



## Collective Decision-Making in Organizations (2687)

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Below you will find three problems, each of it is worth up to 30 points. Please answer two of them. If you answer more than two, then the two first answers in your working sheets will be graded (so make sure to clearly cancel out an answer you do not want to be graded). The usage of pocket calculators, lecture notes, textbooks, or handwritten material is neither necessary nor permitted.

Do not give answers on this exercise sheet; feel free to use this sheet for your notes (they will be disregarded during the grading). Please leave a margin for comments. Undecipherable scribbling cannot be graded. Use the terminology and the mathematical models presented during lecture and tutorial; make clear how you derive your results.

### Question 1 (30 points)

Consider a company owned by five shareholders (A, B...E). A holds 40 shares, B and E own 20 shares each, while both C and D have 10 shares. One share is assigned one vote in the annual assembly, we consider only "yes" or "no" votes (no abstentions). The table shows all possible coalitions which yield a certain percentage of votes:

60%	AB	AE	ACD	BCDE
70%	ABC	ABD	ACE	ADE
80%	ABE	ABCD	ACDE	
90%	ABCE	ABDE		
100%	ABCDE			

- Compute the relative Banzhaf power indices (rBPI) of the five shareholders when an absolute majority is required to determine the social outcome. (10 points)
- Compute the rBPI under a qualified majority rule (66%). (8 points)
- D sells his shares to B. E wants to sell his shares to one of the remaining players (A, B, C). Determine the rBPI under the absolute majority rule for all ownership structures that may result. (9 points)
- In the light of your results, comment on the claim "one share, one vote guarantees that each shareholder's influence is proportional to his number of shares". (3 points)

- See over leaf -

**Question 2 (30 points)**

Consider a multinational manufacturing corporation consisting of three identical regional subsidiaries, labeled *A*, *B* and *C*. The executive board (which is composed of an equal number of representatives from all three subsidiaries) has to decide on building a new production plant in the regions of *A* and *B*.

The construction costs, amounting to €12,000,000 per plant will be paid by the overall corporate budget. Thus, every subsidiary bears an equal share of the costs.

The expected revenues, amounting to €15,000,000 per plant are totally internalized by the respective regional subsidiary the production plant is located in.

- Depict the net profits in a matrix. (3 points)
- How many production plants will be built if a simple majority rule is applied and logrolling is prohibited? (5 points)
- How many production plants will be built if no restrictions on logrolling exist? Evaluate the result with respect to efficiency. (7 points)
- Could subsidiary *C* influence the result derived under c) by offering a sidepayment to *A* or *B*? (5 points)
- Assume now that the expected revenues drop to €11,000,000 per production plant. How does this affect your results derived under b), c), and d)? (10 points)

**Question 3 (30 points)**

Three founding partners of a start-up firm have to decide on the location of their office headquarter. Working on a highly interdependent basis, they will have to permanently work in the same office.

- To find a decision mechanism that suits all three partners, they deliberate about an appropriate majority rule. Which general cost-related considerations have to be kept in mind when trying to find an “optimal majority”? Visualize your argument in a figure! (7 points)
- During a meeting they decide to write down their individual preferences regarding the possible alternatives *Berlin*, *Munich*, and *Cologne*. The preference rankings are displayed in the table below. Show the outcome of a pairwise comparison under single majority rule. Which problem emerges? Visualize your argument in a figure! (7 points)

	<i>Partner 1</i>	<i>Partner 2</i>	<i>Partner 3</i>
<i>1</i>	<i>Berlin</i>	<i>Munich</i>	<i>Cologne</i>
<i>2</i>	<i>Munich</i>	<i>Cologne</i>	<i>Berlin</i>
<i>3</i>	<i>Cologne</i>	<i>Berlin</i>	<i>Munich</i>

- Assume an agenda that starts with a vote between Berlin and Munich (followed by a vote between the winner and Cologne). How can Partner 1 exploit the situation by behaving strategically? (8 points)
- Derive a ranking for Partner 3 so that a Condorcet winner exists. What is now the outcome of the pairwise comparison? Visualize your argument in a figure! (8 points)