

Lecture #13

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Competitive Role of Information in Services

Strategic Focus	Competitive Use of Information	
	On-line (Real time)	Off-line (Analysis)
External (Customer)	<i>Creation of barriers to entry:</i> Reservation system Frequent user club Switching costs	<i>Data base asset:</i> Selling information Development of services Micro-marketing
	<i>Revenue generation:</i> Yield management Point of sale Expert systems	<i>Productivity enhancement:</i> Inventory status Data envelopment analysis (DEA)
Internal (Operations)		

Creation of Barriers to Entry

❖ Barriers created thru economies of scale, building market share, creating switching costs, investing in communications networks, and using databases and information technologies to strategic advantage.

Using Information to Create Entry Barriers

❖ Reservation Systems

- ❑ Online systems provided to sales intermediaries such as travel agents

❖ Frequent User Club

- ❑ American Airlines

❖ Switching Costs

- ❑ Information technology (e.g., online computer terminals) used in the medical supplies industry to link hospitals directly to the suppliers' distribution networks.

Revenue Generation

- ❖ Real-time information technologies with a focus on internal operations can play a competitive role in increasing revenue opportunities.
- ❖ Yield management is best understood as a revenue-maximizing strategy to make full use of service capacity.

Yield Management

❖ Yield Management – application of information to improve the revenue that is generated by a time perishable resource (e.g., airline seats and hotel rooms)

Point of Sale

- ❖ **WalMart Videocart**
- ❖ **Palm-sized microcomputer transmitter**
 - ❑ **A server in a restaurant can transmit an order directly to the kitchen monitor and the bill to the cashier at the same time**
- ❖ **These techniques save unnecessary steps and allows more time for suggestive selling.**

Expert Systems

- ❖ Otis Elevator Company – maintenance staff: expert system + laptops – speeds repairs in the field. Information on behavior of elevators collected over the years – knowledge base that is incorporated into the expert system.
- ❖ Medical field
- ❖ Oil exploration expert system

Database Asset

- ❖ Expense of assembling & maintaining a large database – a barrier to entry by competitors.
- ❖ Database can be mined for profiles of customers' buying habits – presents opportunities for developing new services.

Selling Information

- ❖ Dun & Bradstreet created a business by selling access to its database of business credit information
- ❖ American Express has detailed information about the spending habits of its cardholders and offers breakdowns of customer spending patterns to its retail customers.

Developing Services

- ❖ Service firms that capture customer data at the time of the initial purchase have the opportunity to establish a lifetime relationship, with the potential for creating new or modified services for future purchase.
- ❑ Club Med, single members have married, so now new services include activities for children.

Micromarketing

❖ Bar coding and checkout scanner technology create a wealth of customer buying information that can be used to target customers with precision.

- ❑ Borden Inc. – select stores in which to feature its premium pasta sauce
- ❑ Kraft USA – cream cheese flavors

Bar Codes – How they work

- ❖ Many types of barcodes – a common one we all see all the time is called UPC, the Universal Product Code.
- ❖ A way of encoding numbers and letters by using a combination of bars and spaces of varying widths.
- ❖ The bar code corresponds to a reference number that is associated with a record that contains descriptive data.
 - ❑ A barcode on a soda can corresponds to a 12-digit product number.
 - ❑ Number is scanned by the cashier at checkout – transmitted to computer – record for that item number is retrieved from data base (record: product description, vendor name, price, inventory, etc.)
 - ❑ Computer does "price lookup" and returns price to the cash register. Subtracts quantity purchased from the inventory.

What is a Barcode Scanner?

- ❖ A Barcode Scanner is a device that uses a laser or other technology to collect and interpret barcodes on consumer products, shipping labels and many other items.
- ❖ Barcode Scanners are used around the world because they can collect information quickly and accurately. Used everywhere, from retail checkout counters to delivery companies to movie and sports tickets to medical information bracelets.

Barcode Scanner

❖ Software (incorporated within the scanner itself or on a desktop, laptop, server, PDA, or other computer) turns the code on a product into a string of letters and/or numbers that can then be used to look up pricing, inventory, or other information for that product.

RFID

- ❖ RFID stands for Radio-Frequency Identification. The acronym refers to small electronic devices that consist of a small chip and an antenna. The chip typically is capable of carrying 2,000 bytes of data or less.
- ❖ RFID devices serve same purpose as bar code or magnetic strip on the back of a credit card or ATM card – provides a unique identifier for that object. The RFID device must be scanned to retrieve the identifying information.

RFID – How it works

- ❖ A radio-frequency identification system has three parts:
 - ❑ A scanning antenna
 - ❑ A transceiver with a decoder to interpret the data
 - ❑ A transponder - the radio-frequency tag - that has been programmed with information
- ❖ The scanning antenna puts out radio-frequency signals in a relatively short range. The RF radiation does two things; it provides a means of communicating with the transponder tag (the RFID chip) AND (in the case of passive RFID tags) it provides the RFID device with the energy to communicate. This is an absolutely key part of the technology; RFID devices do not need to contain batteries, and can therefore remain usable for very long periods of time (maybe decades).
- ❖ When an RFID tag passes through the field of the scanning antenna, it detects the activation signal from the antenna. That "wakes up" the RFID chip, and it transmits the information on its microchip to be picked up by the scanning antenna.

Productivity Enhancement

❖ Information collected on the performance of multi-site units can be used to identify the most efficient producers, and productivity is enhanced system-wide when the sources of these successes are shared with other sites.

Inventory Status

- ❖ Frito-Lay sales representatives have eliminated paper forms by using hand-held computers.
 - They download the data collected on their routes each day via telephone to the Plano, Texas, headquarters, and the company then uses these data to keep track of inventory levels, pricing, returned merchandise, etc.

UPS – Hand Held Tracking

- ❖ UPS staff use small Bluetooth scanners, which send package tracking data to UPS's computer network via WiFi (wireless fidelity) terminals.
- ❖ Latest – handheld computer with built-in wireless connectivity to either personal, local or wide-area networks. Results in customers having the most up-to-the-minute tracking information available at all times.

Quick Overview of Linear Programming (LP)

❖ LP is a widely used mathematical technique designed to help operations managers in planning and decision making relative to the tradeoffs necessary to allocate resources.

Quick Overview of LP

❖ Examples of problems solved by LP:

- ❑ Improving bank scheduling operations
- ❑ Allocating police patrol units to high-crime areas
- ❑ Scheduling school buses

Quick Overview of LP

❖ All LP problems have four properties in common:

- ❑ All problems seek to maximize or minimize some quantity (usually profit or cost) – objective function
- ❑ The presence of restrictions, or constraints, limits the degree to which we can pursue our objective
- ❑ The objective and constraints in LP problems must be expressed in terms of linear equations or inequalities.

Example: Dixon Furniture Store

- ❖ Dixon Furniture planning for Labor Day Weekend sale.
- ❖ Two items selected for promotion: folding tables and chairs
- ❖ Store only has only 100 sq. ft. of space for displaying and stocking these items
- ❖ Each table has a cost of \$4, takes up 2 sq. ft., and retails for \$11
- ❖ Each chair costs \$3, requires 1 sq. ft. of space, and sells for \$8

Example: Dixon Furniture Store

- ❖ Demand exists to sell up to 60 chairs
- ❖ Demand for tables is unlimited
- ❖ Dixon's budget for procuring the tables and chairs is \$240
- ❖ Question: how many tables and chairs should be stocked so as to maximize profit

Example: Dixon Furniture Store

- ❖ We begin by introducing some simple notations for use in the objective function and constraints:
 - X_1 = number of tables in stock
 - X_2 = number of chairs in stock
- ❖ Now we create the LP objective function in terms of X_1 and X_2 :
 - Maximize net profit
 - = retail price – wholesale cost
 - = $(\$11X_1 + \$8X_2) - (\$4X_1 + \$3X_2)$
 - = $\$7X_1 + \$5X_2$

Example: Dixon Furniture Store

- ❖ The next step is to develop mathematical relationships to describe the 3 constraints in this problem.
- ❖ One general relationship is that the amount of a resource used is to be less than or equal to the amount of resource available.

Example: Dixon Furniture Store

- ❖ First constraint: Budget used $\leq$ budget available
 - $4X_1 + 3X_2 \leq 240$ dollars available for purchases
- ❖ Second constraint: Space used $\leq$ space available
 - $2X_1 + X_2 \leq 100$ square feet or floor space
- ❖ Third constraint: Chairs ordered $\leq$ anticipated chair demand
 - $X_2 \leq 60$ chairs that can be sold

Graphical Solution

- ❖ In order to find the optimal solution to a LP problem, we must first identify a set, or region, of feasible solutions.
- ❖ So the first step is to plot each of the problem's constraints on a graph

Graphical Solution

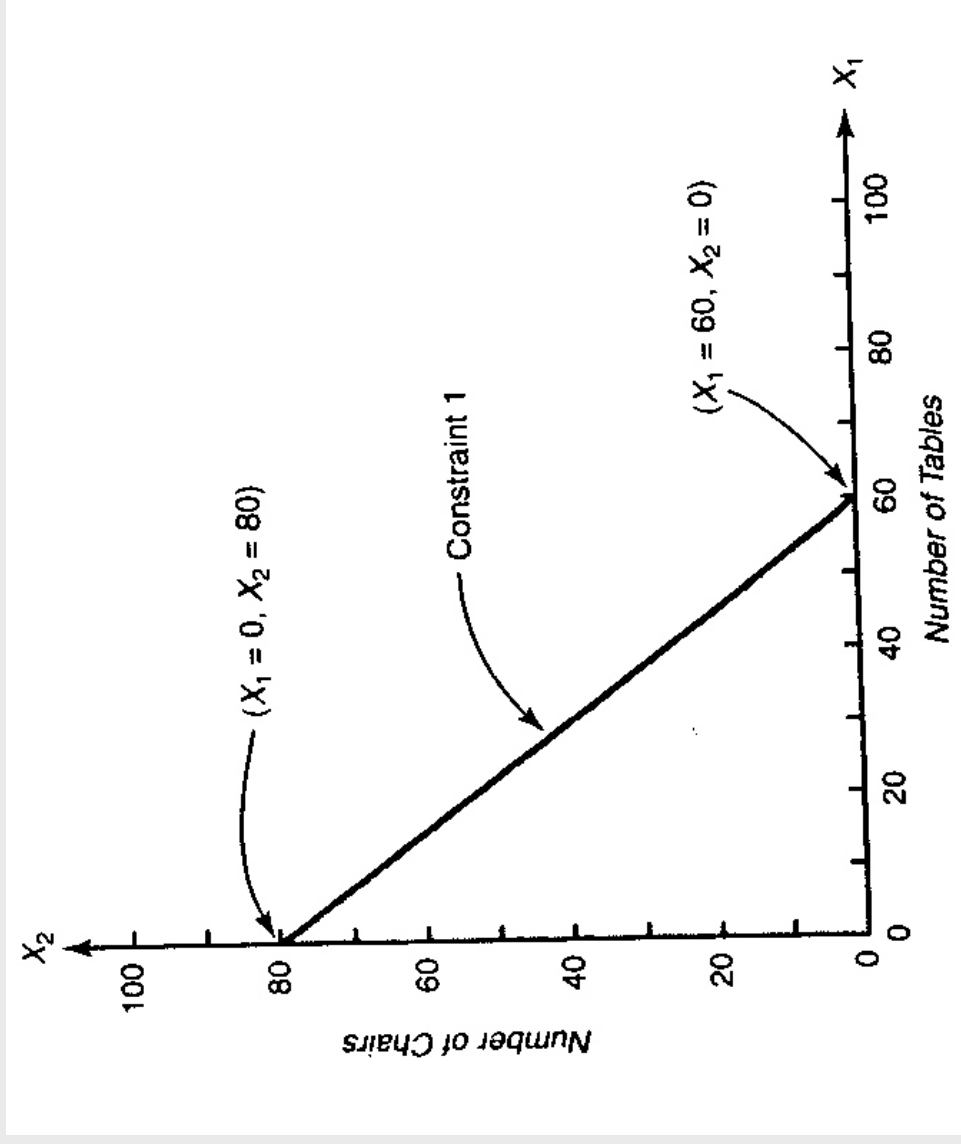
❖ The variable X_1 is usually plotted as the horizontal axis of the graph, and X_2 on the vertical.

□ Maximize profit = $\$7X_1 + \$5X_2$

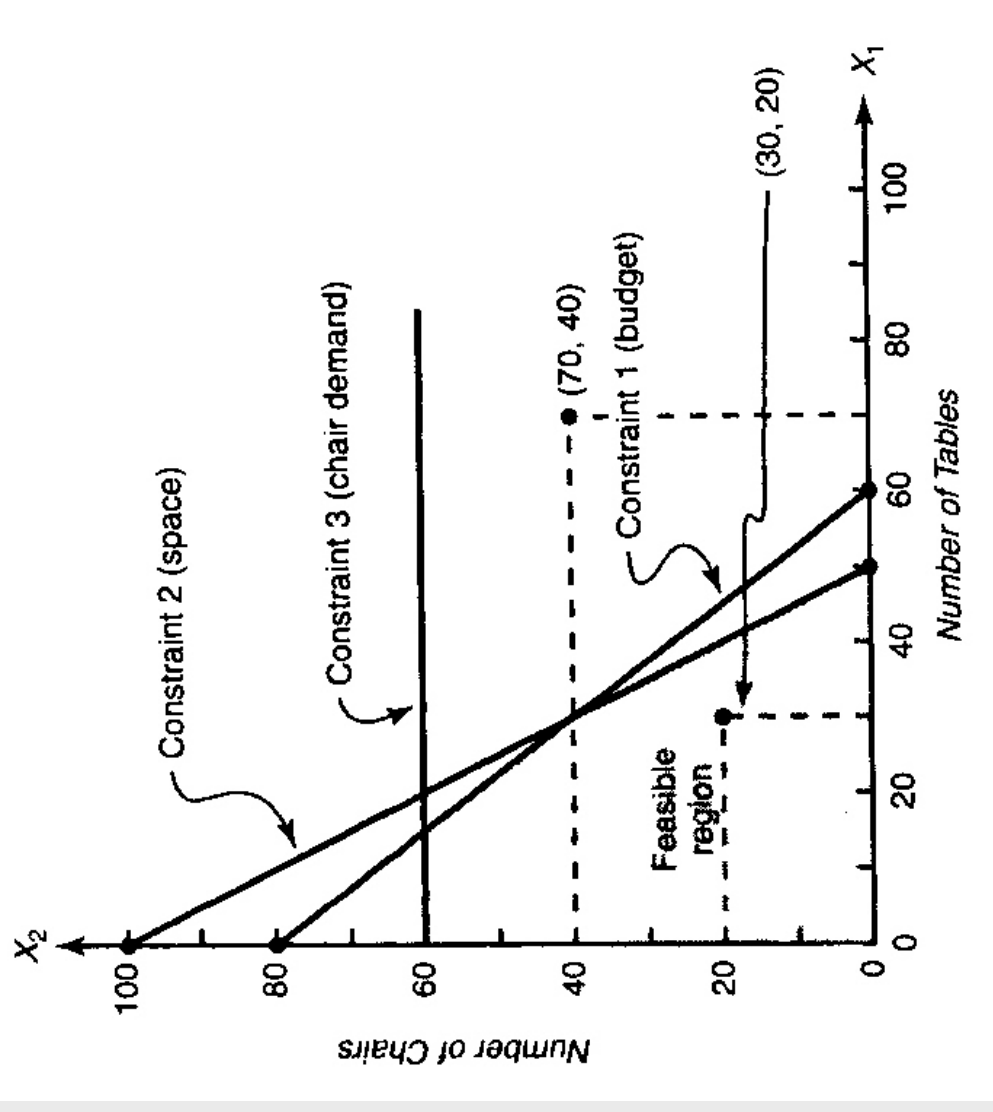
□ Subject to the constraints:

- $2X_1 + X_2 \leq 100$ - space
- $4X_1 + 3X_2 \leq 240$ - budget
- $X_2 \leq 60$ - demand
- $X_1 \geq 0$
- $X_2 \geq 0$

Graphical Solution (budget constraint)



Graphical Solution (all constraints)



Graphical Solution

- ❖ Feasible region – area satisfies all 3 constraints.
- ❖ Any point in feasible region represents a feasible solution – a point outside the shaded area is an infeasible solution.
 - ❑ It is feasible to order 30 tables and 20 chairs ($X_1=30$, $X_2=20$)
 - ❑ Ordering 70 tables and 40 chairs is not feasible – it violates a constraint

Data Envelopment Analysis (DEA)

- ❖ A linear programming technique developed to evaluate nonprofit and public sector organizations and in for-profit service organizations.
 - ❑ DEA compares each service delivery unit with all other service units for a multi-site organization, and it computes an efficiency rating that is based on the ratio of resource inputs to outputs.
 - ❑ Taking this information, the LP model determines the efficiency frontier on the basis of those few units producing at 100% efficiency.

Concerns Regarding Information Use

- ❖ Anti-competition (Barrier to entry)
- ❖ Fairness (Yield management)
- ❖ Invasion of Privacy (Micro-marketing)
- ❖ Data Security (Medical records)
- ❖ Reliability (Credit report)

Using Information on Customers

- ❖ **Coding** grades customers on how profitable their business is.
- ❖ **Routing** is used by call centers to place customers in different queues based on customer code.
- ❖ **Targeting** allows choice customers to have fees waived and get other hidden discounts.
- ❖ **Sharing** data about your transaction history with other firms is a source of revenue.

‘Mrs. Fields’ Strategic Use of Information

Strategic Focus

Competitive Use of Information

On-line

Off-line

(Real time)

(Analysis)

External (Customer)	<i>Creation of barriers to entry:</i>	<i>Data base asset:</i>
Internal (Operations)	<i>Revenue generation:</i>	<i>Productivity enhancement:</i>

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Mrs. Fields MIS

- ❖ How might the management information system contribute to a reported 100% turnover of store managers?
- ❖ Will the management information system support or inhibit the expansion of Mrs. Field's outlets? Why?