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Managing Sustainable Competitive Advantage

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Learning Objectives

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- **Understand the importance of managing sustainable competitive advantage (SCA) by providing innovative offerings**
- **Be able to conduct conjoint analysis for assessing new product/service development**

Innovation Offering

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- **Innovative new offerings help firms build and maintain SCA and barriers to the competitive attacks that arise because competitors continually react to a firm's success (MP#3)**
- **Offering is a purposely broad term that captures both tangible products and intangible services provided by firms**
- **Innovation is the "creation of substantial new value for customers by creatively changing one or more dimensions of the business"**
- **Key Aspects of Innovation**
  - Broader than product or technology innovation
  - Must generate **new value for customers**
  - Involves change leading to **differentiation** and **SCA**
  - Starbucks, Dell, and IPod create SCA

Benefits of Innovation and Offering's Equity

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- **Offering equity refers to the core value that the performance of the product or service offers the customer**
- **By building offering equity, an innovative firm can make it more difficult for competitors to encroach on its business**
- **New offerings often motivate customers to switch from competitors to the innovative firm to gain access to the new product**
- **New offerings can also help the firm acquire new customers or enter new markets when they offer similar performance but at a lower price**
- **Offering new and innovative products tends to enhance the firm's brand, even if customers don't buy the new offering**

Stage-Gate Design Review Process for Effective Product Development

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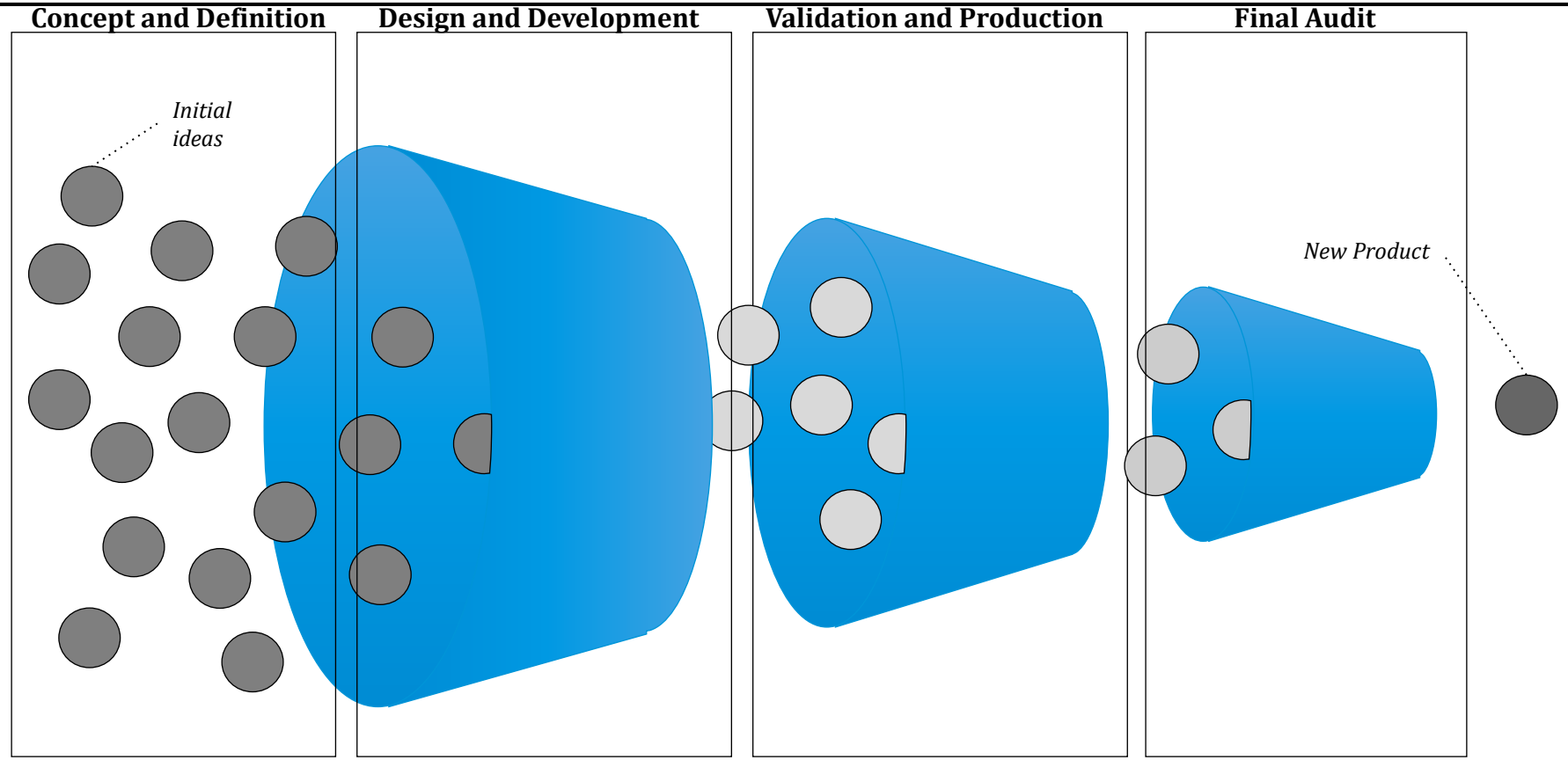

The concept and definition stage consists of an initial screening of all potential ideas, concept assessment, project definition, and feasibility assessment.

The design and development stage consists of product and process design and development. Financial feasibility considerations also are pertinent, including testing of price points and customer acceptance.

The validation and production stage consists of continued market launch planning and product manufacturing and process validation. It also may include test marketing and evaluation of launch plans.

The audit stage consists of final product and product assessments. It often includes some reflection on the previous steps.

Research Approaches for Designing and Launching New Offerings

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- Qualitative techniques such as observation, focus groups, and customer interviews are effective early in the development process; they can reveal some important needs that may be just emerging or that are unknown to the firm

- To avoid the risks associated with the high failure rate of new offerings, firms can use different techniques to improve their decision making and avoid unsuccessful launches, such as conjoint analysis

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Managing Sustainable Competitive Advantage I

Choice-Based Conjoint Analysis

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Agenda

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- Product design task
- What is conjoint analysis?
- How does conjoint work?
- Choice-based conjoint analysis

Product Design

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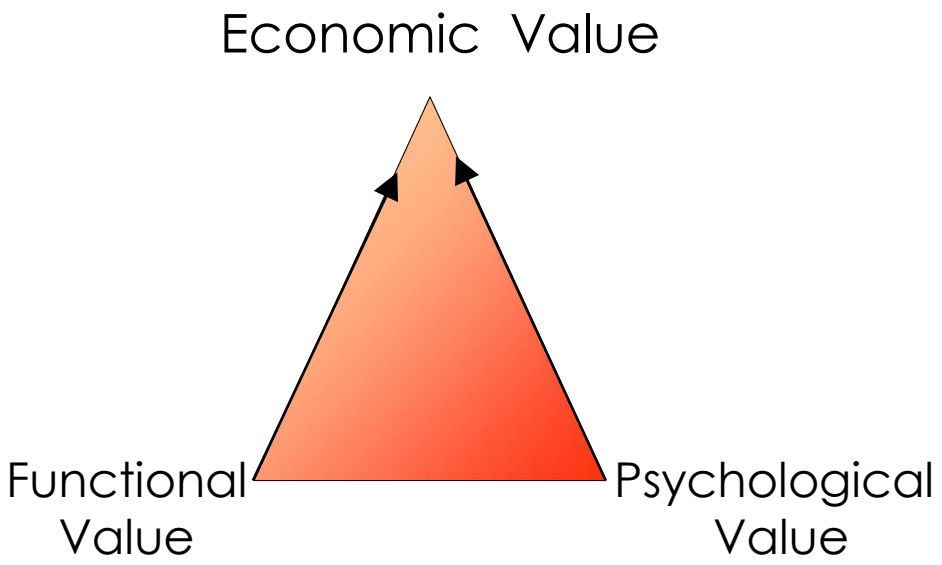
- A product can be considered as a bundle of attribute levels or features.
- Product features provide value to consumers



Product Design

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- **A notebook computer can be described as**

Attribute	Levels
Processor	2.4 Ghz, 3.2 Ghz
RAM	16GB, or 32 GB
Hard Disk	500 GB or 1 TB
Price	£800 or 1000
Color	

Product Design

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- **Optimal design involves choosing attribute levels of a product to maximize objectives**
- **Typical objectives**
  - Market Share
  - Profitability
- **Optimal design is based on an analysis of consumer preferences**

Conjoint Analysis

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- **Conjoint Analysis Helps Make New Offerings "More" Successful**
  -Product superiority drives financial success
  -Product design requires making tradeoff decisions (price, performance, size, location, features…)

- **Conjoint analysis is an approach to**
  -Understand how consumers make trade-offs among product attributes and features
  -Measure the importance of product attributes to consumers

Conjoint Analysis

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- **With a conjoint analysis, marketers can design and develop new products by thinking of products as bundles of attributes, then determining which combination of attributes is best suited to meet the preferences of customers.**
- **When to use it?**
  - To identify product attribute trade-offs that customers are willing to make for a new product
  - To predict the market share and impact of a proposed new product (i.e., bundle of attributes)
  - To determine the amount that customers are willing to pay for a new product

Conceptual Underpinnings of Conjoint Analysis

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- **Consumers differ in their utilities for attribute levels**
- **Utility for a product = sum of utilities of its attribute levels**

$$U = u(\text{ProcessorLevel}) + u(\text{RamLevel}) + u(\text{HardDiskLevel}) + u(\text{PriceLevel}) + \ldots$$

- **Utilities can be measured by consumer evaluation of product profiles**
- **Utility estimates can be used to predict market share of new products**

Conjoint Analysis Process

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1. **Design study**
   - Select attributes and levels (range and #)
   - Develop product profiles (< 16 optimal)
2. **Collect data from respondents**
   - Design data collection instrument
   - Obtain consumer preferences or ratings for profiles
3. **Analyse the data**
   - Calculate partworths
4. **Evaluate product design options**
   - Evaluate market simulations
   - Evaluate different choice rules

Example of a Conjoint Choice Task

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- **Which tablet would you choose?**
- **Each consumer was presented 15 choice tasks**

Brand	iPad	Microsoft Surface	nexus
Screen size	9 inch	10 inch	9 inch
Hard drive	64 gb	128 gb	32 gb
RAM size	4 gb	4 gb	2 gb
Battery life	8 h	7 h	9 h
Price	$399	$399	$199
Alternative	1	2	3

Data

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There are 137 consumers in dataset

ConsumerId	ChoiceSetId	AlternativeIdInSet	Choice	Brand	Size	Storage	Ram	Battery	Price
1	1	1	1	iPad	sz7inch	st32gb	r4gb	b7h	499
1	1	2	0	Surface	sz10inch	st64gb	r2gb	b9h	399
1	1	3	0	Kindle	sz9inch	st16gb	r2gb	b8h	499
1	2	1	1	iPad	sz8inch	st32gb	r1gb	b8h	399
1	2	2	0	Surface	sz10inch	st128gb	r4gb	b7h	299
1	2	3	0	Nexus	sz7inch	st64gb	r1gb	b9h	199

Multinomial Logistic Regression (MNL) Model

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- **Consumer has a utility for each alternative**
- **Utility is a function of product attributes**
  – It is a measure of tablet attractiveness
- **Faced with a choice set, the consumer selects the tablet that has the maximum utility**

Every Attribute Level has a Sub-Utility (Part-Worth)

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- **For example, each brand is worth：**
  - Galaxy: β_{Gal}
  - iPad: β_{iPad}
  - Kindle: β_{Kind}
  - Surface: β_{Surf}
  - Nexus: 0 (reference value)

- **The betas (β) are parameters to be estimated from the data**

Consumer Utility for a Tablet

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$$V_j=\beta_{iPad}iPad_j+\beta_{Gal}Gal_j+\beta_{Kind}Kind_j+\beta_{Surf}Surf_j$$ ← Brand value

$$+\beta_{10"}10inch_j+\beta_{9"}9inch_j+\beta_{8"}8inch_j$$ ← Screen size value

$$+\beta_{128gb}hd128_j+\beta_{64gb}hd64_j+\beta_{32gb}hd32_j$$ ← Hard drive value

$$+\beta_{ram4}ram4gb_j+\beta_{ram2g}ram2gb_j$$ ← RAM value

$$+\beta_{batt9}batt9hrs_j+\beta_{batt8}batt8hrs_j$$ ← Battery life value

$$+\beta_{price}Price_j$$ ← Price value

Except Price, all the variables are binary (0/1) variables to indicate the attribute levels of tablet j

Estimation Results

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	Estimate	Std. Error	t-value	Pr(>|t|)
BrandGalaxy	0.3378857	0.0925056	3.652596	0.0002596
BrandiPad	0.9780287	0.0937336	10.434136	0.0000000
BrandKindle	0.2630105	0.0996254	2.639995	0.0082907
BrandSurface	0.1450365	0.0938521	1.545373	0.1222560
Sizesz10inch	0.3240632	0.0841953	3.848949	0.0001186
Sizesz8inch	0.1890775	0.0829232	2.280151	0.0225987
Sizesz9inch	0.4355415	0.0808408	5.387644	0.0000001
Storagest128gb	0.5897703	0.0870533	6.774822	0.0000000
Storagest32gb	0.2168719	0.0829213	2.615395	0.0089124
Storagest64gb	0.5782183	0.0808259	7.153877	0.0000000
Ramr2gb	0.3189348	0.0672579	4.741970	0.0000021
Ramr4gb	0.6357438	0.0645225	9.853053	0.0000000
Batteryb8h	0.1299599	0.0651501	1.994777	0.0460672
Batteryb9h	0.1253824	0.0650588	1.927216	0.0539528
Price	-0.0050888	0.0002752	-18.488626	0.0000000

Tablet Conjoint (sub) Utilities (β Parameters Estimates)

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Attributes	Levels	Utilities
Brand	Galaxy	0.33788568
	iPad	0.97802873
	Kindle	0.26301055
	Surface	0.1450365
	Nexus	0
Screen Size	10 inch	0.32406323
	9 inch	0.43554151
	8 inch	0.18907747
	7 inch	0
Hard Drive	128 gb	0.58977033
	64 gb	0.57821825
	32 gb	0.21687192
	16 gb	0
RAM	4 gb	0.63574383
	2 gb	0.31893478
	1 gb	0
Battery	9h	0.12538242
	8h	0.12995991
	7h	0
Price		-0.0050888

- Reference levels are marked in grey

Utilities of Tablets 1 & 2 in Choice Task Example

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Brand	iPad	β_{iPad}
Screen size	9 inch	$\beta_{9"}$
Hard drive	64 gb	β_{64gb}
RAM size	4 gb	β_{ram4}
Battery life	8 h	β_{batt8}

Brand	Galaxy	β_{Gal}
Screen size	10 inch	$\beta_{10"}$
Hard drive	128 gb	β_{128gb}
RAM size	4 gb	β_{ram4}
Battery life	7 h	β_{batt7}

$V_1 = \beta iPad + \beta 9" + \beta 64gb + \beta ram4 + \beta batt8$

$V_2 = \beta Gal + \beta 10" + \beta 128gb + \beta ram4 + \beta batt7$

Choice Probabilities

$$p_1 = \frac{\exp(V_1)}{\exp(V_1) + \exp(V_2) + \exp(V_3)}$$

$$p_2 = \frac{\exp(V_2)}{\exp(V_1) + \exp(V_2) + \exp(V_3)}$$

$$p_3 = \frac{\exp(V_3)}{\exp(V_1) + \exp(V_2) + \exp(V_3)}$$

$$0 \leq p_i \leq 1, \ \forall \ i$$

$$\sum_i p_i = 1 \text{ or } p_1 + p_2 + p_3 = 1$$

Predicted Market Share

Suppose these are the three tablets in the market:

ConsumerId	ChoiceSetId	AlternativeIdInSet	Choice	Brand	Size	Storage	Ram	Battery	Price
1	1	1	1	iPad	sz7inch	st32gb	r4gb	b7h	499
1	1	2	0	Surface	sz10inch	st64gb	r2gb	b9h	399
1	1	3	0	Kindle	sz9inch	st16gb	r2gb	b8h	499

```
kable(head(predict(model,data),1))
```

	alternative 1	alternative 2	alternative 3
Predicted share	0.3717263	0.4405521	0.1877216

Hit Rate: Choice Prediction Accuracy


```
Confusion Matrix and Statistics

          Reference
Prediction   1   2   3
         1 362 158 130
         2 164 449 149
         3 136 160 347
```

Tot 662 767 626

Hit Rate=(362+449+347)/2055
=56.4%

vs. 33.3% random prediction

Total number of observations is 2055 (=15 tasks*137 consumers)

Conjoint Simulator

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The impact of a 2GB RAM upgrade on Galaxy mkt-share

Brand	Size	Storage	Ram	Battery	Price	Predicted.Share
iPad	sz7inch	st64gb	r2gb	b8h	399	0.3423928
Galaxy	sz10inch	st32gb	r2gb	b7h	299	0.2540301
Surface	sz10inch	st64gb	r1gb	b7h	399	0.1313854
Kindle	sz7inch	st32gb	r1gb	b9h	169	0.2721917

Brand	Size	Storage	Ram	Battery	Price	Predicted.Share
iPad	sz7inch	st64gb	r2gb	b8h	399	0.3127768
Galaxy	sz10inch	st32gb	r4gb	b7h	299	0.3185544
Surface	sz10inch	st64gb	r1gb	b7h	399	0.1200209
Kindle	sz7inch	st32gb	r1gb	b9h	169	0.2486479

What is the Brand Value of iPad Relative to Galaxy?

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1 / .005088 =
196.540880503

β IPad - β Galaxy ≈ 0.6401

iPad Value= (β IPad - β Galaxy)/ abs(β Price)
=0.6401*$196.54=$125.80

An average consumer would be indifferent between getting a Galaxy tablet plus paying $125.80 extra and getting an iPad.

Similar techniques are often used in litigation, e.g., Samsung vs. Apple:
https://www.greenbook.org/mr/market-research-methodology/how-apple-samsung-and-conjoint-came-together/

Willingness to Pay for an Attribute Upgrade

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$\beta\ 4\text{gbRAM} \approx 0.6357$

$\beta\ 1\text{gbRAM} = 0$

4GB Ram Value =0.6357*$196.54= $124.94

An average consumer would be willing to pay up to $124.94 to upgrade from 1gb to 4gb RAM, holding all other attributes fixed.

Takeaways

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- **Conjoint analysis can facilitate the design and launch of new offerings by helping managers define the optimal product, according to the value assigned to various product attributes by consumers.**

- **Conjoint analysis is the most popular marketing analytics tool in the industry**

- **Conjoint analysis has different types**

  -Choice Based Conjoint – Most used in the industry and can incorporate no choice alternatives to better capture demand