Use of Z-fuzzy numbers in the management of megaprojects

Dorota Kuchta

Faculty of Management

HR EXCELLENCE IN RESEARCH

Wrocław University of Science and Technology

Outline

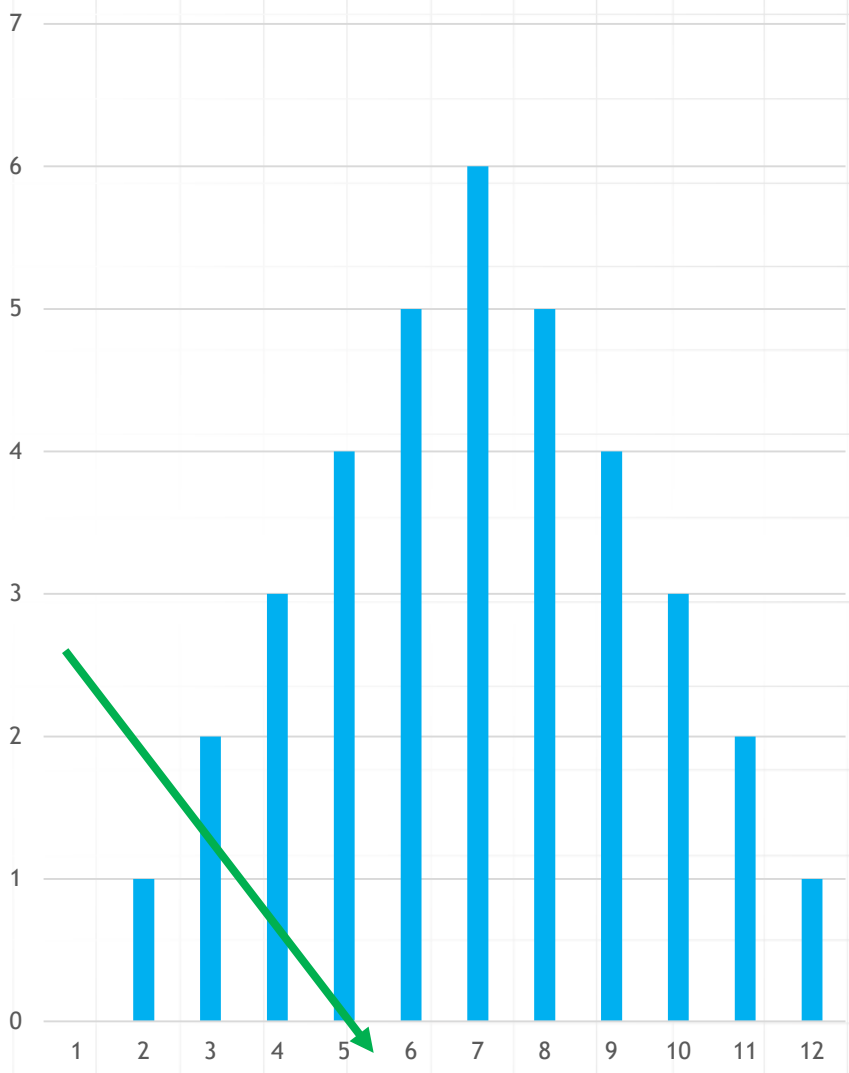
- Megaprojects
- Issue 1 and solutions
- Issue 2 and solutions
- Compromise between theory and practice

Megaprojects

- low performance (not getting better)
- omnipresence
- huge amounts of resources consumed
- are not simply bigger copies of other projects

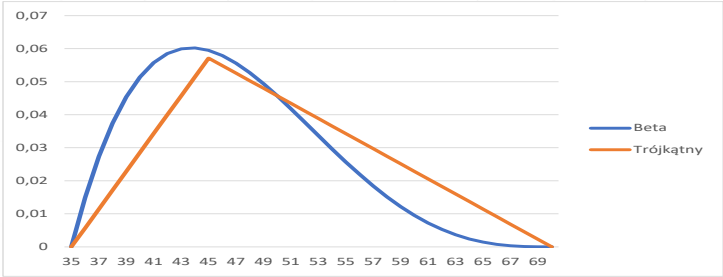
Issue 1: Uncertainty

- "The world of megaprojects planning and implementation is highly stochastic and rarely turns out as originally intended"
- PROBLEM I: in practice mainly fixed numers are used in planning and control (A NONSENSE – generally accepted)



2 solutions to issue 1

- Used fairly often: probabilistic modelling (software like Risk+)
- Hardly used in practice: fuzzy modelling



Main difference: degree of flexibility and subjectivity

- probabilistic: independent assumption or the need to determine correlation; slaves of software;
- fuzzy: possibility degrees (also in arithmetical operations) determined subjectively.

Specification (10,30,40)
Programming (20,40,45)
Testing (10,20,55)
Delivery (30,70,90)

Issue 2: bias, misinterpretion, lies... lack of credibility

- Estimator types:
  - optimistic estimator
  - pessimistic estimator
  - volatile estimator
  - accurate estimator
  - incompetent estimator

Issue 2 cont. – megaprojects specific factors reducing credibility

- Numerous estimators with various attitudes

Issue 2 cont. – megaprojects specific factors reducing credibility

- Corruption, interest groups, politics

Issue 2 cont. – country of origin

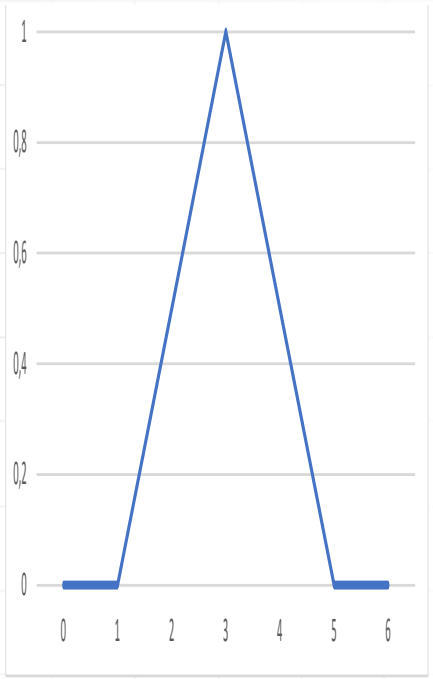
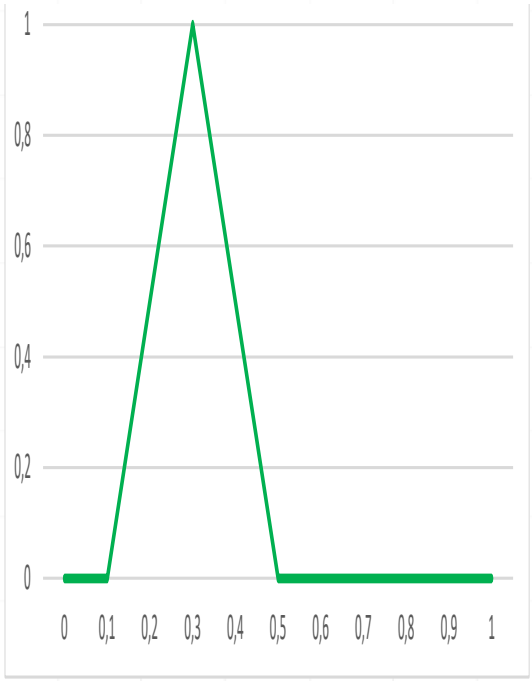
- e.g., Japanese versus French consultants

Issue 2 cont. – sector

- e.g., urban versus rail projects

Solutions to issue 2: Z-numbers (Z*-numbers)

Application results in an **adjusted value**

Original estimation	credibility assessement	type of bias
		• pessimistic • optimistic • volatile
		• **context-related** • **time-related**

Method and application

- In the paper a proposal of a formalised approach
- The actual application can be less formalised – the most important message:
  - **do not trust blindly (people, groups, software);**
  - **admit thay we MAY not know and MAY NOT be given objective information;**
  - **USE NON-CRISP DATA! ADJUST!**

Bibliography

- Ajam, M. A. (2020). *Leading megaprojects : a tailored approach.*
- Flyvbjerg, B., Bruzelius, N., & Rothengatter, W. (2003). MegaProjects and Risk: An Anatomy of Ambition.
- Flyvbjerg, B. (2008). Public Planning of Megaprojects: Overestimation of Demand and Underestimation of Costs. In *Decision-Making on Megaprojects: Cost-Benefit Analysis, Planning and Innovation*
- Flyvbjerg, B. (2014). What You Should Know About Megaprojects and Why: An Overview. *Project Management Journal*,
- Hulett, D. T. (2011). *Integrated cost-schedule risk analysis*
- Zadeh, Lotfi A. (2011). A Note on Z-numbers. *Information Sciences*.

HR EXCELLENCE IN RESEARCH

Wrocław University
of Science and Technology