GLOSERV

ADVANCES IN GLOBAL SERVICES AND RETAIL MANAGEMENT

Editors

Dr. Cihan Cobanoglu

Dr. Valentina Della Corte

Co-Editors

Dr. Cihan Cobanoglu, University of South Florida, USA
Dr. Valentina Della Corte, University of Naples Federico II, Italy

ADVANCES IN GLOBAL SERVICES AND RETAIL MANAGEMENT: VOLUME 2

*Authors are fully responsible for corrections of any typographical, copyrighted materials, technical and content errors.

Co-Editors

Dr. Cihan Cobanoglu, University of South Florida, USA
Dr. Valentina Della Corte, University of Naples Federico II, Italy

***Authors are fully responsible for corrections of any typographical, copyrighted materials, technical and content errors.**

Case Study: HereWay Inc. European Expansion: A Facility Location Problem

Mikhail M. Sher[1], Michael T. Paz[2], and Donald R. (Bob) Smith[1]

[1]Leon Hess Business School
Monmouth University, United States

[2]School of Hotel Administration, S.C. Johnson College of Business
Cornell University, United States

Abstract

This case study describes HereWay Inc., a fictional telecommunications company based in Guangdong, China that manufactures a popular line of smartphones called Soar. At present, HereWay is highly successful at serving its domestic markets. Despite their current local success, however, HereWay has been planning to expand into several international markets. Their initial expansion plans involved introducing their product to the United States market in order to compete with low-cost smartphones being sold by other Chinese and Korean manufacturers. The benefit of constructing local distribution will be discussed.

Keywords: facility location, international business, decision analysis

Introduction

HereWay Inc., a telecommunications company based in Guangdong, China, manufactures a popular line of smartphones called Soar. At present, HereWay is highly successful at serving its domestic markets. Despite their current local success, however, HereWay has been planning to expand into several international markets. Their initial expansion plans involved introducing their product to the United States market in order to compete with low-cost smartphones being sold by other Chinese and Korean manufacturers. The benefit of constructing local distribution will be discussed.

Background

A 2012 ruling by the U.S. Federal Communications Commission (FCC) has kept HereWay smartphones from being used on U.S. networks. This ruling impacts HereWay because it is partially owned by the Chinese government. A recent Executive Order by the President of the United States has essentially closed the door on HereWay's expansion ambitions, effectively banning HereWay from selling any type of equipment in the U.S. market. HereWay has therefore turned its attention to markets in Eastern Europe and Scandinavia as potentially profitable export destinations. After extensive market research, HereWay identified the five most promising markets for exporting their Soar product line: Belarus, Finland, Sweden, Poland, and Russia.

Exporting to these markets will require HereWay to invest in local distribution facilities to support local sales.

Target Markets

After extensive market research, HereWay identified the five most promising markets for exporting their Soar product line: Belarus, Finland, Sweden, Poland, and Russia. Exporting to these markets will require HereWay to invest in local distribution facilities to support local sales. While Hereway currently has an existing distribution facility in Finland and a nearly complete facility in Poland, distribution facilities must be built from scratch in the other three countries. The benefit of constructing local distribution centers is that local shipments from each are unrestricted. Estimated construction costs, as well as anticipated annual demand for the Soar smartphone, for each country are listed in table 1. HereWay has allocated $9 million for distribution center construction.

Table1. Target Export Markets With Demand and Construction Cost Parameters

Country	Anticipated Annual Demand (in units)	Distribution Center Construction Costs
Belarus	15,000	$1,000,000 (New construction)
Finland	20,000	$0 (Existing Center)
Sweden	30,000	$5,000,000 (New construction)
Poland	30,000	$200,000 (Cost to complete existing facility construction)
Russia	50,000	$3,000,000 (New construction)

Distribution Centers Decision

An additional benefit of building local distribution centers in each export market is to reduce shipping times for customers. This is important both for customer satisfaction and cost reasons. Given that many competitors have dedicated distribution operations in these countries, competing on delivery time is an absolute necessity to keep customer happy. Additionally, the costs of shipping are proportional to shipping times. Thus, local distribution centers pay for themselves over time by reducing shipping costs (costs which cannot be passed along to customers due to competitive pressures within the product market). Shipping costs are equal to $5 per day of shipping for each smartphone shipped. Table 2 details average shipping times from one region to another:

Table 2. Shipping Times Between Target Export Markets

FROM \ TO	Finland	Sweden	Poland	Russia	Belarus
Finland	1	2	3	7	5
Sweden	2	1	3	7	5
Poland	3	3	1	6	3
Russia	7	7	6	3	2
Belarus	5	5	3	2	1

In addition to shipping costs, customs duties are collected when shipping smartphones between certain export markets. All European Union (EU) countries charge customs duties of $7 per smartphone on shipments originating from Russia or Belarus. Duties are charged by the EU once the total number of smartphones shipped reaches 20,000 units and are charged on all phones shipped (including the 20,000 units and all subsequent sales). Russia and Belarus, by contrast, charge customs duties of $4 per smartphone on shipments originating from the EU. Duties are charged by Russia and Belarus once the total number of smartphones shipped reaches 30,000

units and are charged on all phones shipped (including the 30,000 units and all subsequent sales). Table 3 provides an overview of HereWay's revenues and expenses (excluding shipping and customs costs) for the Soar line of smartphones.

Discussion and Activities

HereWay has hired your consulting team to determine the optimal locations and production volumes for their facilities. However, profit maximization is only one of HereWay's goals. Maintaining customer satisfaction (by avoiding stockouts) requires that HereWay fulfill yearly demand in each target export market they choose to enter. Thus, HereWay does not have the option to serve only part of the expected annual demand for the Soar smartphone in any export market.

Table 3. HereWay Inc. Partial Income Statement

HereWay Inc. Partial Income Statement for the year ended 12/31/2019			
Product Line: Soar			
Revenues (250,000 units)			$ 62,500,000
Cost of Goods Sold			
	Direct Materials	$ 15,000,000	
	Direct Labor	$ 5,000,000	
	Manufacturing Overhead	$ 12,500,000	
	Total Cost of Goods Sold		$ 32,500,000
Gross Margin			$ 30,000,000
Operating Expenses			$ 5,000,000
Net Operating Income			$ 25,000,000

Questions

- What type of optimization problem is involved in this case?
- What is the objective function for HereWay? What are the constraints?
- What is the per unit profit margin for the Soar smartphone?
- In which regions should HereWay build distribution centers and how should it arrange shipments to maximize the profit and meet the demand?
- The FCC ruling and Presidential Executive Order in the U.S. currently prevent HereWay from exporting to the U.S. How can HereWay use its planned expansion into Eastern European and Scandinavian markets to address U.S. concerns regarding electronic privacy and gain access to the lucrative U.S. markets?

Teaching Note

Summary of the Case

HereWay Inc., a telecommunications company based in Guangdong, China, manufactures a popular line of smartphones called Soar. At present, HereWay is highly successful at serving its domestic markets. Despite their current local success, however, HereWay has been planning to expand into several international markets. Their initial expansion plans involved introducing their product to the United States market in order to compete with low-cost smartphones being sold by other Chinese and Korean manufacturers. The benefits of constructing local distribution will be discussed.

A 2012 ruling by the U.S. Federal Communications Commission (FCC) has kept HereWay smartphones from being used on U.S. networks. This ruling impacts HereWay because it is partially owned by the Chinese government. A recent Executive Order by the President of the United States has essentially closed the door on HereWay's expansion ambitions, effectively banning HereWay from selling any type of equipment in the U.S. market. HereWay has therefore turned its attention to markets in Eastern Europe and Scandinavia as potentially profitable export destinations. After extensive market research, HereWay identified the five most promising markets for exporting their Soar product line: Belarus, Finland, Sweden, Poland, and Russia. Exporting to these markets will require HereWay to invest in local distribution facilities to support local sales.

Teaching Objectives and Suggested Themes

The ideal courses for the use of this case include MBA and upper level undergraduate courses, such as Managerial Decision Making, Data Analysis using Spreadsheets or Operations Research. The case should be introduced after the topics of integer programming, binary variables and mixed integer programming have been covered. Students should also be given an opportunity to develop several simpler spreadsheet programming models in Excel prior to been assigned a more difficult mixed integer programming case such as this one.

Questions

- What type of optimization problem is involved in this case?
- What is the objective function for HereWay? What are the constraints?
- What is the per unit profit margin for the Soar smartphone?
- In which regions should HereWay build distribution centers and how should it arrange shipments to maximize the profit and meet the demand?
- The FCC ruling and Presidential Executive Order in the U.S. currently prevent HereWay from exporting to the U.S. How can HereWay use its planned expansion into Eastern European and Scandinavian markets to address U.S. concerns regarding electronic privacy and gain access to the lucrative U.S. markets?

Teaching Approach and Strategy

- The problem is the case of mixed integer programming. The linear programming component is the choice of the shipment quantity from region A to region B. The integer programming component is the decision on whether to build a distribution center in region A. It's either yes or no. There are no choices in-between – building only a fraction of the distribution center would not help. Therefore, the decision on the distribution center in region A is coded with two values: 1 for "build the center" and 0 for "not to build the center".
- The company is trying to Maximize its Total Profitability:
  - *Max Total Profit = Total Revenue – Total Costs = Total Sold * Profit Margin – Total Setup Costs – Total Shipping and Customs Costs*
  - The primary constraints are as follows:
    - Nokia must meet yearly demand in each of the regions

- - - Number of phones shipped out from a given distribution center cannot exceed that distribution center's available capacity
- Students should use the income statement data included in Figure 3 to identify the per-unit profit margin as $100 per smartphone.
- When solving the problem, we apply the big M method. It says: let X_AB be the number of phones shipped from region A to region B over the whole year. Let Y_A be the variable stating whether a distribution center has been built in region A: 1 for "yes", 0 for "no". If there is no distribution center in region A then X_AB must certainly be 0. On the other hand, if region A has a center then the shipment amount X_AB is unrestricted. The situation can be summarized in a simple linear inequality:
  - $X\_AB <= M * Y\_AB$,

    where M is some huge number, e.g. M = 1e7.
    - The big M method can be easily implemented in Excel using the Excel Solver. This is what we do. The solution is the attached as file Solution.xlsx. The decision variables X_AB and Y_A are highlighted in light pink. The objective function is highlighted in light blue.
    - It turns out that it is optimal to set up additional centers in Poland and Belarus. Finland and Sweden should be covered out of Finland, Poland should be covered out of Poland and Russia and Belarus should be covered out of Belarus. The total yearly profit equals $12.2m.
    - The integer decision variables in the Excel file equal 1 or 0 up to the precision of the optimization routine.
- There are two primary ways in which the planned expansion can be used to make a positive impression on U.S. regulators.
  - European privacy regulations are currently significantly stricter than U.S. regulations. Consistently adhering to E.U. privacy regulations will demonstrate HereWay's commitment to electronic privacy and ability to meet that commitment.
  - Investing in local distribution facilities will demonstrate HereWay's capacity for foreign investment, something which U.S. regulators may view positively.

In the courses where this case study was tested, students identified other potential ways that planned expansion can be used to influence US regulators. These included (1) developing a reputation as a socially responsible company while expanding, (2) networking with US allies to help build a critical mass of support for further international expansion, and (3) providing US regulators with access to HereWay's mass market products to determine their appropriateness for the US market. Other answers may be possible, but these reflect the vast majority of responses received during case testing.

Evidence of Efficacy in the Classroom and Additional Notes

We have tested this case study in both undergraduate and graduate Managerial Decision Making and Decision Analysis using Excel courses at Monmouth and Cornell Universities with excellent feedback from students. Students worked in groups of four and were largely successful in reaching the correct solution. Additionally, students were enthusiastic about the case and relayed that they enjoyed the fact the case resonated with the current political and economic events. We

wish to note that HereWay is a fictional company and the data used in this problem has been created for this case study. These data were created considering differences in per capita income, producer price indices (PPI), and construction costs among the various countries considered in the facility location decision. Cross-country differences in demand and facility cost parameters used in this case study reflect these PPI and construction cost differences.

Table 1. Problem Parameters

Nokia Budget	9000000.00
Shipping Per Day	5
EU coun.--> R/B fee	4
R/B ---> EU coun. fee	7
EU coun.--> R/B cap	30000.00
R/B ---> EU coun. Cap	20000.00
Profit Margin	100

Table 2. Excel Solver Solution Outputs

		Sweden	Poland	Russia	Belarus	
To Build A Distr. Center		0	1	0	1	
Amounts Shipped	**To Finland**	**To Sweden**	**To Poland**	**To Russia**	**To Belarus**	**Shipped From**
From Finland	20000	30000	0	0	0	50000
From Sweden	0	0	0	0	0	0
From Poland	0	0	30000	0	0	30000
From Russia	0	0	0	0	0	0
From Belarus	0	0	0	50000	15000	65000
						TOTAL
Total shipped to specific country	20000	30000	30000	50000	15000	145000
Demand of specific country	20000	30000	30000	50000	15000	
Shipping Times	**To Finland**	**To Sweden**	**To Poland**	**To Russia**	**To Belarus**	
From Finland	1	2	3	7	5	
From Sweden	2	1	3	7	5	
From Poland	3	3	1	6	3	
From Russia	7	7	6	3	2	
From Belarus	5	5	3	2	1	
Big M	10000000					
		Sweden	Poland	Russia	Belarus	
Big M Constraints		0	10000000	0	10000000	
Min Of Shipment	0					
Num Int Constr		0	0	0	0	
Tot Num Constr		0				
Shipping Costs	**To Finland**	**To Sweden**	**To Poland**	**To Russia**	**To Belarus**	
From Finland	100000	300000	0	0	0	
From Sweden	0	0	0	0	0	
From Poland	0	0	150000	0	0	
From Russia	0	0	0	0	0	
From Belarus	0	0	0	500000	75000	
Customs Costs	**To Finland**	**To Sweden**	**To Poland**	**To Russia**	**To Belarus**	
From Finland	0	0	0	0	0	
From Sweden	0	0	0	0	0	
From Poland	0	0	0	0	0	
From Russia	0	0	0	0	0	
From Belarus	0	0	0	0	0	
Combined Costs	**To Finland**	**To Sweden**	**To Poland**	**To Russia**	**To Belarus**	
From Finland	100000	300000	0	0	0	
From Sweden	0	0	0	0	0	
From Poland	0	0	150000	0	0	
From Russia	0	0	0	0	0	
From Belarus	0	0	0	500000	75000	

TOTAL SET-UP COST	$1,200,000.00
TOTAL SH. & CUS. COSTS	$1,125,000.00
TOTAL COST	$2,325,000.00
TOTAL REVENUE	$14,500,000.00
TOTAL PROFIT (OBJECTIVE)	$12,175,000.00