

## RISK MANAGEMENT IMPROVEMENT OF ENGINEERING PROJECTS IN WOODWORKING INDUSTRY

Simona Bartkutė<sup>1</sup>, Eligijus Toločka<sup>2</sup>

Vilnius Gediminas Technical University

E-mails: <sup>1</sup>bartkute.s@gmail.lt; <sup>2</sup>eligijus.tolocka@vgtu.lt

**Abstract.** Risk is a complex phenomenon that has physical, monetary, cultural and social dimensions. Every company wants to save money, time, increase quality, optimise manufacturing, but each factor may involve different risks with different influence to company, its reputation. The aim of the research is to find better risk management improvement decisions, using techniques that could help to reduce risk impact in wood-based nonstandard production with shorter project time, smoother design process, lower costs, better project coordination, increased ability to manage problems, technical solutions.

**Keywords:** Engineering Project, risk, management, improvement.

### Introduction

Engineering Project involves engineers, technicians, suppliers, subcontractors. These kinds of projects are complex and involve employees of variety of sectors.

Cost, safety, time, quality, development methods are the factors that must be estimated in each phase of the process. Employees who are involved in engineering projects depending on their profile participate in defining project's specifications, planning its implementation and drawing its budget.

Engineering project manager is the person who usually reports to a manager or director of engineering. When they notice discrepancies, they notify the managers concerned and work with them to resolve the problem.

Managers of this type participate in writing specifications, researching and selecting suppliers, materials and, at the same time, they need to stay current with the changes

in techniques and regulations in effect in their sector (e.g. working conditions, safety, materials, environment).

In order to save money, time, get necessary quality and optimize process, employees must reduce risk in each step of project as much as possible. In risk reduction of engineering projects the workers of each stage of it must be involved.

### Project risk life cycle and environment

Project management team faces different sources of risk (Stellman *et al.* 2007) as external factors: political, economic, socio-cultural, technological, legal; and internal: schedule, customers, team, information, equipment and tools, developer relations (Fig. 1). The project has many elements of risk environment and it's really hard to control all of them, but the more elements will be monitored the stronger company will become.

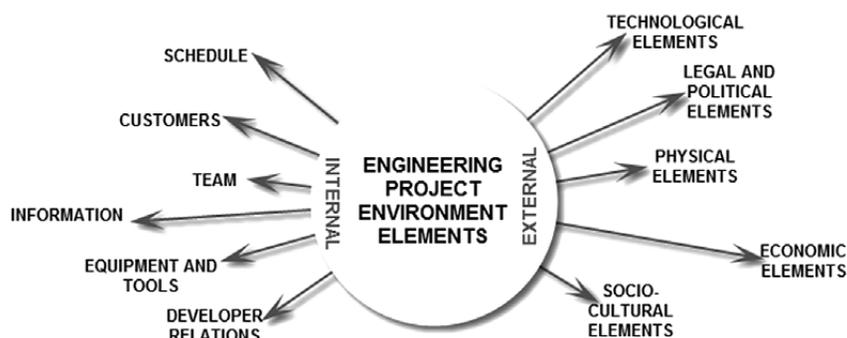


Fig. 1. Engineering project environment elements (Stellman *et al.* 2007)

To manage project effectively each project participant has to know his responsibilities, main focus, hierarchy, usable tools, actions need to be done with identified risk etc.

What is more, managing risk has to be continuous process in each company, as is shown in Fig. 2.

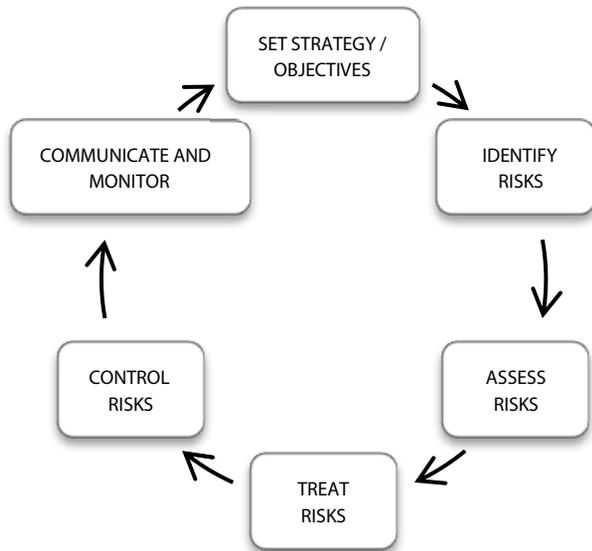


Fig. 2. A continuous risk management process (Enterprise Risk management 2007)

### Risks in woodworking companies

Companies based on non-standard products each time face different tasks with different risks in each project. Even most experienced project managers may have difficult tasks. Companies that have different roles as e.g. contactor, operator, processor and supplier have to consider about managing risks in each role. Some of processes have to be done in one time, so it enforces project participants to work even more. Different roles require different tools, tasks, different specialty of employees etc.

The main type of wood materials used at the time in wood production industry are: pure wood, wood particle or wood chip or fiber boards, saw dust boards.

This industry area is not exception of endless possibilities that could impact spare of success. There are mentioned just few main uncertainty paths that could disrupt the consistency and success of the projects like:

- Inappropriate storage;
- Defects occurred during transportation;
- Too much scrap, not effectively used wood;
- Human factors occurred during design of products;
- Wood products can crack during the exploitation out of enterprise;
- Not right utilization;

- Painting with mordant can change color as wood is an organic material;
- Not coping with deadlines;
- Technical failure;
- Supplier failing to deliver in time.

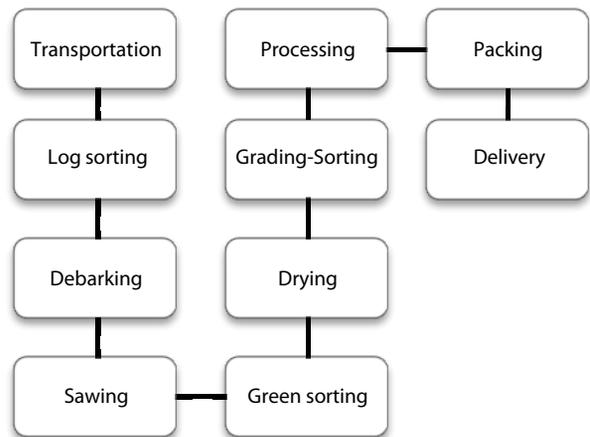


Fig. 3. Chain of modern Wood manufacturing technology

In Fig. 3 the start of wood manufacturing is shown. Even here, when cutting wood, manufacturers face risks. The customers', who produce further wood-based products, retention will depend on how manufacturers will prepare wood.

Products' quality, strength, durability and many other factors depend on how wood will be prepared for further production (e. g. furniture, building constructions).

Manufacturers have to consider also about utilization of wood waste. This material gives many opportunities, such as producing saw dust and chips. These materials are widely used in produced furniture, designed products and common products.

Constant supply, weather conditions for keeping the quality of the material (low temperature protects logs from degradation), protection in summer and other warm seasons, damaging logs during cutting operation with equipment, keeping right humidity, storage problems, precocious debarking process, keeping away from dirt, rocks – these are just a few areas of risk in wood cutting and preparation for other processes after it (Marcinkevičius 2004).

### Process of wood-based nonstandard production

It is better to control process and it is easier to achieve aims knowing responsibilities and hierarchy. It also may help to decrease a number mistakes. The biggest task for different companies is to find best way of giving information between different sectors, to find most suitable programs regarding companies' size, employees' number, distance between administration and workshop.

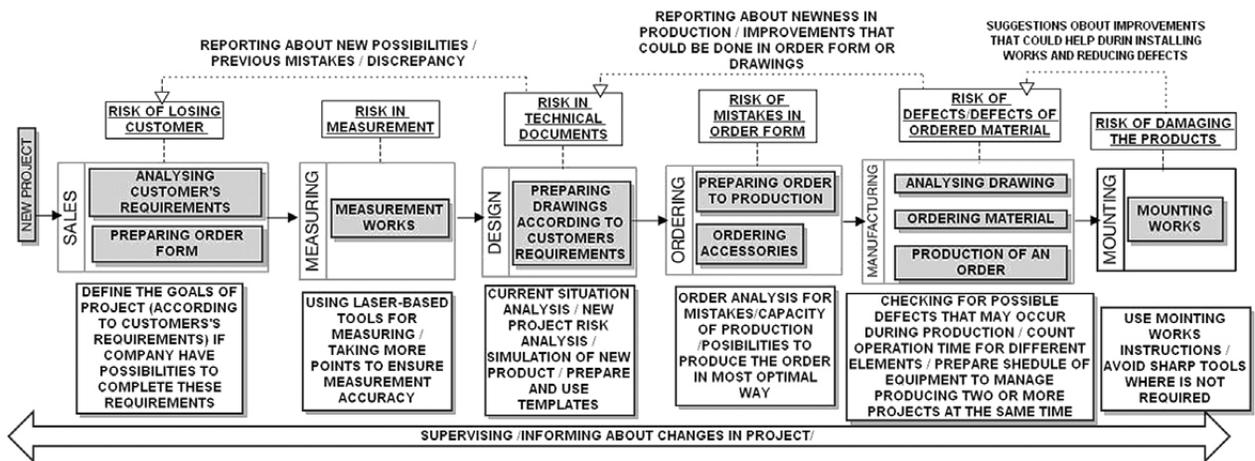


Fig. 4. Wood-based nonstandard production process model

This model (Fig. 4) is most suitable for companies that work with nonstandard products with necessary product drawings, when continuous collaboration between workshop and administration is necessary.

Chosen company for research JSC “Veneks” – manufacturer of custom interior door and technologically related interior elements. Using the sketch or the drawing of a client design in company can be created using unique leaf patterns as well as original ornaments of glazing, rimming and plat bands (“crowns”). Each client can be offered a range of innovative, original and unexpected interior door design solutions.

According to the questionnaire and process analysis it was suggested that development is necessary in drawings preparation time shortening, scoping with deadlines, process fluency. There are not big variety of tools, but usable forms/drawings seem quite simply and understandable for workers. Collaboration with suppliers, quality, and skilled manpower are companies’ strong spheres.

Questionnaire was prepared for director, sales manager, project manager, constructor, director assistant, manufacturing manager, manufacturing manager assistant as it is company of 24 workers. Other, not mentioned – operators, painters.

Higher quality, better name assure more customers, bigger income. These doors are luxury product, as main customers are wealthy, who come with designers, architects with unique ideas, requirements. Each project is unique, new, so each project has something unpredictable. The competitors are similar companies that design and produce nonstandard doors. To stay competitive in this area is a big challenge, because each time you may have radically different order.

Management system standard suggest steps that could help companies to stay competitive and to reduce risk.

These are clearly identification of hazards, assessed and reviewed risks, appreciated and understandable the key risks to the safe execution of their business and periodical assurance of themselves that these risks are appropriately managed and mitigated, maintenance currency of process and identification and monitoring changes which can introduce new risks. All potential hazard/risk elements have to be considered, including the task itself, work environment, skill and competence, third parties, behavior, human factors, emergencies and change management, as well as legal and regulatory obligations.

The process must consider the risk of harm to the employees and the third parties, environmental risk, business risk and reputational risk. Risks should be eliminated, substituted (by using a less hazardous method), reduced or controlled, exposure limited and people protected and/or warned about.

### Findings

In companies where individual design plays a big role in customers’ decision to select this company –work of designers and engineers becomes very important. Everyday technical decisions, human factors, various systems of construction, various customers requirements – in all these spheres is a risk factor. It is in drawings, dimensions, decisions of constructions, deadlines, company’s possibilities to fulfill constructor’s decisions, fulfill customer’s requirements. As in all nonstandard production companies, where customers come with a goal to make all their ideas real, they won’t be happy hearing about constraints that company has, lack of possibilities of equipment, lack of knowledge of constructor about systems, decisions that could be applied.

1. For improvements it was suggested to use templates of drawings (e.g. drawings that enable switching layouts)

and just do correction changes in new project. But if the templates will have mistakes it can do big damage, affect additional costs, so templates need to be accepted by production manager and constructor.

2. When scoping with deadlines it is required detailed analysis of counting time for each operation with getting approximate times (e.g. for different mill). By knowing this it will be easier to schedule, also the company will be able to produce different projects at the same time by knowing which equipment/tools are not used for one project and can be used for another. This will take a lot of time and attention. Also in nonstandard production foreseeing is one of the hardest tasks.
3. There were suggested possible risks in each process step.
4. Hierarchy and responsibilities were given for helping to find better way how to deal and eliminate risks.
5. Using various simulation programs will help to find weak spots, spheres for improvement, identify the range of possible outcomes for a number of scenarios.

## References

- Enterprise Risk management: Tools and techniques for effective implementation, 2007. Institute of Management Accountants.
- Marcinkevičius, A. H. 2004. *Industrial productions systems*: Textbook. Vilnius: Technika, 7–12.
- Stellman, A.; Greene, J. 2007. *Head First PMP: A Brain-Friendly Guide to Passing the Project Management Professional Exam*, USA.
- Veneks. Available from Internet: <http://www.veneks.lt/>
- Wood Group, HSE Management System Standard, 2012.

## MEDŽIO APDIRBIMO PRAMONĖS ŠAKOJE VYKDOMŲ INŽINERINIŲ PROJEKTŲ RIZIKOS VALDYMO TOBULINIMAS

S. Bartkutė, E. Toločka

Santrauka

Rizika – tai reiškinys, turintis fizinių, finansinių, kultūrinių ir socialinių aspektų. Kiekviena įmonė nori sutaupyti laiko, pinigų, gerinti produkcijos kokybę, optimizuoti gamybą, tačiau kiekvienas veiksnys gali būti susijęs su įvairiomis rizikomis, skirtingai veikti įmonės veiklą ir jos reputaciją. Šio tyrimo tikslas – rasti tinkamesnius rizikos valdymo tobulinimo sprendimus, naudojant metodus, padedančius sumažinti rizikos poveikį nestandartinių medienos gaminių pramonėje, esant trumpesniai projekto laikotarpiui, sklandesniam projektavimo procesui, mažesnėms išlaidoms, tobulinant projektų koordinavimą, rizikų valdymą ir techninius sprendimus.

**Reikšminiai žodžiai:** inžinerinis projektas, rizika, valdymas, tobulinimas.