THE HINDUSCARE CASE

Supply Chain Management and Facility Location

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Deadline : October 25

HINDUSCARE is an Indian Company that produces medical equipments with good quality and low prices compared to western competitors. The company has developed at a very fast rate in India, China and other parts of Asia for the last ten years but has now reached its market potential in these countries, where the growth of sales is now at a lower level. Consequently, the new strategy of HINDUSCARE is to develop new markets outside Asia, and Europe was chosen by the Executive Committee as the development priority for the next five years, with the objective to increase sales by 350% in this region.

HINDUSCARE has identified 21 major clients (current and potential clients) in Europe: 5 in France, 2 in UK, 3 in Spain and Portugal, 1 in Belgium, 3 in Germany, 2 in Italy, 1 in Austria and 4 in Eastern countries. These clients are big distributors which buy products from many suppliers, including HINDUSCARE, and sell the products to hospitals and medical centers. So the relationship between HINDUSCARE and its clients is a BtoB relationship, HINDUSCARE will take in charge the delivery to the distributors but not to the final customers.

Currently, HINDUSCARE has no facility in Europe and ships its products directly from the Mumbai harbour. Since the HINDUSCARE brand is not well know in Europe and local competitors are well settled with a strong reputation of quality, the company estimates that it has little chance to expand in Europe and to achieve the strategic objective without having a few plants built in Europe, even if the investment is huge and production costs are much higher in Europe than in India.

Given its investment possibilities, HINDUSCARE has decided to **build 3 plants** (production centers) in Europe. Settling in Europe would also reduce the lead time to deliver European clients, as the current over-sea boat shipping from India is quite slow, so **minimizing the average distance or lead time to deliver the clients will be the main operational objective** of the Facility Location problem.

HINDUSCARE has identified 8 possible sites where it could install a new plant. A map with the locations of the 21 clients and the 8 possible sites is available in Appendix 1. The yearly demands (in tons) of the 21 clients and the distances between clients and sites are given in Appendix 2. As a first step, each plant is supposed to be built with the same pattern and the production capacity of a plant will be 11 000 tons per year.

The Supply Chain location-assignment issue.

Question 1 : **Which 3 sites would you build with multi-source supplying** (i.e., the quantity delivered to a client can be supplied from several plants)?
Give in the Technical Appendix a Mixed-Integer Linear Programming formulation of the problem. You will precisely define your decision variables and comment each kind of constraints and the objective function.

Question 2 : **Solve the problem using Excel Solver**. What is the average delivery distance associated with the optimal solution ? Describe your solution on the map of Europe.

Question 3 : What suffices to change in the model for **single-source supplying**, i.e., all the demand of a client should be delivered by a single plant ? Solve the problem with 3 plants and give the new optimal solution. What is the new objective value?

Question 4 : Conduct any **sensitivity analysis** that looks accurate to you (create new scenarios by changing some critical parameters of the problem).

Question 5 : What are, according to your own experience, the main limitations of the proposed model ?

Grading of the case:

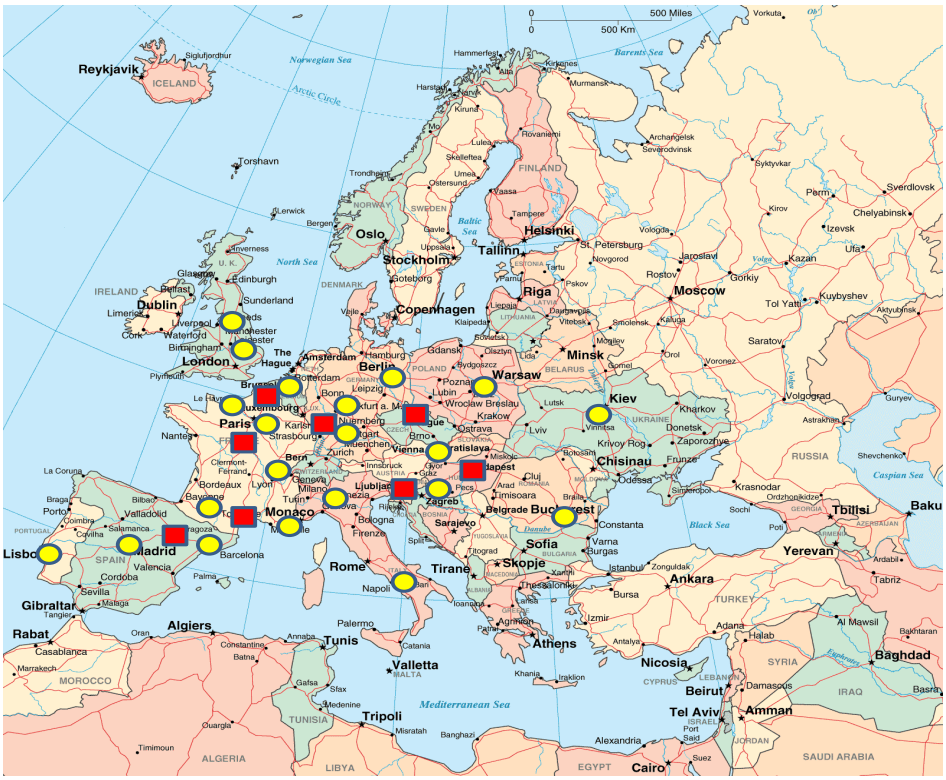
The work is to be done by Teams of **2 participants**. The **deadline is October 25 (xls + doc + ppt files)**. Send your assignments to : alfandari@essec.edu

The grading will take into account two distinct reports (+ the Excel file with Solver):

– The *Executive Summary* (powerpoint) : managerial report presenting conclusions, decisions made, Key Performance Indicators (KPI), figures and drawings... for the Executive Committee) : 8 to 12 slides.

– The *Technical Appendix*, describing the methodology and models (definition of variables, constraints and objective function) for an expert in LP and decision analysis who would be in charge of checking the methodology (around 4 pages with the mathematical models)

Appendix 1 : Map with locations of clients and possible sites



Appendix 2 : Data table with distances (km) and demands (in tons)

		Zarogoza	Montpellier	Orléans	Lens	Karlsruhe	Ljubljana	Praha	Budapest	Demand
		Spain	*France*	*France*	*France*	*Germany*	*Slovenia*	*Tchek Rep.*	*Hungary*	(in tons)
Lisboa	*Portugal*	947	1211	1616	1950	2184	2625	2721	3089	**557**
Madrid	*Spain*	318	939	1148	1470	1705	2057	2242	2520	**1765**
Barcelona	*Spain*	313	341	911	1235	1196	1457	1716	1921	**2015**
Toulouse	*France*	452	240	553	878	1025	1357	1545	1821	**986**
Marseille	*France*	794	170	759	986	873	1000	1392	1463	**1864**
Grenoble	*France*	919	295	573	782	586	854	1106	1317	**1679**
Le Havre	*France*	1183	898	280	300	764	1467	1244	1698	**1146**
Troyes	*France*	1160	673	211	313	447	1151	956	1410	**2127**
London	*UK*	1530	1201	588	272	816	1528	1271	1725	**3143**
Sheffield	*UK*	1663	1480	868	552	1096	1808	1551	2005	**1095**
Brussel	*Belgium*	1384	1026	435	140	447	1159	902	1355	**780**
Frankfurt	*Germany*	1615	1099	868	530	139	809	513	966	**1327**
Stuttgart	*Germany*	1551	927	722	635	79	643	468	876	**2043**
Berlin	*Germany*	2161	1529	1185	890	680	1006	361	887	**2068**
Torino	*Italy*	1156	532	773	974	605	624	990	1088	**1510**
Napoli	*Italy*	1845	1223	1613	1714	1309	951	1506	1415	**1767**
Wien	*Austria*	2086	1464	1369	1239	694	383	294	243	**1128**