



# “CERVEJAS AMERICANAS”

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*Distributing Beer in Brazil*



MIT Center for Transportation Studies  
Cambridge, MA  
&  
Amaxon Beer Company  
Miami, FL

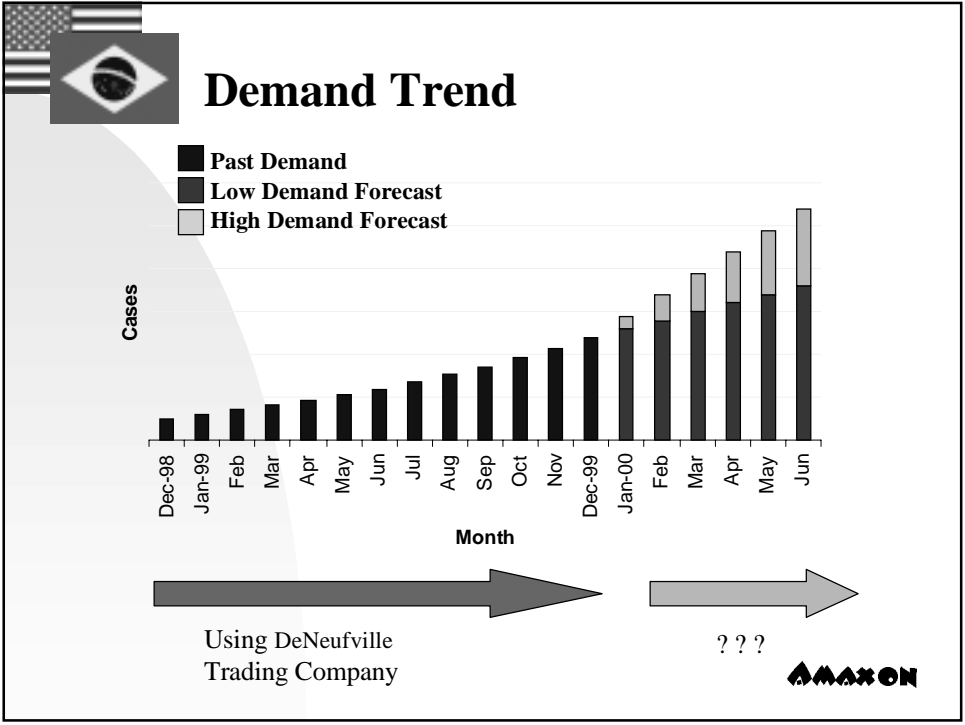
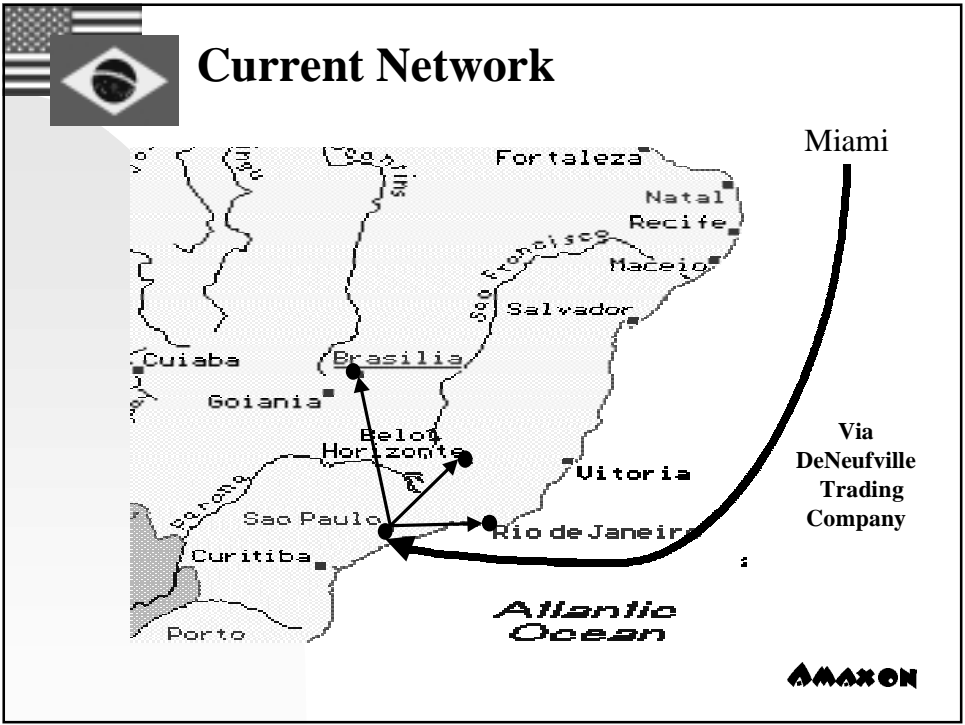
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Gokhan Usanmaz and Wen Xiao




## Overview

- Brazil is an attractive strategic market
- Major demand centers:
  - ◆ *Sao Paolo*
  - ◆ *Rio De Janeiro*
  - ◆ *Belo Horizonte*
  - ◆ *Brasilia*
- Objective: to design a flexible and cost-effective distribution network










## Recommendations


Build a central warehouse in Sao Paolo with expansion capability



## Decision Factors



- Central warehouse *vs.* regional distribution centers
  - ◆ Transportation
  - ◆ Service level
- Regular warehouse *vs.* expandable warehouse
  - ◆ Initial investment
  - ◆ Expansion cost



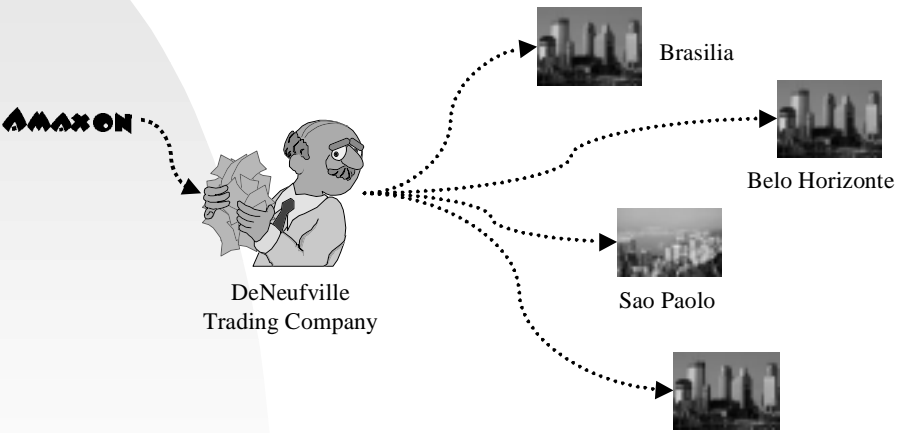


## Strategic Planning Methodology


- Outline choices
- Develop cost model
- Perform NPV analysis
- Decision analysis
- Sensitivity analysis
- Option valuation
- Risk analysis

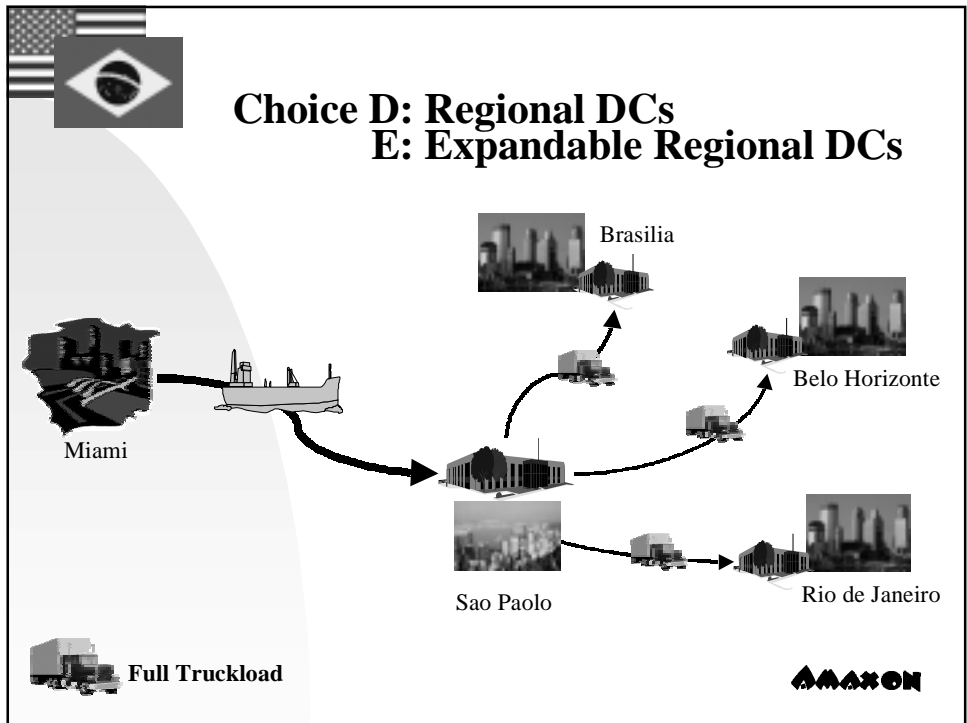
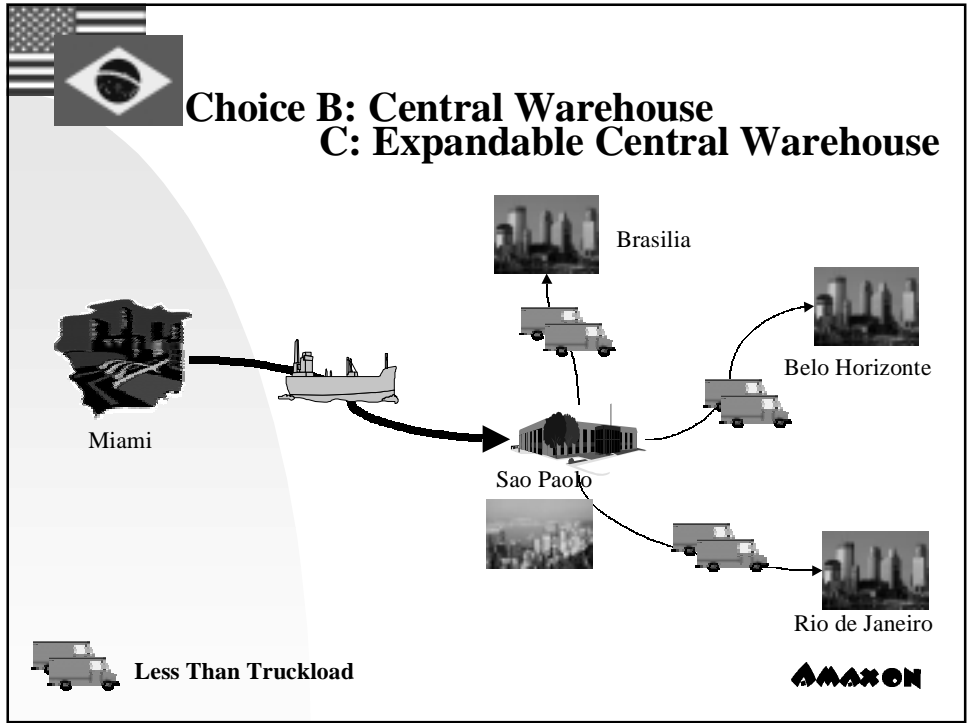



## Choice A: Using Trading Company



The diagram illustrates a strategic choice for Amazon. On the left, the Amazon logo is connected by a dotted arrow to a cartoon character representing the DeNeufville Trading Company, who is holding a stack of papers. From this central figure, four dotted arrows branch out to the right, each pointing to a small image of a city skyline and its name: Brasilia, Belo Horizonte, Sao Paolo, and Rio de Janeiro. The Amazon logo is also present in the bottom right corner of the slide.










## Cost Model

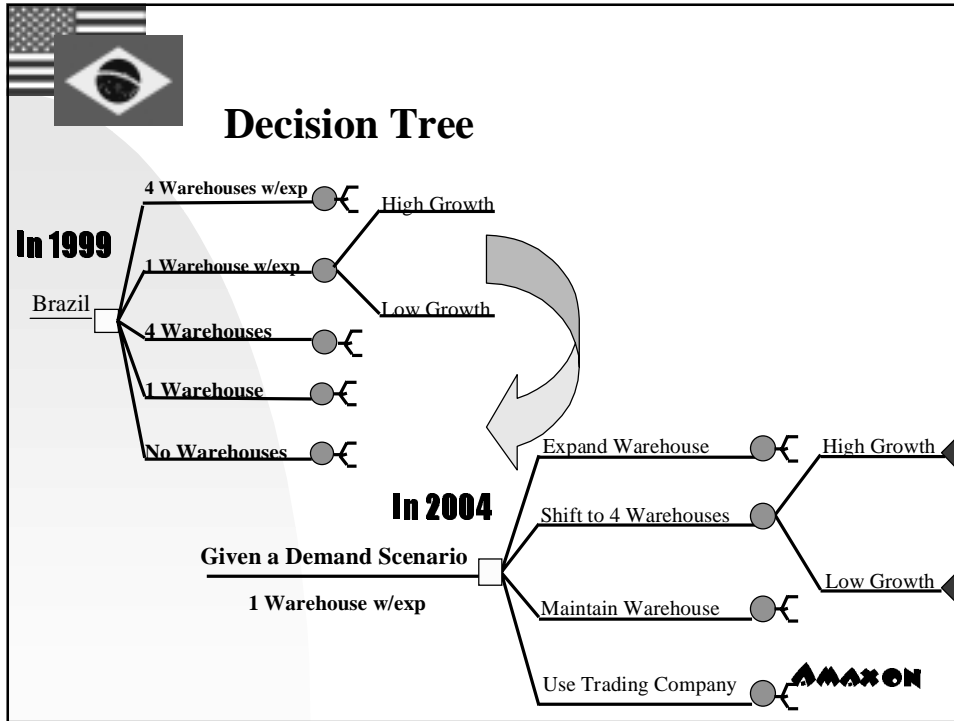
- Cost Structure
  - ◆ Factory wholesale cost: US \$4/case
  - ◆ Transportation costs:
    - ◆ Ocean freight
    - ◆ Land (TL/LTL) freight
    - ◆ Import tariffs
  - ◆ Warehouse costs
    - ◆ Fixed costs: real estate, equipment, tax
    - ◆ Variable costs: labor, throughput, utilities



## NPV Analysis

- Timeline
  - ◆ Estimated project life - 10 years [1999-2009]
  - ◆ Initial decision for 5 years [1999-2004]
  - ◆ Decision Re-evaluated at 2004
- Price: \$10 / case
- Discount rate: 10% (determined by Amaxon)





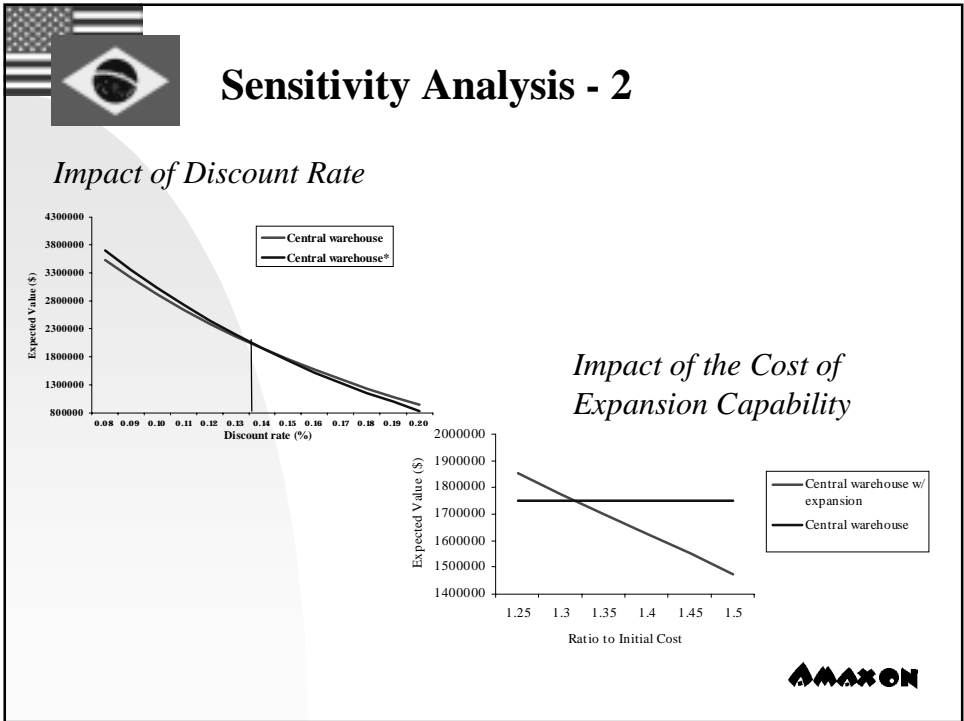
**Sensitivity Analysis - 1**

*Varying Price and Discount Rate*

Discount Rate	Unit Selling Price		
	\$9	\$10	\$11
10%	Central warehouse* (\$1.7M)	Central warehouse* (\$3.0M)	Central warehouse* (\$4.3M)
15%	Central warehouse (\$0.8M)	Central warehouse (\$1.8M)	Central warehouse (\$2.7M)
20%	Trading Company (0.4M)	Central warehouse (\$1.0M)	Central warehouse (\$1.7M)

Central Warehouse\* : single central warehouse with built-in expansion capabilities

**AMAZON**

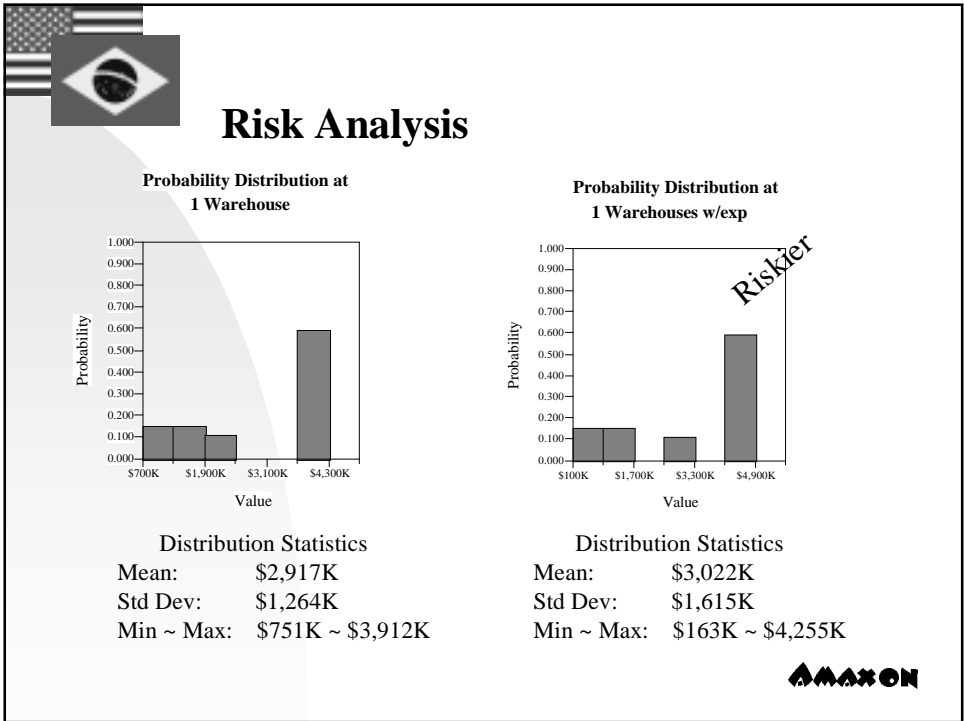


## Option Valuation

- Build in capability now with small extra investment to expand cheaply later
  - ◆ Similar to a buy option
  - ◆ Introduces flexibility
  - ◆ Accommodates growth
- Value of the option: \$104,531

**AMAZON**





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- Conclusion**
- Central warehouse with built-in expansion capacity
    - ◆ Maximum EV of \$3.0 million
    - ◆ Value of the expansion option is \$104K
    - ◆ Riskier approach (larger variance and lower minimum return)
  - Sensitivity analysis shows that as discount rate increases (>14%), the regular central warehouse becomes the better choice.
- AMAZON**



## Appendix A: Cost Function

### NPV CASH FLOW ANALYSIS FOR ONE WAREHOUSE (no built-in expansion capability)

Variables	
Discount rate	10%
Initial demand rate	20,000/yr.
High growth rate	60,000/yr.
Medium growth rate	40,000/yr.
Low growth rate	20,000/yr.
Maximum capacity	300,000/yr.

Variable Costs	
Throughput cost	\$ 0.2000 /case
Unit cost	\$ 4.0000 /case
Land transportation cost (LTL)	\$ 0.3471 /case
Land transportation cost (TL)	\$ 0.2314 /case
Air transportation cost	\$ 4.0000 /case

(HIGH DEMAND / EXPAND / HIGH DEMAND)											
Year	-	1	2	3	4	5	6	7	8	9	10
Demand (cases/yr.)	-	20,000	80,000	140,000	200,000	260,000	320,000	380,000	440,000	500,000	560,000
Number of warehouses	-	1	1	1	1	1	2	2	2	2	2
Volume/plant (demand/ no. of plants)	-	20,000	80,000	140,000	200,000	260,000	160,000	190,000	220,000	250,000	280,000
Price per unit	\$ -	\$ 10	\$ 10	\$ 10	\$ 10	\$ 10	\$ 10	\$ 10	\$ 10	\$ 10	\$ 10
<b>Total revenue</b>	\$ 200,000	\$ 800,000	\$ 1,400,000	\$ 2,000,000	\$ 2,600,000	\$ 3,200,000	\$ 3,800,000	\$ 4,400,000	\$ 5,000,000	\$ 5,600,000	\$ 6,200,000
Cost per unit	\$ -	\$ 4	\$ 4	\$ 4	\$ 4	\$ 4	\$ 4	\$ 4	\$ 4	\$ 4	\$ 4
Throughput cost	\$ -	\$ 4,000	\$ 16,000	\$ 28,000	\$ 40,000	\$ 52,000	\$ 64,000	\$ 76,000	\$ 88,000	\$ 100,000	\$ 112,000
Ocean transportation cost	\$ 49,789	\$ 198,858	\$ 345,224	\$ 494,294	\$ 643,364	\$ 792,433	\$ 941,503	\$ 1,090,573	\$ 1,239,643	\$ 1,388,713	\$ 1,537,783
Land transportation cost	\$ 6,942	\$ 27,768	\$ 48,594	\$ 69,420	\$ 90,246	\$ 111,072	\$ 131,898	\$ 152,724	\$ 173,550	\$ 194,376	\$ 215,202
<b>Total cost</b>	\$ 140,731	\$ 562,626	\$ 981,818	\$ 1,403,714	\$ 1,825,610	\$ 2,247,505	\$ 2,569,401	\$ 2,891,297	\$ 3,213,193	\$ 3,535,089	\$ 3,856,985
<b>Capital profit</b>	\$ 59,269	\$ 237,374	\$ 418,182	\$ 596,286	\$ 774,390	\$ 952,495	\$ 1,230,599	\$ 1,508,703	\$ 1,786,807	\$ 2,064,911	\$ 2,343,015
Capital investment	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -
<b>Net cash flow (total profit-investment)</b>	\$ (1,500,000)	\$ 59,269	\$ 237,374	\$ 418,182	\$ 596,286	\$ 774,390	\$ 952,495	\$ 1,230,599	\$ 1,508,703	\$ 1,786,807	\$ 2,064,911
Present value of cash flow	\$ (1,500,000)	\$ 53,881	\$ 196,177	\$ 314,186	\$ 407,271	\$ 450,547	\$ 537,659	\$ 631,636	\$ 726,844	\$ 822,052	\$ 927,260
<b>Total NPV over 10 years</b>											<b>\$ 2,569,605</b>

