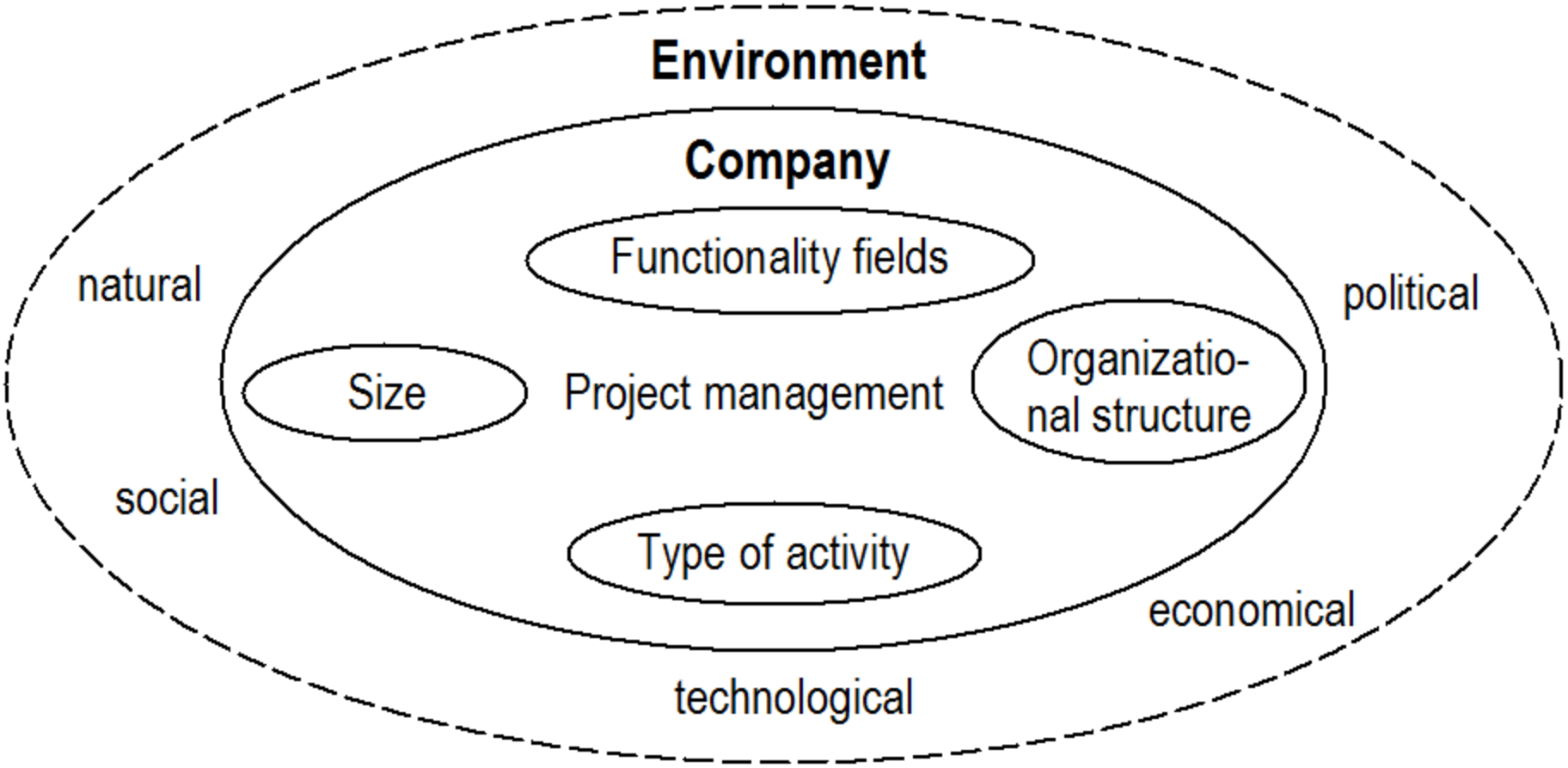
MULTI-PROJECT RISK ASSESSMENT FOR WOOD PRODUCT DEVELOPMENT

Marcin Relich

University of Zielona Góra, Poland

Reference Model of Project Management



Project Risk Definition

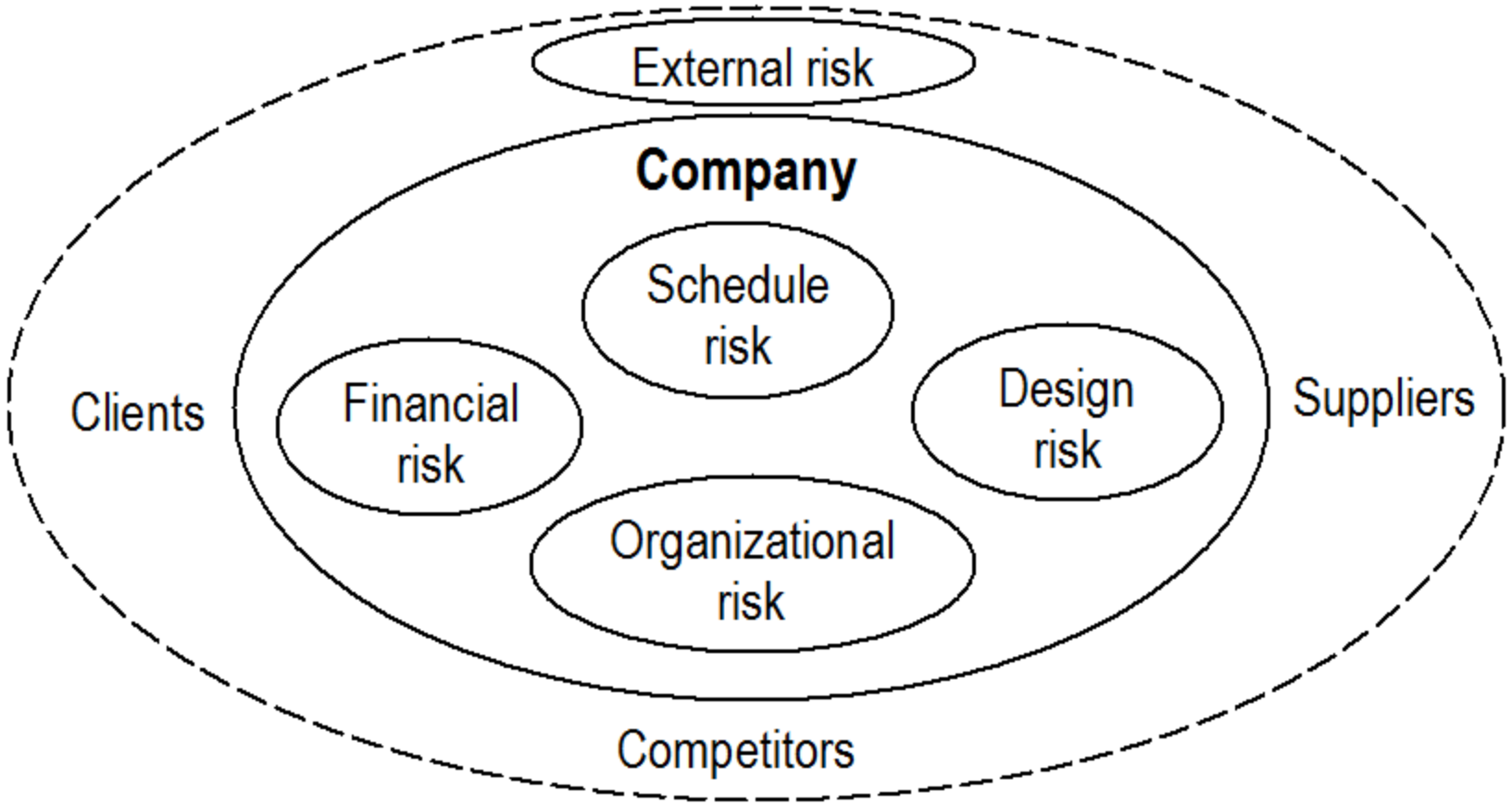
Uncertainty in the wood industry often results from forest management programmes that concern large areas, long time horizons and are difficult to assess.

Uncertainty is immeasurable risk; risk is measurable uncertainty.

Project risk is defined as an uncertain event or condition that, if it occurs, has a positive or a negative effect on a project objective [PMBOK].

Risk identification refers to evidence from previous experiences, in order to increase the probability of the project's success.

Project Risk Identification Model



(*Source: Dikmen et al. 2007, Choi et al. 2010, Dey 2010, Nieto-Morote et al. 2011*)

Major Risk Factors in Wood Product Development: External Risk

1. Insufficient demand

- Attitude of client
- Incomplete understanding of customer requirements
- Poor macroeconomic conditions

2. Environmental requirements

- Inappropriate materials, synthetic chemicals (including hazardous substances) for manufactured products; amount of waste
- Inconsistency with sustainability standards and certification
- Unclear legal requirements

3. Unavailability of suppliers

- Poor performance of suppliers and subcontractors
- Inappropriate forest governance
- Natural disasters such as earthquake, fire, flood, storm, and their impact on the forest and timber industry

Schedule Risk Factors

1. Project complexity
- Schedule inaccuracy
- Project density
- Task dependencies

2. Project duration
- Reserve time inaccuracy
- Incomplete task assignments

3. Unavailability of resources
- Inaccurate estimation of personnel availability
- Inaccurate estimation of material ordered
- Ill-assigned schedule responsibility

Financial Risk Factors

1. Unavailability of funds

- Delay in payments
- Contractor's financial instability
- Inaccurate price conformance of material supplier
- Inaccurate project budget estimation

2. Inappropriate financial reserves

- Economic power of company
- Working capital requirements

Design Risk Factors

1. Lack of experience in similar projects

- Product complexity
- Incomplete product performance (functionality) evaluation

2. Incomplete product specification

- Unfamiliarity with the technology
- Inaccurate estimation of material specification
- Incomplete conceptual manufacturing process design

Organizational Risk Factors

1. Complexity of organizational structure

- Instabilities in management structure
- Inappropriate delegation of responsibilities
- Incompatible hardware/software
- Inappropriate methods/techniques/tools for planning, and metrics (or lack of metrics)

2. Ineffective communication

- Ill-determined team size
- Inaccurate estimation of team skill and training requirements
- Inappropriate leadership style (including lack of clear goals, motivation, trust, commitment, etc.)

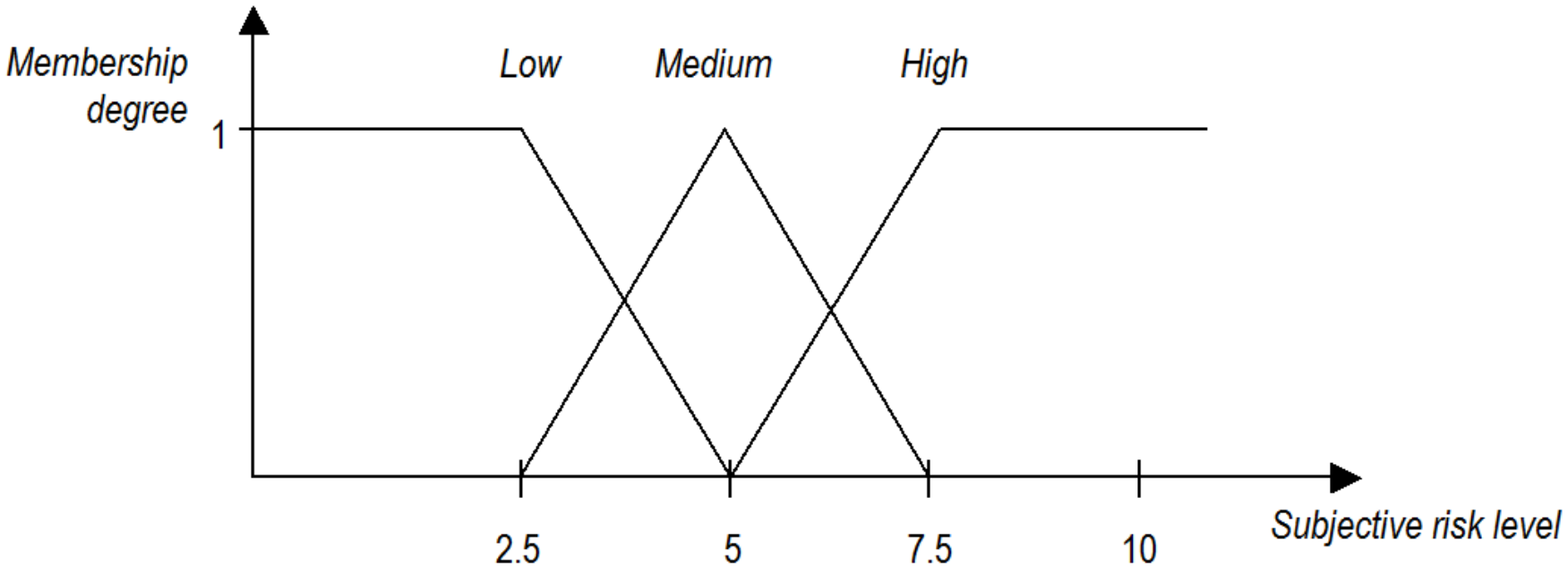
3. Inappropriate project management culture

- Inappropriate organizational culture
- Lack of team member commitment (inappropriate skills, motivation, trust, etc.)
- Personality conflicts

Proposed Method for Project Risk Assessment

1. Selection of a membership function for each variable
2. Obtaining the rule base from the experts
3. Determination of subjective level for risk subfactors
4. Obtaining the ratings for each risk factor, project, and project portfolio

Membership Function



Decision Matrix of Aggregation Rules

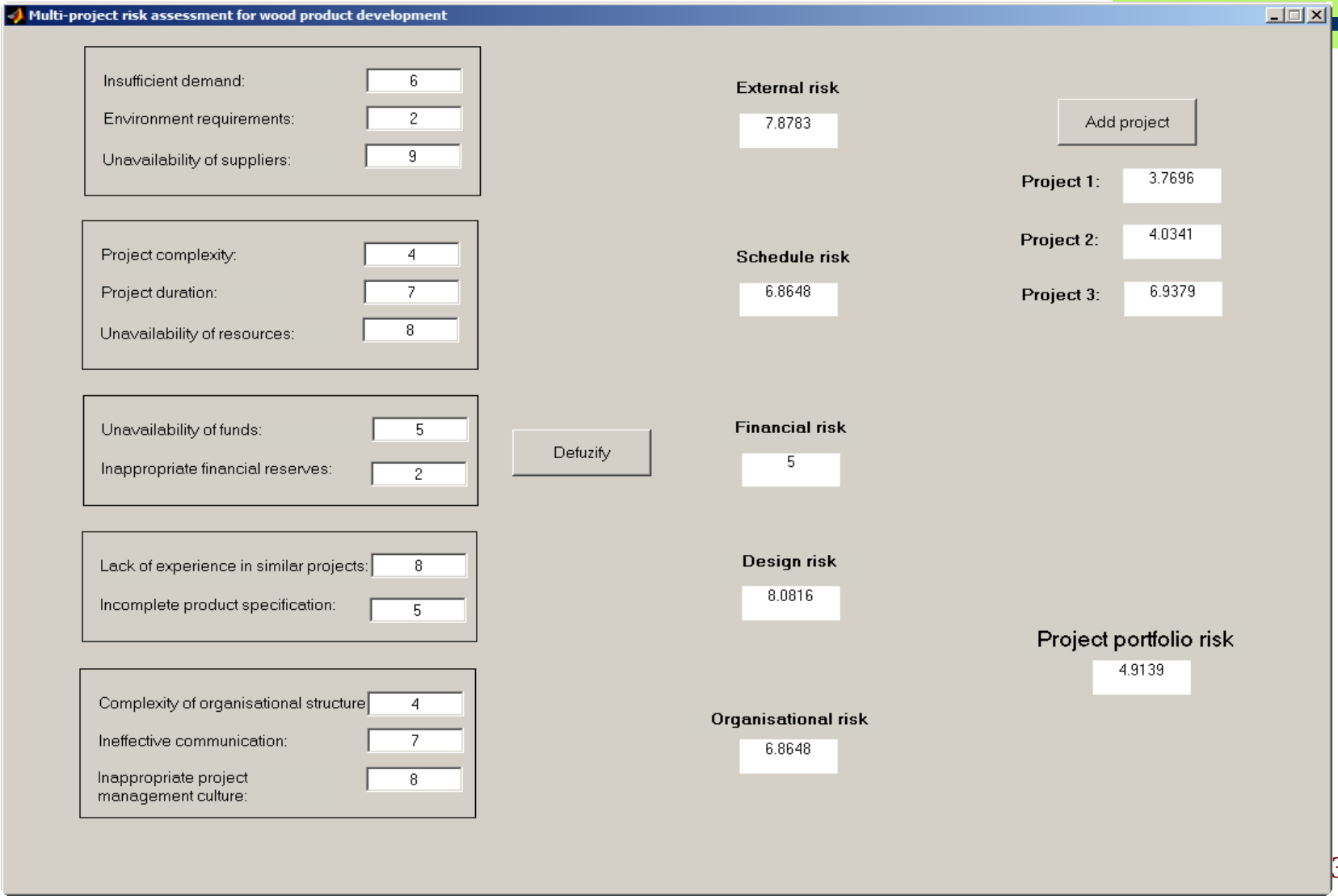
		Project complexity		
		Low (L)	Medium (M)	High (H)
Project duration	Low (L)	L	M	M
	Medium(M)	L	M	M
	High (H)	M	H	H

IF “Project complexity” is *low* AND “Project duration” is *low* THEN “Schedule risk” is *low*

IF “Project complexity” is *low* AND “Project duration” is *high* THEN “Schedule risk” is *medium*

IF “Project complexity” is *medium* AND “Project duration” is *high* THEN “Schedule risk” is *high*

Example of Project Portfolio Risk Rating



Conclusions

1. The main contribution of this work is modelling external and internal risk factors for simultaneous wood products development in a multi-project environment.
2. Fuzzy risk assessment provides a promising tool to quantify risk ratings where the risk impacts are vague and defined by subjective judgements rather than objective data.
3. The proposed approach to risk assessment has been implemented in the form of a decision support tool that can be used by professionals to quantify risk ratings.

Advantages of the Proposed Tool

1. The tool can provide guidance for a wood company about the amount of risk premium that should be included in the mark-up.
2. The tool can help development of a company risk “memory” and can be used as an organizational learning tool. Less experienced staff can refer to this risk information while calculating risk premiums in similar projects.

Limitations of the Proposed Tool and Further Research

1. The difficulties in capturing knowledge from experts. This obstacle leads to the increase of interest in automatic knowledge discovery, for instance, with the use of artificial intelligence techniques.
2. Further research focuses on developing a tool with the use of automatic knowledge discovery and its real life verification.

Questions & Comments

Thank you for your attention