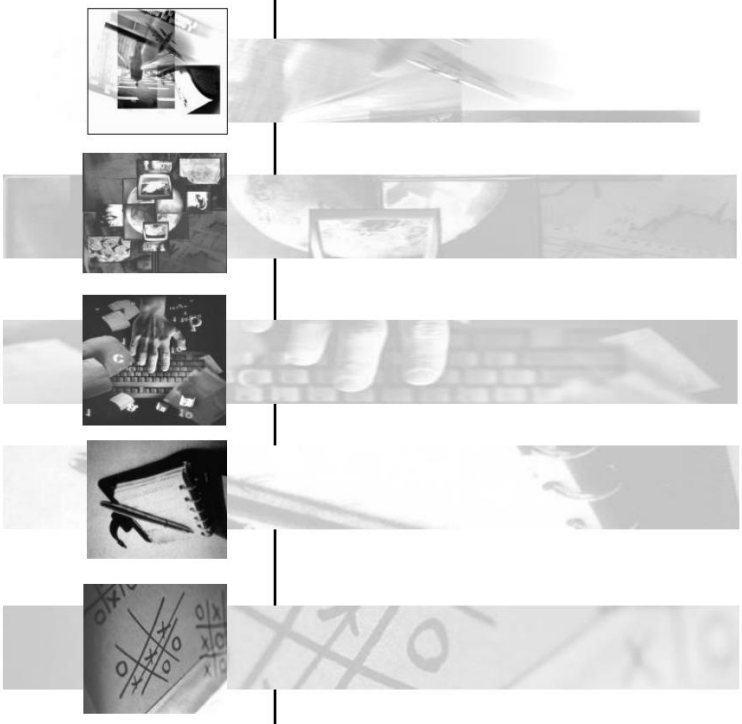
NATIONAL TECHNICAL UNIVERSITY OF ATHENS

DEPARTMENT OF ELECTRICAL ENGINEERING & COMPUTER ENGINEERING
LABORATORY OF DECISION AND ADMINISTRATION SYSTEMS

SYSTEMS DECISIONS



Laboratory Group 12 Exercise

Athens,

December 2023

Subject A

Auto-Motor Industry is active in the production of cars, both racing and passenger. It is presented with a very good opportunity to import 20 million tons of aluminum at €23 per ton, a price which the company considers extremely advantageous. Precisely for this reason, other companies are also interested in this particular order. If the Auto-Motor Industry imports the

product it is certain that it will eventually make €600m
from car sales at the end of the year. However, the US government may deny the request to import the aluminum because its diplomatic relations with the country of origin are not in a good place. In this case the agreement will be canceled but the Auto-Motor Industry will be forced to pay a fine of €2.5 per ton to the country of origin.

The CEO of the Auto-Motor Industry estimates that about half the applications are rejected. Auto-Motor has 4 different moves she can make.

The first is to buy the ore and hope for a subsequent approval of the application by the appropriate US government agency.

The second is to submit the application, wait for the decision of the competent body and if the application is approved, proceed with the purchase. In this case CEO of Auto-Motor he estimates, from past experience, that there is about a 70% chance that another competitor will close the deal.

The third move is to hire a large consulting firm based in Chicago, and ask for their assessment of whether or not the application will be approved. The consulting company requests a fee of €0.6 million for the provision of its services. The CEO of Auto-Motor again estimates that the company's report will be positive with a 90% probability. However, in the event that the application is rejected, the information of the consulting company is not enough and the possibility that its report will be negative is 60%.

Finally, Auto-Motor can attach an agreement with General Motors, which claims that it can issue the license almost certainly (90%). In return, she wants Auto-Motor to give her 1000 passenger cars (at a cost of €5500 to Auto-Motor) over the next year and a 5% cut of the profits from the sales of the cars at the end of the year. In the event that General Motors fails to issue the permit
will pay €10 million in damages to Auto-Motor. In this case Auto-Motor will be able to sell the aluminum for €4 per ton to a European company with a 45% probability, otherwise it will remain in stock.

Subject B

Auto-Motor is also active in the field of distribution of the cars it produces itself, but at the same time it also distributes cars of other manufacturers due to the large network it has.

He recently closed a deal with a small car manufacturing company in Russia. This company has only 3 factories in Russia and hired Auto-Motor to distribute the cars it produces every year. This small company has at its disposal 4 warehouses, where every year it must supply them with at least a certain amount of cars based on agreements it has made. To maximize its profits, Auto-Motor wants to keep transportation costs to a minimum.

Auto-Motor has at its disposal the cost of transportation of the products and the expenses along with the wages of the workers in normalized numbers from each warehouse in each city. All of the above are listed in the table below. The amounts represent thousands of €.

	Data for Auto-Moto.				
	Warehouse 1	**Warehouse 2**	**Warehouse 3**	**Warehouse 4**	**Output**
Factory 1	1.5	1.8	1.9	1.3	500
Factory 2	2.1	1.4	1.5	1.7	750
Factory 3	2.5	1.2	1.7	2.2	700
Demand	300	600	200	450	

Auto-Motor will have €2 million in revenue from this collaboration. In the event that all the cars of the small company are not sold, Auto-Motor can buy them if it wants for €5000 each.

As part of your duties within the company, you are asked to prepare the optimal program for moving the cars that will have the lowest possible cost for the company.

Topic C

Finally, the Auto-Motor board of directors wants to invest the remaining part of the available money left over from the previous investment, in a portfolio that will consist of 5 types of investments. Since the general manager is very aggressive he wants to maximize the profits from the investments, regardless of the risk (risk neutral) and the investments have an average time to maturity of less than 5 years

and start in 2010.

1. Investment A : It can start from the first working day of 2010 and the duration of the investment is estimated at one year. The average return on investment is expected to be 20%.

2. Investment B : It will have a duration of 3 years and is available from the first working day of 2011. The expected return on investment is 25%. The company is willing to put up to 40% of its money into this investment.

3. Investment C : Available at the beginning of 2012, it has an average yield of 40% and lasts for 3 years. The company is willing to put up to 40% of the initial capital in this investment.

4. Investment D : Yields around 25%, but will be available in early 2012. Duration is estimated at 2 years. The company is willing to invest up to 30% of the available initial capital for the implementation of this proposal.

5. Investment E : It is available immediately, has a duration of 1 year and performance of its class 15%.