

University of West Hungary
The Simonyi Karoly Faculty of Engineering, Wood
Sciences and Applied Arts
The Cziráki József Doctoral School of Wood Sciences
and Technologies

Doctoral Thesis

**Proposals for development
of the industrial production of wood-based panels
and the related education and training**

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1. Introduction

The economic recession in recent years negatively influencing the industrial production has also severely affected the wood-based panel industry being one of the dominant sectors of the wood industry in Hungary. The significance of this sector has been more and more growing, as the ecologically responsible approach has come to the fore increasingly in our country also.

The spirit of a conscious environmental management must be in place to target the widest use of wood, produced by the domestic sustainable forest management, and the sale of the processed products at the highest possible level of preparedness instead of foreign sales of raw materials. One of the keys for achieving these objectives is the domestic wood-based panel industry, to determine more opportunities of which an extensive in-depth analysis is necessary based on which proposals for further improvements can be made.

For the development and implementation of plans is essential a well-trained, professional staff with modern knowledge whose education and training is in the interests of the company and the employee alike.

2. The aims of the research

1. The Hungarian domestic wood-based panel industry has a long history. Over the course of history it has reached its current state through many developments and conversions. Production capacities were built, some ones ceased operations after a longer or shorter activity, while others have been working to date. The goal is, reviewing the history of the sector through the

history of the factories, to summarize the main reasons that contributed to the survival and losses of production facilities.

2. The existence of the wood-based panel industry - like for any industry - basically depends on the available raw materials. Areas of the wood-based panel production can be separated according to their product structure such as plywood and plywood productionbased laminated wood product manufacturing, the manufacture of chipboard and fibreboard products. The raw material demand and consequently the raw material supply situations of these three different areas in Hungary are different. The use of domestic wood can be the most obvious raw material base for the domestic wood-based panel industry. This research looks at this possibility.
3. An additional aim of this work is, in respect of Hungary's economic and labor market perspectives, to reveal in which areas are realistic opportunities for planning wood-based panel industry investments.
4. The wood-based panel production, like all industries, which are using wood as raw materials has an important role in environmental protection. This research summarizes the role of the wood-based panel industry in environmental protection and tries to show some of its unknown or less explored opportunities in this field.
5. Application of SWOT analysis based on the current situation of the domestic wood-based panel industry.

The dissertation discusses proposals for developments according to the results of analysis.

6. Working up proposals for solution of the problems of the areas, waiting for an additional development revealed by the examination of the wood-based panel industry.
7. Where the participants of the education and training are mentioned, in most cases is the educational institution as service provider on the one side and the industrial factories as customers are in most cases on the other side. The employee as the subject of the education-training is left out from the approach like this. One of the aims of the research is to make a proposal for an education-training method suiting to both the employees and the employers and which helps apply and efficiently employ for the companies adequately trained employees in their speciality field.

3. The description of the research

3.1. Trends in developments for the wood-based panel industry; a review of relevant literature

Domestic and international literature related to the topic was reviewed before the starting of the research. The gained information helped to identify research areas that demand additional investigations. Thus, the main thrust of this research could be determined. Furthermore it made possible to overview similar research works related to the topic and offered an opportunity for later additional examinations utilizing research results conducted in the past.

The next phase was the analysis of the data found as the result of the data collection, working up and summarizing of the developmental tendencies and the development of processes, picturesque followed with diagrams and tables, furthermore the definition of general tendencies as regards wood-based panel industry. The areas emphasized in terms of the development of the further developmental tendencies cover:

- the history of the wood-based panel industry until now and his present situation,
- the opportunities of basic material supply with wood raw materials available in Hungary currently and expectedly in the future,
- the expected economic and labour-market tendencies influencing the situation of the wood-based panel industry, based on the recent and future changes,
- the importance of the wood-based panel industry and its additional possible role in the area of environmental protection.

3.2. The examination of the motivational background and circumstances of participation in vocational education and training based on questionnaire surveys

Research with a character like this has not been performed in this issue yet. After analysing theoretical and background informations, topics could be defined that helped to reveal the general features of the education and training relations of this industrial branch. The respondents of the survey have already had several years of work experience. Thus, a realistic picture could be outlined from their answers.

The quantitative questionnaire survey was made in printed and electronic form. The target group members (employers and employees) filled out the questionnaires anonymously. To protect the anonymity of the respondents there were no questions in the survey which assisted the identification of a person and/or the place of work of the respondents. The questionnaires implied multiple-choice questions mostly; the questions could be answered in the way of selecting the suitable answer from predefined answer opportunities. For some questions there was an opportunity to list additional individual viewpoints, too.

The two questionnaires focus on the next main topics:

3.2.1. Survey of employers' views of education and training situation

Sixteen questions comprised the survey of employers' views of education and training situation. The questionnaire about the situation in the factories was filled out by managers of wood-based panel factories and factories primarily reprocessing the products of wood-based panel industry (i. e. laminated wood product manufacturers that purchase the veneer). The most significant wood-based panel factories in Hungary were surveyed. The questionnaire was filled in by altogether 11 respondents in the years 2012-2014.

The groups of questions of the questionnaire filled out by the employers:

- Workforce structure of the wood-based panel factories.
- Changes in the production units and their effect on the number and skills of the necessary labour force.
- The factors of the new workforce's application.
- The relationships between the corporate leadership and the education-training. Ha ez csak a vállalatvezető vagy az oktatás-kepzés viszonyaira vonatkozik, akkor az eredeti fordítás a jó. Bár szerintem a kettő közötti viszonyokról van szó.

3.2.2. Survey of the employees' views of finding employment and education and training situation

The survey of the employees' views of finding employment and education and training situation contained thirteen questions.

The questionnaire was filled out by school-leavers of the Roth Gyula Forestry and Primary Wood-industry Technical High School, Saw and Wood-based panel industry section Sopron. This institute, the only one in Hungary, had a special vocational education in wood-based panel industry, between 1982 and 1992. The questionnaire was filled out by altogether 97 respondents in the years 2013-2015.

The groups of questions of the questionnaire filled out by the employees:

- Qualifications and workplace conditions of the employees.
- Experiences of the employees with education and training.

- The situation of the utilisation of knowledge obtained during the vocational education or training.

Data acquisition followed by their statistical analyses. These included the determination of data distributions by percentile and the non-quantitative evaluation of the given answers.

. Processed data were collected in tables; and the prepared diagrams further aided the evaluations.

4. Summary and processing of the results

During the course of the research, from the environmental analysis of the wood-based panel industry and after the evaluation of the answers given to the questionnaires, an opportunity presented itself to draw conclusions and to identify tendencies connected with the circumstances of the industrial branch. Based on these the systematisation and processing of the received informations in a SWOT analysis served as good starting basis for the definition of the development strategies. The process to the forming of the development strategies can be seen in the figure below.

SWOT analysis		The analysis of internal factors	
		<i>Strengths</i>	<i>Weaknesses</i>
The analysis of external factors	Opportunities	S-O strategies	W-O strategies
	Threats	S-T strategies	W-T strategies

The definition of the development strategies with the help of a SWOT analysis

S-O strategies: The strategies created through the comparison of the lists of **strengths** and **opportunities** give an answer to the question, how to turn the organisation's internal strengths into a benefit taking advantage of opportunities.

S-T strategies: Pairing the lists of **strengths** and **threats** strategies can be built up to show how the company can protect itself from external threats making use of the organisation's strengths.

W-O strategies: The strategies created through the comparison of the lists of **weaknesses** and **opportunities** give an answer to the question, how to overcome internal weaknesses of the company by taking advantage of opportunities.

W-T strategies: Pairing the lists of **weaknesses** and **threats** strategies can be built up that enable the organisation to protect itself from threats overcoming the organisation's weaknesses at the same time.

These predetermined strategies were the building blocks of the short-, medium- and long-term development proposals for manufacturing companies and education and training of the wood-based panel industry.

5. Limitations of the study, recommendations for future research

The questions brought up during the course of the presented research, the hypotheses, the worked out questionnaires and the received results can serve as a suitable basis for further examinations. These future analyses were beyond the scope of this study; however, additional survey and research works may make more complete the assessment of current and expected future of the wood-based panel industry.

Another survey may target the exploration of cooperative activities between the different segments of the wood industry. Above all, there is an opportunity to develop the details of an efficient cooperation with the educational institutions.

The strategies, the development suggestions and the short-, middle- and long-term prospects crystallized as the results of this research show a kind of vision for the branch of the wood-based panel industry and for the education and training of specialists employed in this area. The comprehensive and summarizing character of this research may offer an initial basis for a subsequent analysis of several other areas, that were just briefly mentioned in this dissertation.

6. Theses (Conclusions)

The next theses summarize the results of the research and the analysis:

1. During my research I have concluded that in the course of the examination of the development opportunities

in the wood-based panel industry each of the following aspects has to take equal weight:

1. the circumstances of available supply of raw materials,
 2. the current and expected situation of industry sectors using ready products,
 3. the employees' education-training opportunities and circumstances.
2. After analysing the opportunities of the domestic wood raw material production and the complex wood use; I have concluded that for the sake of improved raw material supply, privately-owned forests should be involved more extensively. Significant volume of industrial quality wood may originate from private forest lands. Thus, forest owners should be motivated to increase raw material supply for the industry and to practice afforestation extensively. Furthermore, as a result of tree farming, through the differentiated use of harvested industrial wood volume, considerable economic benefits can be achieved.
3. Reviewing the professional literature I have found that by the quota calculation, method introduced in the new section of the Kyoto convention, the quantity of coal tied in wood-based panel products of the given year has already been included into the quantity of tied coal prescribed for the country. Therefor the wood-based panel production has become more important in this aspect as the country may obtain considerable additional income from sale of its unused quotas. After reviewing the professional literature available for me, I have concluded that through the

creation of marketing of Hungarian wood material and wood products the beneficial characteristics of wood products can be familiarized among the consumers, which also helps spread the environmentally friendly view in the product choice.

4. Answers received in the course of the evaluation of questionnaires constituting a part of my research showed unambiguously that the principle of lifelong learning proved to be true in the area of the wood-based panel industry as well. The employees change workplaces and/or speciality, even within the wood industry, several times during their career, which necessarily force them to acquire new technical knowledge and skills.
5. On the basis of my research I have concluded that the most important aspects for recruitment of new employees are: the special technical knowledges, gained professional experience and the existence of personal acquaintance. From the viewpoint of the employees, motivators for participate in education and training, the travel distance, time span and costs are the most significant. The employers primarily favour education and trainings that are attached to the company's profile. This could contribute to the fact that the companies should get a newly qualified labour who applies for a job already knowing the real circumstances at workplace and having practice. I suggest that the University of West Hungary The Simonyi Karoly Faculty of Engineering, Wood Sciences and Applied Arts as professional knowledge centre should coordinate and encourage the

cooperation between factories and education and training institutions. Additionally, it should motivate the exploration of further opportunities in vocational education and training for the long term, by means of starting a doctoral program for technical-vocational methodology.

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