Creating Value

Willingness to Pay and
Opportunity Cost
Value creation

- In any market, before considering who gets what it is important to understand what there is to get.
- What determines total value created?
Application

The Demand and Supply of Time
Assessing Value Created

- Who are the players?
- What are customers willing to pay for the good or service?
- What are suppliers’ opportunity costs of providing the good or service?
Task 1

Who are the players?
Players

Who are the economic players involved in the creation of economic value?

- **Customers**: derive economic value from use, they are the ultimate recipients of value
- **Firms or Businesses**: convert inputs or resources into products or output
- **Suppliers**: provide resources or inputs for use in production
The “production flow” and the “monetary flow” go in opposite directions.

Business is engaged in two markets: buying resources and selling products.
Follow the Dollar

- Who is a customer?
  - Anyone who pays dollars into the business

- Who is a supplier?
  - Anyone who receives dollars from the business

- Sounds obvious? ...
Shades of Grey ...

- A charitable organisation (e.g., Red Cross):
  - who are its customers?
  - who are its suppliers?

- A newspaper:
  - who are its customers?

- A bank:
  - who are its customers?
  - who are its suppliers?
Extending the Value Chain

The Value Chain really extends all the way from owners of non-produced (‘primitive’) resources to end-users (‘consumers’)

- one business’s output is often another’s input
- even ‘finished’ products are sold to distributors/retailers before customers
Value Creation

Willingness -to- Pay
Price
Cost
Opportunity Cost

Value Created
Task 2

Customers’ Willingness to Pay
Measuring Value Creation

Measuring value creation involves stepping into the shoes of customers and suppliers.

Ask:
- How much does the customer ‘value’ the product it acquires?
- How much does the supplier ‘value’ the resource it provides?
- What is the difference between these two quantities?

Sounds circular? ...
Customer Willingness-to-Pay

- To measure a customer’s increase in well-being perform a ‘thought experiment’:

  Acquire product, pay $

  \hspace{100pt}

  \text{Status quo}
Consumer surplus

Find the maximum amount of dollars the customer would pay to acquire the product

**Willingness-to-Pay**

Then the increase in the consumer’s well-being is:

**Willingness-to-Pay** minus **Price paid**
Determining Willingness-to-Pay

- Sometimes, willingness-to-pay can be objectively determined
  
  Example: Industrial equipment (Case: Harnischfeger portal cranes)

- Often, willingness-to-pay is subjective
  
  Example: many consumer products

- Whether objective or subjective willingness-to-pay is a definite
Willingness-to-Pay: More Examples

- Consumers capture enormous value from many products:
  - Willingness-to-Pay >> Price Paid

- Quality has increased while prices have fallen for:
  - computers
  - cars
  - (generic) drugs
Thought questions

- How much would you be willing to pay for a coffee right now? How much would you be willing to pay for a coffee at the café next door?
- If price follows cost, why are CDs more expensive than LPs?
Case Study 1

Harnischfeger Portal Cranes
Calculating WTP: Log Rolling

- Processing of large tree logs:
  - if can handle tree length sizes, then more productive and higher quality
  - very unwieldy: loading and re-loading

- Old Technology: mobile log stackers.
  - Large forklifts
  - operate on paved roads -- much wear
  - use 4 at a time
Harnischfeger Industries

- Developed the ‘portal crane’
  - grabs logs from above with large claw-like grapples, hoists them into the air and carries them the entire length of the woodyard, very rapidly
  - huge structures (300 feet) operating on runways (2000 feet).
  - woodyards only need one of them.
Costs: Mobile Stackers

- lasts 4 years
- costs $250,000

Operating costs (annual, $’000)
- labour 60
- energy 20
- log breakage 50
- equipment maintenance 30
- parts 20
- road maintenance 100
Costs: Portal Cranes

- Last 20 years (estimated)
- Operating costs (annual, $’000)
  - labour 60
  - energy 20
  - log breakage 40
  - runway maintenance 20
- Parts and maintenance in purchase price
- Freight charge ($50,000); runway
WTP for Portal Cranes?

- Amount of money for which the woodyard is indifferent between buying and not buying a portal crane.

- First question: What will the woodyard pay for log handling capability without a portal crane?
WTP for Log Handling

Capability I

- Four stackers used typically
- Annual operating cost is $180,000 each, so $720,000 per annum in total.
- Last four years: assume replace one per year. This adds $250,000 to the annual cost.
- $100,000 in roadway maintenance
- TOTAL = $1,070,000 per year.
WTP for Log Handling Capability II

- Woodyard prefers paying $1,070,000 for log handling capability to any other arrangement.
- But they will not pay this amount for a portal crane.
  - Still have to incur operating costs
WTP for Portal Cranes

- Additional costs:
  - Operating costs = $140,000
  - One-time costs = $425,000

- The decision:
  - Don’t Buy: pay $1,070,000 per year
  - Buy: pay $WTP for crane + $425,000 now and then $140,000 per year

- Trade-off types of costs (see Topic 4)
Calculating WTP

- WTP is the value of $WTP such that the woodyard is indifferent between buying and not buying.

- Solve
  
  \[-WTP - 425,000 - 140,000/\text{year} = -1,070,000/\text{year}\]

  or \[WTP = -425,000 + 930,000/\text{year}\]
Present Value I

- Compare initial expenditure with flow savings per year.
- \( r \) is the annual discount (interest) rate.
- Present value terms of WTP
  
  \[- \$425,000 + \frac{\$930,000}{r}\]  
  (ignore need to replace crane after 20 years)
- WTP depends on interest rate.
**Present Value II**

<table>
<thead>
<tr>
<th>Discount Rate</th>
<th>WTP Portal Crane</th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td>$18,175,000</td>
</tr>
<tr>
<td>10%</td>
<td>$8,875,000</td>
</tr>
<tr>
<td>15%</td>
<td>$5,775,000</td>
</tr>
<tr>
<td>20%</td>
<td>$4,225,000</td>
</tr>
</tbody>
</table>
Lessons from WTP

- What is the decision?
  - Log handling capability versus comparison to other technologies
- Care over type of costs
  - one time versus on-going
- WTP can depend on discount rates
Competition and WTP

- Without competition, Harnischfeger can probably make about $5 million per crane.
- In 1987, faced competition from Kranco bought by former Harnischfeger executives - very close substitute in terms of costs and efficiency.
- Buyers could play one off against the other to get a better deal.
Task 2

Suppliers’ Opportunity
Costs
Supplier Opportunity Cost

To measure a supplier’s increase in well-being, perform a parallel ‘thought experiment’:

Provide resources, receive $

Status quo
Examples of Opportunity

Cost

Computer service:   Daytime versus night time service.

Undeveloped land:   Land adjoining MBS.

Machine time:       Scheduling in a job shop.

People time:        Waiting in line for petrol.
Supplier’s surplus

Find the minimum amount of dollars the supplier would accept to provide the resource:

- Opportunity Cost

The increase in the supplier’s well-being is:

Price received minus Opportunity Cost
Opportunity Cost: Examples

- The opportunity cost of a resource is often found by looking at the ‘best alternative use’ of that resource (hence the term)

- Examples:
  - Alternative employment opportunities
  - supplying capital:
    \[
    \text{Payoff} > 1 + r \\
    - 1 + \frac{\text{Payoff}}{1 + r} > 0
    \]
This example highlights the difference between economic and accounting profit.

Accounting profit is aimed at determining how much money your business earned.

Economic profit uses opportunity costs rather than accounting costs. It is aimed at forecasting the returns from different decisions.

Sunk costs do not represent opportunity costs.

Thus, choice should be guided by economic rather than accounting notions of profit.
Recap

- Focus on creation of value (rather than price)
  - Total value = WTP - OC
  - WTP & OC are formal concepts
- Determining WTP requires objective and subjective criteria
- Economic profit uses OC rather than accounting costs
Looking Forward

- Examples of opportunity cost (Case 1-2)
- Finding opportunities to create value
  - Specialisation
  - Make or buy
Tough bikkies ...

- Caroline baked excellent chocolate-chip biscuits in the Midwestern US.
- She wanted to market them to supermarkets.
- However, she ran into the practice of ‘slotting.’ Caroline was charged a high fee just to place products on the shelves. These prices ranged from $3,000 to $25,000. Also, had to buy back items unsold.
- Caroline complained on ‘60 Minutes’ about
Supermarket manager:

“I run a good store. Each yard of shelf space in my store generates about $10,000 in sales every week! If I put a new product on a yard’s worth of shelf space, and if it fails to sell well, I lose those $10,000 in sales. That is the real cost to me, just as if I had taken money out of the safe or written a check. It is a cost even if I get the new product for nothing or sell it on consignment. It is a cost, because sales are foregone or lost.”
Case 1-2

Sport Obermeyer
Cost Concepts for Firms

- What costs can be *avoided* by not producing ...
  - an extra unit of output (Marginal Cost)
  - at all (Fixed plus Variable Cost)
  - in the first place (Sunk plus Fixed plus Variable Costs)
  - today (Interest earnings on expenditures)

- Importance of time horizon and magnitude of decision
Costs at the Margin

Critical to any cost decision are the notions of *incremental* or *marginal* cost.

*How much will it cost me to produce one additional unit of my product, or to supply one more unit of my service?*
Example: Flight Services

- Consider people flying from Paris to Edinburgh for a Rugby International. Traffic is overwhelmingly in one direction on that particular weekend.

- An Air France marketing manager realised that there were many residents of Edinburgh who might like a weekend in Paris. Offered substantial discounts for this direction (e.g., £50 instead of the usual, £300. Now the reverse flights were full.
Example continued...

- Air France’s profits were much higher. Why?
- The additional or marginal cost of carrying the passengers to Paris was very small, a little extra fuel and a cup of coffee. Much less than £50.
- The plane would have to go back anyway, so its use is not an opportunity cost.
Two Types of Costs

- Attributable Costs: extra fuel and food is caused by additional passengers
- Economies of Scope: passengers on each direction are complements (on the supply side) -- who should bear these costs?
Thought Experiment

“If two independent parties owned the outward and return legs respectively, or if Air France were to auction the rights to these, what cost allocation would they agree to?”

Appropriate allocation depends on the relative demand for the products and not simply on engineering characteristics. The technical characteristics of the services are identical.

Causality of costs is determined by demand.

As a stand alone product, £50 per passenger is unprofitable. But considering both legs it is not.
Summary

- Marginal costs are critical in determining the costs of output expansion.
- In the Air France case, whether to expand output on the return leg (by offering a discount) depended on marginal and not average or total costs.
Finding Opportunities to Create Value

- Specialisation
- Make or buy
- Complementarities
Trade with many units

- Consider trade between two consumer-producers.
- Should they self-provide or trade?
- On what basis do we decide who should produce what?
Interdependence and Trade:
“A Parable for the Modern Economy”

Imagine...
...only two goods (potatoes and meat)
...only two people (potato farmer and a cattle rancher)

What should each produce?
Why should they trade?
A World of Self-Sufficiency
A World of Self-Sufficiency

By ignoring each other:
- the farmer and rancher will produce a limited amount of meat and potatoes.
- each consumes what they each produce.
- each is subject to tradeoffs between meat and potatoes.
Self-Sufficiency: without trade, economic gains are limited.

<table>
<thead>
<tr>
<th>Farmer</th>
<th>Rancher</th>
</tr>
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<tbody>
<tr>
<td>Meat: 1</td>
<td>Meat: 4</td>
</tr>
<tr>
<td>Potatoes: 2</td>
<td>Potatoes: 4</td>
</tr>
<tr>
<td>Meat: 2</td>
<td>Meat: 5</td>
</tr>
<tr>
<td>Potatoes: 2.5</td>
<td>Potatoes: 5</td>
</tr>
</tbody>
</table>

Note: The numbers represent quantities of goods produced or traded.
Specialisation and Trade

[Table & Figure in notes]

- If the farmer and the rancher were to *specialise in producing* the product that they were more suited to produce, and then *trade* with each other, they would be better off.
  - Farmer should produce potatoes.
  - Rancher should produce meat.
  - Farmer and Rancher should trade.
Should they trade?

- **Absolute advantage**: to produce a pound of potatoes the rancher needs 8 hours whereas the farmer needs 10 hours. Choose the rancher?
  - No, must consider the rancher’s opportunity cost: if produces one pound of potatoes, the rancher cannot produce 8 pounds of meat.
  - Farmers opportunity cost is only 1/2 pound of meat. It is lower than the
Comparative Advantage

- Comparative advantage tells us who should produce what.
- Who faces the lower opportunity cost of producing meat?
- What relative price would achieve this?
  - Suppose that three pounds of meat exchanges for one pound of potatoes.
  - Compare price with opportunity cost.
Applications

- Should Michael Jordan mow his own lawn?
- Should one partner stay home while the other works?
- Should Australia trade with other countries?
Transfer Pricing

In an attempt to allocate costs to departments effectively, Bellcore uses a system of transfer pricing. In the late 1980s, the transfer price for typing reports reached as high as $50 per page, due to the way that overhead costs for space, electricity, employee travel, parking and so on were allocated. [See “Getting Transfer Prices Right: What Bellcore Did?” Harvard Business Review, (Sept-Oct, 1989), pp.146-154]
Make versus Buy

- General principle: a firm should make rather than buy if the opportunity cost of doing it yourself is less than the price you would pay for the service in the market place.

- Has this principle been applied to outsourcing decisions in your organisation?
Exploiting Complementarities

A different way of locating valuable trade is searching for other activities that, if added to your own, create value.
Air and Land

- Hotels need airlines, airlines need hotels
- Allied or conflicting interests?
- Consumer cares about \( p_a + p_h \)
- Each firm wants the other to be cheap
Complementary

Providers of complementary products and services
- Hardware and software
- Cars and car loans
- VCRs and Showtime
- Intel and Windows
The Value Net

COMPETITORS

CUSTOMERS

COMPANY

COMPLEMENTORS

SUPPLIERS
Competitors & Complementors

A player is your complementor if customers value your product more when they have the other player’s product than when they have your product alone.

A player is your competitor if customers value your product less when they have the other player’s product than when they have your product alone.
Complementor: Technical definition

Two firms are complementors if, to a customer:

\[ W_{tP}(A + B) > W_{tP}(A) + W_{tP}(B) \]

Examples

- cars and roads
- Hallmark and Valentines Day
- Desktop printers and digital cameras
- Impeachment and CNN
What business is RACV in?

- roadside assistance?
- insurance
- travel
- buying club
- financial products

Complementary businesses
Creating complementors

- Common funds
  - 1913: GM, Hudson, Packard created the Lincoln Highway Association to fund ‘seeding miles’
  - Today: Compaq, Sun, Netscape and Oracle provided a $100m Java development fund.

- Bundling: solve conflict over pricing
  - *Software applications, Textbook and AFR, cinema and food at Jam Factory*
**Complementors & Competitors:**

**The Supply Side**

A player is your complementor if it’s more attractive for a supplier to provide resources to you when it’s also supplying the other player than when it’s supplying you alone.

A player is your competitor if it’s less attractive for a supplier to provide resources to you when it’s also supplying the other player than when it’s supplying you alone.
Complementor: Technical definition

- For suppliers,
  \[ OC(A+B) < OC(A) + OC(B) \]

- Economies of scale and scope
- Peak and off peak
  - cricket and football
  - network usage
The Supply Side:
Examples

Compaq & Dell
- compete with each other for the latest Intel chip
- complement each other in defraying Intel’s R&D costs

Qantas & Ansett
- compete with each other for landing slots and gates
- complement each other in defraying Boeing’s R&D costs
Multiple Roles: Jekyll and Hyde

Competitive threat or complementary opportunity?

- Movie theaters & video rentals
- Traditional & Internet booksellers
- Computers and paper: “paperless” office
- ATM machines - the fate of Citibank
- Sony and Connectix
Multiple Roles:

Making Markets

Antique stores on High Street, Armadale
Theater, music, & dance on and off Broadway
Supermarkets and hot bread stores

Complementors in making the market
Competitors in dividing
Friend or Foe?

Friends
Customers, Suppliers, Complementors

Foes
Competitors
The Division of Value

Willingness-to-Pay

Value Created

Price

Opportunity Cost

Value captured by...

Buyer

Seller
Price measures the division of value between business and customer.

Cost measures the division of value between business and supplier.

What determines these divisions of value?

Added Value
Summary

- The size of the pie
  Willingness-to-Pay minus Opportunity Cost

- The division of the pie: Added Value

- The next step: what happens if you cannot cooperate to maximise value created?