Lecture 11: Conclusions and exam preparation

Learning outcomes on Business Analytics 2

- After the course, the student can
  - recognize the types of real-life business problems where the use of models brings added value
  - interpret the results of these models to derive defensible decision recommendations
  - build and solve these models using **spreadsheets** and **programming scripts** to support business decision making
- Modelling tools:
  - Simulation
  - Decision trees
  - EUT, MAUT and MAVT
  - Optimisation

Top 10 skills according to the WEF

in 2015

1. Complex problem solving
2. Coordinating with others
3. People management
4. Critical thinking
5. Negotiation
6. Quality control
7. Service orientation
8. Judgment and decision making
9. Active listening
10. Creativity

in 2020

1. Complex problem solving
2. Critical thinking
3. Creativity
4. People management
5. Coordinating with others
6. Emotional intelligence
7. Judgment and decision making
8. Service orientation
9. Negotiation
10. Cognitive flexibility

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Other Software for Business Analytics

- Monte Carlo/ Decision trees
  - Oracle Crystal Ball; Palisade @Risk and PrecisionTree6
  - Open source: SIMTOOLS
- Optimization solvers
  - Gurobi, IBM CPLEX Optimizer, FICO Xpress, MOSEK, …
  - Open source: OpenSolver, lp_solve, GLPK, PuLP
- Optimization models are usually built with a "programming language", which then calls the solver
  - C++, Java, Python, R, Matlab, …
  - Third-party Excel interfaces exist for most solvers

Goals of Decision Modelling

- Most examples during the course have focused on the identification of the best alternative, but modelling may also serve other purposes
  - Identification of objectives
  - Creation of new alternatives
    - The obvious alternatives can be outdated and based on a narrow perspective
  - Creation of a common problem framework (objectives, attributes, alternatives,…)
    - Can enhance an organization's commitment to the decision and its implementation
  - Construction of a decision support framework for repeated use
  - Quantification of subjective knowledge (probabilities, outcomes,…)
    - Identification knowledge/data that is lacking or is too imprecise
  - Creation of multiattribute indices
    - E.g. Global Competitiveness Ind., UN Human Development Ind., Uni Rankings, etc
  - Modelling sometimes required by legislation

Realities of decision modelling

- Objectives, alternatives and scenarios are not given
  - In fact, problem structuring is often the most time-consuming (and most valuable?) task in using model-based decision support

- Parameters almost never come in the form of a nice table
  - Often a large share of the parameters (alternatives' outcomes, probabilities, etc) cannot be obtained from "hard data" but they require expert judgement

- A model is always an approximation of the real world
  - Not everything is modelled
  - Some simplifying assumptions or approximations are always required
  - "All models are wrong, but some are more useful than others"

ISM-E1006 Decision Analytics for Consulting

Decision analytics comprises of methods and tools for supporting better decision making. Often, decision analytics models must be structured in collaboration with human decision makers to capture the decision makers' values, preferences, and beliefs, and to create a sense of ownership of the decision recommendations generated by the model. This course focuses on tools and facilitation techniques in such collaborative decision analytics processes. After taking the course, the student can (i) recognize the types of real-life business problems where the use of models adds value, (ii) facilitate processes for structuring such models in collaboration with human decision makers, and (iii) interpret the results of these models to derive defensible decision recommendations.

Extra readings that go beyond course materials

Hammond, J.S., Keeney, R.L. and Raiffa, H. (2015). *Smart choices: A practical guide to making better decisions.* **Boston, MA: HBR Press**

Goodwin, P. and Wright, G. (2014). *Decision Analysis for management judgment* **(5th ed.). Chichester: Wiley**

Spetzler, C., Winter, H. and Meyer, J. (2016). *Decision quality: Value creation from better business decisions:* **John Wiley & Sons.**

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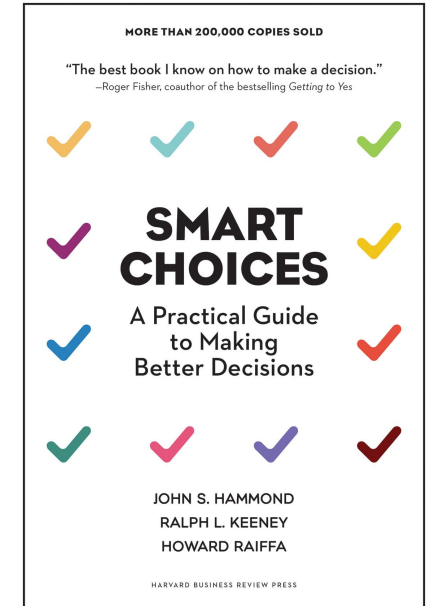
Exam 19 February 2024 9:00 – 12:00

- Arranged **online** at MyCourses course page Exam section

- Exam becomes available at 9:00

- Exam closes at 12:15

- Time limit 3 hours

- If you have <u>technical</u> problems there will be a Zoom session open on exam day between 9:00 – 10:00

Examinable content and questions

- All material discussed during the course is examinable
  - Lecture slides
  - Assignment materials
- Exam contains ~12 quiz type questions
  - Multiple choice
  - Interpretations of figures or computer screenshots
  - Calculations

Question types

- Multiple tries may be allowed in calculation type questions, but points are deducted after each incorrect answer

- In multiple choice problems, incorrect choices may reduce points from correct choices

- Grading is automatic and only based on the answers submitted
  - After you are done answering, finish your attempt and submit
  - Any unsubmitted exams will be automatically submitted

Problems during the exam

- There will be a Zoom session open on the exam day 9:00 – 10:00 so you can ask for help for <u>technical</u> issues

- If your computer crashes or apps freeze at critical time points, take a photograph and keep it for evidence

- Prepare for the worst case scenarios, i.e. make sure you have your materials available offline if there are network glitches

How to work through the exam

- Keep your materials and notes available and know where to find the relevant support for your answers

- Have Excel open and prepare to conduct small calculations with it (e.g. expected value/utility or Bayes rule calculations)

- Wolfram Alpha is great for quick analytical calculations

- Read carefully the problem descriptions and check your answers

- Exam is individual work and any attempts to collude with others are handled as academic misconduct

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Thank you for your participation!

I am available as a Master's Thesis supervisor, please contact me if you have an interesting topic in mind: ilkka.j.leppanen@aalto.fi

Analytics and problem structuring can be applied to almost any kind of a problem

Feel free to connect with me

Please remember to leave course feedback!