Defining and Quantifying "Customer Value"

A discussion about high-value, high-ROI innovation

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High-Value Innovation

Use fundamental metrics: customer value, cost, and pace of innovation

- Company's needs
  - Greater competitive advantage
  - Greater profitability while minimizing loss of market share
  - Two to three times greater leverage on technical investments (i.e., ROI)
- Approach: Value-based innovation
  - Deploy value-based innovation throughout company
    - Creating "Customer Value" comes first in an organization
    - Shareholder value follows
  - Every function in an organization contributes to Customer Value (or not)
    - Everyone should have an understanding of what "value" is and how to measure it
    - Simple tools can be used to help the organization focus on the most important ways to increase Customer Value and measure progress
- Benefits/$
  - Improved ROI: $2k to $4k improvement in pricing power for mid-sized sedans
  - In some cases it will result in entirely new solutions and business opportunities
- Competition and alternatives
  - Current company approach is AMS (a company market analysis tool)
    - Can be used to measure Customer Value
    - But the working engineer currently does not have the skill set needed to utilize that knowledge
  - Design for Six Sigma Company
    - Cutting edge versions include the ideas we are proposing
    - Our experience suggests that a large improvement is possible just by focusing on Customer Value at all levels of the organization

Organizational Context for Value-Based Innovation

Three over-riding organizational themes

- Corporate Strategic Intent
  - The overarching message, which should be both inspiring and directive, e.g.:
    - What?: Build the highest quality products; at the lowest possible price; in the shortest possible time
    - How?: By using Company Standardized Work; while respecting the humanity of our workers; and eliminating all non-value adding activities
- Total Quality Management (TQM)
  - Quality is the backbone of a manufacturing company: it adds to Customer Value
  - Design for Six Sigma company provides the firm foundation to stand upon
- Value-Based Innovation
  - The purpose of technical innovation is to provide a sustainable competitive advantage
  - Innovation starts by identifying specific customer needs
  - High-ROI innovation is a disciplined process to address those needs by creating compelling Customer Value
    - Like TQM it requires common concepts and shared language, tools, and processes
    - It means addressing a perceived paradox: improving quality and reducing costs (i.e., improving Customer Value)
    - A good, simple measure for the merit of innovation is (Customer Value - Cost) / Time
- The goal of these viewgraphs: Start a discussion to help define and quantify concepts centered around “Customer Value” – the central concept behind high-value innovation

Presentation Overview

A description of "Customer Value" and how to quantify it

- The central importance of Customer Value
  - The ability to define and quantify Customer Value is critical if one is to quickly and optimally design high-value products and services
    - We find confusion about the definition of Customer Value and even more about how to quantify it in most organizations
    - Questions: Does the company need to be doing better in this regard?
  - The purpose of this presentation is to address these two issues
- The ingredients of "value" are defined: we focus on "Customer Value"
  - Three examples are used to illustrate how Customer Value can be quantified
    - Example 1: Developing a Demand Curve for lottery tickets
    - Example 2: Estimating Brand Value
    - Example 3: Creating a Value Curve for Car Noise
  - The process for determining "Value Curves" is described
    - A Value Curve is a plot of Customer Value versus a product attribute
    - The process for constructing Value Curves consists of three steps
      - Step 1: Estimating an "Intuitive Value Curve"
      - Step 2: Performing a pilot experiment with a small sample group
      - Step 3: Performing a large-scale marketing study
    - The process for creating an "Intuitive Value Curve" is described with truck turning radius used as an example
- Appendix
  - Value Factor Analysis: to estimate relative product value
  - Value Propositions: The basic information required for all innovations
  - Need Hierarchies: techniques for identifying customer needs

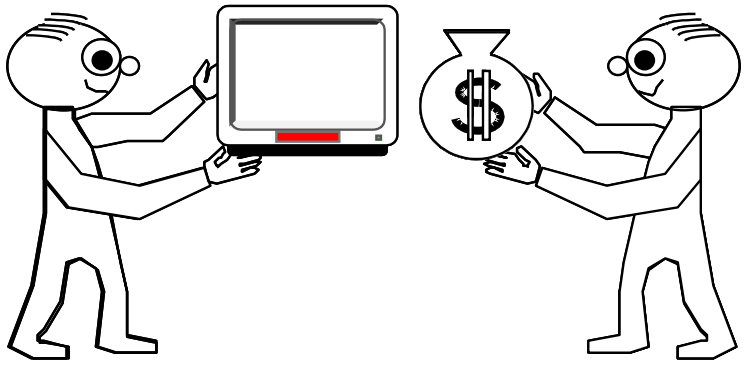
Kinds of "Value"

Many different kinds

- There are many meanings of "value"
  - Customer value
  - Company value
  - Employee value
  - Shareholder value
  - Societal value
- Elements of Customer Value
  - Quantifying Customer Value starts by identifying potential customer needs
  - There are many different kinds of needs, from tangible to intangible
  - Product features become benefits only when they address the needs of consumers in each market segment
  - Net Customer Value is a function of both benefits and price
    - Would you like a new Corvette for $500? Yes!
    - Would you like a new Corvette for $1,000,000? No!
- Our perspective
  - In the universe of products and services, all forms of Customer Value can be expressed in financial terms
  - We will also show that there are times when determining the relative value of different products (i.e., Value Factor Analysis) has great utility

Definitions of Net Value to the Customer and Seller

General concepts and definitions



Seller: $N_{vs} = P - C$

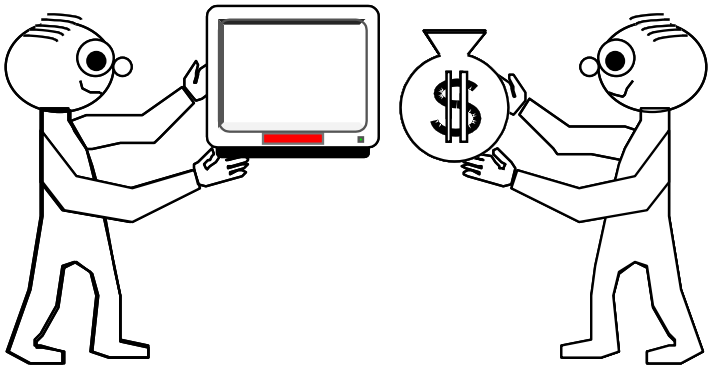
Customer: $N_{vc} = B - P$

- B = *Customer Value* due to a product's or service's benefits*
- Net value to the seller, N_{vs}, is price minus cost: (P - C)
- Net value to the customer, N_{vc}, is the dollar value of the customer benefits minus the price: (B - P)
- For any product or service there will be a demographic distribution for B, which will define a Demand Curve for that product or service

* People often refer to "Value." Here we always refer to Customer Value, B

Major Results

Two limiting cases used throughout this presentation



Seller: Nvs = P – C

Customer: Nvc = B – P

- Monopoly
  - If the customer and seller bargain equally then the net value to the seller will equal the net value to the customer
  - Thus, Nvs = Nvc = (B – C)/2 and P = (B + C)/2
  - This is the point of maximum cash flow (i.e., profit) for a monopoly (i.e., this is the price Microsoft should pick)
- Competitive market
  - In a very competitive market (e.g., Consumer Electronics with 10+ competitors) the Price can be close to Cost and the Demand Curve can describe a large market
    - Thus, Nvc = B - P ~ B – C
    - This can be a tough place to make a living
  - If there are ~ 5 competitors, then B ~ 2P (e.g., the automobile business)

Example 1: Demand Curve for Lottery Tickets

Let's do a simple experiment

- A simple experiment demonstrates the relationship between net value to the customer, Nvc, the value of benefits, B, and price, P
  - We will create a "Demand Curve" for lottery tickets
  - A Demand Curve says what percent of consumers will buy at a given price
- Ask several dozen people to do the following experiment
  - Offer two lottery tickets
    - 50% chance of winning $100 and
    - 80% chance of winning $100
  - For each ticket have each person check the boxes in the table and answer the following question:
  - You have a 50% chance of winning $100 dollars in the lottery. For what price would you buy the ticket?

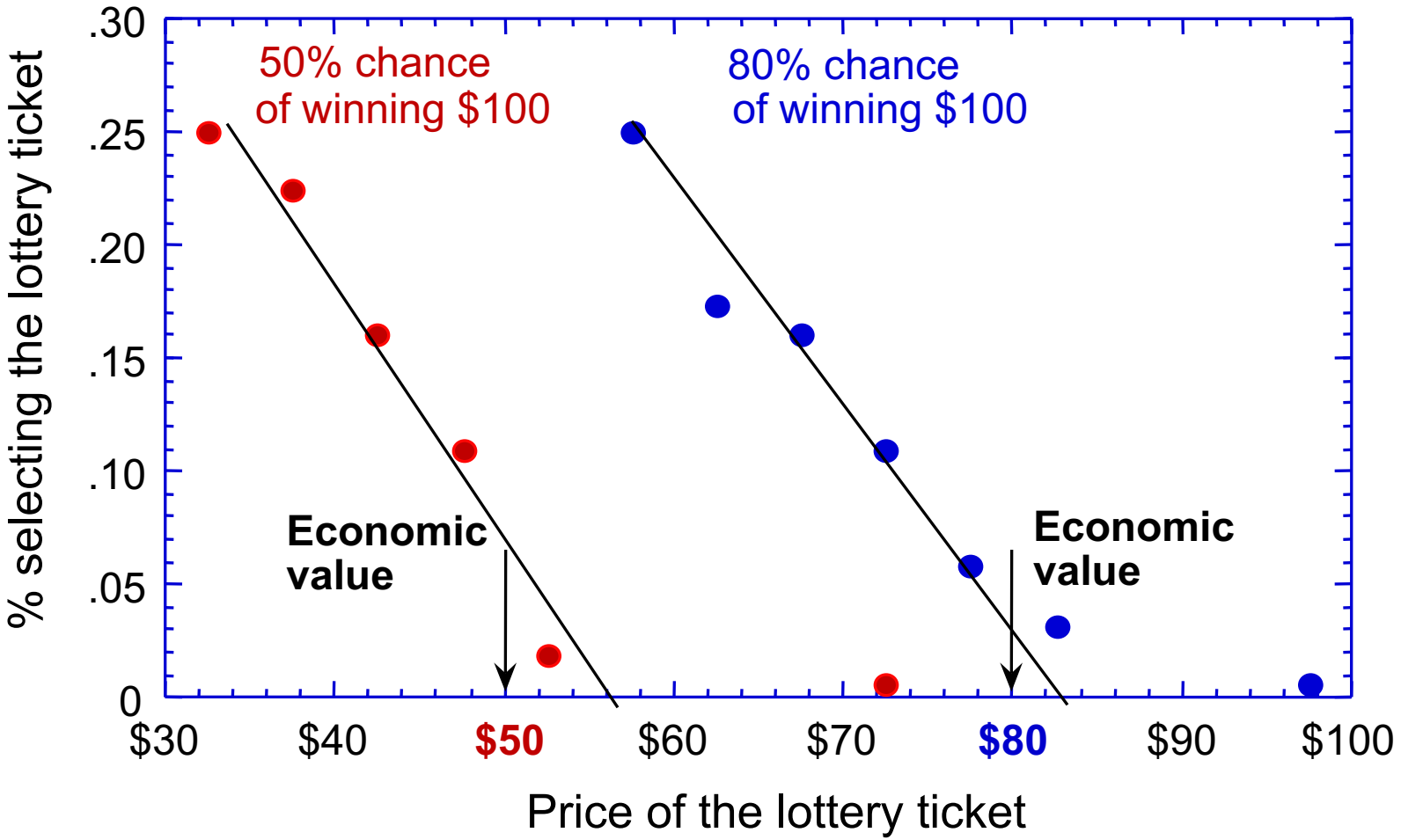
$0	$10	$20	$30	$40
$50	$60	$70	$80	$90

  - Repeat the experiment assuming an 80% chance of winning $100
- After everyone has filled out the table, determine the percent willing to pay at each price and plot the data, as shown on the next slide to create the Demand Curve

Demand Curve Results for Lottery Tickets

An increase in economic value by $30 shifts the demand curve by $30

From the results given below, the Demand Curve, D, can be approximated by D = k(B - P)



Demand Curve for Lottery Ticket Conclusions

Simple experiments can provide useful results

Experiment: Simulated demand for two lottery tickets
- 50% chance of winning $100 and
- 80% chance of winning $100

- Observations
  - In both cases the demand curves closely predict the actual economic value (but not exactly, which can be important)
  - There are outliers (i.e., risk takers willing to pay more than economic value)
  - An increase in value of $30 shifts the demand curve by $30, as it should
  - The slopes of the demand curves are similar: this is important because it shows that demand curves do not change radically depending on the specific parameters within a given task
- Conclusions
  - Simple experiments can be performed to answer questions such as, “What is the perceived financial benefit of a lottery ticket?”
  - These experiments are not meant to be “absolute” results. But they do provide useful information to guide both strategy and tactics

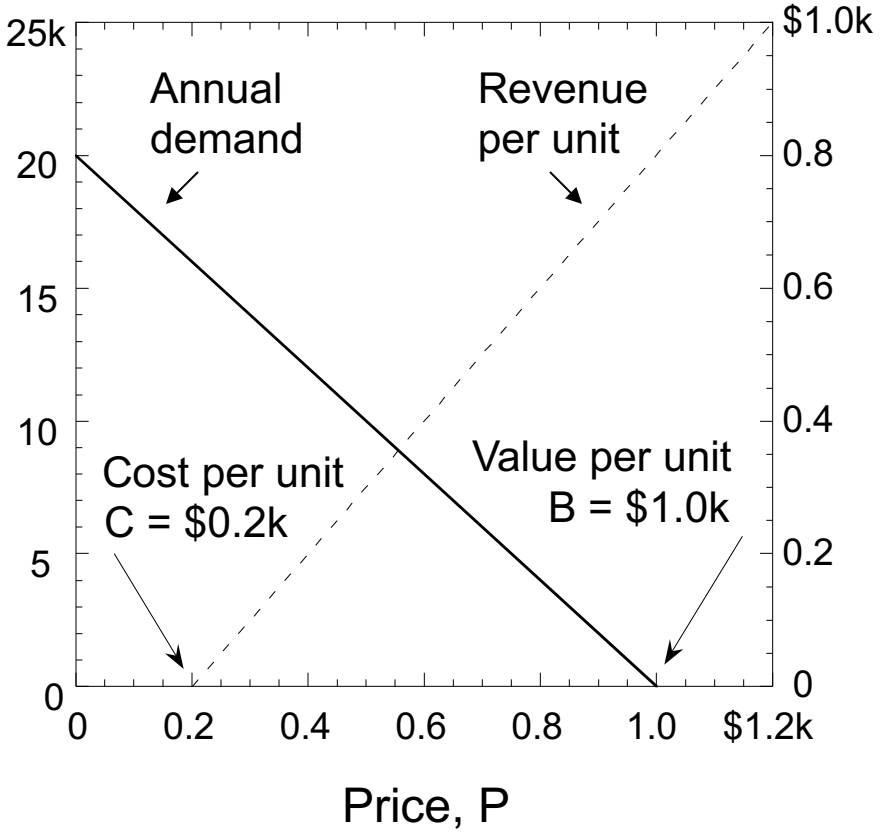
Maximum Cash Flow for a Monopoly

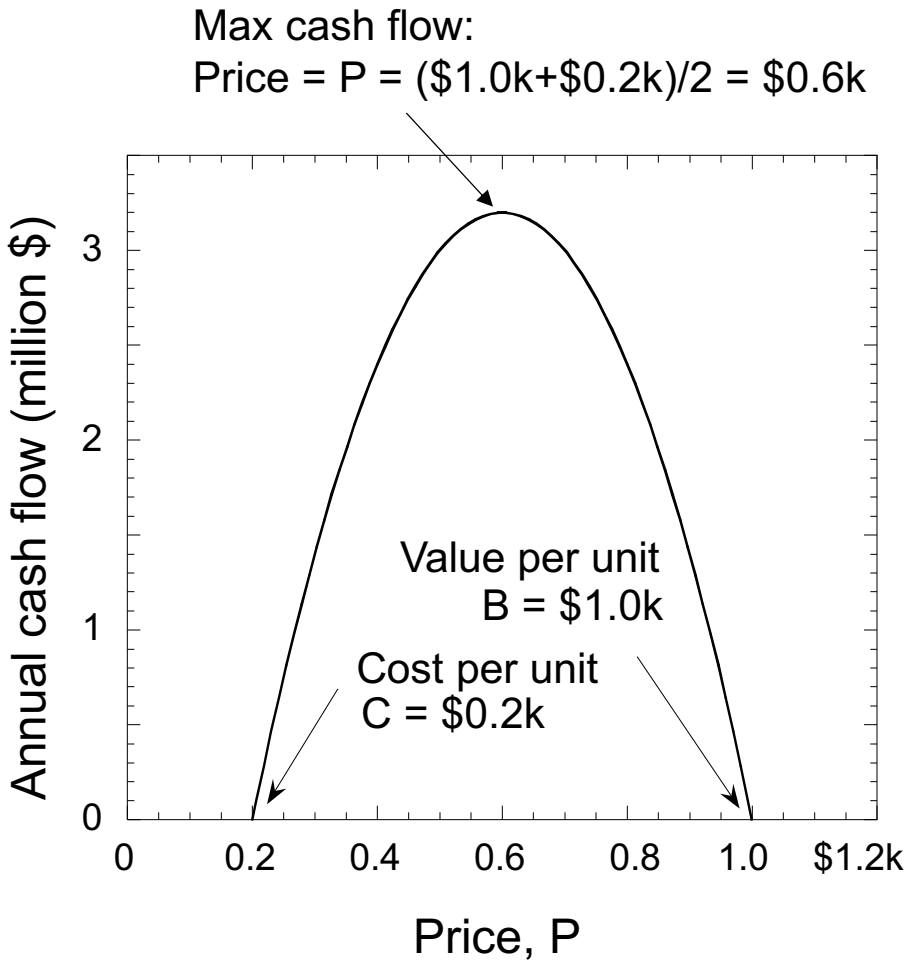
Price = (Customer Value + Cost) / 2

- The last chart shows that:
  - One can determine the customer value, B, of a product (e.g., the "economic price," where no one will buy) and:
  - The Demand Curve
- But what price should one charge to maximize cash flow (i.e., profit)?
- Consider a monopoly product
  - The product has a linear demand curve with 2000 units "sold" at a price of $0
  - The product has a value, B, of $1000 and a unit variable cost of $200
- As price increases revenue per unit sold increases but the number sold decreases
  - This causes the maximum in cash flow to occur at a price equal to 1/2 of the sum of Customer Value plus cost: P = (B + C)/2
  - This is the price a monopoly *should* pick to maximize profit
- Two graphs illustrating these conclusions are shown on the next slide
  - Annual demand and revenue per unit versus price
  - Cash flow versus price

Example of Maximum Cash Flow for a Monopoly

Price = (Customer Value + Cost)/2

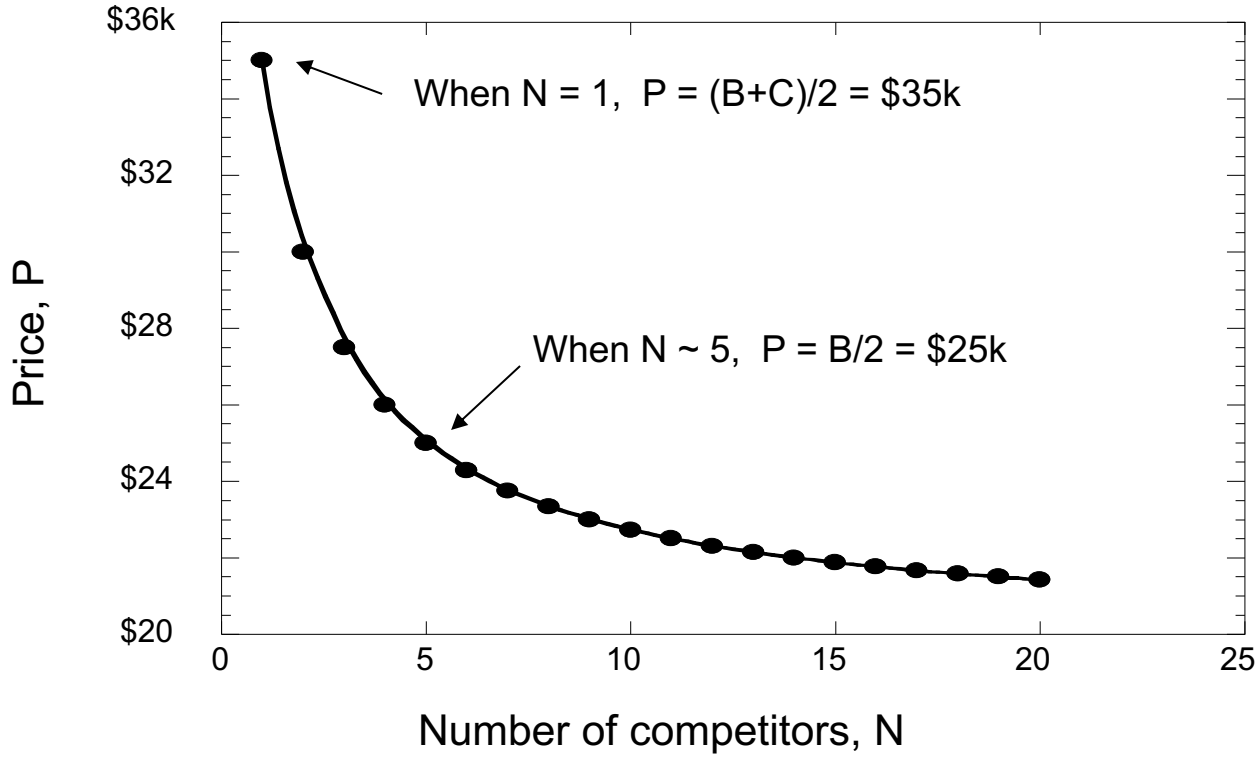




Impact of Competition

For moderate competition, B = 2P

- Price, demand, and profit are a function of the number of competitors, N
- Example: mid-ranged car priced at $25k with N = 5
  - Customer Value, B = $50k
  - Manufacturing cost, C = $20k
- Assumptions used
  - Cournot-Bertrand pricing model
  - The N competitors make an identical car



Example 2: Estimating Brand Value

Introduction

- Certain products and brands command a premium
  - Starbucks
  - Apple
  - Toyota
  - Honda
  - Gucci
  - Mikimoto
- We will use a simple approach to show how one can determine the approximate financial benefit of one brand over another
  - We will use a survey of potential buyers
  - Then create a Demand Curve from the data
  - We will use different automobile manufacturing companies as the example
- Our objective
  - Show that even simple techniques can be used to provide useful estimates of subjective Customer Value for different product and service attributes
  - These estimates can be used to prioritize investments and help engineers maximize their contribution to Company

Survey to Estimate Brand Value

Direct value method of marketing research for brand value of manufacturer B versus A

Survey Introduction

- Assume that you are in the market to purchase a mid-sized vehicle sedan
  - You have a choice of a vehicle manufactured by Company A or Company B
  - The two vehicles are built to the same performance specifications and have the same interior and exterior styles and appearance
- Four paired comparisons are shown on the next slide
  - For each of the four comparisons, select either the vehicle on the left or the one on the right
  - The vehicle manufactured by Company A is offered at the same price for each comparison
  - The vehicle manufactured by Company B is offered at a different price for each comparison

Survey Form for Estimating Brand Value

Direct value method of marketing research
for brand value of Company B versus A

Baseline, Company A, price fixed at P_A = $16,000

Alternate, Company B, price varies over the range

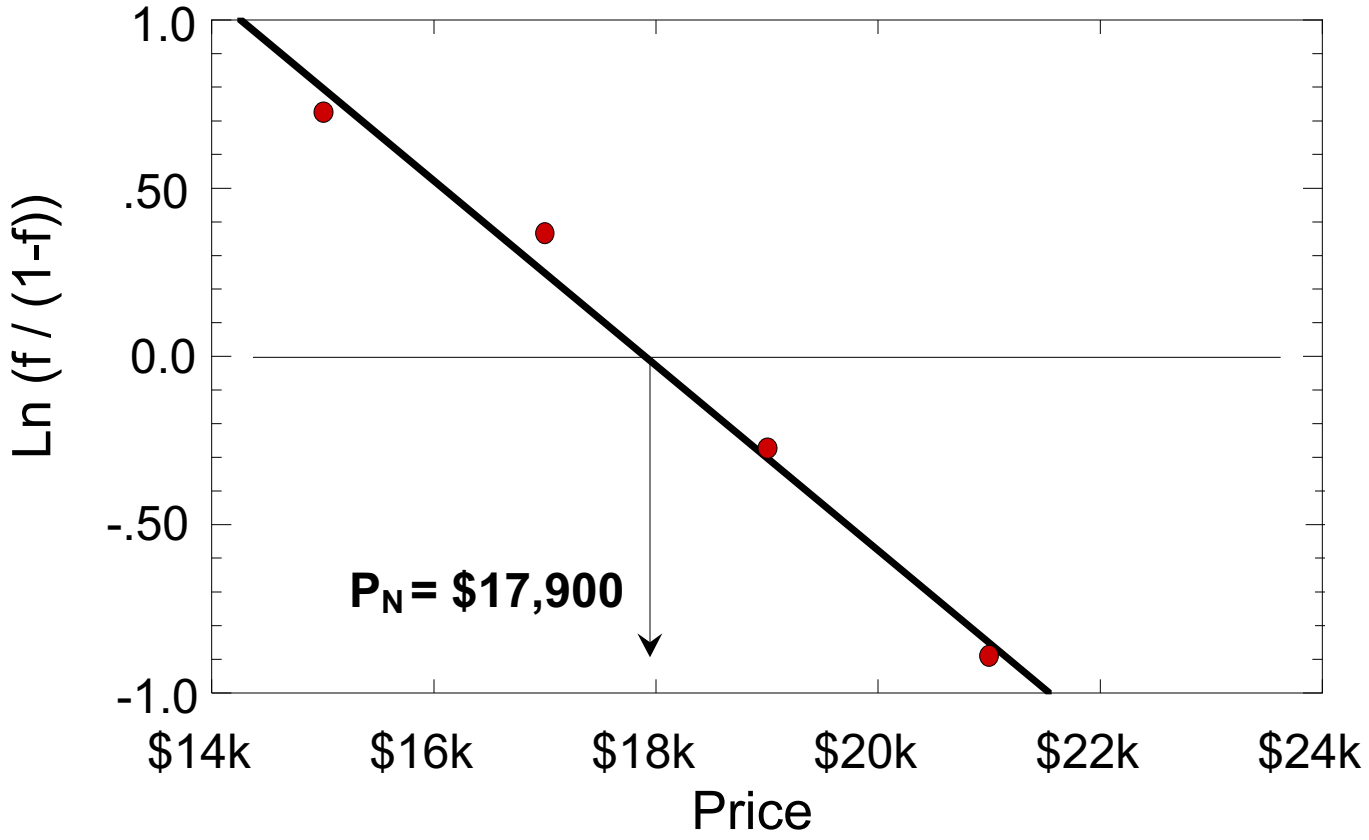
Mid-sized Sedans

Company A: Ford			Company B: Toyota
$16,000	☐	Select One	☐ $15,000
$16,000	☐	Select One	☐ $17,000
$16,000	☐	Select One	☐ $19,000
$16,000	☐	Select One	☐ $21,000

Brand Value Survey Results (Logit Plot)

Fraction, f, choosing B-price versus A-price yields the neutral price, P_N

- Baseline price, P_A, for Company A is $16,000
- Equivalent value price, P_E, for Company B equals $17,900
- Change in Customer Value is equal to PE - PA and is $1,900
- Thus the Company B “brand” value is worth $1,900 to the customer



Example 3: Value Curve for Car Noise

A simple experiment to quantify the Customer Value of reducing "noise" in automobiles

Description of the Experiment

(See the computer screen shot on the next viewgraph)

- Respondents, using headphones, listen to the noise level of a "baseline" vehicle and an "alternative" vehicle at a different price and a different noise levels
- Respondents must select one or the other
  - Respondents will select the "alternative" if it is quieter when both vehicles are at the same price
  - The computer will then increase the price of the "alternative"
  - The respondent repeat the exercise, increasing the price, until he or she switches to the "baseline"
- The experiment repeats with the "alternative" at different noise levels

Value Curve for Car Noise Experiment

Computer screen shot of the display used in the experiment

The only difference between the baseline and alternative vehicles is the level of interior noise at 70 mph.

Go Back 1 Screen

Start Over This Screen

Baseline Vehicle

$40,000

Play Baseline Sound

Buy Baseline

Alternative Vehicle

$40,000

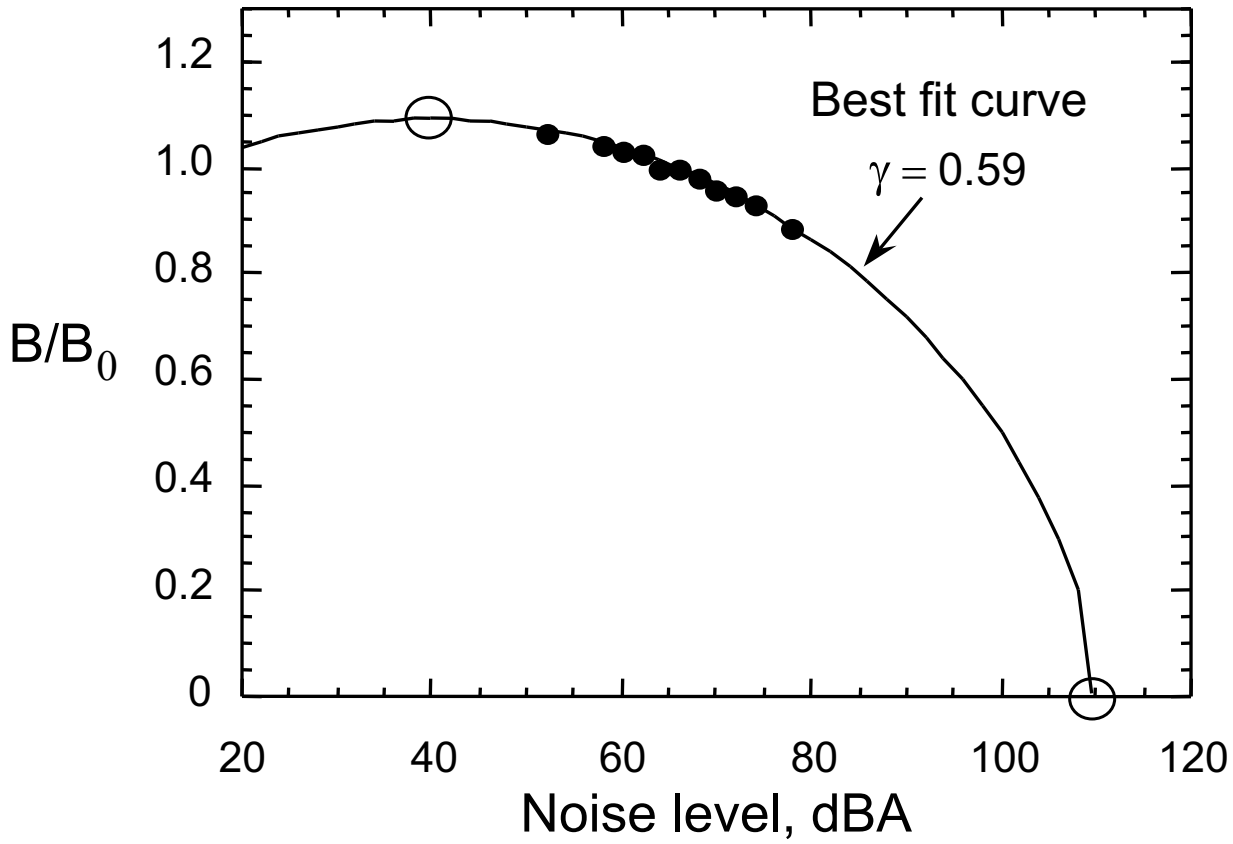
Play Alternate Sound

Buy Alternative

No difference in sound levels

Value Curve for Car Noise Results

Data fit to a parabola: exponentially weighted by gamma = 0.59



- From human factor studies, Customer Value is a maximum at 40 dBA (things can be too quiet!). This was used to fit the curve by having zero slope at 40 dBA
- Customer Value is zero at 110 dBA, which is the threshold of pain
- Results: one dBA in noise reduction is approximately worth ~$400 in Customer Value, B, for a luxury vehicle priced at $40,000 (Pozar and Cook SAE paper 980621)

Value Curve Generation Process

A step by step process to create Value Curves

- Step 1: Develop an "Intuitive Value Curve"
  - The Intuitive Value Curve is created by an evaluation of the baseline, ideal, and critical specifications
  - A small "jury" of experts judges the appropriateness of the numbers selected
  - A curve (a parabola taken to the power, gamma) is fit to the data. This is a curve that in many previous experiments has provided a good fit to the data
  - The weighting coefficient, gamma, is also estimated by the jury in terms of the fraction of time that the attribute is important during the use of the product (i.e., gamma varies between 0 and 1.0)
- Step 2: Perform a small internal market research study
  - Use selected internal (e.g., company) respondents
  - They should not biased as to the outcome
- Step 3: Conduct a national market research survey
  - Perform the survey if the Customer Value of the attribute estimated from the first two steps is sufficiently promising versus cost
  - Participants should be randomly selected from the pool of potential buyers
  - The results should provide the Customer Value generated by the new attribute while also determining the variability in Customer Value across the consumer population

Example: Turning Radius Value

Estimating the potential Customer Value for a new product

- An automobile manufacture wants to determine the potential Consumer Value of adding four wheel steering on mid-size trucks and vans
  - The product is called QuadraSteer
  - It will reduce the turning radius of trucks from 44 feet to 37 feet
  - Today cars and trucks vary widely in terms of turning radius
    - 2004 Lexus IS 300: 34.1 ft
    - 2005 Land Rover LR3: 37.6
    - 2004 BMW 7: 39.8 ft..
    - 2005 HUMMER H2: 43.5 ft.
    - 2005 GM Truck: Sierra Denali: 46.1 ft
- There are three possible benefits for the consumer from this new product
  - Ease of parking and turning
  - Smoother driving in traffic (handling)
  - Ease of towing trailers
- We wish to estimate the potential Customer Value from these features
  - Step 1: we will first create a Intuitive Value Curve to estimate the potential Customer Value using known information
  - If Step 1 indicates significant potential Customer Value, we will move to Step 2 and form a focus group to verify our initial conclusions
  - Success with Step 2 will lead to Step 3 – a major marketing study

Turning Radius Intuitive Value Curve Assumptions

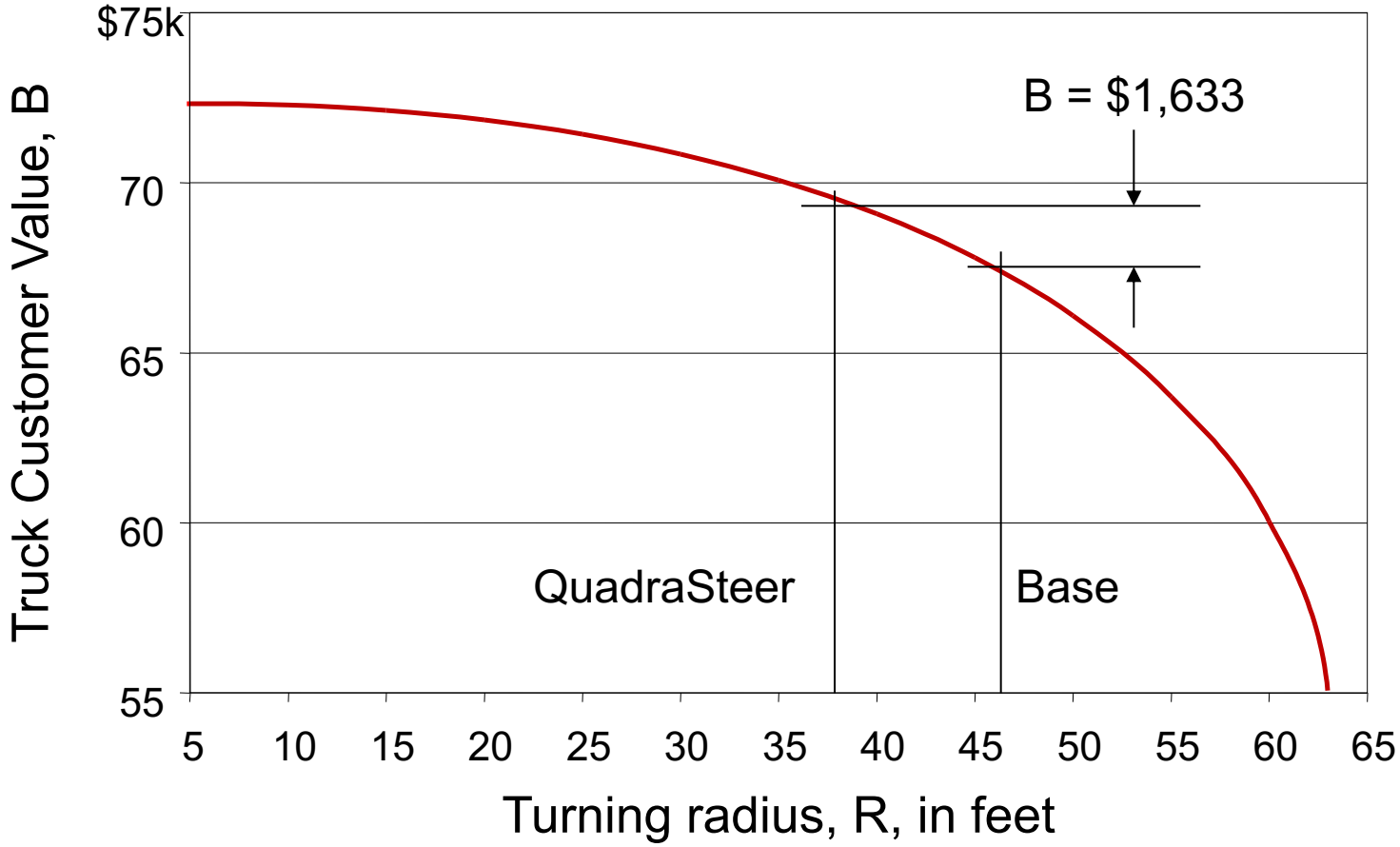
Estimating the potential Customer Value for a new product

- We start by creating the Intuitive Value Curve for parking and turning
- The Intuitive Value Curve is computed from the following assumptions
  - Base turning radius for a truck *without* QuadraSteer: R = 44.3 feet
  - Base truck Customer Value, B ~$67,700 (2x price)
  - QuadraSteer turning radius: R = 37.4 feet
  - Performance at the extremes
    - The increase in Customer Value as the turning radius goes to zero is zero (i.e., the slope of the Value Curve is zero at R = 0)
    - The maximum turning radius that allows a right turn to be made is R ~ 67.4 feet
    - Turning radius comes into play when cornering, parking, and entering and leaving a garage (From Donndelinger and Cook, SAE paper No. 970762)
  - From experience, the Value Curve can be approximated by the equation:
    - Value Curve = a parabola taken to a power, gamma (gamma = 1/8 here)
    - These assumptions were used to compute the Intuitive Value Cure (next slide)
    - Two other curves were computed for the expected Customer Value due to improved 1) handling and 2) towing
- The parameters used are from jury evaluations by graduate students
  - Alternatively one could easily compromise the turning radius of a vehicle, have a jury drive it, and get a direct answer for the minimum turning radius
  - If there were doubts about the results, this would be done

Turning Radius Intuitive Value Curve Results

"Intuitive Value Curve" for truck turning radius

- The Intuitive Value Curve estimates that the Customer Value, B, resulting from improved parking is $1,633
- This Customer Value is large enough to justify moving to Step 2 and a study to better quantify these results using a focus group



Turning Radius Intuitive Value Curve Conclusions

"Intuitive Value Curve: for truck turning radius

- Results: The Intuitive Value Curve predicts the following results (also shown are the results of similar analysis for driving and towing)
  - Parking and Cornering…….....$1,633
  - Handling ……..…….....$363
  - Towing……$10

    Total net increase in Customer Value, B = $2,006
- It turns out that this product has been built, so we can compare these estimates by looking at the increase in resale price due to QuadraSteer
  - AMS (A company program for predicting market share)……$ 480
  - Kelly Blue Book…….$1,300-1,600
  - The intuitive, "back of the envelope" calculation seems reasonable
- Other conclusions
  - QuadraSteer should be advertised as a way to improve parking and cornering, not towing of trailers or driving handling
  - QuadraSteer was initially offered at $4.5k (The price was increased because other changes had to be made, including roof marker lights, suspension changes, traction control, electronic shift, and heavy duty trailering for an added price of $1,235 (need to check these data))
  - Later the price was reduced to around $2k

Overall Conclusions

Simple experiments and analytical techniques can estimate the Customer Value due to product and/or service attribute benefits

- Customer Value can be financially quantified
  - Net Customer Value to the seller, N_{VS}, is price minus cost: (P - C)
  - Net Customer Value to the customer, N_{VC}, is the dollar Customer Value of the customer benefits minus the price: (B - P)
    - With one competitor: P = (B + C)/2
    - With five competitors P = B/2
- The financial value of all customer benefits can be quantified
  - Product and service feature and convenience value
  - Brand and styling value plus emotional value
  - Estimates can be determined for N_{VC} and B using simple experiments
- Example results
  - Second sliding door on minivan: $1.25k in Customer Value
  - Interior noise level: $0.4k in Customer Value per dBA for a $40k luxury vehicle
  - Brand value: Toyota/Honda are worth $3k over Chevrolet (1997 mid-size vehicles)
- These results, with other approaches, can be used to guide product design
  - AMS: Company market analysis tool
  - IDEO: behavioral design
  - Value Factor Analysis
  - Honda Value Analysis (question: is it like the analysis described here?)

Appendix

Additional Discussion about Value

The relationship between needs, benefits, and Customer Value

- What is the relationship between needs, benefits, and Customer Value?
- Customer needs come first
  - At the highest level we start with Maslow's Hierarchy of Needs
  - Within these overarching needs, there are more specific needs, such as communication, mobility, entertainment, sustenance, etc.
  - In each category there are specific product attributes, such as Quality versus Convenience, to address those needs (see next slide)
  - Needs are not static: they change with people's experience and environment
- Benefits are determined by the customer
  - Benefits are product attributes that we care about (i.e., we will pay $)
  - All benefits, B, have a $ value
  - Most products are made up of many specific attributes that provide benefits to consumers in a market seCompanyent
  - Market seCompanyentation attempts to find relatively large clusters of customers who will pay a premium for certain benefits (e.g., Prius)
- Net Consumer Value includes all costs
  - Net value to the customer is $N_{VC} = B - P$: P is price (total cost to the consumer)
  - Value Factor Analysis (VFA)
    - VFA looks at a summary of all of a product's benefits and divides them by all the costs, VF = B/Costs, to obtain a measure of relative product value
    - The sum of costs can often be reflected in the product's price, P and thus VF = B/P

Value Propositions to Facilitate Communication

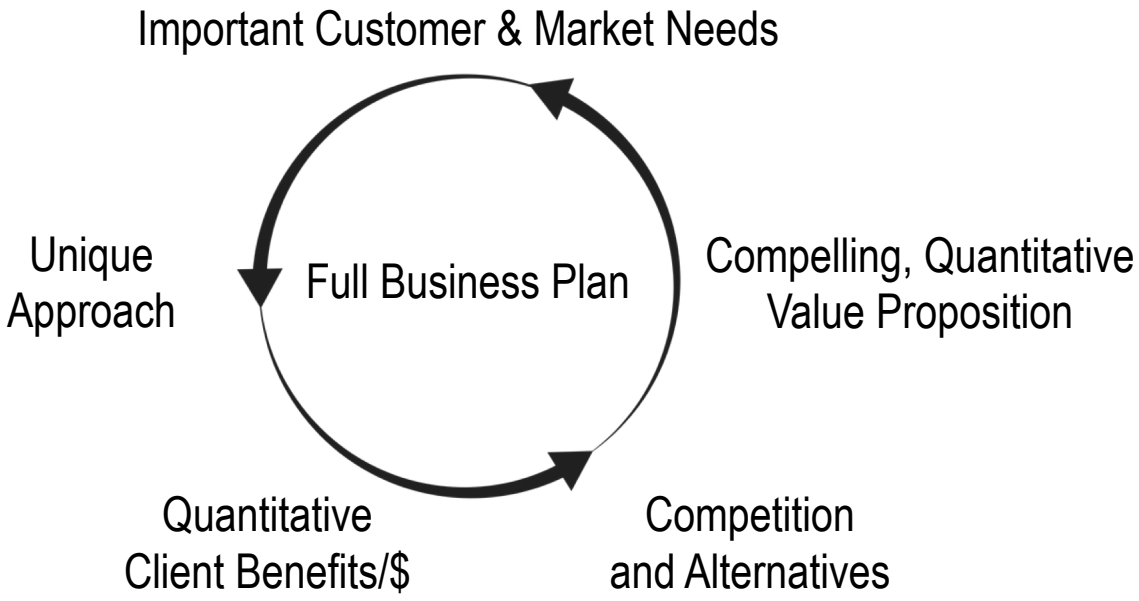
The fundaments that must always be addressed

IMPORTANT CUSTOMER NEEDS

APPROACH

BENEFITS/$

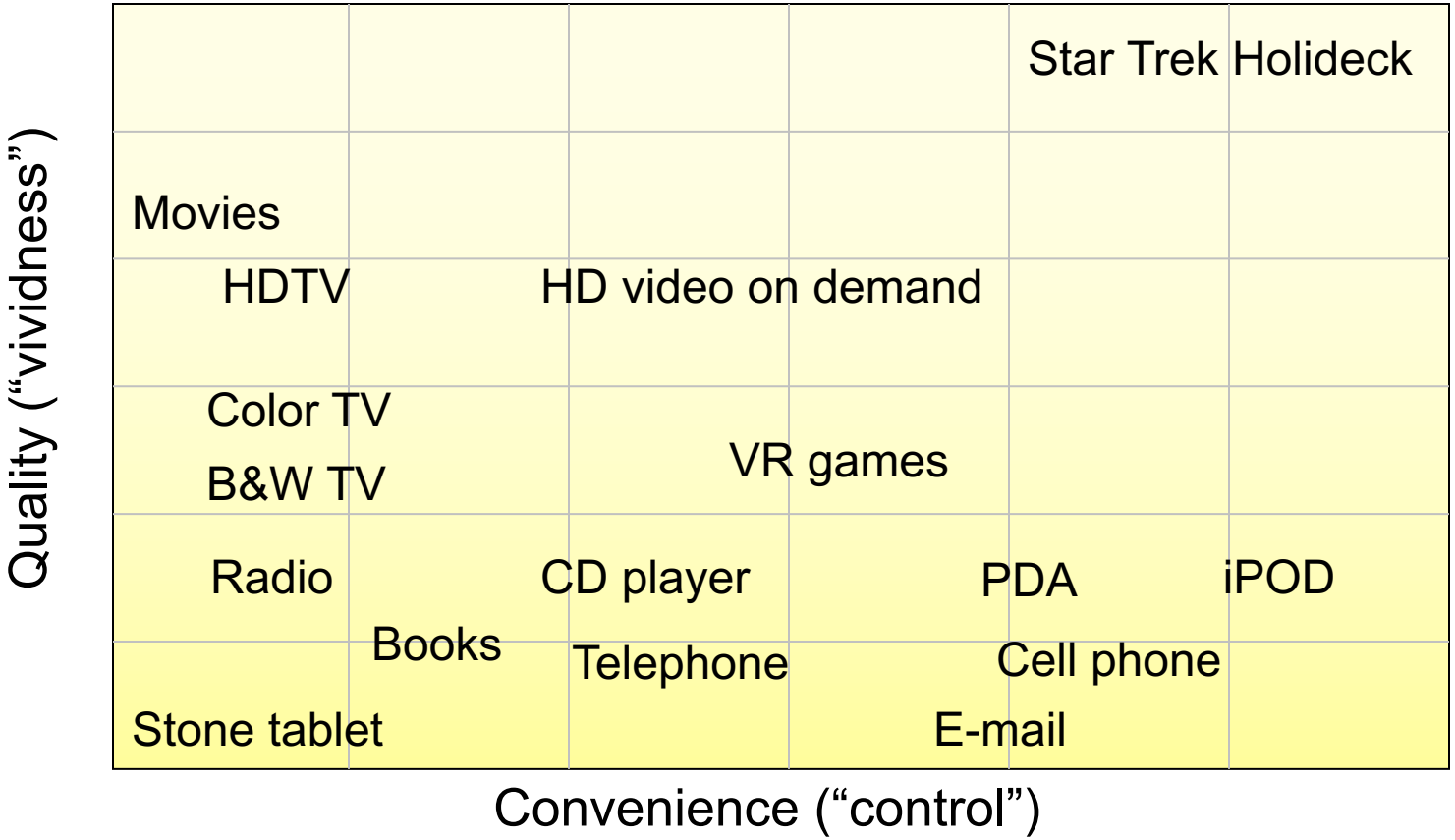
COMPETITION



Dimensions of Customer Needs

Significant advances in quality and/or convenience can result in new industries

- A product or service attempts to address fundamental needs
- Two of the most important are quality ("vividness") and convenience ("control"): they are independent needs – i.e., orthogonal
  - Below is a chart for (mostly) consumer electronics products
  - It is clear that each product can be further segmented into additional attributes

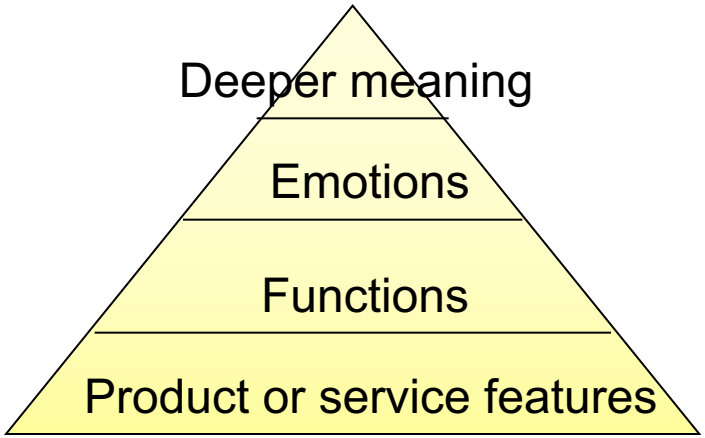


Segmenting Needs Using a Value Hierarchy

Segmenting higher-level needs that can result in additional customer benefits

- Not all customer benefits are tangible or immediately obvious
  - Brand value, for example, can provide multiple customer benefits
  - The first step in quantify this value is to seCompanyent the different need levels
- Michael Markowitz uses a “needs hierarchy” to aid in identifying possible benefits (it is like Maslow’s hierarchy of needs)
- Once identified, the potential benefit value that results from addressing these needs can be quantified

Needs Hierarchy



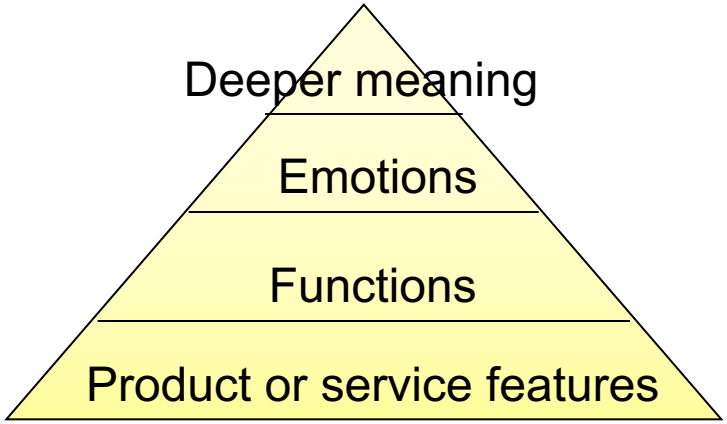
Example: Kodak color film benefits

- Immortality
- Warm emotions, sharing
- Color quality, non-fading, ..
- Color film, resolution, cost, ..

Additional Value Hierarchy Examples

Using a simple language to clarify assumptions

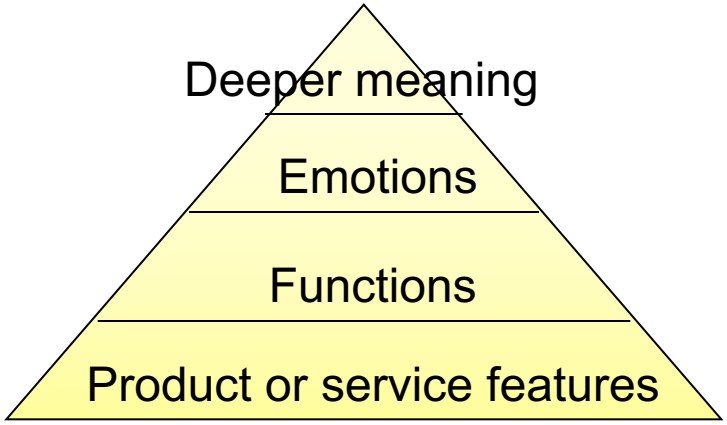
Needs Hierarchy



Example: iPOD by Apple

- Identity: I am special
- Fun, control
- Music, convenience, …
- 1000 songs, portable, style, cost, …

Needs Hierarchy



Example: Corvette

- Identity
- Excitement, sexual attraction
- Transportation, music, …
- Convertible, style, cost, …

Value Factor Analysis

A tool to help quantify the Customer Value of a product or service relative to the competition and alternatives

- Value Factor Analysis (VFA)
  - VFA is a means to identify potential product and service attributes
  - It allows a comparison of the benefits per cost of a product or service with its competition and alternatives
  - It compares *relative value* (Benefits/Costs): it is a number, not $
- VFA complements the other tools described in this presentation
  - It helps list and uncover all potential product or service attributes that may be of importance to a customer
  - It can include objective (e.g., image quality) and nor-tangible aspects (e.g., warm emotions)
  - It breaks benefits into two orthogonal quantities: Quality and Convenience
  - Intangible attributes (warmth, immortality, brand) are included in Quality*
- VFA can be used with small focus groups or larger ones: it always stimulates a positive discussion and inevitably uncovers hidden needs

- VFA was invented by Len Polizzotto
- This assumption is based on human factor experiments that show tangible product features can be interchangeable with subjective ones. For example, film quality. A high resolution image of a mountain scene can be rated as having the same overall picture quality as a low resolution image of your child.

Value Factor Analysis Steps

A tool to help quantify the Customer Value of a product or service relative to the competition and alternatives

- VFA process
  - In the first column
    - List all the possible product's or services' features (include everything you can think of)
    - List all the possible convenience and non-tangible attributes
    - List all the possible costs that will impact the consumer
  - In the second column ("Market") have a "jury" judge the *Importance* of an attribute using Table A, below
  - In the third column ("Competition 1") have a jury estimate the *Performance* of that product using the criteria of Table B
  - Repeat the last process for "Competition 2," etc. and for "Our Product"
- VFA calculation
  - The spreadsheet will give a score (1 to 5) for the elements listed in Tables A and B
  - In each row it will multiply Importance X Performance to score that product attribute
  - It will then add together all the scores for Features, Convenience, and Costs
  - Finally, it will multiply Features times Convenience and divide by Costs: the Value Factor
  - One can then compare different products in terms of their overall, relative Customer Value

Table A: Customer and market needs level of importance	
Most Important	MI
Very Important	VI
Average Importance	AI
Low Importance	LI
Not Important	NI

Table B: Product performance level of satisfaction	
Superior Satisfaction	SS
Excellent Satisfaction	ES
Good Satisfaction	GS
Fair Satisfaction	FS
Poor Satisfaction	PS

Value Factor Analysis Spreadsheet

A tool to help quantify relative Customer Value

	Market	Competition 1		Competition 2		Competition 3		Our Offering	
Quality	Importance	Satisfaction	Total	Satisfaction	Total	Satisfaction	Total	Satisfaction	Total
1			0		0		0		0
2			0		0		0		0
3			0		0		0		0
4			0		0		0		0
5			0		0		0		0
6			0		0		0		0
7			0		0		0		0
8			0		0		0		0
9			0		0		0		0
10			0		0		0		0
Total			0		0		0		0
	Market	Competition 1		Competition 2		Competition 3		**Our Offering**	
Convenience	Importance	Satisfaction	Total	Satisfaction	Total	Satisfaction	Total	Satisfaction	Total
1			0		0		0		0
2			0		0		0		0
3			0		0		0		0
4			0		0		0		0
5			0		0		0		0
6			0		0		0		0
7			0		0		0		0
8			0		0		0		0
9			0		0		0		0
10			0		0		0		0
Total			0		0		0		0
	Market	Competition 1		Competition 2		Competition 3		**Our Offering**	
Cost	Importance	Satisfaction	Total	satisfaction	Total	Satisfaction	Total	Satisfaction	Total
1			0		0		0		0
2			0		0		0		0
3			0		0		0		0
4			0		0		0		0
5			0		0		0		0
6			0		0		0		0
7			0		0		0		0
8			0		0		0		0
9			0		0		0		0
10			0		0		0		0
Total			0		0		0		0
Customer Value: (Quality*Convenience/Cost)			#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!

Possible Application Within Company

Augmenting the company's innovation process

- Premise: Investments should maximize ROI for the company and be guided by the use of fundamental metrics: Customer Value, cost, and pace of innovation
- Break investments into three "buckets"
  - Stay in Business
    - These are required, such as emission regulations
    - The analysis described here would help optimize the solutions
  - Game Changing
    - Fuel cells are an example
    - The analysis described here would help optimize the solutions
  - Competitive Advantage
    - Leveraging other assets
    - The analysis described here can make a significant improvement in innovation success
- Initially focus this analysis on "competitive advantage" investments
  - Each project over $1M should have:
    - A Value Factor Analysis
    - An Intuitive Value Curve with results from an internal focus group plus AMS
  - Each presentation should start with these market analysis results to help focus discussion, establish priorities, and speed up development
  - Projects should be prioritized using a simple overall metric: Customer Value – Cost over Time: (B – C)/T

Other Technical Topics

Additional work and issues

- Is the sum of the individual benefits for a product equal to the overall benefits?
  - If they are small, it is a sum
  - Multi-attributes must be determined empirically
  - Some attributes are multiplicative (e.g., 110 dB noise results in zero value)
- How does behavioral economics impact these conclusions and results

Next Steps for Company

Many topics for discussion

- Are these ideas redundant with what company does today?
- Can we put the current company process on a few slides?
- What would key people say is missing with this current process?
- How can these ideas complement the notable progress already made?
- How should new ideas be introduced?
- Who are the key players who should be talked to first?
- Other?