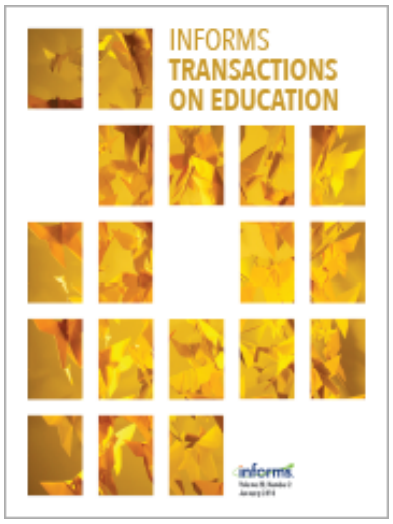

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Case

Integrating Network Design Models for a Global Supply Network

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1. Introduction

Managers from Oz Sourcing Limited (Oz Sourcing) are worried about the recent uncertainty and volatility in business environment. Oz Sourcing operates across Australia in the following five major cities: Adelaide, Brisbane, Melbourne, Perth, and Sydney. Traditionally, Oz Sourcing has been relying on an overseas supplier, Ovis Supply Limited (Ovis for short), for a stereo system that is quite popular among its customers. Oz Sourcing has been asking Ovis to sea transport all the stereo systems to the warehouses in the five major cities. When there are changes in demand among the five cities, Oz Sourcing will either need to incur road transportation cost if it decides to redirect the stereo systems from one city to another within Australia or forgo the additional demand, as the long lead time from Ovis does not allow a quick delivery.

The top management at Oz Sourcing sees the opportunity to address this issue when a company, Domes Manufacturing Systems (Domes for short), approaches them to offer manufacturing services. Domes can offer fully flexible manufacturing services; that is, it can produce any number of stereo systems in any major city in Australia as demanded by Oz Sourcing, as long as the number does not exceed an agreed-upon cap and the location of manufacturing does not change.

To start with this transition, Oz Sourcing decides to commission 500 fully flexible units to Domes every month. The location of manufacturing, however, still needs to be determined. Oz Sourcing adopts and operates on a monthly ordering cycle. Table 1 lists the monthly demand for each city, the Domes production cost (which depends on the city of production—e.g., "Domes Adelaide" means the production is in Adelaide, and the unit cost of $450 applies), and the unit cost from Ovis (delivered cost—i.e., delivered duty paid, which means Ovis is responsible for arranging carriage and delivering the goods, cleared for import and all applicable taxes and duties paid).

2. Transport Cost and Lead Time

Sea transport is used for the shipments from Ovis, whereas road transport will be used for transportation within Australia. For sea transport, Oz Sourcing can choose to use either a 40′ or a 20′ container, depending on the volume shipped. Each 40′ container can hold 200 units; each 20′ container can hold 100 units. Because of loading and safety constraints, containers must be fully loaded at all times. If the number of units is not enough to fill a full container, the less-than-container load (LCL) option, where special safety measures are taken, must be used.

Oz Sourcing needs to pay its supplier up front, which means that Oz Sourcing needs to bear the inventory

Table 1. Monthly Demand at Each City and Location-Based Unit Production Cost

Demand location	Units	Production location	Unit cost ($)
Adelaide	420	Domes Adelaide	450
Brisbane	870	Domes Brisbane	480
Melbourne	1,250	Domes Melbourne	505
Perth	930	Domes Perth	490
Sydney	1,310	Domes Sydney	515
		Ovis (delivered)	440

Table 2. Sea Transport Cost and Lead Time from Ovis to the Five Major Cities

Location	$/40′ container	$/20′ container	$/LCL unit	Lead time (days)
Adelaide	2,000	1,200	25	30
Brisbane	1,600	1,000	20	21
Melbourne	1,800	1,100	23	28
Perth	1,200	700	15	18
Sydney	1,650	1,050	22	25

holding cost when the freight is being transported from Ovis. Table 2 presents the unit transport costs for a 40′ container, a 20′ container, and a unit transported via LCL. The lead time of sea transport between Ovis and each major city is also listed in the table. The accounting department of Oz Sourcing mentions that an annual interest rate of 15% would be reasonable to be used to calculate the inventory holding cost.

Within Australia, road transport will be used. The unit transport cost between each pair of cities is shown in Table 3. The inventory holding cost for the duration of road transport can be safely ignored because of the relatively short lead times for road transport.

Table 3. Road Transport Cost per Unit Between Cities (in Dollars)

	Destination				
Origin	Adelaide	Brisbane	Melbourne	Perth	Sydney
Adelaide	0	35	10	35	25
Brisbane	35	0	25	70	15
Melbourne	10	25	0	45	15
Perth	35	70	45	0	55
Sydney	25	15	15	55	0

3. The Road Ahead

The management team at Oz Sourcing now wants to conduct a cost-benefit analysis on engaging Domes. In order to do that, Oz Sourcing will need to know, on a monthly basis, the following:

1. How much does it cost for Oz Sourcing to ship directly from Ovis to each city?
2. If Oz Sourcing does not engage Domes, is the current shipping practice the best for Ovis?
3. In which city should Oz Sourcing ask Domes to manufacture?
4. How much could Oz Sourcing save, if engaging Domes prove to be cost beneficial?