advantages is the maximization of the business performance what leads the companies to increase their efficiency and overall effectiveness. It is necessary to know businesses actual and real performance and know how to exploit effectively the business opportunities that the market environment creates. Everyone, not just a successful enterprise entity often put a fundamental question: "How to achieve the higher efficiency and economic effectiveness of business?" For the qualified and correctly answer is the first necessary to determine what is the current and real business performance, and which appropriate and objective indicators use to measure this performance. The collected information - the values of the indicators are important factors for decision making about future investment in companies. Appropriately allocated investment is a contribution to the growth of business performance and its competitiveness, which we present in our work.

Between representatives of the theory, consulting firms and businesses conducts nowadays "a lively discussion on the relevance of the application of selected indicators for measuring the businesses performance". Different opinions and views are based on the two facts as follows:

- normal, ordinary so far used performance indicators are related to the past and is highly questionable whether they sufficiently reflect the company's future competitiveness,
- used indicators do not sufficiently reflect the quality of customer relationships.

It can be concluded that the economic experience quite often realizes the financial management based on the accounting profit and common indicators such as profitability or activity ratios. These indicators are presently considered as insufficient, which is also one of the reasons for the significantly poor competitiveness of enterprises. Traditional methods of measuring business performance (for example in Knápková, Pavelková, 2010 or Kislingerová, 1999) are based primarily to maximize profits (which is also in line with the objectives of business activity). To measuring the performance are used absolute and relative indicators (Kislingerová, 1999). However, in recent years can be seen objections to the traditional performance measurement indicators such as profitability.

In evaluation of investment we evaluate their suitability, efficiency and feasibility of the particular project. Moreover we evaluate the impact of the project on total effectiveness, prosperity and financial stability of the company (Polách et al., 2012). Discounted cash-flow methods for investment valuation take time factor into consideration. In economic life time factor makes things more serious, it enables the change of money evaluation. If that change was taken wrongly, it would be possible to make a wrong decision which would have significant influence on project effectiveness, enterprise stability (Drábek, Jelačić, 2007). Discounted cash-flow methods underlie two basic rules of financing (see more in Brealey, Myers, 1999) considering time changes of money values. While discounted cash flow valuation is only one of the three ways of approaching valuation, it is the foundation on which all other valuation approaches are built (Damodaran, 2012).

Business performance was solved by our research team recently with the objective to analyze the extent of the use of traditional and modern indicators, methods and models of performance management on a sample of randomly selected companies in various industries of

Slovakia, based on relevant mathematical and statistical methods to identify the cause and subsequent context and determine their influence in achieved business performance. The core of mentioned research was at first to define specific parameters that are characteristic for the highest performance, but also to point the parameters that despite their use and related costs cause only average or low performance. Rajnoha et al. (2013) published the research results and demonstrated the impact of selected factors in the performance of surveyed companies. We examined in complex several areas - financial, investment, processes, strategic management and specific parameters. As the indicator of business performance, was considered the Return on Equity (ROE).

There is a review by the perception of prices, while investors will not certainly decide for the lowest current price - as low production costs and cheap labor or low tax cost - but primarily on the lowest cost throughout the life cycle of the investment (Merková, Drábek, Jelačić, 2012). Apart from the quality of infrastructure, size of the domestic market or access to regional and international markets, foreign investors particularly take into account the factors such as energy costs, availability of suppliers and customers, sufficient qualified and skilled workforce, predictability of economic development, stability of legislative conditions, security of companies and others.

7.2. OBJECTIVE AND METHODOLOGY

We focus on complex area of investment measurement and management in this work, we investigated the investment behavior, factors and elements such as routing, types and objectives of investment, form of investment financing and cost of capital, preparing and valuation of investment projects, we interested in the question of investment risk analysis and other important facts.

The research objective was to analyse selected parameters of investment measurement and management, consequently we analyzed relationship between investment factors and performance given by the indicator Return on Equity. To goal was to find out relevant determinants with the impact in better performance of companies. On the base of questionnaire we analysed obtained results.

Selected results of the research presented in this work content analyses:

- Obtained business performance
- Forms, sources of financing investment
- Approaches to determine the cost of capital
- Used methods of investment risk analysis.

What is the current situation, behavior and decision-making in area of investment in Slovak industry compared with the wood processing industry of Slovak republic (WPI SR), where the progress and development is, we presented in our work.

Methodologicaly, there was created on-line questionnaire through internet application to build data collection of companies in Slovakia. We maintain complete anonymity of participating firms. The size of research sample was 164 counts. The relatively low frequency resulted mainly from the reluctance of companies, their negative mood and skepticism of economic development, lack of time or lack of interest. Nevertheless, the research sample of 164 firms we consider as relevant with sufficient expressive capability.

The research was also interested in wood processing companies. Statistical classification of Economic activies (NACE Rev. 2) in the Statistical Office of the Slovak Republic defines within the industry:

- Manufacture of wood (Wood industry – WI)
- Manufacture of pulp and paper products (Pulp and paper industry – PPI)
- Manufacture of furniture (Furniture industry – FI).

The aim was also to analyse individual sectors included to wood processing complex, but just low number eg. in the pulp and paper industry (2 companies), in the furniture industry (11 companies) would cause the low relevance of the results for the two-dimensional statistics, because these sectors individually assessed only by means of univariate descriptive statistics. For two-dimensional statistics for qualitative (nominal) variables we put related sectors together. In this case, the sample created all sectors of the wood processing industry (WPI) covering 34 companies. Basic information about research samples presents Table 7.3.

Table 7.3. Basic information of research samples

Sample	Industry	Sample size
Sample of all companies	All tested industries and branches	164 companies
Sample of WPI companies	Industries included to WPI: WI, FI, PPI	34 companies

Companies were initially analyzed according the distribution of the achieved performance of the 6 particular groups (Group 0-5, group 0 - worst performance with negative ROE, Group 5 - the highest performance with the ROE over 10%).

We have used mathematical and statistical methods in the research of interdependencies and impacts of individual factors on achieved performance of companies.

One-dimensional inductive statistics:

In research, we analyzed selected descriptive statistics for one variable – absolute and relative frequencies, cumulative frequency and cumulative relative frequency, mean, median and mode. Statistical methods were used: frequency tables showing the frequency by categories, histograms, pie charts, bar and cumulative bar charts, time series and trends.

Two-dimensional inductive statistics between categorical variables

The research consisted from qualitative – nominal variables, their relationship cannot adequately describes the correlation analysis, so the association between variables we examined with contingency.

Cumulative bar graph represents the best way of graphical representation of the relationship between a pair of categorical variables. In fact, it is a graphical representation of row or column percentages in contingency table (Rimarčík, 2007).

We applied chi-squared test, which is commonly used for testing the independence between two categorical variables. Results of chi-squared tests describe selected statistics: Pearson's chi-square and significance p-value „p", Maximum-Likelihood chi-square and p-value, Pearson's contingency coefficient (CC), Adjusted contingency coefficient (Adj. CC) and degrees of freedom (df).

The term contingency table was first used by Pearson (1904). It is a method of organizing and analyzing data by groups, categories or classes, which allows them to be compared. It combines the frequency distribution of two variables and represents an extension of simple frequency table. It contains the observed frequencies, expected frequencies and the difference between observed and expected frequencies (residuals).

The only assumption underlying the use of the Chi-square (other than random selection of the sample) is that the expected frequencies are not very small. The 2x2 tables would be the value of the expected frequency for each cell being in a table greater than 5. When the expected cell frequencies fall below 5, those probabilities cannot be estimated with sufficient

precision. For larger tables, compliance of this condition is often problematic. The result is inaccurate approximation of the test characteristics of the chi-square probability distribution. However, according to Finkelstein & Levin (2001), for tables larger than 2x2 it is recommended to have at least 80% of the expected frequency of greater than 5 or not the expected frequency of less than 1 in more than 10 % of cases.

For statistical analysis, numeric and graphical presentation of the research results, we used the program MS Office Excel and Statistic software from StatSoft, Inc.

7.3. FINDINGS FROM THE RESEARCH

7.3.1. Obtained business performance

For basic sorting parameter Business performance (ROE indicator), we analyzed the selected descriptive statistics of one variable. Achievements in various sectors as well as in related research samples are presented in

Table 7.4 and Table 7.5, histogram according to the particular performance groups in the sample of all companies recorded Figure 7.1.

Table 7.4. Descriptive statistics: Business performance (ROE indicator)

Industry	Counts	Mean	Median	Mode	Counts (mode)
Pharmaceutical industry	1	5.00	5	5	1
Automotive industry	16	2.94	3	multiple	4
Electrotechnic industry	8	2.25	2	1	3
Buildings	15	2.13	2	1	5
Engineering industry	30	2.00	2	multiple	7
Wood harvesting and transport	5	2.00	2	multiple	2
Other	55	2.00	2	1	15
Wood industry	21	1.90	1	1	8
Furniture industry	11	1.27	1	2	4
Pulp and paper industry	2	1.00	1	multiple	1
Common samples:					
Sample of all companies	164	2.06	2	1	47
Sample of WPI companies	34	1.65	1	1	11
Manufacture	106	2.02	2	1	32
Servises. commercial	58	2.14	2	1	15

Table 7.5. Observed frequencies: Business performance (ROE indicator)

Group (ROE indicator)	Group 0 (negative ROE)	Group 1 (0-2 %)	Group 2 (2-4 %)	Group 3 (4-7 %)	Group 4 (7-10 %)	Group 5 (over 10 %)	Total
Sample of all companies							
counts	25	47	35	26	12	19	164
cumulative	25	72	107	133	145	164	-
relative counts	15.24%	28.66%	21.34%	15.85%	7.32%	11.59%	100.00%
cumulative	15.24%	43.90%	65.24%	81.10%	88.41%	100.00%	-
Sample of WPI companies							
counts	8	11	8	3	0	4	34
cumulative	8	19	27	30	30	34	-
relative counts	23.53%	32.35%	23.53%	8.82%	0.00%	11.76%	100.00%
cumulative	23.53%	55.88%	79.41%	88.24%	88.24%	100.00%	-

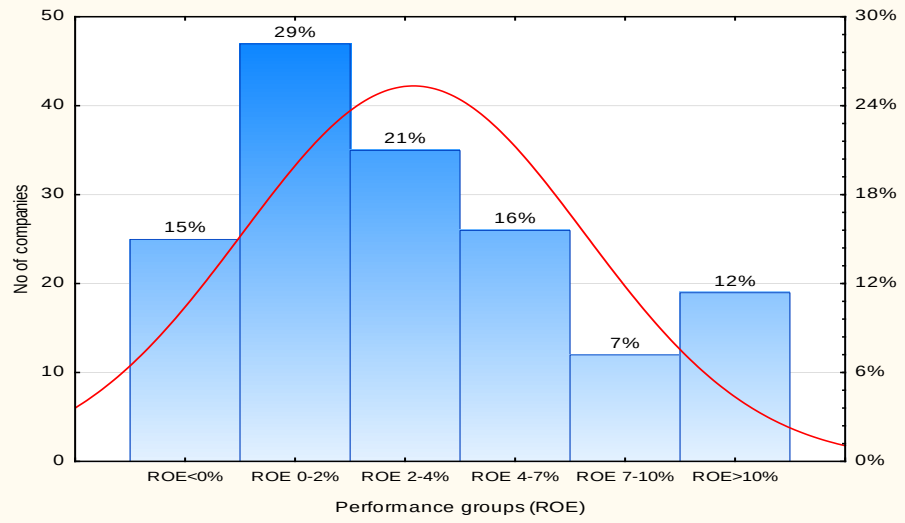

Figure 7.1. Histogram: Business Performance (ROE)

From the descriptive statistics of variable business performance (categorized according the ROE indicator into 6 groups) in the sample of all companies, presented on Figure 1 shows the mean 2.06, companies in average create positive, but relatively low Return on Equity in the range of 2-4 % in Slovakia. Median is at level 2. Modus, the maximum frequency is represented in the second group with a performance at the level of 0-2 % ROE, which includes 47 (29 %) of the total sample of enterprises.

By comparison, in the sectors of the WPI are larger frequencies of lower performance in groups 0, 1, 2 and 3, the median in comparison with the sample of all enterprises have been reduced to a negative one, which means that up to half of the WPI enterprises has a negative or

very low positive ROE. The results of descriptive statistics thus represent the lowest performance of all surveyed industries.

7.3.2. Investment decisions

7.3.2.1. Form of financing investment

Forms of financing investment analysis was conducted based on questions where respondents could identify only one of eight predefined answers. From the presented results (Figure 2) it is evident that most companies use as a method of combination of equity and debt, as well as the ranking of the five most numerous categories for the two research samples are the same. An analysis of the frequencies in each category forms of financing arise some differences between the sample of all businesses and WPI enterprises. Almost half of WPI enterprises DSP (47%) use a combination of own resources and debt, the sample of all businesses is to a lesser extent (30%). WPI firms use less equity finance only - the retained earnings, never through stock increase and non-repayable contributions (grants) as the sole source of financing the investment.

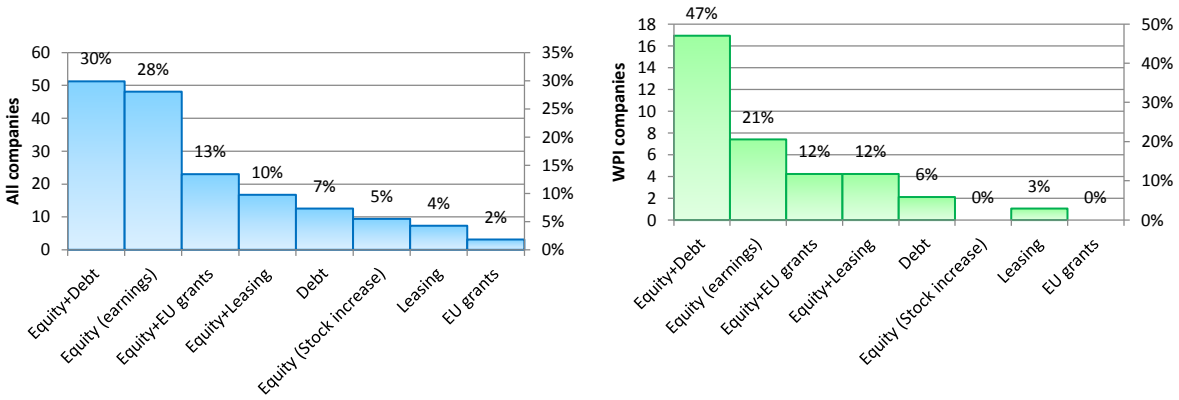

Figure 7.2. Observed relative frequencies: Forms of financing investment in all companies and WPI

Table 7.6. Observed frequencies: Forms of financing investment – all companies

Forms of financing investment	Group 0 ROE<0	Group 1 ROE: 0-2%	Group 2 ROE: 2-4%	Group 3 ROE: 4-7%	Group 4 ROE: 7-10%	Group 5 ROE>10%	Row Totals
Equity + Debt	7	14	11	6	6	5	49
Share in category	14.29%	28.57%	22.45%	12.24%	12.24%	10.20%	
Share in total	4.27%	8.54%	6.71%	3.66%	3.66%	3.05%	29.88%
Equity + Leasing	2	5	3	5	0	1	16
Share in category	12.50%	31.25%	18.75%	31.25%	0.00%	6.25%	
Share in total	1.22%	3.05%	1.83%	3.05%	0.00%	0.61%	9.76%
Equity (retained earnings)	5	12	13	3	2	11	46
Share in category	10.87%	26.09%	28.26%	6.52%	4.35%	23.91%	
Share in total	3.05%	7.32%	7.93%	1.83%	1.22%	6.71%	28.05%
Equity + EU Grants	3	4	4	9	0	2	22
Share in category	13.64%	18.18%	18.18%	40.91%	0.00%	9.09%	
Share in total	1.83%	2.44%	2.44%	5.49%	0.00%	1.22%	13.41%
Debt	5	3	1	2	1	0	12
Share in category	41.67%	25.00%	8.33%	16.67%	8.33%	0.00%	
Share in total	3.05%	1.83%	0.61%	1.22%	0.61%	0.00%	7.32%
Equity (Stock increase)	2	4	0	1	2	0	9
Share in category	22.22%	44.44%	0.00%	11.11%	22.22%	0.00%	
Share in total	1.22%	2.44%	0.00%	0.61%	1.22%	0.00%	5.49%
Leasing	0	3	3	0	1	0	7
Share in category	0.00%	42.86%	42.86%	0.00%	14.29%	0.00%	
Share in total	0.00%	1.83%	1.83%	0.00%	0.61%	0.00%	4.27%
EU Grants	1	2	0	0	0	0	3
Share in category	33.33%	66.67%	0.00%	0.00%	0.00%	0.00%	
Share in total	0.61%	1.22%	0.00%	0.00%	0.00%	0.00%	1.83%
Counts total	25	47	35	26	12	19	164
Share total	15.24%	28.66%	21.34%	15.85%	7.32%	11.59%	100.0%

Table 7.7. Observed frequencies: Forms of financing investment – WPI companies

Forms of financing investment	Group 0 ROE<0	Group 1 ROE: 0-2%	Group 2 ROE: 2-4%	Group 3 ROE: 4-7%	Group 5 ROE>10%	Row Totals
Equity + Debt	4	5	5	1	1	16
Share in category	25.00%	31.25%	31.25%	6.25%	6.25%	
Share in total	11.76%	14.71%	14.71%	2.94%	2.94%	47.06%
Equity + Leasing	2	0	1	1	0	4
Share in category	50.00%	0.00%	25.00%	25.00%	0.00%	
Share in total	5.88%	0.00%	2.94%	2.94%	0.00%	11.76%
Equity (retained earnings)	0	2	2	0	3	7
Share in category	0.00%	28.57%	28.57%	0.00%	42.86%	
Share in total	0.00%	5.88%	5.88%	0.00%	8.82%	20.59%
Equity + EU Grants	1	3	0	0	0	4
Share in category	25.00%	75.00%	0.00%	0.00%	0.00%	
Share in total	2.94%	8.82%	0.00%	0.00%	0.00%	11.76%
Debt	1	0	0	1	0	2
Share in category	50.00%	0.00%	0.00%	50.00%	0.00%	
Share in total	2.94%	0.00%	0.00%	2.94%	0.00%	5.88%
Leasing	0	1	0	0	0	1
Share in category	0.00%	100.00%	0.00%	0.00%	0.00%	
Share in total	0.00%	2.94%	0.00%	0.00%	0.00%	2.94%
Counts total	8	11	8	3	4	34
Share total	23.53%	32.35%	23.53%	8.82%	11.76%	

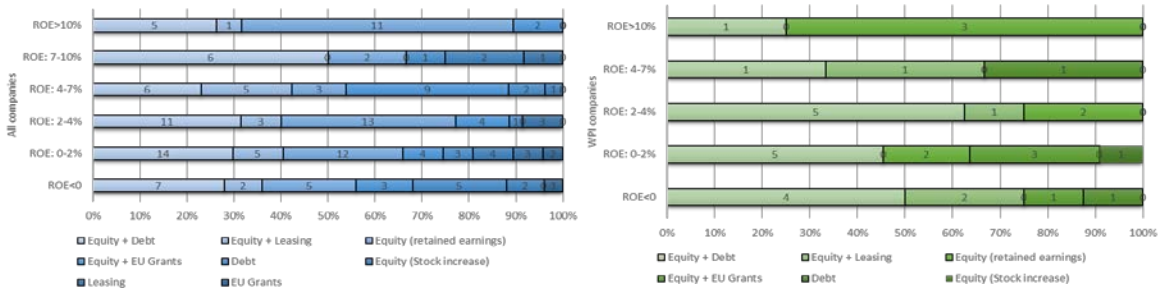

Figure 7.3. Cumulative bar charts: Forms of financing investment in all companies and WPI

The analysis of the data sample of all firms (Table 7.6) it can be seen that enterprises that finance investments combination of equity and grants, the largest share (40.91%) were placed in group performance 3 (ROE 4-7%), while in financing the combination of equity and debt most were in group 1 (s ROE 0-2%). When financing leases were mainly represented by performance groups 1 and 2 (ROE 0-4%). The graphic solution (Figure 7.3) clearly dominates

the relatively high frequency of firms that finance the investment from its own resources (retained earnings) and achieve the highest performance with a ROE of 10%.

The results of the research WPI enterprises (Table 7.7) indicate a rather negative conclusion in the most frequently way of financing - a combination of equity and debt, which businesses predominantly merit in the lowest groups 0, 1 and 2 (negative ROE, respectively ROE 0-4%). In financing investments by combination of equity and grants, three of the four enterprises reached underperformance at 0-2% ROE. Again, even relatively specifically in WPI businesses appears most often achieved performance group 5 with a ROE of 10% in financing of investment from retained earnings (Table 7.8).

Table 7.8. Average performance in categories: Forms of financing investment

Forms of financing investment	Equity + Leasing	Equity + Debt	Equity (retained earnings)	Equity + EU Grants	Debt	Equity (Stock increase)	EU Grants	Leasing	All categories
All companies	1.937	2.102	2.391	2.2272	1.250	1.666	0.666	1.857	2.0609
WPI companies	1.250	1.437	3.000	0.7500	1.500	-	-	1.000	1.6470

The results of performance averages in each category (Table 8) evidence, that the highest performance achieve the enterprises applying finance investments from retained earnings, significantly, particularly in the WPI companies, where the average value of 3.00, which represents the performance under the ROE 4-7%. This may be influenced by two factors. Firstly, it is a reflection of Slovak companies that still consider the equity as the cheapest source, and do not take into account the opportunity cost of capital, and secondly, the cost of debt capital is high in Slovakia. In the sample of all firms can be positively stated second most powerful form of financing combination of equity and grants, given the form of financing is clear negative for WPI companies, which is the lowest average value.

7.3.2.2. Approaches to determine the cost of capital

As businesses determine the cost of capital, we analyzed the question where respondents are selected just one of five responses. From the initial results show that up to 39% of the all enterprises do not determine the cost of capital, in WPI enterprises this category

represented to a lesser extent (32%). From the above it can be assumed that firms in this category do not apply a discounted methods of assessing the effectiveness of investments based on applying the cost of capital as the discount rate. The percentages in all categories presents the Figure 7.4.

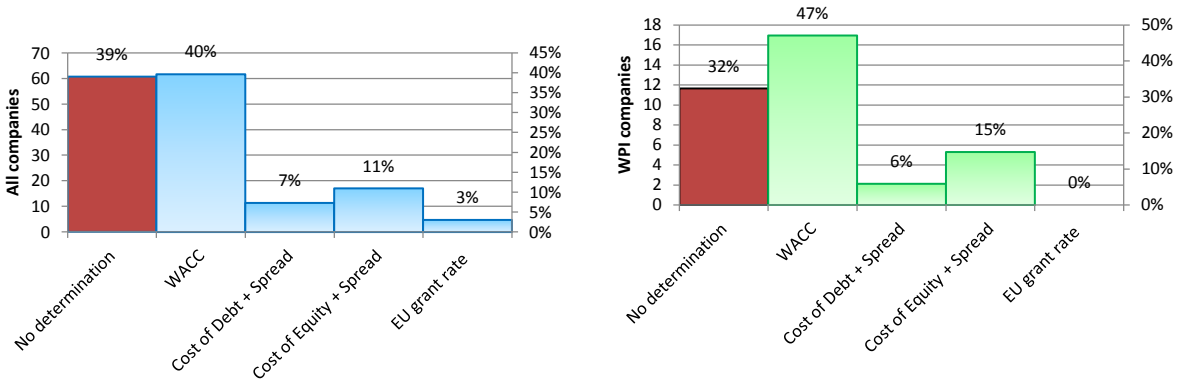

Figure 7.4. Observed relative frequencies: Determination of capital cost in all companies and WPI

Table 7.9. Observed frequencies: Determination of capital cost – all companies

Determination of capital cost	Group 0 ROE<0	Group 1 ROE: 0-2%	Group 2 ROE: 2-4%	Group 3 ROE: 4-7%	Group 4 ROE: 7-10%	Group 5 ROE>10%	Row Totals
No determination	9	20	11	10	6	8	64
Share in category	14.06%	31.25%	17.19%	15.63%	9.38%	12.50%	
Share in total	5.49%	12.20%	6.71%	6.10%	3.66%	4.88%	39.02%
WACC	8	15	21	13	3	5	65
Share in category	12.31%	23.08%	32.31%	20.00%	4.62%	7.69%	
Share in total	4.88%	9.15%	12.80%	7.93%	1.83%	3.05%	39.63%
Cost of Equity + Spread	5	5	1	2	2	3	18
Share in category	27.78%	27.78%	5.56%	11.11%	11.11%	16.67%	
Share in total	3.05%	3.05%	0.61%	1.22%	1.22%	1.83%	10.98%
Cost of Debt + Spread	1	5	2	0	1	3	12
Share in category	8.33%	41.67%	16.67%	0.00%	8.33%	25.00%	
Share in total	0.61%	3.05%	1.22%	0.00%	0.61%	1.83%	7.32%
EU grant rate	2	2	0	1	0	0	5
Share in category	40.00%	40.00%	0.00%	20.00%	0.00%	0.00%	
Share in total	1.22%	1.22%	0.00%	0.61%	0.00%	0.00%	3.05%
Counts total	25	47	35	26	12	19	164
Share total	15.24%	28.66%	21.34%	15.85%	7.32%	11.59%	100.00%

Table 7.10. Observed frequencies: Determination of capital cost – WPI companies

Determination of capital cost	Group 0 ROE<0	Group 1 ROE: 0-2%	Group 2 ROE: 2-4%	Group 3 ROE: 4-7%	Group 5 ROE>10%	Row Totals
No determination	3	4	2	1	1	11
Share in category	27.27%	36.36%	18.18%	9.09%	9.09%	
Share in total	8.82%	11.76%	5.88%	2.94%	2.94%	32.35%
WACC	3	4	6	1	2	16
Share in category	18.75%	25.00%	37.50%	6.25%	12.50%	
Share in total	8.82%	11.76%	17.65%	2.94%	5.88%	47.06%
Cost of Equity + Spread	2	2	0	1	0	5
Share in category	40.00%	40.00%	0.00%	20.00%	0.00%	
Share in total	5.88%	5.88%	0.00%	2.94%	0.00%	14.71%
Cost of Debt + Spread	0	1	0	0	1	2
Share in category	0.00%	50.00%	0.00%	0.00%	50.00%	
Share in total	0.00%	2.94%	0.00%	0.00%	2.94%	5.88%
Counts total	8	11	8	3	4	34
Share total	23.53%	32.35%	23.53%	8.82%	11.76%	

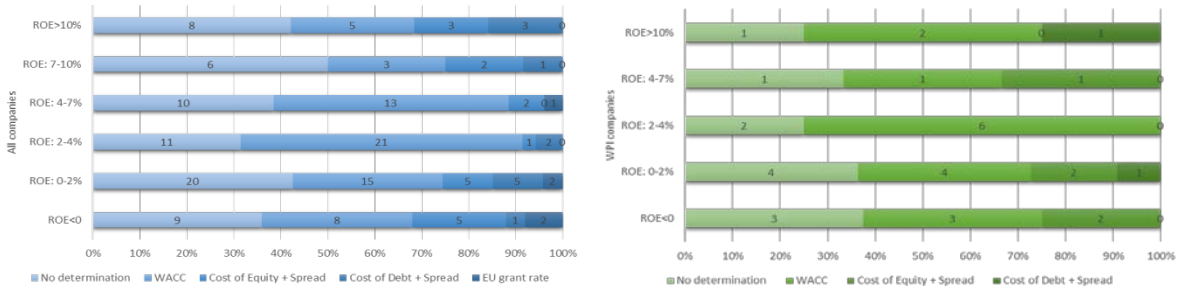

Figure 7.5. Cumulative bar charts: Determination of capital cost in all companies and WPI

For category where companies do not determine the cost of capital, a similar development was recorded in a sample of all enterprises (Table 7.9) than in WPI enterprises (Table 10). The highest frequency was found in the below-average performance group 1 (ROE 0-2%), lower frequencies (in the range of 6-11 in the sample of all enterprises, 1-3 WPI companies) were relatively evenly distributed in the other categories. From the graphic solution also can be seen (Figure 7.5), that the greatest frequencies throughout the investigation were in the category of WACC in the third performance group with 2-4% ROE.

The analysis of methods for determining the cost of capital and business performance showed the measured value of $p<0.05$ in the sample of all enterprises. Failure to meet the assumption of minimum frequencies in cells of contingency tables, however, consign us to the decision to not examine further contingency coefficients and the results of residues, which designate the typical categories for particular performance group.

Table 7.11. Average performance in categories: Determination of capital cost

Determination of capital cost	No determination	WACC	Cost of Debt + Spread	Cost of Equity + Spread	EU grant rate	All categories
All companies	2.125000	2.046154	2.333333	2.000000	1.000000	2.060976
WPI companies	1.454545	1.812500	3.000000	1.000000	-	1.647059

When analyzing the average of the categories specified cost of capital, we found (Table 7.11), that the sample of all enterprises is relatively balanced level in 4 categories (except the cost based on sources from the EU grants) in the range 2.00 to 2.33. For the WPI enterprises are some differences, where the highest value reached 3.00 average the category with cost based on the debt cost plus a risk premium, but the results are not considered authoritative, whereas in this category were only two WPI companies.

7.3.2.3. Methods of investment risk analysis

Possibilities and ways of assessing risk investments, we analyzed in the question of where businesses could choose only one of the five responses. The results show (Figure 7.6), the most numerous category is no method of investment risk analysis, the sample of all enterprises 55%, less in WPI (44%), but the high proportion of this category in both research samples. The most numerous category is no method of investment risk analysis, the sample of all enterprises 55%, less in WPI (44%), but the high proportion of this category in both research samples.

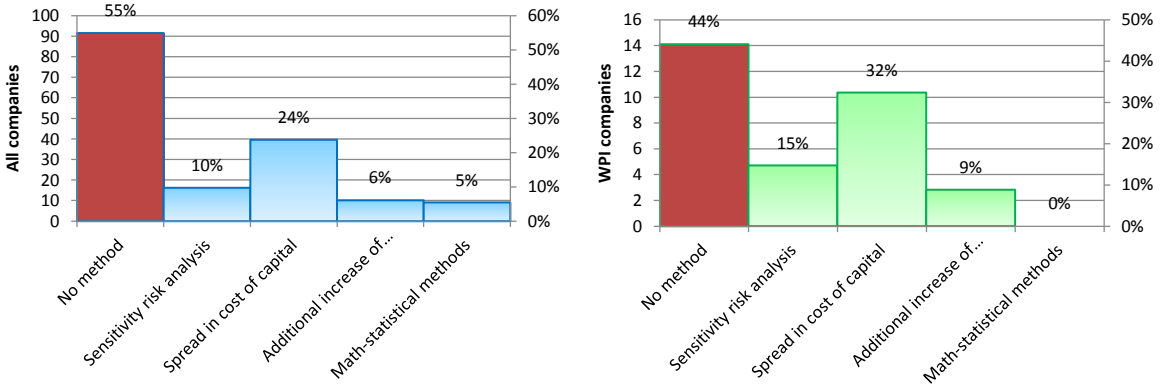

Figure 7.6. Observed relative frequencies: Methods of investment risk analysis in all companies and WPI

Table 7.12. Observed frequencies: Methods of investment risk analysis – WPI companies

Methods of investment risk analysis	Group 0 ROE<0	Group 1 ROE: 0-2%	Group 2 ROE: 2-4%	Group 3 ROE: 4-7%	Group 4 ROE: 7-10%	Group 5 ROE>10%	Row Totals
No method	13	30	17	13	8	9	90
Share in category	14.44%	33.33%	18.89%	14.44%	8.89%	10.00%	
Share in total	7.93%	18.29%	10.37%	7.93%	4.88%	5.49%	54.88%
Additional increase of interest rate	1	6	2	1	0	0	10
Share in category	10.00%	60.00%	20.00%	10.00%	0.00%	0.00%	
Share in total	0.61%	3.66%	1.22%	0.61%	0.00%	0.00%	6.10%
Spread in cost of capital	9	8	9	3	3	7	39
Share in category	23.08%	20.51%	23.08%	7.69%	7.69%	17.95%	
Share in total	5.49%	4.88%	5.49%	1.83%	1.83%	4.27%	23.78%
Sensitivity risk analysis	1	2	6	3	1	3	16
Share in category	6.25%	12.50%	37.50%	18.75%	6.25%	18.75%	
Share in total	0.61%	1.22%	3.66%	1.83%	0.61%	1.83%	9.76%
Math-statistical methods	1	1	1	6	0	0	9
Share in category	11.11%	11.11%	11.11%	66.67%	0.00%	0.00%	
Share in total	0.61%	0.61%	0.61%	3.66%	0.00%	0.00%	5.49%
Counts total	25	47	35	26	12	19	164
Share total	15.24%	28.66%	21.34%	15.85%	7.32%	11.59%	100.0%

Table 7.13. Observed frequencies: Methods of investment risk analysis – WPI companies

Methods of investment risk analysis	Group 0 ROE<0	Group 1 ROE: 0-2%	Group 2 ROE: 2-4%	Group 3 ROE: 4-7%	Group 5 ROE>10%	Row Totals
No method	4	5	3	1	2	15
Share in category	26.67%	33.33%	20.00%	6.67%	13.33%	
Share in total	11.76%	14.71%	8.82%	2.94%	5.88%	44.12%
Additional increase of interest rate	0	2	1	0	0	3
Share in category	0.00%	66.67%	33.33%	0.00%	0.00%	
Share in total	0.00%	5.88%	2.94%	0.00%	0.00%	8.82%
Spread in cost of capital	3	3	2	1	2	11
Share in category	27.27%	27.27%	18.18%	9.09%	18.18%	
Share in total	8.82%	8.82%	5.88%	2.94%	5.88%	32.35%
Sensitivity risk analysis	1	1	2	1	0	5
Share in category	20.00%	20.00%	40.00%	20.00%	0.00%	
Share in total	2.94%	2.94%	5.88%	2.94%	0.00%	14.71%
Counts total	8	11	8	3	4	34
Share total	23.53%	32.35%	23.53%	8.82%	11.76%	

When analyzing the various categories of risk analysis (Table 7.12 and Table 7.13) we found that the use of mathematical and statistical methods lacking in WPI enterprises, the sample of all enterprises were recorded in a small range of 5.49%, but most businesses

reached the fourth performance group with ROE 4-7%. Businesses that apply sensitivity risk analysis, most placed in the third performance group with 2-4% ROE. The highest frequency (30 businesses) in the category which do not apply the analysis of risk in the investments, the performance of group 1 of very low ROE to 2%, lower frequency (in the range of 8-17, in the sample of all companies) were relatively evenly distributed in other categories (Figure 7.7).

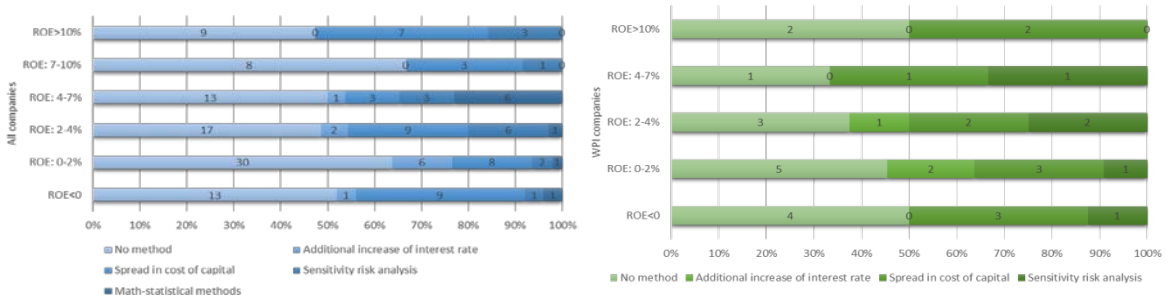

Figure 7.7. Cumulative bar charts: Methods of investment risk analysis in all companies and WPI

The research of investment risk analysis methods and performance of businesses showed the measured value of $p<0.05$ in the sample of all enterprises. Failure to meet the assumption of minimum frequencies in cells of contingency tables have led us to the decision to not examine the results of chi-square test, contingency coefficients or the results of residues, what designates the typical categories for each performance group.

Table 7.14. Average performance in categories: Methods of investment risk analysis

Methods of investment risk analysis	No method	Sensitivity risk analysis	Spread in cost of capital	Additional increase of interest rate	Math-statistical methods	All categories
All companies	2.000	2.625	2.102564	1.300	2.333	2.0609
WPI companies	1.600	1.600	1.818182	1.333	-	1.6470

Data averages in the sample of all enterprises shows that the highest performance is achieved, when companies apply sensitivity risk analysis, in contrast, low performance is at an additional increase of capital cost. These facts can be evaluated in a way that firms increase their performance away from the simplicity and uncertainty (how much to increase additionally the capital cost?) into precise methodological approach (quite challenging, but precisely

formulated sequence of steps in the sensitivity analysis). It can not, however, say that if companies exclude the investments risk analysis, achieve a lower performance (see Table 14). In WPI is the highest performance category, where companies apply a risk premium to the cost of capital.

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8. BUILDING AND IMPLEMENTING THE COMPETENCY MODEL IN WOOD-INDUSTRY SECTOR

Jože Kropivšek, Matej Jošt, Anton Zupančič

8.1. INTRODUCTION

Organizational changes, changes in technologies and other business challenges are forcing companies to develop skills and knowledge of employees. Last couple of years we have witnessed dramatic changes in the types of skills that employees require to succeed in the workplace. Nowadays individuals can access and distribute specialised information quickly and easily (e.g. internet), therefore the demand for skills associated with the storage and retrieval of detailed technical information (e.g., memorisation and classification for archival purposes) has reduced. In contrast, the ability to source, process, manage, communicate and apply knowledge across diverse contexts has come to be seen as critical for workplace success (Young and Chapman, 2010).

Competencies are very important at obtaining inter-organizational competitiveness. Organizations strive to enhance competencies as part of organizational human resources management and curriculum development (Overby and Suvanujasiri, 2012).

Training and education of employees is very important at ensuring their competence for the job, which in turn leads to their increased motivation, greater efficiency and quality of work. Broader and more in-depth knowledge and greater competencies of employees are key to ensuring innovation in the development of the company (and sector), search for new and better solutions and increase competitive advantages. In that manner also reward systems, career tracks, selection systems, and the structure of organizations need to change to focus on competencies; in the global competitive environment the competency-based approach and the capabilities that individuals need to acquire and develop should be the major focus (Lawler, 1994).

The importance of competencies to organizations cannot be overstated; in fact, they can be the key to competitive advantage. In order for an organization to succeed in its mission,

organizational competencies must match strategic intent. Without the needed competencies, even well-conceptualized and well-stated strategies cannot be successfully implemented and realized. It is competencies that allow the concept of strategic intent to be operationalized (Cardy and Selvarajan, 2006).

Providing agility is often a problem in practice, mainly because of the low level of knowledge and/or inadequate competencies of employees. This is a major obstacle in the wood-industry companies, where the basic educational structure is relatively low (Kropivšek et al., 2009). Competency model development for the wood industry is therefore necessary, but its implementation in job classification and human resources management (HRM) is even more important. In the framework of a larger project (Kropivšek et al., 2013) a sectorial model of competence for wood-industry were developed, which covers the needs and diversity of large, medium and small companies and considers the specifics of their activities.

The objectives of the research was: (1) to review the literature about competencies and building the competency models, (2) to measure the state of competencies (competency gaps) of the individual employees at various jobs and profiles based on developed competency model for wood-industry sector in different organizations, and (3) to provide required content of education and training to improve identified lack of competencies at different jobs and profiles in Slovenian wood-industry sector.

8.2. COMPETENCE

Competence is understood as "knowledge, ability, dexterity, know-how, experience and other personal characteristics necessary to successfully performance of specific tasks" (Svetlik, 2005). The concept of competency can include the traditional knowledge, skills, and abilities, but also go beyond these characteristics. According to Lustri et al. (2007), the topic about competences began to be discussed by US psychologists and administrators, with the publication of “Testing for competence rather than intelligence”, McClelland (1973), who defines competencies as personal characteristics that can lead to higher performance. These characteristics are aptitudes (natural talent, susceptible to improvement), abilities (the practical application of a talent) and knowledge (necessary information for task achievement). Specifically, effective performance includes not only capability, but also the motivation or desire

to perform (Woodruffe, 1993). Kochanski (1996) offers a simple description of competencies as the success factors in an employee's organization and profession. Similarly, Kennedy and Dresser (2005) recently defined competencies as anything employees have or acquire that contributes to organizational success. In sum, employee competencies are characteristics associated with successful performance (Cardy and Selvarajan, 2006).

The terms “competence” and “competency” differs in literature. David Dubois' (1998) define the competency as: “Those characteristics-knowledge, skills, mindsets, thought patterns, and the like–that when used whether singularly or in various combinations, result in successful performance” (Dubois, 1998, Teodorescu, 2006). Woodruffe (1993) defines competency as a set of behaviour patterns that the incumbent needs to bring to a position in order to perform its tasks and functions with competence (Woodruffe, 1993). McClelland (1973) does not directly define the word competency, but uses the term as a “symbol for an alternative approach to traditional intelligence testing”. In this approach, McClelland advocates the use of skill sets related to performance on the criteria based on criterion sampling (Cardy and Selvarajan, 2006). Competency development and management are widely regarded as vital tools to enhance competitiveness for organizations. Furthermore, organizational-level competencies are embedded in the employee-level competencies, and the employee level competencies can be further divided into technical competencies and behavioural competencies. The technical competencies are job-related skills and knowledge, while the behavioural competencies refer to personal attributes or characteristics (Yu-Ting, 2010).

Marrelli et al. (2005) define competency as a measurable human capability that is required for effective performance. A competency may be comprised of knowledge, a single skill or ability, a personal characteristic, or a cluster of two or more of these attributes. Competencies are the building blocks of work performance. The performance of most tasks requires the simultaneous or sequenced demonstration of multiple competencies (Marrelli et al., 2005):

- Knowledge is awareness, information, or understanding about facts, rules, principles, guidelines, concepts, theories, or processes needed to successfully perform a task. Knowledge is acquired through learning and experience.
- Skill is a capacity to perform mental or physical tasks with a specified outcome.

- Ability is a demonstrated cognitive or physical capability to successfully perform a task with a wide range of possible outcomes. Ability is often a constellation of several underlying capacities that enable us to learn and perform.
- Personal characteristics may be required for or may influence effective performance. These characteristics, such as attitudes, values, and traits, often have an emotional or personality component. It is also useful to define these personal characteristics as ‘‘enabling behaviours.’’ These include work habits, ways of interacting with others, or manners of conducting oneself that contribute to effective work performance.

Competency is a combination of motive, trait, skill, aspect of ones self-image or social role. Boyatzis (1982) has emphasized on the concept of competency as the characteristics of people and indicates ways of behaving or thinking generalizing across situations and enduring for a reasonably long period of time. The outcome of possessing a competency at a particular level is the ‘behaviour’, which is observable. Thus competencies can be judged on the behaviour of an individual on specific situations (Sarkar, 2010). Figure 8.1 shows the relation of competency and performance.

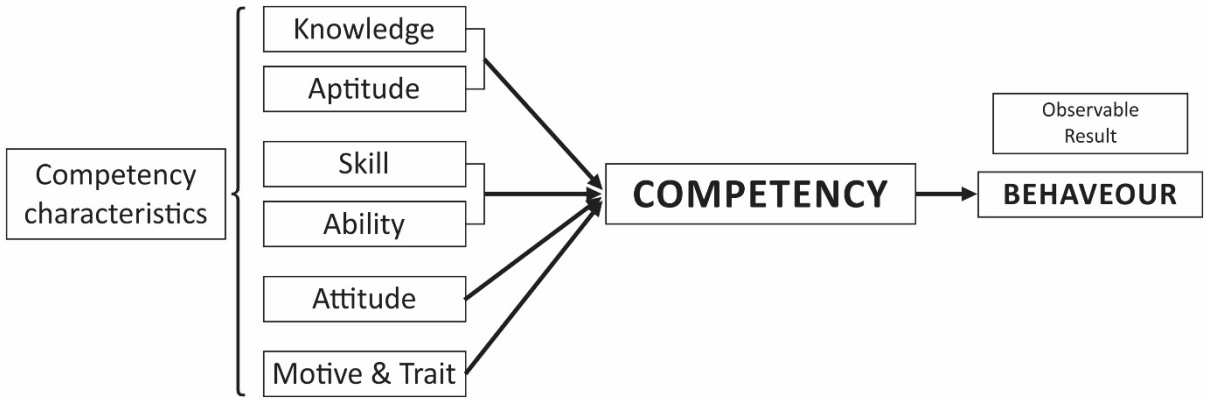

Figure 8.1. Concept of Competency (adopted by Sarkar, 2010)

Competence equals worthy performance that leads directly to the most efficient accomplishment of organizational goals. It is the way that we use and apply it at our work (Teodorescu, 2006). Gilbert (1996) defines competence as: “Competent people are those who can create valuable results without excessively costly behaviour”.

The competencies are now commonly conceptualized as measurable patterns of knowledge, skills, abilities, behaviours, and other characteristics that differentiate high from average performance (Yu-Ting, 2010).

Turner and Crawford (1994) broadly classify competencies as belonging to one of two categories: personal or corporate. Personal competencies are possessed by individuals and include characteristics such as knowledge, skills, abilities, experience, and personality. Corporate competencies belong to the organization and are embedded processes and structures that tend to reside within the organization, even when individuals leave. These two categories are not entirely independent. The collection of personal competencies can form a way of doing things or a culture that becomes embedded in the organization. In addition, corporate characteristics can determine the type of personal competencies that will best work or fit in the organization. Our focus is on personal, or employee, competencies (Cardy and Selvarajan, 2006).

8.3. COMPETENCY MODEL

As we already found out, competencies have the potential to be sources of competitive advantage. With this aim, the competencies must, first and foremost, be aligned with the strategic direction of the organization. Cardy and Selvarajan (2006) suggests answering the following questions: (1) What competencies are really needed to realize the strategic goals? and (2) What kinds of skills, knowledge, and other characteristics do employees need that will provide the organization a competitive advantage?

One of the possible ways to this direction in to develop competency model. There are several definitions of what competency model is. Mansfield (1996) defines competency model as a “detailed and behaviourally specific description of the characteristics employees need to be effective”. He claimed that competency model might be also considered as a set of competencies associated with a job or role in an organization. Marrelli et al. (2005) defines competency model as an organizing framework that lists the competencies required for effective performance in a specific job, job family (i.e., group of related jobs), organization, function, or process. Individual competencies are, according to the same authors, organized into

competency models to enable people in an organization or profession to understand, discuss, and apply the competencies to workforce performance.

A competency model can also be defined as a set of success factors, and includes the key behaviours required for excellent performance in a particular role; it usually comprises a list of required competencies (Yu-Ting, 2010). Another definition of competency model is more technical and recognises a competency model as a descriptive tool that identifies the “knowledge, skills, abilities, and behaviour needed to perform effectively in an organization" (Gayeski et al., 2007). With competency modelling, the result is a list, graphic, spreadsheet, or interactive program that lists the skills, knowledge, attributes, and desirable behaviour thought to be required for successful performance for a specific job role. One major problem is that these statements may be very broad and may not link directly to the actual day-to-day work or to the measurable results that the organization requires and pays people for (Teodorescu, 2006).

If we understand competency model as detailed, behaviourally specific description of the skills and traits that employees need to be effective in a job, two ways of developing and using competency models are possible (Mansfield, 1996):

(1) the single-job competency model and

(2) the "one-size-fits-all" competency model.

Each of them has pros and cons. Trends in the workplace will make the last multiple-job approach more attractive. First, as organizations accomplish more and more work through teams that are assembled for specific projects, it will become more important to develop efficient methods for locating employees with particular skill sets. With the multiple-job approach, the organization can assess all employees on a large set of technical and nontechnical competencies. If these assessments are stored in a database, it is easy to locate individuals with required combinations of skills. The development of software applications designed to facilitate the matching of employee profiles with job requirements will also increase the attractiveness of the multiple-job approach, if the applications allow easy customization to meet particular organizational needs. Another organizational trend favouring the multiple-job approach is the increasing use of skill-based compensation which is often implemented when organizations implement cross-functional teams. Because jobs on these teams require a broader range of skills, organizations often implement skill-based compensation to encourage

employees to develop the new skills. One final organizational trend which may foster increased use of the multiple-job approach to building competency models is decreased upward mobility. Competency models must include technical skills and a set of generic competencies that can encompass the requirements of a diverse set of jobs, what is essential requirement of the multiple-job approach (Mansfield, 1996).

Furthermore, the competency model can be used to "identify the required competencies which employees need to improve performance in their current job or to prepare for other jobs; in particular, employees' competencies may be compared to an appropriate model in order to detect where the gaps in their competencies exist" (Yu-Ting, 2010). In this way individual training and development plans can be developed to bridge these gaps.

8.4. BUILDING A MODEL

Different approaches, tools and techniques are used to develop competency model. Marrelli et al. (2005) have developed a thorough competency modelling process in seven steps. One of the most important step is data collection. Authors suggest that at least two different methods of collecting data should be used in a competency identification project. Every method of data collection has relative strengths and weaknesses, so multiple methods can complement each other and compensate for the weaknesses in singular approaches. Possible approaches are (Marrelli et al., 2005):

- Literature Review
- Focus Groups
- Structured Interviews
- Behavioural Event Interviews
- Surveys
- Observations
- Work Logs
- Competency Menus and Databases

As we noted above, if multiple data collection methods are applied within a single study, the methods can complement each other and offset the inherent disadvantages of each. For example, a large group survey is a good way to test the validity of focus group result, which are typically based on small sample sizes. Surveys are also a good way to confirm the results of observations. Another excellent combination of data collection methods is the structured interview and survey. The job content and competencies identified in the interviews subsequently can be used to construct the survey questionnaire (Marrelli et al., 2005).

According to Mansfield (1996) developing a single-job competency model starts with an identification of critical jobs and then collection of the data, which usually includes both a resource panel or focus group of job holders and/or their managers and interviews with jobholders. The data gathering phase may also include interviews with customers and direct reports, surveys of additional job holders, and direct observation of job holders at work. Once this is complete, the next step is to analyse the data to distil it into a competency model that typically includes 10-20 traits or skills, each with a definition and a list of specific behaviours that describe what effective performers do and how to achieve effective results. To develop "one-size-fits-all" competency model the first step is to identify the population (group of jobs) for whom the model will apply. Instead of gathering data, a team charged with developing the competency model usually selects concepts from available individual job competency models and from books and articles on leadership, business, organizational development, and human resource development. The competency framework can that way be aligned with the unit's mission and values and with other key organizational initiatives. All employees in the group for whom the model is developed are assessed against the same competencies and, therefore, can be compared with each other. The obvious disadvantage of it is that the competency model does not clearly describe what is needed in any specific job.

Companies use different tools and techniques to enhance the performance and rejuvenate its employees. One such technique is ‘Competency Mapping’, which can also be used for developing competency model. Competency mapping is a “tool to identify the required competencies as well as the desired level for various profiles” (Sarkar, 2010). Usefulness of the competency mapping tool is very broad: it can be used also for competency based recruitment and selection, competence development, career development, developing technical competencies, application of creativity & innovations, training and development with structured

learning plan. Competency mapping is a technique which identifies ideal behaviour and the personal skills which distinguishes exceptional and astonishing performance from average. The competency mapping model focuses on directly interacting and interviewing with the organization's person in command to understand the current and future goals of the organization. If the right sets of behavioural competencies are focused for individual employees, it helps them to gain the technical competencies required for the particular job post. Competency mapping is thus a technique to identify the gap of an employee which through adequate training can enhance his performance and lead to personal development along with professional development leading to organizational development (Sarkar, 2010).

Competency analyses as an important phase in competency model development has changed recently due to new requirements and technological possibilities. Traditional approaches base on, as we learned above, identification of competencies for a job by interviewing or observing successful performers to tease out their relevant knowledge, skills, and attitudes. The problem is that many job requirements change rapidly, so using data from a master performer today may not yield competencies that will be necessary to succeed in that same job in the future. Those who are designing training programmes and plans must base them on forward-looking rather than backward-looking competencies and workplace requirements. Traditional approaches to competency analysis are often slow, expensive, and backward looking, but new computer-aided approaches to competency analysis (such as website content scanning programs, online collaboration systems, and group decision support tools) can ensure that analyses are efficient, valid, and forward looking (Gayeski et al., 2007).

Cardy and Selvarajan (2006) established various frameworks for identifying and developing employee competencies, including two traditional approaches and two alternative approaches. Table 1 summarizes their four competency identification approaches based on the nature of competencies and organizational context. The two traditional approaches are labelled job-based and future-based. The job-based framework is labelled as such because the competencies are derived from an analysis of the job requirements. The future-based approach focuses on competencies needed to achieve a future strategic direction. This approach is still often based on an analysis of the job. But as the job will exist in the future an alternative competency framework is labelled value-based because competencies in the framework are based on the values of the organization. A second alternative framework is referred to as

person-based, as the competencies are based on characteristics of people rather than on task (Cardy and Selvarajan, 2006).

Table 8.1. Nature of competencies and organizational context as a function of the type of competency development approach (Cardy and Selvarajan, 2006)

	Job-based	Future-based	Person-based	Value-based
Nature of competencies	Static-focus on what gets done	Directional change-focus on what needs to be done	Broad and emergent	Process-focus on how things are done
Organizational context	Fixed-static; hierarchical	Fixed-future oriented	Innovation-organic and dynamic; empowered	Strong process focused

8.5. IMPLEMENTATION OF THE MODEL

In addition to developing competency model, its efficient implementation in practice is also very important. At this point we have to stress that employees must be involved in all important phases in developing and implementing the competency model. Kessler (2004) in his research indicates that "if employees are involved in developing the competency-based systems, organizations generally achieve their goals more quickly, because they have more accurate data as well as increased buy-in from employees".

Before the organization can gain much value from the model, it must build human resources tools and a program based on the model. A typical program might include (Mansfield, 1996):

- a competency assessment questionnaire to be completed by job holders, their supervisors, and their peers;
- a resource guide to help job holders form development plans based on their competency assessments; and
- a workshop to explain the competency model and provide training in development planning.

Developing these tools and the program typically takes several more months and involves significant additional costs (Mansfield, 1996).

Cardy and Selvarajan (2006) expose criteria as an important tool at implementing employee competencies, as a tool for driving employee evaluation and development. If the competencies are really to make a difference in the day-to-day routine of how the work of the organization is performed, they need to be translated into criteria for assessing and developing employees. Criteria serve to focus attention on what is important in an organization and drive recruitment and selection efforts. Further, they are used as the basis for performance appraisal, often determine compensation levels, and are used as a basis for personnel decisions such as promotion and termination. Additionally, criteria can operationalize the strategic direction and value orientation of an organization (Cardy and Selvarajan, 2006).

Effective implementation of competencies into practice is closely associated with the concept of business agility, which means the ability at adapting the organization to changes in the environment quickly and effectively. It corresponds to the concept and mentality of "agile", adaptable, learning, committed and self-motivated people who are ready to participate, to take innovation and look for opportunities for their contribution to the success of the company (Narasimhan et al., 2006).

Effective implementation of competencies means in practice ensuring the so-called learning organization, which includes continuous, lifelong learning of all employees. Learning, for both individuals and the entire organization, covers the knowledge gained at different stages of (formal) education and skills gained through various forms of (informal) training (Možina et al., 2002). On the other hand the majority of the initial work on generic competencies emanated from the Vocational Education and Training (Young and Chapman, 2010).

8.6. CASE: IMPLEMENTING THE COMPETENCY MODEL IN SLOVENIAN WOOD-INDUSTRY SECTOR

8.6.1. Introduction and method

Competency model for the wood-industry sector can be described as a combination of “single-job” competency model and multiple-job approach (according to Mansfield, 1996). On

one hand the general competencies and common technical and nontechnical competencies for groups and/or for all employees were developed, on the other hand specific competencies for each job or employee were defined to meet individual needs and particular organizational needs for mobility.

Development of the competency model started with an identification of critical jobs and then collection of the data, which included both a resource panel or focus group of job holders and their managers and interviews with jobholders. The data gathering phase included also some surveys and direct observation of jobholders at work.

Focus groups of different jobs and profiles was performed and designed according to the level of complexity and similarity of tasks and duties in the workplace:

Profile 1 - Production workers on simple and less demanding jobs in the woodworking industry,

Profile 2 - Joiners and operators of complex woodworking machinery and technological lines,

Profile 3 - Leaders of organizational units and groups in woodworking production,

Profile 4 - Technologists, designers and constructors of wood products and furniture,

Profile 5 - Purchase and sales commercialists of wood products and furniture,

Profile 6 - Middle and top managers and professionals in other fields.

After data collection phase the competency model for the wood-industry sector was formed. According to the literature (i.e. Young and Chapman, 2010; Kohont, 2005; Cardy and Selvarajan, 2006; Dulewicz, 1989) competencies can be classified into several categories / groups. For the purposes of this research, the following sets of competencies were designed:

- generic competencies are transferable and are not tied to a specific job or task and can be applied across different job and life contexts,
- professional competencies are linked to formal education and
- job-specific competencies are related to business, organizational and technological requirements or restrictions on individual jobs.

Table 8.2. An example from competency model for one kind of job in profile 1.

Production workers assistant	
Generic competencies:	
Competence	*Competence includes:*
quality control	self-control and appropriate response to faults
communication	use of appropriate way of communication
health protection and safety at work	acting according to health protection and safety at work principles basics of first-aid
environment protection	waste handling
Professional competencies:	
Competence	*Competence includes:*
perform simple work in the production	performing assistant work in the production (stacking, sorting, various handwork, etc.)
basic maintenance of work equipment	basic maintenance of work equipment (regular prevent checking, cleaning etc.)

Next, thorough analyses of the achievement of competencies for different focus groups (profiles) were done. The lack of competencies of jobs and profiles was measured with the method of personal evaluation using the evaluation sheet / questionnaire, which was implemented in MS Excel using macros in order to manage the complexity of the model effectively and later easier analysing. It was sent to 18 wood-industry companies of different sizes, in which 817 employees from all profiles were analysed.

The evaluation sheet was designed to investigate the level of achievement of competencies of each employee. In the evaluation phase, the evaluators are enrolling in the form currently level of development of individual competencies. Level of development of individual competence was graded from 1 to 4:

Grade 1 - Competence not reached

Grade 2 - Competence partially reached

Grade 3 - Competence mainly reached

Grade 4 - Competence reached in full-range

The evaluation process was conducted by HR manager with the participation of at least one professional co-worker (in most cases, a leader of the evaluated employee).
In the analysis, as a criterion for determining the achievement of competencies, the relative proportions of individual assessments were used:

$$\%\ \text{of grade X} = \frac{\text{number of grades X}}{\text{total of all grades}} \cdot 100 \qquad (14)$$

Legend:
% of grade X - relative share of individual grades (scale of 1 to 4) of all grades for competency
number of grades X - the number of individual grades (scale of 1 to 4) for the evaluated competency
total of all grades - the total number of grades for evaluated competency

$$\%\ \text{of grade } 1 + \%\ \text{of grade } 2 + \%\ \text{of grade } 3 + \%\ \text{of grade } 4 = 100\%$$

The relative share of ratings 1 and 2 have been grouped, as both represent a deficit or strong non-achievement of expected level of competence. The cumulative share (1+2) was then the source data to develop a training summary plan for profiles. For this purpose, the matrix of training-competence for each profile was used.

8.6.2. Results and discussion

Evaluation of employees' competence in Slovene wood-industry companies was conducted in April and May 2013. It involved 817 employees from 18 companies, of which 592 (70%) were men and 225 (30%) women. The average age of the evaluated worker was 42 years. The base unit of further analysis represent profiles or jobs. Figure 8.2 shows the number of evaluated employees according to different profiles.

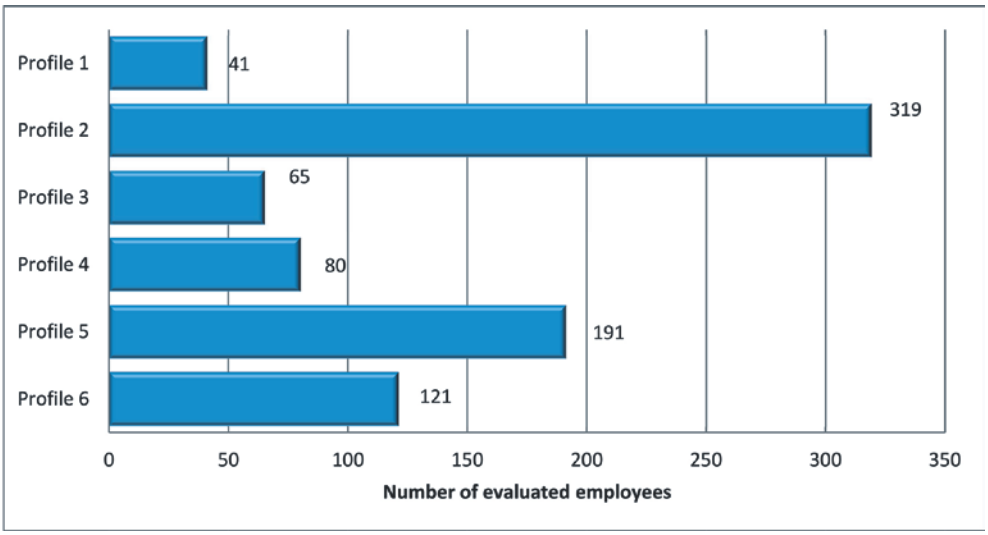

Figure 8.2. Number of evaluated employees by profiles (n = 817).

The achievement of the level of all 91 competencies within the three different sets were assessed in the analysis. It was found out that the share of grades 1 and 2 (represent a deficit or strong non-achievement of expected level of competence) was the highest on average in the generic competences (37,2%), while the highest value of grades 1 and 2 belongs to one competence within the set of professional competences. In the frame of professional competence set there was the highest number of different competences and the median of this set had the highest value.

From the content point of view, within the set of generic competences the biggest lack of competence was in foreign languages, health protection and safety at work and the (team) work management and organization.

Within the set of professional competences marketing and sales competencies, competencies associated with the use of specialized software tools, project management and business process management were exposed. In the case of job-specific competences, the largest deficit was found in competencies related to the energy efficiency products evaluation and restoring of wooden cultural heritage.

Furthermore, the achievement level of all 91 competencies according to the profiles and jobs were determined. An example of the assessment for achievement of different competencies for profile 1 is presented in Table 8.3.

Table 8.3. An example of achievement of different competencies for “profile 1” (Production workers on simple and less demanding jobs in the woodworking industry)

ID_KOM	COMPETENCY *(is trained for)*	Profile 1 Share of grades 1+2 together
2	decision-making and problem-solving	42,4
5	quality control	46,3
7	communication	36,6
9	health protection and safety at work	58,5
10	environmental protection	19,5
11	preparation of job	71,1
12	perform simple work in the production	66,7
13	perform less demanding work in the production	69,6
14	basic maintenance of work equipment	43,9
16	implementation of internal transport (eg pallet trucks, forklifts, cranes, etc.)	37,5
23	quality control in production (selfcontrol, interphase control)	100,0

With the decline of large-scale production in the past, wood-industry companies has to change their internal structure in terms of increased agility. This is most obvious at blue-collar workers (Profile 1 and 2), who has to have developed wide competencies to perform work in different jobs, so-called multitasking competency. A large part of these competences is related to technical and computer skills. Due to the circulation of production workers between different jobs, the need for the acquisition of competences from the field of ecology, health protection and safety at work has also increased.

Leaders of organizational units and groups (profile 3), in addition to technical and technological competences must also have competencies concerning leadership and organization. Due to the increasingly "fragmentation" of the production, as a result of requirements for increased range of products and reducing size of the production lots, competences from operational (resources) planning of production, technological optimization and complex technological problems solving are very important. It was found out that employees who have been classified in profile 3, have in particular a lack of competence in the field of leadership and organization, business process management, the use of specialized computer skills, legislation and standardization. The analysis shows the need for additional

trainings for CNC technology management and performance of complex manufacturing activities.

Profile 4 represents a very heterogeneous group of professional staff, therefore a set of competencies that were evaluated for this profile is also very wide. According to the fact that working on projects is increasing in a sector, it is not surprising that the analysis indicates the need to develop competencies for project work, both in terms of their management, implementation and monitoring. Linked to the project work, which is often carried out abroad, the expressed need for upgrading language skills is reasonable. Also, the expressed need to develop skills for working in a team is understandable, since the development of both products and technologies is typically organized as teamwork. The need to develop competencies in the field of safety at work is related to the fact that technologists and developers are tightly involved in the technological development of the production process. The knowledge of risk management at work is crucial for ensuring safety of production workers.

As it was expected the results for the profile 5 show the need for upgrading the language and communication skills. An important segment of the results represent the lack of knowledge in the field of online marketing (e-commerce management, development and maintenance of websites), the use of special computer software tools, and information and communication technologies (ICT) and services. Especially in smaller companies the role of sales staff is often associated with the field of technology and production, so the employees from that profile should also have some competencies from that fields. The analysis for profile 5 also shows a need to develop skills in leadership, organization and planning, teamwork, ecology, health protection and safety at work.

Profile 6 combines the most diverse professions, as it includes middle and senior managers and professionals of other fields (finance, accounting, HRM, informatics, quality etc.). Competencies assessed for this profile are very heterogeneous. The largest deficit was observed in the competences of planning, leadership and organization, teamwork and language skills. The need for development of competences in the field of environmental protection and evaluation of opportunities for reducing environmental impacts should be understood as required trainings of responsible employees to activate their engagement in sustainable development contents.

To achieve greater transparency of the training plan, the single trainings were combined into six areas: (1) professional knowledge, (2) computer skills, (3) foreign languages (4) soft skills (5) ecology and safety at work, and (6) conferences and fairs. Table 8.4 shows the classification of the trainings for these areas according to the number of planned inclusions in trainings.

Table 8.4. Planned number of inclusions in different training areas by profiles

Training area (planned number of inclusions)		Profiles						
		Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	Total
1	Professional knowledge	41	324	90	94	229	173	**951**
2	Computer skills	1	179	24	58	156	88	**506**
3	Foreign languages	0	11	11	35	125	58	**240**
4	Soft skills	1	13	38	25	157	80	**314**
5	Ecology and safety at work	90	860	94	85	105	79	**1313**
6	Conferences and fairs	0	0	1	1	1	10	**13**
	Total	**133**	**1387**	**257**	**297**	**772**	**478**	**3324**

The training program is very comprehensive and covers 3324 inclusions of employees from wood-industry companies of different sizes (Table 4). Overall, we can conclude that the highest values of included employees are for the trainings in the field of environmental protection and safety at work. These trainings are provided primarily for production workers (Profile 1 and 2), which are due to their nature of work, highly exposed to danger at work and have a direct impact on the environment with their activities, so the development of their environmental awareness is very important. The next there are professional trainings, which are crucial for high quality and efficiency. The increasing role of information and communication tools and services at ensuring of effective business, requires a number of trainings from this field, which are different regarding to the depth and complexity of content for different profiles. Soft skills and foreign languages are especially important for profiles 3, 4, 5 and 6. In these profiles it is very important to ensure knowledge of leadership and communication on the one hand, and active speaking of (more) foreign languages, as a result of involvement in global business networks, on the other hand.

According to the lacks of competence and knowledge for each employee, human resource managers from wood-industry companies of different sizes prepared training plan for each of them. Total number of all inclusions in the training program was 3324, where most of

employees will attend more than one training. Figure 8.3 shows that most of employees will attend from 1 to 8 training, while one employee will attend even 17 different trainings.

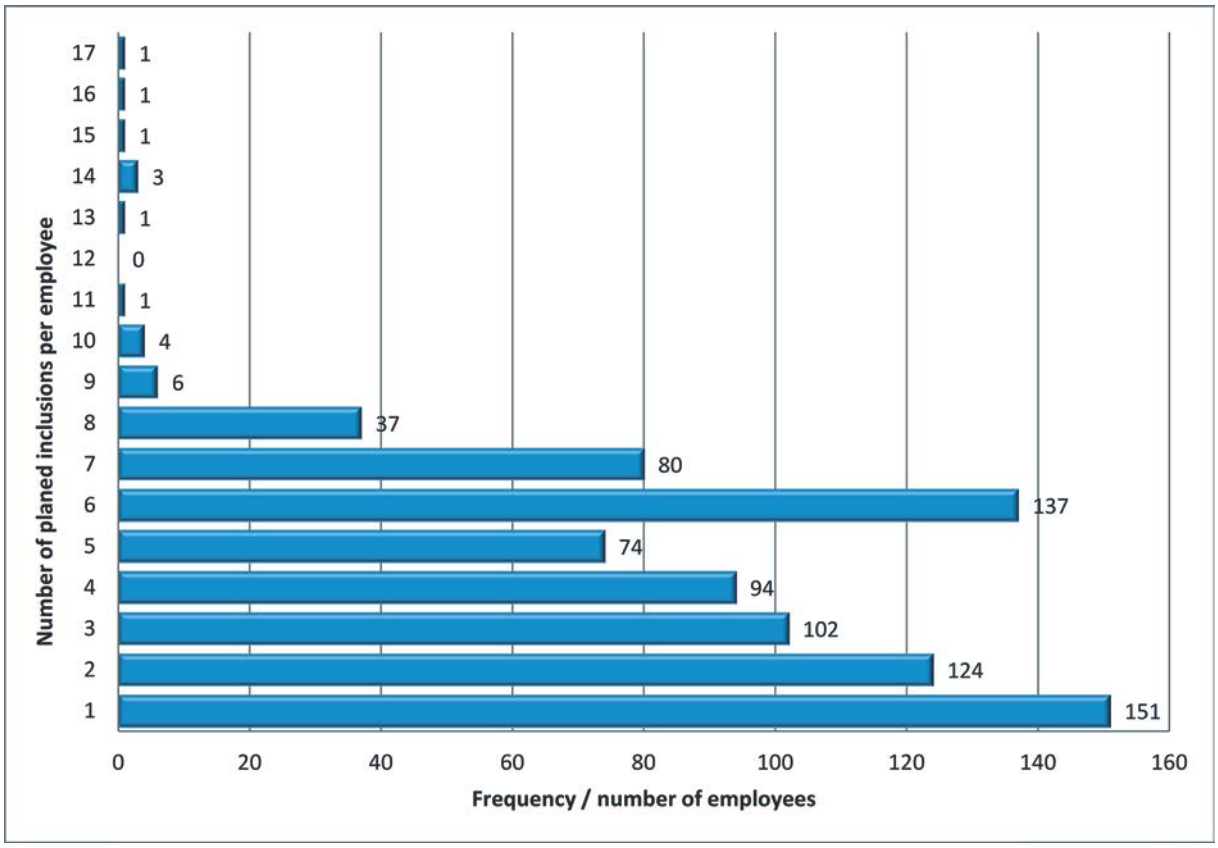

Figure 8.3. Number of planned inclusions per employee (n = 3324).

8.7. CONCLUSION

Competencies are very important for achieving inter-organizational competitiveness, so organizations strive to enhance competencies as part of human resources management development. Education and training of employees is the key to ensuring their competence for the job, which in turn leads to their increased motivation and greater efficiency and quality of work. Broader and yet more in-depth knowledge and enhanced skills of employees are also key to ensuring innovation in the development of the company (and industry), the search for new and better solutions and increasing competitive advantage. It leads to more agile business.

Competency model development for the wood industry was therefore necessary, but its implementation in job classification and human resources management (HRM) is even more important. In the framework of a larger project (Kropivšek et al., 2013) a sectorial model of

competence for wood-industry were developed. Development started with an identification of critical jobs and then collection of the data. Then focus groups of different jobs and profiles was performed and designed according to the level of complexity and similarity of tasks and duties in the workplace (Profile 1 to 6). After data collection phase the competency model for the wood-industry sector was formed.

Within the phase of implementation of the competency model for wood-industry sector into practice, a detailed analysis of the achievement of competences for jobs and profiles has been carried out. The main focus was on deficits of competencies. It was found out that the companies, included in the study, have a relatively small proportion of unskilled employees (15%), which is quite below the sector average (compare with Kropivšek et al., 2009). This gives the studied companies sufficiently good basis for further improvements in the learning organizations and / or for the introduction of a competence model into the practice. The largest deficits of competencies have been identified in the area of professional knowledge, environmental protection and safety at work, which was expected due to production orientation of wood-industry companies. Therefore, in these areas over 2/3 inclusions are planned, especially for blue-collar workers. Many inclusions are planned for profile 2, due to larger number evaluated employees within this profile, and their larger lack of certain competencies on the other hand. Many inclusions are planned in sections 5 and 6, slightly less in the other three profiles.

It can be concluded that the competencies in Slovenian wood-industry companies are relatively well developed, but in certain areas, there is a lot of space for improvements. Special emphasis should be put on upgrading professional knowledge in all fields of work, on foreign languages, basics knowledge of information technology and communication, and leadership skills for managers/leaders. Only with the systematic measurement of deficits of competencies, development of appropriate training and their implementation in the context of a learning organization, the wood-industry companies should be able to perform agile operations, achieve higher added value and business success.

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9. EVALUATING EFFECTIVENESS OF INVESTMENT IN WOOD PROCESSING INDUSTRY

Andrea Sujová, Petra Hlaváčková, Dalibor Šafařík

The aim of this chapter is to present indicators designed to measure the effectiveness of investments at the sectoral level and assess the efficiency of investment in the woodworking industry of the Slovak Republic, the Czech Republic and Austria for a period of ten years.

9.1. INVESTMENT IN WOOD PROCESSING INDUSTRY

Wood processing industry (WPI) is a sector based on renewable natural resources of wood raw material. It is therefore able of sustainable growth and be competitive on the international markets. The WPI is extremely multi-functional and provides a wide range of products and materials. It provides economic, environmental and social contribution based on use of renewable resources. Wood-based products are recyclable, re-usable either in new products, or as an energy. They are biodegradable and can be used to replace materials from non-renewable resources. The WPI is an important part of developing economies, new prospective direction based on biotechnology. Production of wood-based products in conditions of european countries has, in regard to sufficient supply of input wood material, long tradition and as one of the options for obtaining renewable resources it is closely connected with many sectors of the national economy. The interest of the European Union is to build economy based on renewable natural resources, resulting in the need to pay increased attention to the development and support of the WPI.

Providing required technical level of tangible fixed assets, its continuous renewal, which is the basis of competitive production, requires a substantial investment. Investment decisions (how much, to what, when, where and how to invest) is one of the fundamental decisions, which greatly affect the future development of the company and its efficiency.

According to macroeconomic theory, investments reflect the conversion of financial funds for substantive asset of the firm. Under investments we understand the formation of capital investments in material form, thus increase of long-term and short-term fixed capital.

Investments in terms of capital expenditures of the company are expenditures where we expect the conversion to future cash flows over a longer period of time. Capital expenditure are: expenditure to renewal, to extension of tangible fixed assets, expenditure to research and development programs, to a permanent increase of stocks and receivables, expenses of buying long-term securities, expenditure to training and education of staff, expenditure to advertising campaign, expenses associated with the evaluation of the lease. (Drábek, 2007)

Investment in the economy perform several important functions: (Drábek-Potkány, 2008; Sujová, 2005):

- Capacitive: new fixed capital built by investments create new production capacity, capital acummulation is rising and thereby production volume is increasing. At macroeconomic level increasing physical capital increases potential output and improve the possibility of long-term economic growth.
- Income: it is manifested in the implementation phase of investment, when investment demand is increasing, employment grows, there is a growth in income of population.
- Substitution: this function results from the ability of investment to substitute, replace, change the combination of production factors. Investments inserted into production follow the aim of reducing production costs and to ensure increased efficiency of production.

In scientific literature several classifications of investments exist, what reults from the view to investments at macro, meso and micro levels.

At a macroeconomic level the investments are one component of GDP and also of aggregate demand. Investments are considered as gross private investments consisting of following components:

- Net investments to tangible fixed assets
- Depreciation of long-term fixed assetsamortizácia dlhodobého fixného kapitálu
- Stock change (stocks of short-term fixed assets)

Investments are basicly divided to renewing and net investment which together present gross investments:

- *Renewing investments* serves to renewal of used-up capital goods.

- *Net (developing) investments* present a purchase of additional, new capital goods. We can distinguish them to:

- *Autonomous investments are invoked by population growth, scientific nad technical progress and innovation activity.*
- *Induced (evoked) investments* depend on volume of income (product) and lead to extensive spread of existing capital goods.

At a microeconomic level, business investments can be divided into following groups (Drábek, 2007):

- tangible (substantive, capital, material) investments creating or extending production capacity of the enterprise;
- intangible (inmaterial) investments as a purchase of know-how, expenditures to research, education, social development;
- financial investments: purchase of commercial papers, bonds, securities, money deposit in bank, lend money at interest, dividend or profit.

At a sectoral level there are in official statistical databases following groups of investments:

- Gross and net investment in tangible goods
- Gross investment in land
- Gross investment in existing buildings and structures
- Gross investment in construction and alteration of buildings
- Gross investment in machinery and equipment

A special group of investments the direct foreign invetments are. They represent a category of international investment that reflects the intention of an entity resident in one economy (direct investor) to obtain a permanent share in an enterprise resident in another economy (direct investment enterprise). Permanent share reflects the existence of a long-term relationship between the direct investor and the direct investment enterprise and a significant degree of influence over the management of the company. As a part of foreign direct investment is considered in addition to a share in the capital also reinvested earnings and other capital associated with various inter-company debt transactions.

9.2. MEASURING EFFECTIVENESS OF INVESTMENTS AT THE SECTORAL LEVEL

Investment decisions at the macro level depend on three basic factors: investment income, the cost of investment and expectations of future economic development:

- Income: investment will bring additional revenue only if the investment will sell more or less expensive. This implies that an important determinant of investment, the level of GNP and estimate the demand for goods and services.
- Costs: investment goods have a long life and can be financially costly. Therefore, investors may invest when their "price" is relatively low. Investments are financed by borrowed money, in the case of low interest rate that should be lower than investment income rate. The cost of investments may affect the state tax; high tax rates discourage investment.
- Expectations of future development in the country: positive expectations, as rapid recovery and economic growth in the near future invoke growth of investment activities. If entrepreneurs do not expect a favourable development, they do not invest.

Other factors that affect the investment activities of enterprises are: the attraction of investments, available resources, the question of tax and depreciation policy, the possibility of obtaining grants, subsidies. Entrepreneurs invest if they expect that the investments will bring them a profit, this means that investment income will be higher than the cost of the investment.
Efficiency of investments at a company level is assessed on the basis of a number of static and dynamic methods evaluating the effectiveness of individual investment projects, where the basic measure is the profitability of investment and return on investment. This issue has long been dealing by the authors of several scientific publications: Drabek, J., Polach, J., Merková, M. In the capital-intensive investment projects, attention must be paid to the risks that the preparation, realization and use of investment bring. The allocation of available financial resources to fixed assets or investments in modernization of production technologies are possible ways when a company can ensure its prosperity. In order to ensure adequate use of these investments, it is necessary to evaluate their economic benefits and also to analyze the risk associated with the investment. It is not possible to develop business activity without taking into account an acceptable level of risk. It is difficult to find a suitable and acceptable balance between the

current risk and a potential profit. Each investment activity in the company is accompanied by risk and uncertainty; therefore, in making everyday decisions, the enterprise must accept and consider their impact on future profits.Risk analysis of investment helps the companies to prepare investment projects in order to increase their probability of success. (Merková et al, 2013)

As for foreign direct investments, their The infl ow into the country is affected by a number of factors described in literature or published annually for example in UNCTAD surveys. Major factors in terms of savings are low labor costs, availability of resources (material, energy, fi nancial). On the other hand, factors that influence revenues are usually market size and market growth. (Merková et al, 2012)

Investments are a prerequisite for the development of enterprises and allow improvement of the economic performance of the company, or industry. Intensity of investment activity can be assessed on the base of the investment rate (IR), which shows what proportion of the generated funds is invested. Investment rate can be calculated as a share of investment (I) on revenues (R) and profit (P):

$$IR_R = I/R \qquad (15)$$

IR_R indicates what part of one monetary unit of sales is invested.

$$IR_P = I/P \qquad (16)$$

IR_P expresses how much is invested from one monetary unit of generated profit.

Another indicator to assess the rate of investment facilities the capital-labour ratio is, which in the modification reflects how much investment fall on one employee:

$$IR_E = I/Employees \qquad (17)$$

Rate of investment at the sectoral level can be considered also from the view of number of companies operating in the sector. Rate of investment per company expresses how much investments are performed in one company:

$$IR_C = I/Companies \quad (18)$$

Efficiency of investment at the sector level is a measure of such investment contributes to the economic performance of the sector. Indicators that we proposed to measure the efficiency of investment sectors are as follows:

- *Return on investment (ROI)* expresses what profit value is created by one invested monetary unit:

$$ROI = Profit / I \quad (19)$$

- *Efficiency of investments* referred to as the productivity of investments is the efficiency of capital using. A background characteristic is the average product of capital, which in microeconomic theory represents the share of production volume fallen on one invested monetary unit. Effectiveness of investments should be monitored in relation to production, sales and value-added:

- The efficiency of investment in relation to production (EIQ) expresses what production value (Q) is created by one invested monetary unit:

$$EIQ = Q / I \quad (20)$$

- The efficiency of investment in relation to sales (EIS) reflects how many revenues (R) fall on one invested monetary unit:

$$EIR = Sales / I \quad (21)$$

- The efficiency of investment in relation to value added (EIVA) expresses what value the value added (VA) was generated by one monetary unit of investment:

$$EIVA = PH / I \quad (22)$$

- *Marginal efficiency of investments* represents the impact of investment to changes in economic output of the sector. It expresses additional financial output value of the industry (sales, production, value added, profit, equity) generated by additional unit of investment. In other words, marginal efficiency of investments reflects how is increase in values of sales, value-added, profits, capital if there is an increase of investment by one monetary unit (e.g. euro). We have proposed the following indicators for indication of marginal efficiency of investment, which incurred by modifying the variable: marginal product of capital under the micro-economic theory:

- MEI_R expresses increase of revenues (R) by increase of investment per unit

$$MEI_R = \frac{\Delta R}{\Delta I} \qquad (23)$$

- MEI_Q indicates additional value of production value of the sector (Q) by additional unit of investment:

$$MEI_Q = \frac{\Delta Q}{\Delta I} \qquad (24)$$

- MEI_{VA} shows the increase of value added (VA) by increase of investment per unit:

$$MEI_{VA} = \frac{\Delta VA}{\Delta I} \qquad (25)$$

- MEI_P indicates generated additional profit by one additional unit of investment:

$$MEI_P = \frac{\Delta P}{\Delta I} \qquad (26)$$

- MEI_{FA} expresses the change of fixed assets (FA) by increase of investment per unit:

$$MEI_{FA} = \frac{\Delta FA}{\Delta I} \qquad (27)$$

For the indicator MEI applies:

If MEI > 0 investment growth causes growth in economic indicator of industry.

If MEI < 0 increase of investments causes a decrease in economic indicator of sector.

If |MEI| > 1 we talk about the multiplier effect of investment, which means that investment growth invokes a multiple change in the economic results of the sector.

9.3. ANALYSIS OF INVESTMENT EFFECTIVENESS IN WOOD PROCESSING INDUSTRY

This section presents the results of the analysis of the efficiency of investment in wood processing industry made in Slovakia, the Czech Republic and Austria and comparison of the obtained results.

9.3.1. Methodology of Analysis

Required material for obtaining relevant outputs we obtained from a secondary research, on the basis of an analysis of available scientific literature dealing with issue of evaluating effectiveness of investments and on the basis of processing statistical data of the wood processing industry. Input data for our analysis we obtained from database of Statistics Office, of Slovakia, the Czech Republic, Austria and Eurostat with annual data on slected economic indicators for a period of years 2002 - 2011.

Calculation of individual indicators for measuring the effectiveness of investments was applied in the wood processing industry (WPI) and its individual sections in selected, abovementioned countries EU. A characteristic feature of the WPI is processing of raw wood and wood products production at various stage of finalisation. WPI within the classification of business activities of the EU (NACE) consists of following sections:

- NACE 16: primary mechanical wood processing (timber industry),
- NACE 17: primary chemical wood processing (pulp and paper industry),
- NACE 31: secondary wood processing (production of furniture).

For appropriate calculation of indicators values we created application in MS Excel and we analyzed investment effectiveness in WPI and its individual sections from several views:

- analysis of achieved values in indicators measuring effectiveness of investments in the sector;
- trendline analysis of indicators in the period of years 2002 - 2011 in selected countries;
- comparative analysis: based on calculation of average a median values of indicators the achieved investment effectiveness in Slovakia, the Czech Republic and Austria was compared.

9.3.2. Achieved Results in Indicators Measuring Investment Effectiveness

The results of indicators to measure the effectiveness of investments in wood processing industry in Slovakia, the Czech Republic and Austria for a period of five years are shown in Tables 9.1. to 9.3. Basic input data was the total gross investment of the industry. There is also presented comparison of results in wood processing industry with the results of efficiency of investment in the industry as a whole in each country. The values in the tables are in millions euro.

The results of indicators of investment rate in Slovak wood processing industry show that the share of investment per company was gradually decreasing from 254 000 € to 9 000 €, which indicates a gradual decline in investment activity and it is well below the investment activity of the industry SR as a whole. In Slovak wood processing industry is an investment rate in regard to revenues over the average of industry SR. Wood processing companies invest at average tenth generated revenue into capital formation. The amount of investment is three times higher than the profit, what could be considered that investments are financed mainly by foreign sources. As for capital-labour ratio, at average 8 000 € of investment fall on one employee, which is slightly above the average in Industry.

Results of the investment efficiency show that the wood processing industry is below the industry average of SR, however, the results are positive. On one invested euro fall at average 2.5 euro of value-added and 12 euros of sales. Return on investment is positive, it present an average amount of 37 € in profit per euro invested.

Table 9.1. Wood Processing Industry (WPI) of Slovakia

Indicator/year		2007	2008	2009	2010	2011
Investment rate						
IR_C	Industry	0,425	0,406	0,278	0,035	0,038
	WPI	0,254	0,186	0,117	0,009	0,009
IR_R	Industry	0,067	0,058	0,052	0,045	0,044
	WPI	0,113	0,091	0,073	0,061	0,053
IR_P	Industry	0,811	0,913	1,014	0,744	0,715
	WPI	2,661	1,944	9,216	1,250	2,784
IR_E	Industry	0,009	0,007	0,005	0,006	0,007
	WPI	0,012	0,009	0,007	0,006	0,006
Efficiency (rentability) of investments						
EIVA	Industry	2,591	2,581	2,812	3,970	3,761
	WPI	1,641	2,106	3,079	4,089	4,045
EIR	Industry	14,827	17,154	19,354	22,052	22,691
	WPI	8,828	10,992	13,642	16,289	18,882
ROI	Industry	123,3	109,6	98,6	134,5	139,9
	WPI	37,6	51,4	10,9	80,0	35,9
Marginal efficiency of investments						
MEI_P	Industry	4,59	2,39	1,33	5,16	1,96
	WPI	-0,10	0,05	1,18	-2,90	-18,37
MEI_R	Industry	50,61	-4,80	12,46	50,74	29,30
	WPI	3,53	3,79	6,65	2,14	129,00
MEI_Q	Industry	52,90	-4,67	12,49	50,38	27,86
	WPI	3,84	2,74	8,03	-3,71	32,34
MEI_{FA}	Industry	11,76	-4,82	-0,10	-0,48	0,60
	WPI	-0,45	0,51	0,03	0,02	-26,29
MEI_{VA}	Industry	6,88	2,68	2,09	16,28	1,61
	WPI	0,01	0,56	0,51	-1,31	2,17

The

Looking at the results of the marginal efficiency of investment, it can be seen that investment growth causes twice larger decrease in profit and equity, which is logical, if by the investment own resources are used, although the situation is reversed in the industry. The results also demonstrate that investment growth has a multiplier effect on the growth in sales and production, which can be considered a positive phenomenon. As a negative result it can be considered that the increase in investment causes only a slight increase in value added, that is well below the industry average of SR.

The results of indicators of investment rate in wood processing industry of the Czech republic (see Table 9.2) show that the share of investment per company is only slightly decreasing and it moves at an average of € 10,000 per company, but it is below the industry

average. In Czech wood processing industry is an investment rate in regard to revenues at the average of industry CR. Wood processing companies invest at average 6 % of generated revenue into capital formation. The amount of investment represents 1.2 times higher than the profit made, what could be considered that by their funding in addition to own also borrowed funds are used. As for capital-labour ratio, at average 10 000 € of investment fall on one employee, which is slightly above the average in Industry.

The results of the investment efficiency show that the wood processing industry is little below the industry average of CR, however, the results are more positive than in Slovakia. On one invested euro fall at average 3.7 euro of value-added and 17 euro of sales. Return on investment is positive, it present an average amount of 87 € in profit per euro invested, which indicates a high efficiency of investments in the Czech wood processing industry.

Looking at the results of the marginal efficiency of investment, it can be seen that investment growth causes a drop in profits, sales, value added and equity, although the situation in the total industry of CR is the opposed. The results also demonstrate that investment growth has a multiplier effect on the decline in sales and equity, which cannot be regarded as a positive phenomenon. As a negative result it can be considered that the increase in investment causes decrease in value added and only a slight increase in production value, that is well under the industry average of CR.

The results of indicators of investment in wood processing industry of Austria show that the share of investment per company was moving at about the same level, at an average of 152 million euro per firm, but it is below the industry average. It follows that in Austria there are larger companies that carry out investments in larger volumes. In Austrian wood processing industry is an investment rate in regard to revenues slightly above the industry average of Austria. Wood processing companies invest at average 5 % of generated revenue and production value into capital formation. As for capital-labour ratio, at average more than 10 000 € of investment fall on one employee, which is slightly above the average of Industry.

The results of the investment efficiency show that the wood processing industry is close to the average of Austrian industry, but the results are better than in the Slovakia and the Czech Republic. On one invested euro fall at average 6.2 euro of value-added and 21euro of sales.

Table 9.2. Wood Processing Industry (WPI) of the Czech Republic

Indicator (mil. €)/year		2007	2008	2009	2010	2011
Investment rate (IR)						
IR_C	Industry	0,050	0,054	0,036	0,035	0,035
	WPI	0,016	0,018	0,013	0,012	0,010
IR_R	Industry	0,06	0,06	0,05	0,04	0,04
	WPI	0,07	0,08	0,07	0,06	0,05
IR_P	Industry	0,98	1,81	1,64	0,90	0,98
	WPI	0,96	1,54	1,49	1,21	1,17
IR_E	Industry	0,01	0,01	0,00	0,00	0,01
	WPI	0,01	0,01	0,01	0,01	0,01
Efficiency (rentability) of investments						
EIVA	Industry	4,02	3,38	4,46	5,09	4,77
	WPI	3,88	3,13	3,80	4,21	4,39
EIR	Industry	17,82	15,78	20,29	23,41	22,47
	WPI	15,25	12,49	14,86	16,96	18,74
ROI	Industry	102,4	55,2	61,1	110,7	102,2
	WPI	104,6	64,9	67,1	82,6	85,5
Marginal efficiency of investments						
MEI_P	Industry	2,05	-3,92	0,43	28,94	0,13
	WPI	0,96	-2,75	0,58	-2,94	0,53
MEI_R	Industry	22,45	-3,52	6,75	198,67	12,63
	WPI	7,73	-11,09	5,25	-33,87	-1,18
MEI_Q	Industry	22,63	-5,51	7,00	205,71	12,53
	WPI	8,16	-4,99	6,08	-27,54	-0,07
MEI_{FA}	Industry	6,61	-0,54	-0,05	46,32	-1,05
	WPI	2,21	-0,25	-0,14	-13,35	2,28
MEI_{VA}	Industry	4,60	-2,67	1,21	40,31	1,46
	WPI	1,78	-3,23	1,09	-5,75	2,44

Looking at the results of the marginal efficiency of investment, it can be seen that investment growth is causing a tenfold greater sales growth and nearly double growth of value added, although the situation in the industry of Austria is opposed. The results also demonstrate that investment growth has a multiplier effect on the decline in the value of production, which may be caused by pumping its own funds to finance investment. From these results it can be concluded that the investments have a high positive impact on the economic results of the Austrian wood processing industry.

Table 9.3. Wood Processing Industry (WPI) of Austria

Indicator (mil. €)/year		2007	2008	2009	2010	2011
Investment rate (IR)						
IR_C	Industry	259,41	281,81	237,59	217,38	240,61
	WPI	176,99	108,13	94,78	91,68	110,77
IR_R	Industry	0,048	0,045	0,042	0,036	0,035
	WPI	0,049	0,041	0,040	0,036	0,040
IR_E	Industry	11,727	11,620	9,918	9,214	9,965
	WPI	11,809	8,104	7,236	7,063	8,408
IR_Q	Industry	0,052	0,048	0,045	0,038	0,037
	WPI	0,039	0,043	0,042	0,037	0,041
Efficiency (rentability) of investments						
EIVA	Industry	6,46	6,35	6,85	8,19	8,00
	WPI	5,99	6,92	7,56	8,51	7,40
EIR	Industry	20,77	22,18	23,83	27,98	28,66
	WPI	20,32	24,20	24,89	28,10	25,27
Marginal efficiency of investments						
MEI_R	Industry	7,54	-57,57	14,74	-21,21	35,65
	WPI	14,43	127,45	20,56	-61,28	10,49
MEI_Q	Industry	7,57	-65,52	15,15	-22,22	34,65
	WPI	29,13	-42,12	20,72	-62,87	10,46
MEI_{VA}	Industry	2,35	12,23	4,11	-7,73	6,02
	WPI	4,03	31,71	3,54	-17,98	1,60

9.3.3. Trendline Analysis of Investment Effectivenes in Wood Processing Industry

Trendline analysis shows the development of efficiency of investment in the wood processing industry of analyzed countries. The aim of this analysis was to determine the positive and negative effects of investment on economic performance of wood processing industry. For the purposes of carrying out the trend analysis, we selected the most important indicators of investment effectiveness of the sector: efficiency of investments in terms of revenues (IR_R), ROI and marginal efficiency of investments in the production (MEI_Q) and added value (MEI_{VA}). Results of trendline analysis are shown in Figures 9.1-9.3.

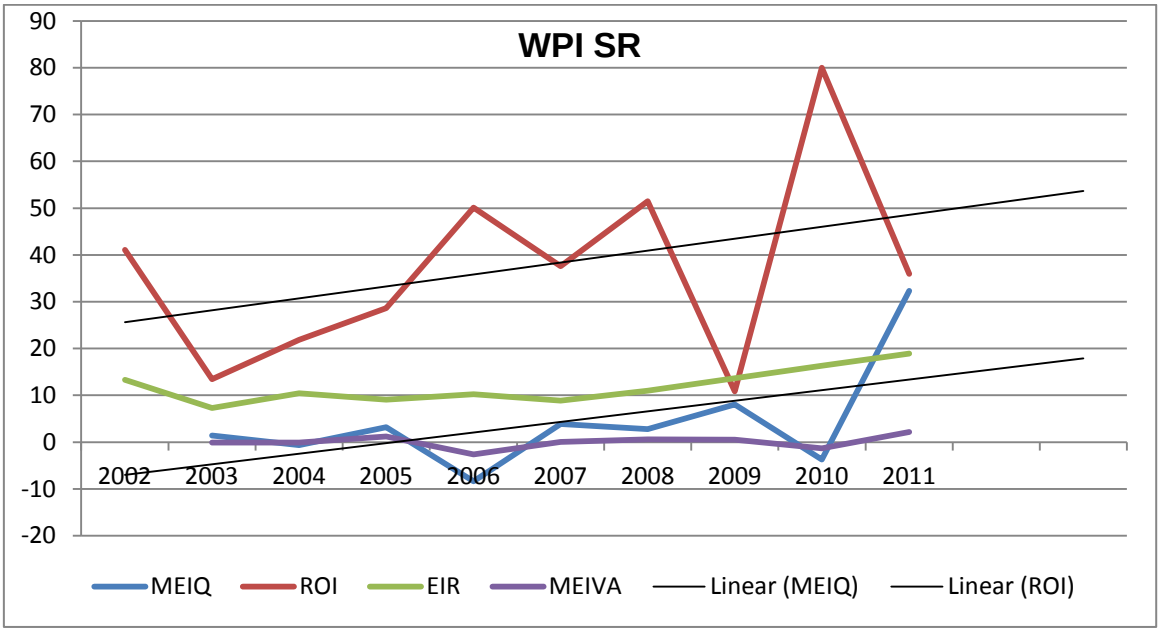

Figure 9.1. Investment effectiveness in wood processing industry SR

Development trend of the indicators measuring the efficiency of investment in slovak wood processing industry shows the unstable development of indicator ROI, where its sharp decline in 2009 was due to the economic crisis. His projected trend is growing, which is positive. Large fluctuations can also be seen in the development of marginal efficiency of investment to production (MEI_Q). By this indicator it is desirable to reach as high positive values as possible, which indicate the multiplier effect of investment on output growth of industry. A significant improvement of this indicator occurs in the last year 2011 and projected trend is also growing. Development of indicator of investment efficiency to revenues (R/I) shows a gradual increase in the share of sales per unit invested. The overall trend in the efficiency of investment in wood processing industry of Slovakia is positive, efficiency is constantly increasing.

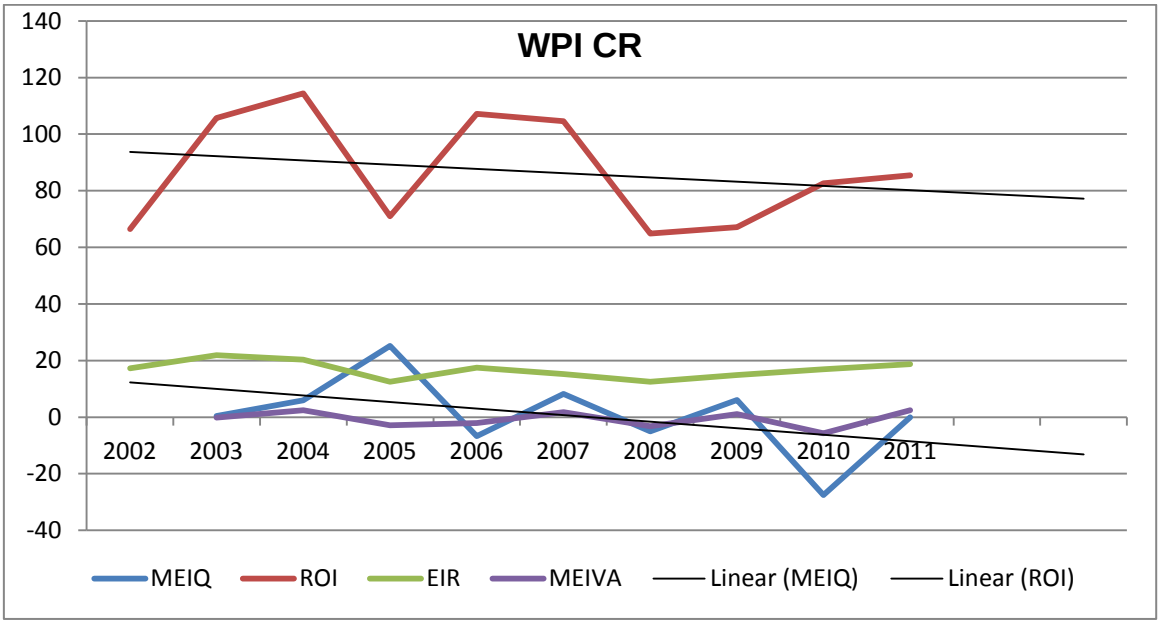

Figure 9.2. Investment effectiveness in wood processing industry CR

Looking at the development of indicators in the Czech wood processing industry the similar fluctuations as in Slovakia can be seen. However, despite the fact that wood processing industry in the Czech Republic achieves higher levels of indicator ROI, the development is negative and the projected trend shows continuing decrease of this indicator. Development of marginal efficiency of investment in the production (MEI_Q) indicates its gradual decline, and its prognosis is also negative, which means that investments are losing influence on output growth and the growth of value added is affected by investment growth also only in a minor rate. The positive trend can be observed only in the efficiency of investment to revenues, where is a slight increase. The overall development of effectiveness of investments during the decade is in the Czech wood processing industry negative and further decline is expected in next years.

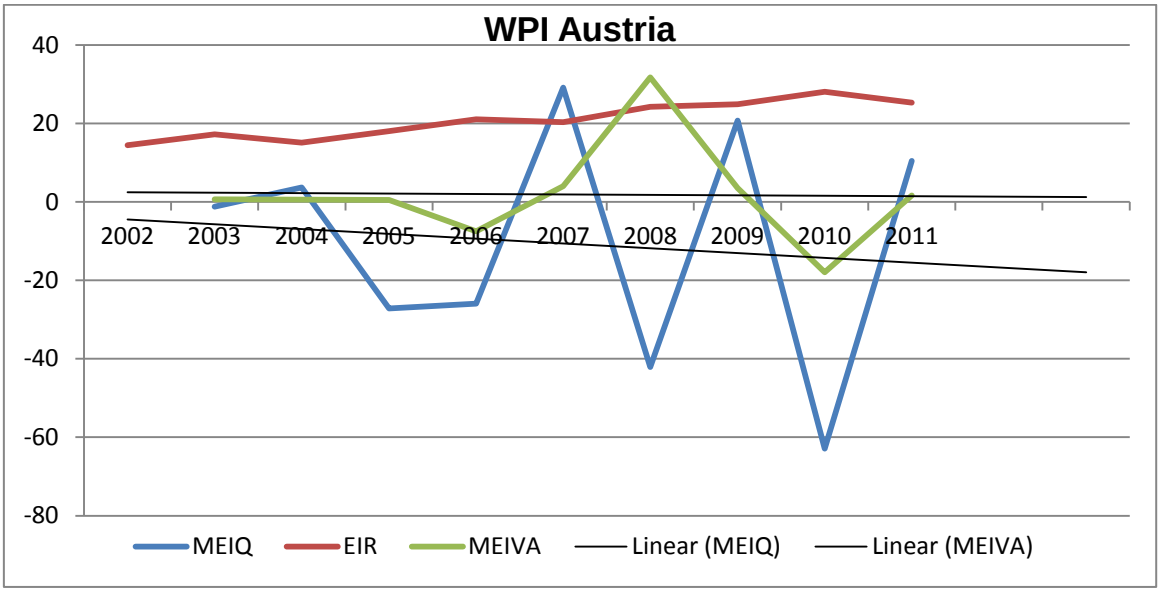

Figure 9.3. Investment effectiveness in wood processing industry of Austria

In the wood processing industry of Austria the largest fluctuations in the indicators evaluating the effectiveness of investments can be seen, especially in the marginal efficiency of investment. Investment growth has a decreasing effect on the growth of production and value-added, it is reaching mostly negative values, which means that investment growth is causing a decline in production and value added. However this fact needn´t to be a negative signal if the investments are financed by own equity. The prognosis trend is projected to continue declining in the future. The positive trend can be seen in the development of efficiency of investment to sales, where is the gradual growth.

9.3.4. Comparative Analysis of Investment Effectiveness in Wood Processing Industry

Comparative analysis is used to compare the results of the efficiency of investment in wood processing industry analyzed in three countries: Slovakia, the Czech Republic and Austria. Basis for this analysis, mean (average) and median values of indicators representing effectiveness of investments were. Median value presents the value in the middle of a set of calculated values of indicators for the 10-year period. The obtained results of the analysis are

shown in Table 4. Comparison of the results of selected indicators show the following graphs in Figures 9.4 and 9.5.

Table 9.4. Average and median values of indicators in WPI

indicator *(in mil. €)*	Slovakia		Czech Republic		Austria	
	mean	*median*	*mean*	*median*	*mean*	*median*
IR_C	0,190	0,210	0,01	0,011	152,80	168,840
IR_R	0,091	0,093	0,06	0,058	0,05	0,048
IR_P	3,777	2,722	1,20	1,19	n	n
IR_E	0,008	0,009	0,01	0,01	10,34	11,019
EIVA	2,498	2,087	3,67	3,688	6,24	6,120
EIR	11,894	10,715	16,77	17,095	20,87	20,706
ROI	37,1	36,753	86,9	84,039	n	n
MEI_P	-2,554	-0,104	-1,6	-0,64	n	n
MEI_R	15,427	2,878	-24,35	-1,183	10,15	3,405
MEI_Q	4,310	2,740	0,75	0,457	-10,59	-1,199
MEI_{FA}	-2,539	0,031	-8,21	-0,14	n	n
MEI_{VA}	0,034	0,007	-0,71	-0,184	1,90	0,643

The results of the comparative analysis shows that, according to the median values, in six of the eight indicators of investment efficiency is achieved almost the same level in the wood processing industry of Slovakia, the Czech Republic and Austria. The best results are achieved in the Czech wood processing industry in all indicators, except the amount of investments accounted for one worker and one firm, which a significantly higher proportion is in Austria. Based on the above, we can conclude that the rate and efficiency of investment in the wood processing industry in Slovakia and the Czech Republic are the same in comparison with Austria, in which wood processing industry achieves a much higher economic performance.

According to the average values of the indicators, we can see that the efficiency of investment to added value (EIVA) and to sales (EIR) is slightly higher in Austrian wood processing industry, as well as the rate of investment per worker and per one firm. However, the marginal efficiency of investment is higher in the Slovak wood processing industry, which means that in comparison with the Czech and Austrian wood processing industry the effects of investments to output and revenues growth are higher. By contrast, in the Czech Republic is the impact of investment on output growth only minor and on sales it is opposite. On the other hand, wood processing industry in the Czech Republic has the highest return on investment.

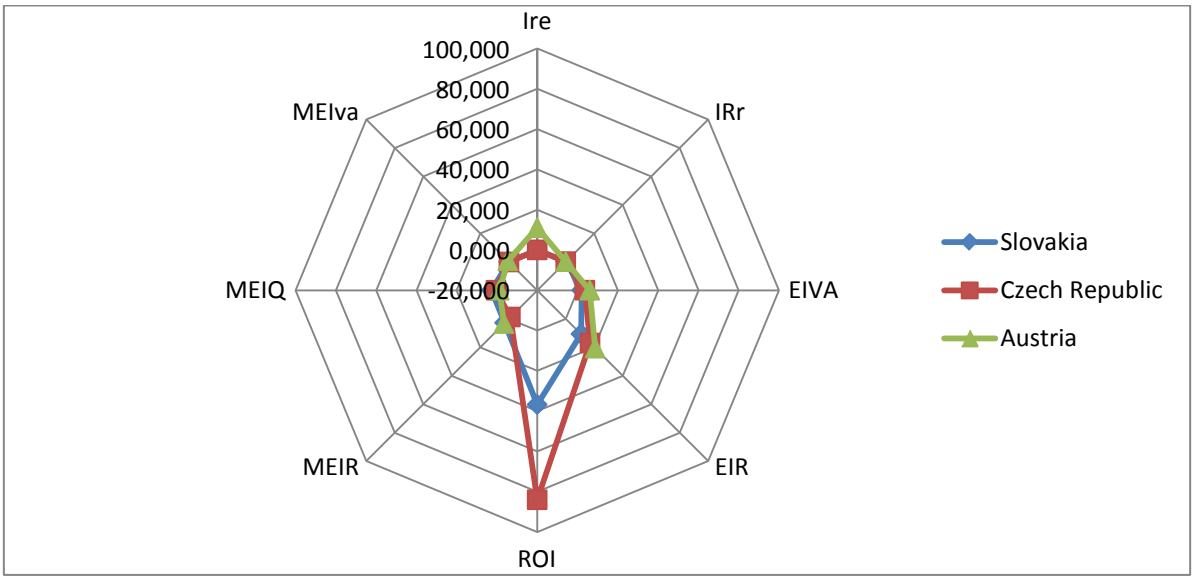

Figure 9.4. Comparison of investment effectiveness in WPI (median values)

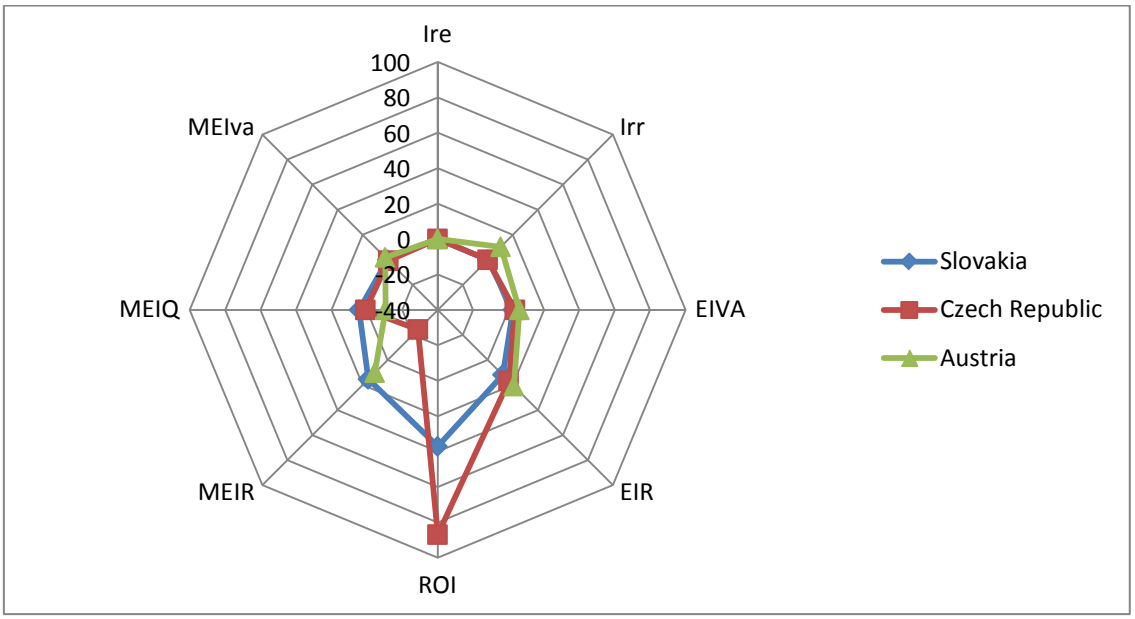

Figure 9.5. Comparison of investment effectiveness in WPI (mean values)

9.4. SUMMARY OF ACHIEVED RESULTS

The wood processing industry has the potential to achieve a high competitiveness on international markets, to create an active trade balance and to contribute to economic growth of the sector and the country.

Investments are an important factor affecting the growth performance of the sector. Effective investments can improve the efficiency of production resources using, and make an intensive economic growth of the sector as well as to increase the production capacity of enterprises in wood processing industry. It is therefore important to monitor the effectiveness of the investments and their effects on the economic results of the sector.

Measuring the effectiveness of investment is different at the enterprise level and at the sector level. Enterprises obviously evaluate the effectiveness of individual investment projects based on their profitability. At the sector level we proposed indicators to measure the effectiveness of investments, which are divided into three groups: the investment rate, which reflects the intensity of investment activity in the sector; the efficiency of investment, which indicates the efficiency of investments use and marginal efficiency of investments reflecting the impact of the investment growth on growth of sectoral economic results.

Analysis of the level and development of investments effectiveness in wood processing industry in Slovakia, the Czech Republic and Austria for a period of ten years, we came to the following findings:

- In Slovakia and the Czech Republic there are a number of smaller companies that carry out investments in small volumes.
- Wood processing enterprises invest averaged of 5 – 10 % of the generated revenues.
- The rate of investment in relation to profit is higher than 1, which means that investments are financed largely by foreign sources.
- A capital- labour ratio presents the level of 8,000 to 10,000 euros of investment per worker yearly.
- Efficiency of investment in wood processing industry is slightly below the average of the industrial sector; per invested euro accounts for 3-6 euro of the added value of the sector and from 12 to 20 euro in sales.

- Return on investment is positive, at the level 37 euro of profit per invested euro in Slovakia and 87 euro of profit in the Czech Republic.
- The impact of investment growth in wood processing industry is the most demonstrative in sales growth, but only slightly in the growth of value added, except the Austrian wood processing industry.
- Investment growth is causing the decline of the profit level and the fixed assets of the sector, indicating that by the implementation of investment wood processing firms use their own available resources.
- Effectiveness of investments are gradually increasing in Slovak and Austrian wood processing industry, however, in the Czech Republic is recorded a negative downward trend.
- Rate and effectiveness of investments in wood processing industry is in all analyzed countries at almost the same level, with the exception of the share of investment per worker and per enterprise, where significantly higher values are reached in the Austrian wood processing industry.

On the basis of presented results we can conclude that the wood processing industry achieves a high return on investment, to which contributes the use of foreign funds to finance investments. Investment growth primarily affects the sales growth and it has a low influence on output growth. Investments in wood processing industry are not able to generate profits and increase value added in the same period. It can be assumed that investments affect their growth in subsequent periods. However, impact of investment on value added growth in Austria is reflected immediately.

Performance increase in wood processing industry is conditional to the implementation of effective, development investments that enable to achieve higher added value and to generate higher profits in enterprises. In the Czech and Slovak wood processing industry the efficiency of investment is not at a sufficient level, the effects of the implemented investments don´t occur sufficiently in the most important performance indicators, which are value added, profit and equity of the enterprise. It is therefore appropriate to deal with the structure of investments in wood processing industry in detail.

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10. EMPLOYMENT TRENDS IN THE CROATIAN WOOD PROCESSING AND FURNITURE MANUFACTURING

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

10.1. INTRODUCTION

Almost half of Croatia's land area is covered with forest, the accessible portions of which provide abundant resources for lumber, pulp, and paper. Wood industry and forestry are of the great importance in the Croatian economy. Our economic and political history is charted in the appearance and condition of our forests and forest areas. Long centuries to the present days witnessed how our national substance is kept by forest. But also for the centuries in the croatian history, the natural forest's treasures were depleted into someone else's benefit, unfortunately often wastefully and irrational.

Wood processing and furniture manufacturing, as a significant segment of a forest-based industry in Croatia, is characterized by numerous changes which carries the modern business world. Intense competition, which comes as a result of globalization and the recently entry into the full membership of the European Union, leads us to the necessity of looking at the current market state of labour resources, in order to predict the situation in the future. Knowledge of the market situation directly affects on all companies in the sector, their development, growth and business success in the future (Motik and Pirc, 2008). The European Union has committed to the principle of sustainable development as its policies and actions, based on balanced economic growth, price range of stability, strengthening the internal market, research and development, innovation, education, competitive social market economy and a high level of protection and improvement of environmental quality (Lučić, 2009). 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. The key to survival and growth in the market is in organization's ability to adapt its strategy to the rapidly changing environment (Kotler, 2001). 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.

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 (Lovrinčević, 2001). 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).

The dynamic economic analysis of time series data for three periods was performed. Analysing periods 1890-1910 and 1947-1952 we shown the importance and position of Croatian wood industry since the late 19th century. On the basis of established values in the period 1996-2012 we discuss a possibility to predict the number of employees in the future period in Croatian wood industry sectors. Because of turbulences in this market and the length of analyzed time series the prediction is limited to the year 2020.

10.2. MATERIAL AND METHODS

For the analysis of employment in the remote past, we used data of the number of enterprises and number of employees according to type of industry in the period 1890-1910 in the former Northern Croatia, as well as data of the mobility of wood industry labor in sectors of logging, sawmill processing, final production and communication for period 1947-1952 in the former People's Republic of Croatia (Forest encyclopedia 1, 1958; Encyclopedia of Croatian history and culture, 1980). According to the above sources, the data for both analysis are presented in Table 10.1 and Table 10.2, in the processing of the authors.

Table 10.1. Number of enterprises and number of employees according to type of industry in the period 1890-1910 in the former Northern Croatia

Wood industry sector	Number of companies per year			Number of employees per year		
	1890	1900	1910	1890	1900	1910
Forest companies	42	75	49	3.987	5.871	3.699
Sawmill	12	27	36	1.485	2.777	3.331
Final production	6	11	16	458	1.113	1.158
Total 1	60	113	101	5.930	9.761	8.188
Other industries	50	100	170	3.962	9.038	14.993
Total 2	110	213	271	9.892	18.799	23.181

Table 10.2. Number of employees according to type of industry in the period 1947-1952 in the former People's Republic of Croatia

Wood industry sector	Number of employees per year					
	1947	1948	1949	1950	1951	1952
Forest exploitation	13.056	19.103	15.867	13.329	11.750	12.643
Sawmill	5.042	6.461	10.850	9.160	6.641	8.042
Final production	3.751	3.996	4.950	4.980	4.904	7.909
Communications	1.864	2.866	3.170	2.168	2.000	3.096
Total	23.713	32.426	34.837	29.637	25.295	31.690

Further analysis follows the time course of an employment in the Croatian wood industry sectors for period 1996-2012. The data for analized period were gathered from database of Croatian's State Bureau of Statistics (DSZ) and Ministry of Finance and Financial Agency (FINA). The data are shown in Table 10.3.

Table 10.3. Number of employees per year in the Croatian wood industry sectors for period 1996–2012

Year	Furniture manufacturing	Wood processing	Total
	(EFM)	(EWP)	(ETL)
1996	12.641	11.223	23.864
1997	12.116	11.577	23.693
1998	10.973	11.908	22.881
1999	11.515	11.287	22.802
2000	11.611	11.495	23.106
2001	11.627	10.833	22.460
2002	11.719	11.376	23.095
2003	10.348	11.780	22.128
2004	10.563	11.584	22.147
2005	10.851	11.404	22.255
2006	10.638	12.014	22.652
2007	11.386	12.842	24.228
2008	11.603	12.819	24.422
2009	9.637	11.501	21.138
2010	9.676	11.050	20.726
2011	9.357	10.839	20.196
2012	8.887	11.072	19.959

Focus of this analysis was to determine recent trends of an employment in the forest-based industry of Croatia. Variable EWP represent the number of employees per year in Wood Processing (sector C16), Variable EFM represent the number of employees per year in

Furniture Manufacturing (sector C31), and Variable ETL represent the number of employees per year in Wood processing and Furniture manufacturing together, for period 1996 – 2012.

For the purposes of forecasting future trends in the indicator of market condition (number of employees per year), the dynamic economic analysis of time series data was performed. Two types of time series models were built: models based on average rates of change (models A) and linear trend models (models B).

It is known that future projections of development can not predict the detail movement of market indicators, such is the number of employees. They are only a rough indication of the future course, assuming that the macroeconomic policies won't change significanty (Hanke and Reitsch, 2001). According to Rozga and Grčić (2002), 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 an employment indicator in the near future.

10.3. RESULTS AND DISCUSSION

Analyzing data for the period 1890-1910 it is evident that the wood industry according to the number of companies exceeded all other industries in 1890 and in 1900, and also a fact that 37.3% of all industrial enterprises in 1910 were wood-industrial enterprises. Wood industry of that time was devided as a forest enterprises, steam sawmill and factories for furniture goods. According to the number of companies it is evident that a forest companies initially dominate, and that the number of steam sawmills and factories for furniture goods was constantly growing. The significance of the wood industry of that time is also evident when we compare the number of employees in wood sectors with the number of employees in entire industry. Results indicates that the wood industry in the number of employees exceeded all other industries in 1890 and in 1900, while in year 1910 number of employees in the wood industrial enterprises represented 35.3% of total employment in the whole industry of the former Northern Croatian. Results are shown in Figure 10.1 and Figure 10.2.

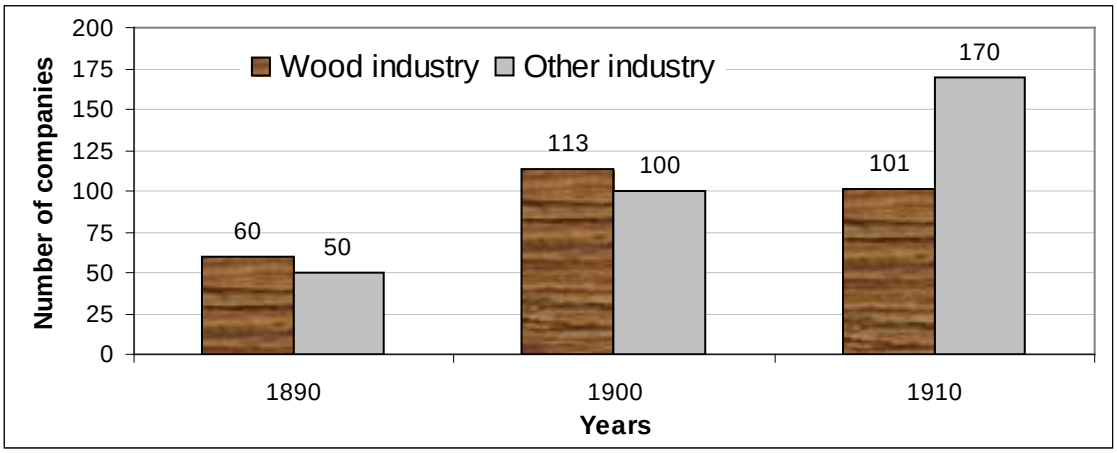

Figure 10.1. Number of companies in the former Northern Croatian for period 1890-1900

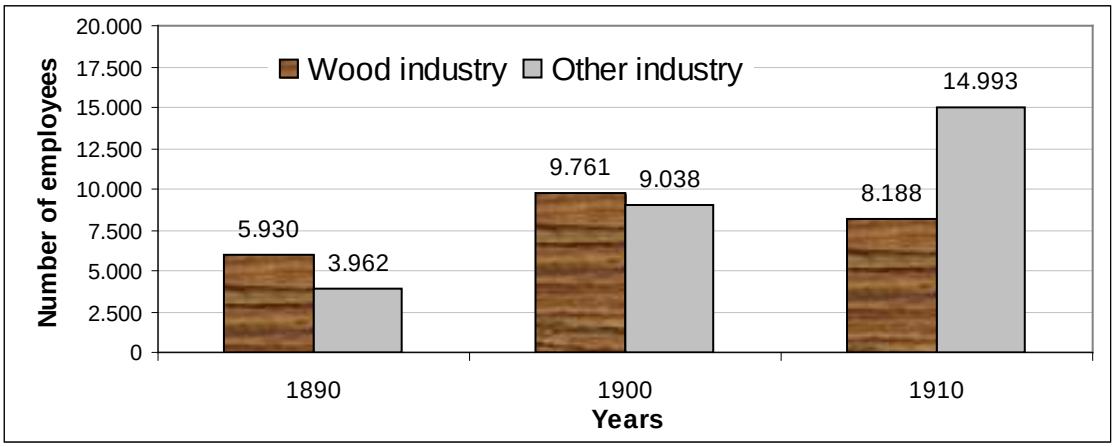

Figure 10.2. Number of employees in the former Northern Croatian for period 1890-1900

Analyzing data for the period 1947-1952 we found that despite the intensive exploitation of woods, croatian wood industry kept a significant place in the overall economy. In the structure of the wood industry the sawmills still dominate. The big problem are great number of small sawmills (448), with a total capacity of 723,000 m^3. In the wood industry of the former People's Republic of Croatia were employed an one sixth of the total number of employees in all other industries and in mining. The share of employment in forest exploitation falling from 58.9% in 1948 to 39.9% in 1952, while the number of employees in final wood production

increase from 12.3% in 1948 to 25% in1952. Trends in the share of employees according to the branches of the wood industry for period 1947-1952 are shown in Figure 10.3.

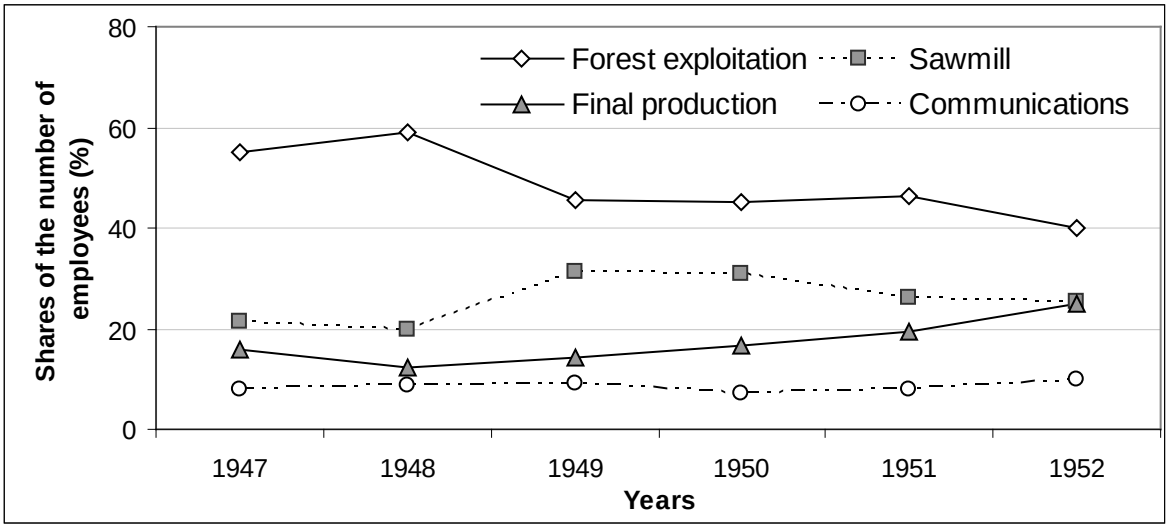

Figure 10.3. Trends in the share of employees according to the branches of the wood industry for period 1947-1952

Descriptive statistics were determined for the number of employees in the Croatian wood industry sectors for period 1996–2012. Average number of employees in both sectors is approximately equal for analized period, 10.891 workers in Wood processing and 11.565 workers in Furniture manufacturing. The coefficients of variation of the number of employees for all variables are relatively small (EWP 9,56%; EFM 5,03% and ETL 5,89%), so the arithmetic mean is representative indicator for the number of employees in the observed sectors. Results are given in Table 10.4.

The basic indices ($I_{b=2009}$) for all variables are presented with a common reference year (currently 2009 = 100) and belonging rates of change ($S_t = I_{b=2009} - 100$), also chain base index (V_t) and belonging rates of change ($S_t * = V_t - 100$). Results of these analysis for the number of employees in Wood processing (EWP) and for the number of employees in Furniture manufacturing (EFM) are given in folowing tables (Table 10.5 and Table 10.6).

Table 10.4. Descriptive statistics for the number of employees in croatian wood industry for period 1996–2012

Descriptive Statistics	Variable		
	Furniture manufacturing (EFM)	Wood processing (EWP)	Total (ETL)
Valid N	17	17	17
Minimum	8.887	10.833	19.959
Median	10.973	11.495	22.652
Maximum	12.641	12.842	24.422
Sum	185.148	196.604	381.752
Mean	10.891	11.565	22.456
Std.Dev.	1.041	581	1.323
Coef.Var. (%)	9,56	5,03	5,89
Confidence -95%	10.356	11.266	21.776
Confidence +-95%	11.426	11.864	23.136

Table 10.5. Employment indices and rates of change for Wood processing for period 1996 – 2012

Year	EWP	$I_{b=2009}$	S_t (%)	V_t	S_t^* (%)
1996	11.223	97,6	-2,4	-	-
1997	11.577	100,7	0,7	103,2	3,2
1998	11.908	103,5	3,5	102,9	2,9
1999	11.287	98,1	-1,9	94,8	-5,2
2000	11.495	99,9	-0,1	101,8	1,8
2001	10.833	94,2	-5,8	94,2	-5,8
2002	11.376	98,9	-1,1	105	5,0
2003	11.780	102,4	2,4	103,6	3,6
2004	11.584	100,7	0,7	98,3	-1,7
2005	11.404	99,2	-0,8	98,4	-1,6
2006	12.014	104,5	4,5	105,3	5,3
2007	12.842	111,7	11,7	106,9	6,9
2008	12.819	111,5	11,5	99,8	-0,2
2009	11.501	100	0	89,7	-10,3
2010	11.050	96,1	-3,9	96,1	-3,9
2011	10.839	94,2	-5,8	98,1	-1,9
2012	11.072	96,3	-3,7	102,1	2,1

Table 10.6. Employment indices and rates of change for Furniture manufacturing for period 1996 – 2012

Year	EFM	$I_{b=2009}$	S_t (%)	V_t	S_t* (%)
1996	12.641	131,2	31,2	-	-
1997	12.116	125,7	25,7	95,8	-4,2
1998	10.973	113,9	13,9	90,6	-9,4
1999	11.515	119,5	19,5	104,9	4,9
2000	11.611	120,5	20,5	100,8	0,8
2001	11.627	120,6	20,6	100,1	0,1
2002	11.719	121,6	21,6	100,8	0,8
2003	10.348	107,4	7,4	88,3	-11,7
2004	10.563	109,6	9,6	102,1	2,1
2005	10.851	112,6	12,6	102,7	2,7
2006	10.638	110,4	10,4	98	-2,0
2007	11.386	118,1	18,1	107	7,0
2008	11.603	120,4	20,4	101,9	1,9
2009	9.637	100	0	83,1	-16,9
2010	9.676	100,4	0,4	100,4	0,4
2011	9.357	97,1	-2,9	96,7	-3,3
2012	8.887	92,2	-7,8	95	-5,0

The average rate of change for the number of employees in Wood processing for period 1996 - 2012 was negative (-0,0857%), also as the average rate of change for the number of employees in Furniture manufacturing (-2,178%).

For the number of employees in the both wooden sectors (ETL), the basic indices ($I_{b=2009}$) are shown in Figure 10.4, and the chain indices (V_t) in Figure 10.5.

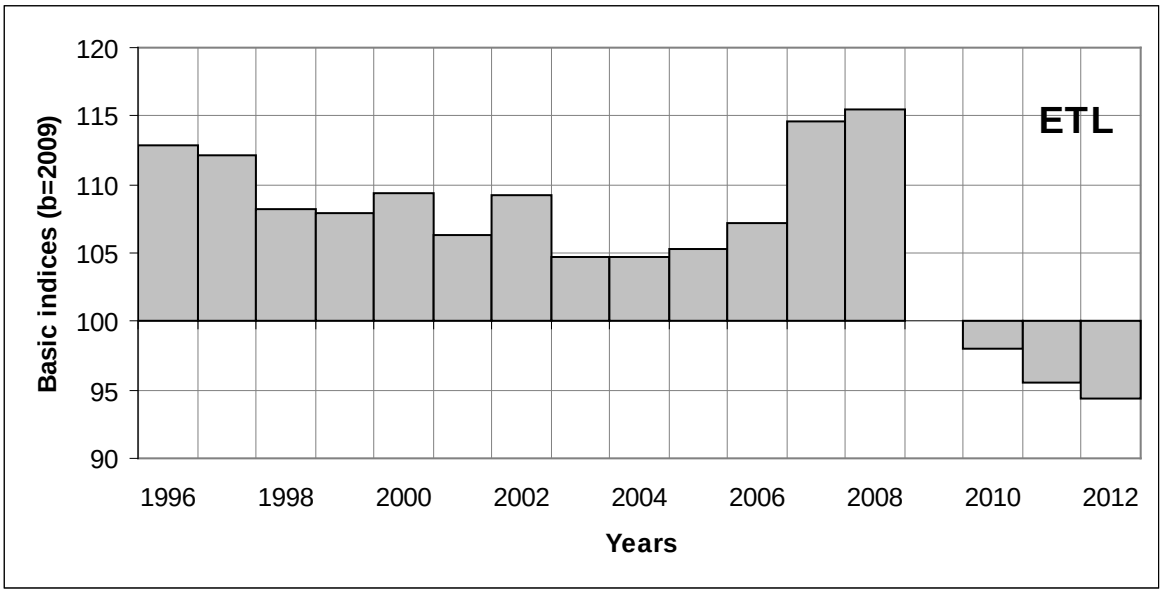

Figure 10.4. Basic indices for the number of employees in whole wooden sector for period 1996 – 2012

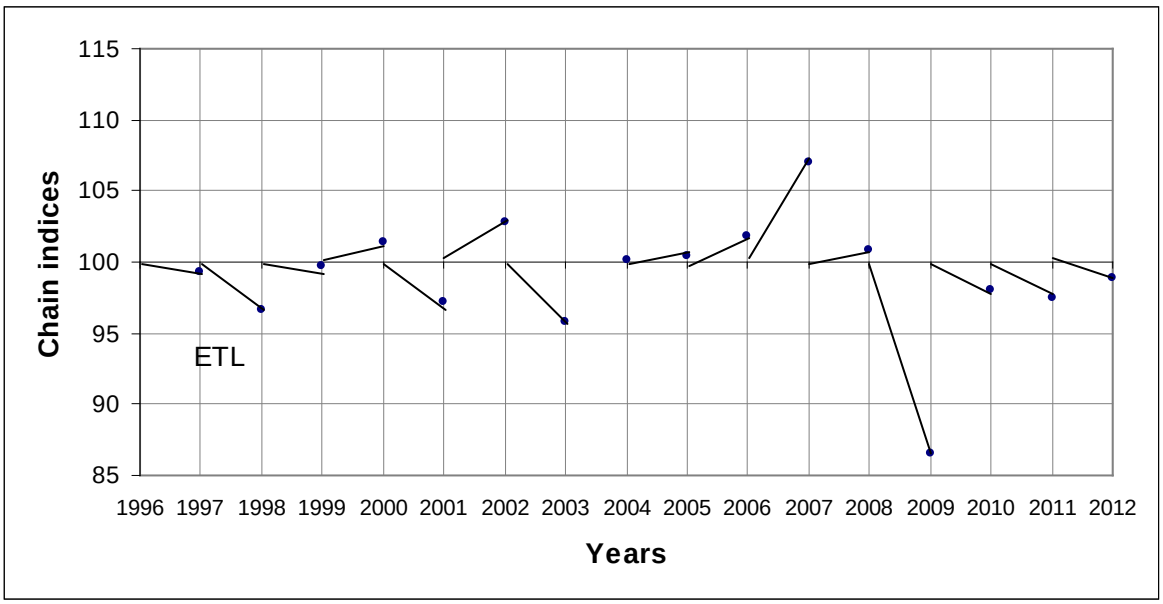

Figure 10.5. Chain indices for the number of employees in whole wooden sector for period 1996 – 2012

The average rate of change for the number of employees in Wood processing and Furniture manufacturing (ETL) for period 1996 - 2012 was also negative (-1,111%).

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 periods (Blažević, 2007). Based on the average rates of change for EWP, EFM and ETL in the observed period, models A for prediction of future values of the number of employees in Wood processing and Furniture manufacturing were developed.

Correlation analysis to determine the degree of correlation between the values of the number of employees as dependent variables, and time (*t*) as independent variable was used for models B. Pearson's linear correlation coefficient (*r*) which describes the direction and strength of the correlation relationship was negative and high in two cases, *r* = -0,8195 for EFM and *r* = -0,6283 for ETL. Correlation relationship for EWP was positive, but extremly low (*r* = 0,0374).

In all models, *t* is mark for the time, where *t* = 0 compared to year 1996, *t* = 1 for year 1997; ... , *t* = 16 to year 2012, etc. Models predict values in the number of employees. Constructed models A and models B for predicting the future values of the number of employees in Croatian wood sectors are shown in Table 10.7.

Table 10.7. Models A and models B for calculating the future number of employees in Croatian wood sectors

Wood industry sector	Model A	Model B
Wood processing (EWP)	$A_1(t) = 0,999^t \cdot 11223$	$B_1(t) = 4,34 \cdot t + 11530$
Furniture manufacturing (EFM)	$A_2(t) = 0,978^t \cdot 12641$	$B_1(t) = -168,95 \cdot t + 12243$
Total (ETL)	$A_3(t) = 0,989^t \cdot 23864$	$B_1(t) = -164,61 \cdot t + 23773$

According to the linear trend models (models B), the expected linear increase in the annual value of the number of employees in Wood processing is only 4 workers. The expected linear decrease in the annual value of the number of employees in Furniture manufacturing is 169 workers, and for whole wooden sector, expected linear decrease in the annual value is 165 workers.

The predicted values of the number of employees in Wood processing using model A and model B, are graphically compared in Figure 10.6, in Figure 10.7 are compared the predicted values in Furniture manufacturing, and in Figure 10.8 are compared the predicted values for whole wooden sector.

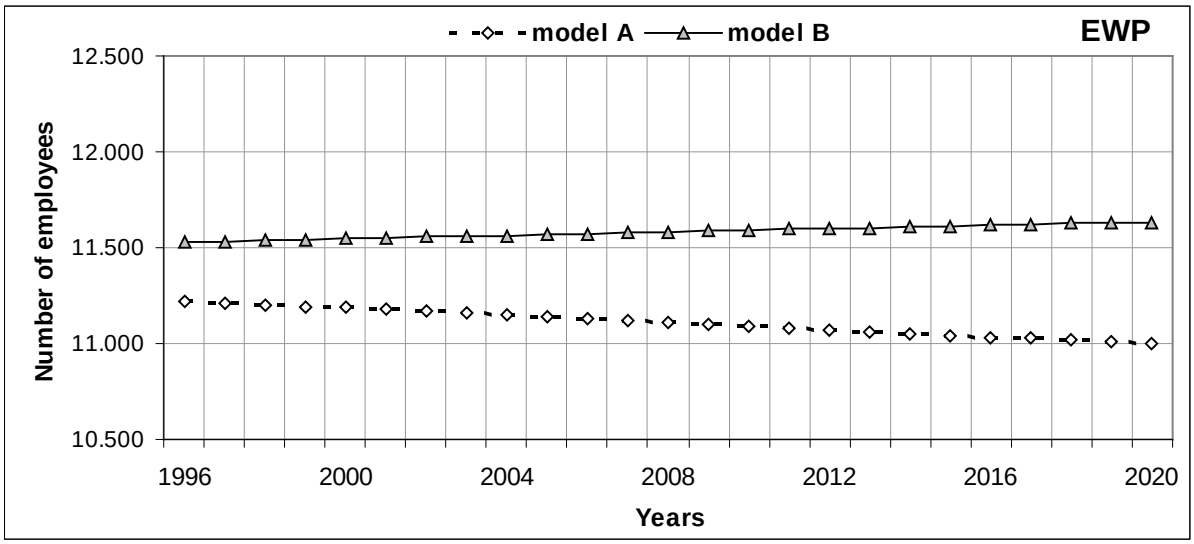

Figure 10.6. Comparison of the predicted values of the number of employees in Wood processing

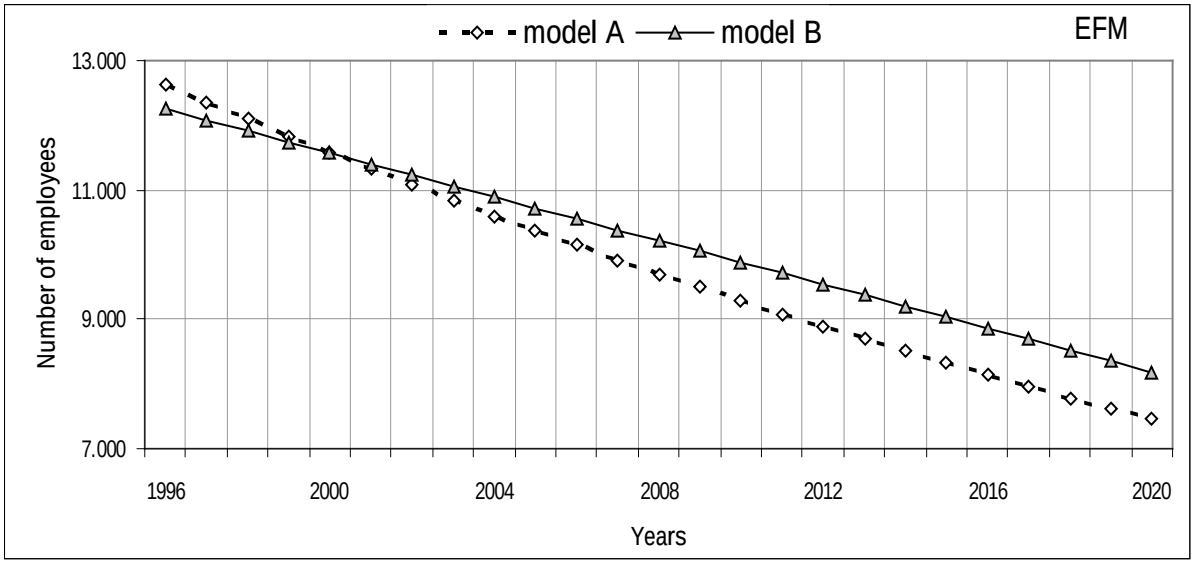

Figure 10.7. Comparison of the predicted values of the number of employees in Furniture manufacturing

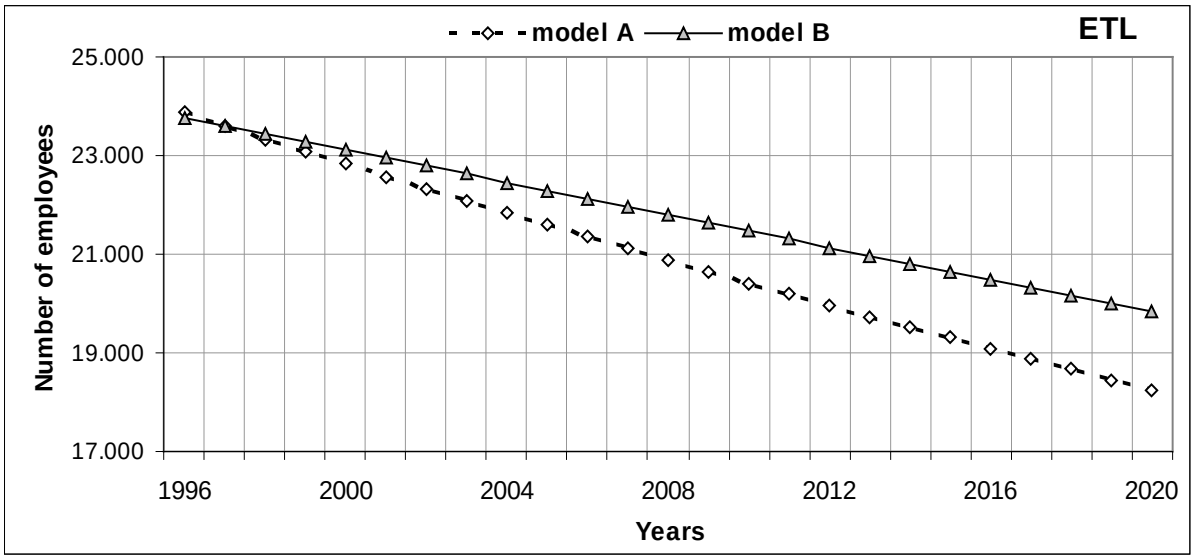

Figure 10.8. Comparison of the predicted values of the number of employees in whole wooden sector

Testing the differences between predicted values by using model A and model B with actual values of the number of employees was left for further research.

10.4. CONCLUSION

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 timber industry. Assuming that the macroeconomic policies will not be altered, and assuming that the models for predicting the number of employees satisfy all statistical and theoretical terms, constructed models A and models B could become a great help for a future actions.

Using time series models for forecasting the number of employees in the future, companies in the wood-based industry 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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11. INVESTMENTS TO WOOD SECTOR PRINTED MEDIA PROMOTION IN SOME EUROPEAN COUNTRIES

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11.1. WOOD PROCESSING AND FURNITURE MANUFACTURING IN SOME EUROPEAN COUNTRIES

Wood processing and furniture manufacturing is among the important industrial sectors in many European countries. Its share in GDP is placing that industrial sector among those which should be part of the national strategy plans. But media coverage of wood processing and furniture manufacturing in Croatia, as well as in other South East European countries, is far behind the promotion of other industrial branches. This chapter will give the current situation in promotional activites of wood sector in some European countries printed media and it will show the existing differences among particular countries.

When deciding on countries which should be involved in this research, we choosed 3 countries in South East European region with similar level of wood processing and furniture manufacturing in state economy. It was also decided to include countries of different status regarding European Union. Therefore Croatia, Slovenia and Serbia were included in this research. All those countries have very similar way of investigating media coverage of particular industrial and economical branches within countries, so it made comparation much easier to make. To compare the results achieved in those 3 South East European countries with the situation in other countries we chose Poland and investments to printed media in that European Union country much bigger than chosen South East European countries.

The Republic of Croatia is located in South East Europe with total area over 56 thousand km^2 and population of 4.5 mil people. In Croatia wood represents a significant raw material. The share of wood processing and furniture manufacturing in Croatian GDP was about 2 % in 2007. Domestic wood consumption in Croatia is over 3.4 mil m^3 annually and in the year 2007 the revenues were over 1 bil Euros with over 25 thousand employees. (Source: Statistical Yearbook of Croatia)

Industrial production indexes show significant decrease since 2007 until 2010. The same goes for wood processing and furniture manufacturing, since those are the first industrial branches which respond to any crisis, especially the global one. The main reason for that is the fact that wood processing and furniture manufacturing in Croatia are highly export oriented. So, any disturbances in global or European market have a significant influence on Croatian wood processing and furniture manufacturing (Jelačić, D. 2010).

Situation in employment is almost the same. Total number of employees in wood processing and furniture manufacturing decrease from 25.000 in year 2007 (which was 9,8 % of all employees in industrial sector, and 1,67 % af all employees in Croatia) to 21.000 in year 2009 (9 % in industrial sector, i.e. 1,41 % of all employees). That number decreased even more to less than 20.000 in year 2013. (Source: Statistical Yearbook of Croatia)

Economic recession has strongly influenced the operation of companies in the last several years. We can notice its influence in all business fields, also in promotion activities of wood processing and furniture companies. At the moment, Croatia is the newest European Union country accepted to EU in the year 2013 and, at the moment, Croatia is still under recession.

The Republic of Slovenia is located on western Croatian border with total area over 20 thousand km^2 and population of 2 mil people. The share of wood processing and furniture manufacturing in Slovenian GDP was about 1,5 % in 2007. In the year 2007 the revenues were over 1,5 bil Euros with over 22,5 thousand employees.

Industrial production indexes also show significant decrease since 2007 until 2010. Total revenues decreased from 1,5 bil Euros in 2007 to 0,75 bil Euros. Total number of employees in wood processing and furniture manufacturing decrease from 22.500 in year 2007 to 17.000 in year 2010 and to 15.500 in year 2011. Slovenia is a member of European. (Source: Statistical Yearbook of Slovenia).

The Republic of Serbia is Croatian eastern neighbour with total area of 88 thousand km^2 and population of 7,2 mil people. The global economic crisis had a bad influence on Serbian wood processing and furniture manufacturing so the number of employed people in that industrial branch decreased to 29.300 in year 2010, which was 1,63 % of all employed persons in Serbia. Serbia just started the negotiation process with European Union. (Source: University of Belgrade, Faculty of Forestry, Center for Marketing and Economics of Wood Industry).

The Republic of Poland is situated on the North Central part of Europe with a total area of 313 thousand km^2 and population of 38,5 mil people. Polish GDP is constantly growing from year 2006 until nowadays, and the share of the wood sector in the sold production of industry is more than 8%. The employed in the wood sector account for 11% of all the employed in industry, and in all wood sector the total of 297 thousand people are empolyed. In the year 2011 share of wood processing in Polish GDP was 0,79 %, and share of furniture manufacturing was 0,9 %. In the same year wood processing had a share of 3,11 % in all Polish manufacturing and furniture had a share of 3,56 % in all Polish manufacturing.

11.2. MATERIAL AND METHODS

According to EFFIE index, in the world 400 billion USD per year is spent on advertizing and promotional activities. That amount is increasing each year by 5 % at least (Žujo, M. 2011). Large amount of that money is invested into advertizing and promotion activities on TV and printed media (newspapers, journals, magazines …) (Stasiak-Betlejewska, R., Borkowski, S. 2007).

In South East Europe most of the adverts are presented on TV, radio and in printed media, although other ways of promotion, such as billboards or brochures and flyers, cover significant share of market. At the moment the most successful promotions were those who cover several different ways of marketing, including social networks, such as Facebook (Žujo, M. 2011).

This chapter will consider those promotion activities in printed media which were monitored by official agencies for monitoring the promotion covering in most exploited media in Croatia, Slovenia and Serbia.

IPSOS is an agency which monitors adverts in printed media and on the radio. Since they have started to monitor radio stations recently, the presented data covers only printed media. Given data will be presented in financial investment amounts to promotion in different printed media.

Research period was since the year 2006 until 2011, which covered the years of well economic conditions, the years of global recession and years of new growth and development after the crisis in some of the countries.

11.3. RESEARCH RESULTS

Printed media promotion activities in South East European countries are monitored by IPSOS as the amount of money invested in printed media for advertizing according to valuable price list in particular newspaper or journal. In Poland, the monitoring is made by Kantar Media. Advertizing is not monitored by sectors, but according to groups of products or production programs. Therefore the data for printed media is different than data for other media, but never the less the state of promotion activities of wood processing and furniture manufacturing branch in three countries in question can be observed. Following tables show the share of financial assets invested to promotion in printed media by wood processing and furniture manufacturing and some of the most exposed other branches for comparison in each particular South East European countries and in Poland.

Table 11.1. Investments to promotion in printed media in Croatia for period 2006-2011 (in €)

Year	2006	2007	2008	2009	2010	2011
Category	Investment	Investment	Investment	Investment	Investment	Investment
Magazines and Newspapers	17.853.443	16.146.843	18.933.626	15.759.596	16.889.629	23.061.594
Department stores, Retail chains, Hypermarkets	10.957.228	14.524.991	12.865.797	14.000.275	20.487.949	21.111.773
Car Personal Use	14.888.160	16.116.159	17.973.979	13.896.785	14.100.939	14.331.180
Financial Institutions	17.467.560	20.196.584	18.068.992	16.583.246	16.630.415	13.784.801
Telecommunication Providers	17.010.940	19.991.077	17.708.356	17.712.148	16.754.394	10.784.850
Furniture	3.238.474	3.247.640	3.461.730	3.040.894	3.101.617	2.333.708

Table 11.2. Investments to promotion in printed media in Slovenia for period 2006-2011 (in €)

Year / Category	2006 Investment	2007 Investment	2008 Investment	2009 Investment	2010 Investment	2011 Investment
Assurance	12.181.030	12.936.242	14.652.362	13.986.235	14.742.533	16.497.257
Finance	10.734.952	15.952.734	13.807.477	9.112.094	9.357.034	9.458.162
Mobile telecommunications	10.213.447	11.587.927	12.054.233	12.977.131	12.223.183	9.001.678
Megastores, retail stores	9.010.208	13.115.129	13.715.968	10.522.351	11.424.746	13.095.351
Personal cars	8.379.324	9.884.303	10.698.760	8.288.988	7.107.848	8.008.023
Furniture	590.127	685.102	643.867	936.890	1.004.846	409.059

Table 11.3. Investments to promotion in printed media in Serbia for period 2006-2011 (in €)

Year / Category	2006 Investment	2007 Investment	2008 Investment	2009 Investment	2010 Investment	2011 Investment
Banks and banking	5.624.114	7.171.149	6.893.112	4.285.452	4.268.204	4.347.825
Services	5.447.928	6.745.874	5.600.277	5.240.027	4.546.627	3.972.470
Cars	4.576.492	6.127.202	7.710.093	5.822.652	6.421.111	5.193.675
Media	3.680.775	4.449.919	4.930.312	3.022.388	3.260.958	4.552.994
Mobile telecommunications	2.509.344	18.085.391	8.982.028	6.354.252	6.822.855	6.061.613
Furniture	1.171.199	1.414.442	1.444.833	1.485.122	1.230.268	1.137.330

Table 11.4. Investments to promotion in printed media in Poland for period 2006-2011 (in €)

Year / Category	2006 Investment	2007 Investment	2008 Investment	2009 Investment	2010 Investment	2011 Investment
Food	67.239.010	72.295.354	79.830.055	76.558.449	92.606.564	82.521.851
Telecommunication	45.310.567	60.675.647	68.605.391	63.334.306	81.655.081	82.676.415
Pharmaceuticals	43.872.202	46.773.492	53.855.921	55.790.138	68.993.668	74.235.222
Finances	39.054.283	51.547.006	67.519.425	48.463.858	66.459.490	78.451.627
Trade services	47.318.249	53.047.873	54.733.793	53.053.980	63.617.580	72.534.420
Furniture	2.456.335	2.500.747	2.763.924	3.035.818	2.875.402	3.252.661

Table 11.5. Total investment to promotion in printed media (in mil. €) and share of furniture (in %) for period 2006-2011

Country	2006		2007		2008		2009		2010		2011	
	Total investment	Share of furniture	Total investment	Share of furniture	Total investment	Share of furniture	Total investment	Share of furniture	Total investment	Share of furniture	Total investment	Share of furnitu re
Croatia	179,6	1,80	204,6	1,59	216,8	1,60	194,8	1,56	204,6	1,52	206,7	1,13
Slovenia	124,5	0,47	144,3	0,47	157,8	0,40	145,3	0,64	150,8	0,67	147,2	0,28
Serbia	63,6	2,94	98,6	2,57	96,2	2,70	72,6	3,28	71,0	2,52	68,0	2,50
Poland	501,6	0,49	575,9	0,43	637,1	0,43	552,5	0,55	679,9	0,42	693,0	0,47

While South East European countries do not keep track to investements to all forms of promotion, such as billboards, TV or radio advertising and others, in Poland investments to promotion in printed media makes approx. 37 % of investments to all forms of promotion in average.

As it can be observed from the tables 1 to 4, the share of furniture manufacturing in the total investment to promotion in printed media is much lower than in 5 most exposed branches in all four countries. It is especially obvious for data in Poland. For example, in Croatia, the share of furniture adverts in printed media in the year 2011 (the smallest) was 1,13 % and the highest share furniture had in the year 2006 and it was 1,80 %.

Similar situation is in Serbia, where the share of furniture in printed media promotion is higher than in Croatia and it is between 2,50 % in year 2011 and 3,28 % in year 2009.

In Slovenia the situation and the share of furniture in promotion in printed media is between 0,28 % in year 2011 and 0,67 % in year 2010, and that share of furniture in Slovenia is much lower than those in Croatia and Serbia.

The share of furniture in promotion in printed media in Poland is similar to the share of furniture in Slovenia, which is much lower than those in Croatia and Serbia, and it is in the range between 0,42 % in year 2010 and 0,55 % in year 2009.

In total values, Croatian and Poland companies invested to promotion in printed media much more than those companies in Serbia or Slovenia. It is to be expected for Poland, since there are much more printed publications in the country with 38,5 mil people than in those with

19,25 times less citizens (if we compare Poland and Slovenia), or 5,35 times less people (Poland to Serbia).

But if we compare total investments to promotion of furniture in printed media in Poland and Croatia, more money was invested by Croatian furniture manufacturing companies. In Poland yearly investments of furniture was between 2,46 mil € in year 2006 to 3,25 mil € in year 2011. In Croatia those yearly investments made by furniture manufacturing companies were between 2,33 mil € in year 2011 to 3,46 mil € in year 2008.

The difference between investments to promotion of furniture in Poland and in Croatia is the fact that investments in absolute and in relative values in Poland are increasing in from year 2006 to 2011, and in Croatia those values are decreasing from year 2006 to 2011.

If we compare Croatia and Slovenia, there are more printed publications in Croatia than in Slovenia according to population in those 2 countries, so it is logical for total amount of money for promotion in printed media to be invested in Croatia. But, if we observe the share of furniture in the total of money invested to printed media, Croatian values are decreasing from year 2006 to 2011, and Slovenian values are increasing from year 2006 to 2010.

And the difference in total investments to promotion in printed media between Croatia and Serbia could partly be explained by much lower prices in € for adverts in Serbia, since according to population, there should be much more printed publications in Serbia than in Croatia.

11.4. CONCLUSION

It is obvious that the industrial branch such as wood processing and furniture manufacturing deserves a better place in the promotion business of all observed countries. Especially on TV channels, since there is a saying “if it is not on TV, it doesn’t exist”. According to share of wood processing and furniture manufacturing in national GDP-s in observed countries (2 % in Croatia, 1,5 % in Slovenia, 0,9 % in Poland) the share of that sector in TV promotion (0,5 % in Croatia, 0,3 % in Slovenia, 0,6 % in Serbia) is not satisfactory (Jelačić et. all, 2012).

When we observe the situation with promotion in printed media in chosen countries, the highest investments in total values were made by Croatian furniture manufacturing companies,

even more than in Poland regarding the fact that Poland has 8,56 times more citizens than Croatia, which would imply that Poland has much more printed publications than Croatia. But that absolute value of investments in Croatia is decreasing year by year, while in Poland the trend is totally opposite and it is increasing each year. In Slovenia and Serbia the amount of money invested to promotion of furniture was increasing to the year 2009 in Serbia and to the year 2010 in Slovenia.

In relative values, the share of furniture in total amount of money invested to promotion in printed media, the best situation is in Serbia, where that share matches and exceeds the share of wood processing and furniture manufacturing in GDP. In other 3 countries the share if promotion of furniture in printed media is lower or much lower that the share of wood sector in national GDP. And if we observe the number of employees in the branch or the share of the branch in national production and export, comparing to its share of promotion, numbers are even worse.

The main problem for promotion of wood products in Croatian media is lack of working capital, so wood processing and furniture manufacturing companies decide to invest it into something else instead of promotion activities. Second reason is lack of lobby which would promote wood processing and furniture manufacturing as an environmentally friendly industry. Wooden clusters could and should improve that by making joined actions in that direction. The battle between wooden clusters and PVC lobby regarding joinery (windows especially) is very hard and PVC is winning at the time. But that should be changed fast and soon. One more way to improve it is for companies to get together in cluster based on production program and not regionally, so they could act together in promotion activities. Especially, it would be good toward promotion on TV, since it is much more expensive than promotion in printed media.

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