The Kellogg-Recanati MBA Handbook

The Handbook of the Kellogg-Recanati International Executive MBA Program (1999 – 2001)

Revised: 2007

Edited by: Stuart Ballan, MBA
THANKS FROM THE KR04 STUDENTS ..... 

Thanks to our sponsors, who committed to, funded and supported our studies throughout the two year course.

Thanks also to the administration team of the Kellogg-Recanati Executive MBA program, who for 2 years, looked after us, beyond the call of duty.

Thanks to the KR04 students who volunteered their time to summarize individual courses, and to the Professors of those courses, who together, effectively acted as an Advisory Committee to this publication, by magically finding time in their busy schedules to carefully and comprehensively review the course summaries, and provide feedback, in order to ensure the quality of this Kellogg-Recanati MBA Handbook is of the highest possible.

Finally, on a personal note, thanks to my wife, Dorit, for encouraging me to make this Kellogg-Recanati MBA Handbook happen, and for supporting me, whilst I made it happen.

USEFUL WEBSITES

Kellogg School of Management
- http://www.kellogg.northwestern.edu/

Kellogg-Recanati Program
- http://kr-emba.tau.ac.il/

Kellogg-Recanati MBA Handbook
- http://www.kr04.net

Kellogg-Recanati Alumni Club
- http://kelloggalumni.northwestern.edu/clubs/recanatimideast/

DEDICATION

The Kellogg-Recanati MBA Handbook is dedicated to the spouses, children and friends of the KR04 students, who for two years, have (usually) tolerated the absence of their husband, wife, father, mother and friend!

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INTRODUCTION

I still clearly remember the KR02 class representative addressing the audience at KR02’s graduation ceremony, in late 1999. “For every course, I put a piece of paper in my pocket, containing key messages from that course”, he said.

Sitting there in the audience, about to embark on the new Kellogg-Recanati KR04 International Executive MBA program, the most prestigious MBA available in the Middle-East and one of the top business courses available in the world, I really could not relate to why on earth he’d want to do that.

A year later, halfway through our 2-year program, I understood. The volume of information in the first year had been huge. Class material from the middle of the year now seemed, well, a little confused and vague, whereas class material from the beginning of the year was closer to a distant memory!

In order to maximize my long-term benefit of the EMBA program, I wanted to capture the main points of each of the 27 courses of the KR04 program, before it was too late. I assumed that if I needed such a summary, then so would others. I certainly knew that there was no realistic way I would be able to summarize 27 courses myself!

The Kellogg-Recanati MBA Handbook grew out of this common need. Many KR04 students volunteered their time to summarize 1 and sometimes 2 courses each. It was decided that for each course, there would be a 1 page summary, typically containing 5 key points to “take home” from the course, (analogous to the “piece of paper in my pocket”, discussed above), and a more verbose description of the course, of about 3 to 5 pages in length. A process was put in place to ensure quality was maintained, by securing the services of the respective course Professors, who each agreed to review the course summaries and to comment if needed, to ensure the content was accurate and of the highest possible quality.

The Kellogg-Recanati MBA Handbook was written “by the students, for the past, current and future students, with quality approved by the professors, and with the full support of Dean Dipak Jain”. The print version was distributed at the graduation ceremony of the class of KR04 in November 2001, was sent to all KR alumni, to all course professors, and far beyond. The full content was also published on the web at www.kr04.net, and since November 2001 has become standard reference material for over 125,000 visitors, spanning over 40 countries, enjoying significant local and international visibility and press as a result.

Even though the stock of print copies of the Kellogg-Recanati MBA Handbook have long since been exhausted, the demand for print copies continues 6 years after publication. It was to meet this demand that this 2007 special version of the handbook has been published, in PDF format.

My thanks to all who contributed to this handbook. Without your help, this handbook would not have been possible. Finally, consistent with the original objective of this handbook, I hope you find it a useful source of reference for years to come.

Regards

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HOW THE KELLOGG-RECANATI MBA HANDBOOK IS ORGANIZED

The 27 courses of the International Kellogg-Recanati Executive MBA fit into any one of 7 sections, as summarized below:

1. Marketing
2. Accounting
3. Finance
4. Organizational Behavior
5. General Management & Strategy
6. Business Economics
7. Statistical Decision.

The KR MBA Handbook includes a course summary for each of these courses, organized within the above 7 sections. A summary of all the 27 courses, and where they fit, can be found in the Table Of Contents.

To help you find courses quickly within this handbook, look up the course in the Table of Contents, for example, you’ll find “Market Research” as course 1.4, starting on page 16. You can then either look for the correct page number, or “flick” through the handbook, looking for the following graphics on the top right hand corner of each page:

You should be able to find any course very quickly, using this method.

Each course summary consists of a single “Summary page”, being the high-level points that should be taken away from each course. In addition, each course summary consists of between 3 to 6 “Detail pages”, offering a more verbose explanation of the points contained in the “Summary page”. You can look underneath the course number to see where you are within a course; Either a summary page, or, say, “Detail page 2 of 3”

It should be noted that the course summaries are not intended to replace the wealth of knowledge available via the respective course textbooks, class notes and of course, course attendance. They are, however, intended to be a quick and portable reference guide for the most important points of all the 27 courses, providing accurate, relevant and quality checked information. As the Kellogg-Recanati MBA Handbook is also available on the web at www.kr04.net, the web version offers readers “the information you want, when and where you want it”. Readers wishing to look deeper into a given subject can use the Kellogg-Recanati MBA Handbook as an index into the text books and class notes, distributed throughout the 2 year course.

Finally, as Dean Jacobs told the class on our opening day, we should “work hard and have fun”. We certainly did!
## SUMMARY PAGE

1. **Marketing is everything and everything is marketing**

2. **Sustainable Customer Advantage**
   You have *customer advantage* when customers value the benefits you provide, are willing to pay for them, and believe you are the one *best able to deliver* those benefits. Assets and skills provide the basis for a sustainable *customer advantage*.

3. **The 4 P’s of marketing tools are:** Product, Price, Promotion, Place

4. **Segmentation**
   A segment consists of a group of entities that share something in common. Usage, demographics, Geography, psychographics and benefits are used as bases for segmentation. A segment must be identifiable, significant, accessible and responsive.

5. **Targeting and positioning**
   *Select* and *prioritize* the segments to go after where you have customer/competitive advantage. Understand who is your target, who are your competitors and what is your point of difference.

6. **New Market strategies**
   The objectives are to (1) attain first mover advantage through pioneering, (2) enter new synergetic markets, (3) preempt competition, (4) increase product offering and (5) defend your current position.

7. **First Mover advantage**
   Pioneers have the opportunity to shape customer preferences, preempt positioning and potentially increasing switching costs to later entrants products.

8. **Late entry strategy**
   You need late entry strategy to survive, grow and influence the market. *Small scale* penetration you use fringe, me-too, niche and premium strategies. For *large scale* you use differentiation, challenger, penetration strategies.

9. **Pricing strategies**
   - Of the 4 P’s, price is the only one that produces revenues; the other three P’s produce costs.
   - Cost, competition, customer value or the channel may drive pricing strategies.
   - The pricing process consists of collecting data and information, making pricing decisions, communicating the prices, analyzing the responses of the customers, competitors, monitoring and evaluating the strategy.

10. **Service quality**
    - Customers perceive Service quality as the extent of discrepancy between customer’s expectations or desires and their perceptions of actual service performance.
    - The key is to meet or better exceed what customers expect from the service. Customer expectations are influenced by past experience, word-of-mouth, personal needs and both direct and indirect messages and prices.
    - To judge service quality, customers use dimensions such as tangibles, reliability, responsiveness, assurance and empathy.
    - There are 4 gaps contributing to poor QOS (1) Not knowing what customer expect (2) Setting the wrong QOS standards (3) The service performance gap (4) Discrepancy between actual service delivery and what is communicated about it.
Definitions

What is marketing?
“Marketing is everything and everything is marketing”. Marketing is:
1. Identifying what customers want.
2. Translating those needs into actionable product/service attributes.
4. Communicating product/service offering to customers.
5. Influencing customer preferences promotional activities.
6. PR and eCommerce support.
7. Selecting the right channels for distribution.

Marketing Mix
The set of marketing tools that a firm uses to pursue its marketing objectives in a target market. The four P’s of marketing are:
1. Product – variety, quality, design, features, packaging sizes, services, warranties and returns.
2. Price – List price, discounts, allowances, payment period and credit terms.
3. Promotion – sales promotion, advertising, sales force, PR and direct marketing.
4. Place – channels, coverage, assortments, locations, inventory and transport.

Customer Value – 3 types of benefits
Value is defined as the perceived worth in monetary units of the set of economic, functional/technical, and psychological benefits received by the customer in exchange for the price paid for a product offering taking into consideration available competitive offering and pricing.

Customer advantage
• Customers are value-maximizers. They form an expectation of value and act on it. Buyers will buy from a firm that they perceive to offer the highest customer delivered value, defined as the difference between total customer value and total customer cost.

• Marketing is delivering on customer advantage. You have customer advantage when customers value the benefits you provide, are willing to pay for them, and believe you are the one best able to deliver those benefits. You use assets and skills to attain a sustainable customer advantage. You need competitive advantage to be a player and to make the sale but customer advantage helps you make the margin. Consequently, customer advantage is more critical than competitive advantage.

• Sellers must assess the customer value and cost associated with each of their competitors to know how their own offer stacks up. Sellers in who are at a delivered value disadvantage can try either to increase total customer value or to lower total customer cost.

• A buyer satisfaction is a function of the products perceived performance and the buyer expectations. Companies use Total Customer Satisfaction (TCS), both as a goal and a marketing tool.
Target Marketing

- Target marketing involves three activities: segmentation, targeting and positioning.
- Markets can be targeted at 4 levels: segments, niches, local areas and individuals. Market segments are large identifiable groups within a market. Marketers localize their campaigns for trading areas, neighborhood and individual stores.
- There are two bases for segmenting consumer markets: consumer characteristics and consumer responses.
- As it is not easy to segment directly on benefits, so it is often simpler to start with directly observable variables such as: size/type of industry/firm/operational characteristics / demographics, etc, and then obtain data that delineates benefits.

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<th>Product features / service levels</th>
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- The major segmentation variables for consumer markets are geographic, demographic, physycographic and behavioral. These variables can be used singly or in combination.
- To be useful, market segments must be measurable, substantial, accessible, differentiable, and actionable.
- Once a firm has identified its market-segments opportunities, it evaluates the various segments and decide how many and which ones to target. The choice can be a single segment, several segments, a product or the full market. When choosing the full market, it must choose between differentiated and undifferentiated marketing.

Positioning

- **Positioning** is delivering on customer advantage and creating a bond between the customer mind and your product. To successfully position a product, the product must be in the consideration set and there must be a point of difference. In other words:
  - Customer has to know you (awareness)
  - Customer has to like you
  - Customer has to choose you (meaningful point of difference)
- **Positioning statement** summarizes the essence of competition and differentiation
  - Who is your target
  - Who are your competitors (implicitly or explicitly)
  - What is your point of difference? What is your reason for being
- There are many ways of positioning:
  - Attribute based
  - Focus on benefits (economic, functional and psychological)
  - By Use
  - By User/Lifestyle
  - By product class
  - Against competition (Hertz versus Avis)
  - Country or Geographic area

Differentiation

The key to competitive advantage is product differentiation. Differentiation is worth establishing to the extent that it is important, distinctive, superior, preemptive, affordable and profitable. Products can be differentiated along 5 dimensions:

1. **Product** (form, features, performance and conformance qualities, durability, reliability, repairability, style, design)
2. **Services** (ease of ordering, delivery, installation, training, consulting, maintenance and repair)
Points of difference” can be achieved through the 3 value disciplines:

1. **Operational excellence** – providing customers with reliable products, at competitive prices, with the least inconvenience
2. **Customer intimacy** – providing products and services that uniquely meets customer needs.
3. **Product leadership** – offering customers products and services that are superior to the competition, constantly innovating and keep raising the bar.

**New product strategy**

The objectives of a new product strategy are to attain first mover advantage through pioneering, preempt competition, increase product offering and defend your current position.

A new product strategy can be Market driven or Market driving. A Company adds new products through acquisition or development. There are 6 categories of new products:

1. New-to-the-world products that create an entirely new market
2. New product lines allowing a company to enter an established market for the first time.
3. Addition to existing product line
4. Improvement or revisions of existing products
5. Repositioning of existing products by targeting new markets or segments
6. Cost reduction – new products that provide similar performance at reduced cost.

**Pioneering Strategy - First Mover advantage**

The objectives of a First mover are to define/establish the rule of the games. Pioneers have the opportunity to gain pioneer advantage in 3 ways:

- Shape customer preferences,
- Preempt positioning
- Potentially increasing switching costs to later entrants products.

They do it by:

- Educating customers about benefits/features.
- Reduce the uncertainty about product and technology
- Influence customer preferences toward product supplied by pioneer.
- Frame perceptions of late entrants

**Late entry strategy**

You need late entry strategy to survive, grow and influence the market. For small scale penetration you use fringe, me-too, niche and premium strategies. For large scale you use differentiation, challenger, penetration strategies. The options are to compete with similar emphasis, change the emphasis of competition, or change the rules of competition.

**Pricing strategies**

Pricing is an integral element of marketing strategy and should be consistent with overall strategic objectives. To effectively translate pricing strategy into actual prices requires a pricing process that is fact-based, monitored and updated. Of the 4 P’s, price is the only one that produces revenues; the other three P’s produce costs.
Four Pricing approaches:
1. **Cost-driven** – focuses on estimating costs and adding on a preset margin. It does not use any marketing input.
2. **Competition-driven** – focuses on competitors' prices. It encourages price competition and ignores product differentiation. Might trigger price wars and dilute values.
3. **Customer-value-driven** - focuses on what is the worth of the product to the customer if it offers solutions to their problems. It is driven by marketing and sales and is a cross functional approach.
4. **Channel-driven** – focuses on the incentive for the channel member to carry the product.

Six steps Pricing Process:
1. **Data collection**
   - Internal data (costs/margins/profits)
   - Competition (prices, margins, elasticity)
   - Customers data (elasticity, product evaluation)
2. **Information** – use statistics, reports and expert systems to analyze history of prices, volumes and profit
3. **Pricing decisions**
   - How pricing decisions integrate with marketing and corporate strategies.
   - What rules will be used to set price for a product/line.
4. **Execution**
   - Providing and communicating the pricing decisions to customers and distributors.
   - Signaling price changes to competitors.
5. **Market response** – monitor and analyze responses from Customers, Distributors and Competitors
6. **Monitoring and evaluation**
   - Monitor sales, margins and profit
   - Monitor customer retention percentage
   - Analyze competitive pricing versus own pricing.
   - Track competitors’ responses to pricing

**Customer service quality**
Service quality, (QOS), is perceived by customers as the extent of *discrepancy* between customer’s expectations or desires and their perceptions of actual service performance.

*The key is to meet or better exceed what customers expect from the service.* Customer expectations are influenced by past experience, word-of-mouth, personal needs and both direct and indirect messages and prices. To judge service quality, customers use dimensions tangibles, reliability, responsiveness, assurance and empathy.

**Four gaps contributing to poor Quality of Service (QOS):**
- **Gap 1 – Not knowing what the customer wants** - The discrepancy between customers’ expectations and management perceptions of these expectations. The key to reducing it is to know what customers expect by thinking OUTSIDE IN. Customer expectations can be researched through (1) complaints, (2) similar industries and (3) customer intermediates (employees, dealers, distributors) (4) key-client studies (5) customer panels (6) tracking satisfaction with individual transactions (7) comprehensive customer-expectation studies
- **Gap 2 – Not setting the right standards** - Setting the wrong QOS standards. Resource constraints, short-term profit orientation, market conditions, perception of infeasibility or management indifference may be the cause. Gap 2 may be closed using hard technology such as information databases, automating tasks and scheduling or delivery systems.
• **Gap 3** – *Not delivering on the standards* - The difference between the service specifications and the actual service delivered. May be caused by role ambiguity, role conflict, employee-job fit, technology-job fit, and teamwork.

• **Gap 4** – *Not delivering on the promises* - When promises to customers do not match delivery. Gap 4 may be caused by inadequate horizontal communications or a tendency to over promise. Effective communication about QOS must (1) deal with the quality dimensions of features that are most important to the customers, e.g., *reliability*; (2) accurately reflect what customer actually in the service (3) help customer understand their role in performing the service.

**Communication can be used to manage customer expectations**

**Service tenets to live by**
- Seek constant improvement
- Forget about being in a commodity business
- Do the service right the first time
- Do the service very right the second time

**Summary of course Cases**

**EMI Case**
The concept of *benefits* was used to discuss the EMI case and how EMI could have positioned itself.

**Sealed Air Case**
This case considered whether or not the company should market an uncoated bubble, and how to limit *cannibalization*.

**The Calyx & Corolla Case**
This case allowed an entrepreneurial business to be considered. It is a great idea but when an STP was done, and focused on who values the benefits that C&C provides, it became clear that the benefits mattered only to some *sub-segments*, and on *awareness* 1-800-FLOWERS dominated C&C.

**Kodak Funtime Film Case**
This case discussed the following issues: Should Kodak launch Funtime? Does it hurt their brand? Can they prevent share slippage? How do they manage cannibalization?

**The Rohm & Haas case**
The company did not understand that the customer with small tanks, who is typically a small machine tool operation, is very different from the large customers, who are familiar with biocides. The *channel structure* that was optimal for large customers needed to be rethought for the new market. Different pricing options were considered: *Cost-plus* pricing, pricing based on *competition*, pricing to *incentivize* the formulat ors to sell the biocide, and a price based on *customer value*. A critical problem with the MWX biocide was positioning: both a lack of *awareness* and a *point of difference* that was understood by the customers. This meant education would be necessary. Under the current *pricing structure* there is no *incentive* for any channel member to provide education. A price flow that could help to *educate* the customer was outlined, and some options that R&H could pursue were discussed.
1. Definition of Marketing Channel
   A marketing channel is a set of independent organizations involved in the process of making a product or service available for use or consumption. Channels involve many organizations (intermediaries), are a process and focus on end-users.

2. Channel Flows
   A marketing channel performs marketing flows. The flows are: Physical possession, Ownership, Promotion, Negotiation, Financing, Risking, Ordering and Payment.

3. Zero-based Channel
   A zero-based channel meets the service output demands (SODs – what the end-users demand) at a minimum cost of performing the channel flows necessary for to meet these SODs.

4. Equity Principle
   The equity principle states that compensation in the channel system should be given on the basis of the degree of participation in flows and value created.

5. Channel Power
   Channel power is the ability of one member (A) to get another member (B) to do what it otherwise would not have done. Power can be based on coercion, legitimacy, reward or expertise, or reference.
Definitions

A marketing channel is a set of independent organizations involved in the process of making a product or service available for use or consumption. Marketing channels involve many organizations (intermediaries); are a process, not an event; and focus on end-users. Intermediaries add value and reduce cost.

A marketing channel performs marketing flows. The most ubiquitous flow is information, which flows between every possible pair of channel members. Other examples for flows: physical possession, ownership, promotion, negotiation, financing, risking, ordering and payment. Not every channel member needs to be involved in every flow. Members can be eliminated from the channel but the flows performed by these members cannot, and therefore must be performed by remaining members.

Channel members are: manufacturers, intermediaries and end-users. The channel captain is the member who cares most about the flows, usually (not always) the manufacturer.

Design and Implementation of Marketing Channels

A zero-based channel meets the target market segment’s service output demands (SODs) at a minimum cost of performing the channel flows necessary for to meet these SODs.

Marketing channel design consists of: segmentation, positioning, targeting and refining.

Marketing channel implementation consists of: identifying power sources and conflicts.

Channel coordination (between members and of flows) is achieved if the above five steps are successfully implemented. Coordination is an ongoing process.

Service Output Demands

Service output demands are a framework for understanding how the end-user wants to buy a particular product. Bucklin identifies four basic service output demands (given price is equal): Bulk breaking, Spatial convenience, Waiting time and Product variety. Other SODs include: customer education, after-sale service, etc.

The greater the service outputs demanded by end-users, the more likely it is that intermediaries will be included in the channel structure. As SODs increase, channel costs (performance of flows) increase too.

Key factors determining whether and how to respond to knowledge about unmet SODs include: cost, competition, ease of entry and other marketing mix variables. After SODs are identified, the segments are targeted and the channel is customized to the segments chosen.

Channel Flows & Efficiency

There are eight generic channel flows:
- Physical possession – cost storage and transportation
- Ownership – costs of inventory, product
- Promotion – costs of selling, advertising, PR
- Negotiation – costs of personnel, legal counsel
- Financing – costs of interest, discounts
- Risking – costs of price guarantees, warranties, insurance, after-sale service
- Ordering – costs of ordering systems
- Payment – costs of payment systems
The **efficiency template** is a tool for measuring costs borne and value added by each channel member in its performances of channel flows. It is used to describe: a) types and amounts of work done by each member; b) importance of each flow to provision of SODs; c) resulting share of profits for each member (normative profit share). Each channel, and each segment in a channel, should have its own efficiency template, which can also be used to design a zero-based channel.

The **equity principle** states that compensation in the channel system should be given on the basis of the degree of participation in flows and value created, i.e. it should mirror the normative profit shares for each member. In the short term, actual profit share could be different than the normative profit share derived from the efficiency template, because of competition. In the long term, normative profit share should prevail.

**Channel Structure**

**Channel structure** is a summary of: a) the types of members in the channel; b) the intensity (number of members), and; c) the number of distinct channels, in the market.

**Gap Analysis**

When a zero-based channel does not exist, or is difficult to build, a **channel gap** exists. Channel gaps, that prevent zero-based channels, exist because of environmental and managerial bounds. Managerial bounds can be dealt with to close gaps; environmental bounds are harder to tackle.

**Demand-side gaps** create a service-value gap. These gaps can occur if service outputs supplied are less than service outputs demanded (SOS<SOD) or because of SOS>SOD. Too high or too low a service causes gaps. Demand-side gaps can occur in more than one Service Output, and in more than one segment.

**Supply-side gaps** occur when total cost of performing one or more flows is too high, or when channel does too little of one flow. The total cost of all flows determines if there is a supply-side gap, not the cost of one or more flows. Supply-side gaps can occur even when end-users (demand) are happy; they are not caused because of lack of service, but because service provided is too costly.

**Closing demand-side gaps** can be achieved by: expanding/retracting level of SOS, offering multiple, tiered SO levels to different segments, and altering the list of segments targeted. **Closing supply-side gaps** can be achieved by: changing roles of members, investing in new distribution technologies to reduce cost, and bringing in new distribution function specialists to improve functioning.

The **gap analysis template** is a tool to analyze gaps and ways to close them. Gap analysis is a process, because of changing environmental bounds, end-user demands, distribution technology, etc.

**Managing Channels**

**Channel power** is the ability of one member (A) to get another member (B) to do what it otherwise would not have done. This power depends on the value A has for B and on the dependency of B on A.
Sources of power:
- Reward – B believes A has ability to reward B (e.g. margins, discounts, exclusivity). The equity principle (value-based compensation) is important in determining rewards for each member.
- Coercive – B expects punishment by A if B fails to conform to A’s influence (e.g. margin reduction, withdrawal of rewards, slowing shipments). Coercion can be illegal.
- Expert – B believes that A has special knowledge. The problem is retaining this power, because once exerted, the knowledge moves to B. Remedies: give out knowledge sparingly, constantly learn, and create tie-in by specializing.
- Referent/Identification – referent power of A over B is based on identification of B with A.
- Legitimate – B feels that A “has a right to” exert influence and B has an obligation to accept it.

Channel conflicts occur when one member perceives another member to be engaged in a behavior that prevents it from achieving its goals. Conflicts are measured on three levels: intensity, frequency, and importance.

Sources of conflict: goal divergence, domain dissensus, and different perceptions of reality. No conflicts at all can lead to passivity and non-innovation. Avoid pathological conflicts (harm the whole channel); seek constructive conflict.

Conflict resolution strategies can be information-intensive or information-protecting. Parameters that define which strategy to use include: issue, relationship, personalities, environment, and structure.

Channel power can be used to resolve channel conflicts, through threats, legalistic pleas, promises, requests, recommendations, and information exchange. Leadership is critical for channel management and one member should be clearly responsible for ultimate management control.
1. What is Customer Advantage?
   Customer Advantage is achieved when customers value the benefits you provide, are willing to pay for them, and believe you are the one best able to deliver those benefits.

2. Definition of Customer Value
   “Value is defined as the perceived worth in monetary units of the set of economic, functional/technical, and psychological benefits received by the customer in exchange for the price paid for a product offering taking into consideration available competitive offerings and prices”

   - **Operational Excellence**: Providing customers with reliable products or services at competitive prices with the least inconvenience.
   - **Customer Intimacy**: Providing products or services that uniquely meets customer needs. Precise knowledge of customers & operational flexibility enable companies to respond quickly in fulfilling special needs.
   - **Product Leadership**: Offering customers cutting-edge products and services that are superior to competition; constant innovation keeps raising the bar.

   **Specific Strategies for Leader:**
   - Market domination/expansion strategy
   - Attack strategy
   - Flanker strategy
   - Strategic withdrawal

   **Specific Strategies for Followers:**
   - Direct confrontation.
   - Leapfrog strategy.
   - Harassment strategy.
   - Avoidance strategy.

5. Marketing Strategies for Mature & Declining Markets
   **Mature markets.**
   - **Objective for leaders and followers**
     - Profitability and, secondarily, growth
     - Improving operating efficiencies, cost containment becoming important
   - **Options for leader and followers.**
     - Market Dominance:
     - Broader Specialist (good option for small players)
     - Niche strategy (an option for smaller players)
     - Harvest
     - Divest
   **Declining Markets**
   - **Strategic options;**
     - Seek maximum share
     - Niche
     - Harvest
     - Quick Divest
* Professor Krishnamurthi would like to thank Professor Carpenter for his generosity in sharing his insights and teaching material on Marketing Strategy.

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3. Creating & Delivering Customer Value
   - **Operational Excellence**: Providing customers with reliable products or services at competitive prices with the least inconvenience. E.g. Wal-Mart, Southwest Airlines, Dell, Fed Ex. Amazon.com
   - **Customer Intimacy**: Providing products or services that uniquely meets customer needs. Precise knowledge of customers & operational flexibility enables companies to respond quickly in fulfilling special needs. E.g. Nordstrom, Four Season, Lexus.
   - **Product Leadership**: Offering customers cutting-edge products and services that are superior to competition; constant innovation keeps raising the bar. E.g. Nike, Sony, Johnson & Johnson, Boeing.

Summary:
- Strategy starts with understanding the customer. Competition comes second.
- Matching competition leads to parity and exacerbates price competition.
- In the short run, competition can serve as the benchmark; in the long run it should not.
- It is easier to price based on competition, harder to do based on customer value. But differentiation is the name of the game, and the biggest leverage is by delivering customer value.
- You are not selling a physical product. You are not selling a value proposition; you are selling a solution. Differentiation and providing value comes from rethinking what you value proposition is. Looking at competition is a start, but that is not the answer.
- Customers wants benefits not product attributes per se. Focusing on attributes leads to price parity; focusing on benefits leads to differentiation and potentially higher prices.
- Benefits are of three types; economic, functional, and psychological
- Different customers want different types of benefits.
- In order to get the margin, according to Treacy and Wiersema you have to dominate on either “operational excellence”, or “product leadership” or “customer intimacy” and be at, or above, the industry average in the other two. Professor Krishnamurthi believes that relative “operational excellence” is a requirement regardless of the business you are in.
- Achieving competitive advantage is usually tit-for-tat, is often reactive and may not deliver customer advantage. Achieving competitive advantage help you make the sale, but it is customer advantage that help you get the margin.

* Kellogg-Recanati MBA Handbook - Page 12
• Competition and customers can influence prices but should not set them. Do not lower the price to the customer for the same product under customer pressure. If you do so your pricing loses credibility.
• Your customer is a partner not an adversary. How do you help your customer and help yourself? These are the points of leverage, how you get the margin.

Rapid growth characteristics.
• Sales growing at a growing rate.
• New competitors entering.
• Margins strong.
• Under capacity.

Specific Strategies for Leader:
• Market domination/expansion strategy
  o Stimulate primary demand
  o Capture growing share of new customers
    Preempt rivals in new markets/new segments
  o Acquire competitors

  Note: Even in a growing market, you should not forget your current customers, so retention is important

• Attack strategy.
  o Head to head competition to retain current customers.
  o Attack competitors by targeting their customers.

• Flanker strategy.
  o Introduce a second, lower priced product, typically of lower quality, to appeal to a broader customer segment to provide protection from competition.
  o Introduce a second, improved product offering at a higher price to current customers to address shortcomings of existing product.
  o Appeal to new customers by focusing on benefits that are specific to them with new product.

• Strategic withdrawal
  o Withdraw from hard to defend segments.

Specific Strategies for Followers:
• Direct confrontation.
  o Battle leader head to head.
  o Reduce first mover advantage of leader.
  o Fight for penetration.
  o Challenge leader on becoming the technical and psychological standard

• Leapfrog strategy.
  o Get ahead of leader on the product curve.
  o Advance the state of the art.
  o Become the new standard.
• Harassment strategy.
  o Flanker strategy (concentrate on one or two large segments that the leader is not well positioned in)
  o Encirclement strategy (concentrate on several small segments that the leader is paying limited attention to)
  o Guerrilla attack (concentrate on a few small segments that the leader is paying limited attention to)

• Avoidance strategy.
  o Focus on unpenetrated market.
  o Position distinctly from leader.
  o Penetrate new market quickly.

Summary
• Both a strategy for growth as well as managing growth is essential for survival
• The source of growth depends on competitive position and stage in the life cycle
• Focusing to achieve your strategic objective is essential
• Requires a very clear understanding of customers, competitors and a sense of strategic direction

5. Marketing Strategies for Mature & Declining Markets

MATURE MARKETS.

Characteristic of mature markets;
• Growth is slow (or stagnant), no real decline yet.
• Distinct segment exists.
• Product differentiation.
• Scale economies.
• Some price stability.
• Concentrated with few players, or fragmented with many players.
• Switching costs.
• Cost leadership becoming important.

Objective for leaders and followers
• Profitability and, secondarily, growth
• Improving operating efficiencies, cost containment becoming important

Options for leader and followers:
• Market Dominance:
  o Increase use among existing customers
  o Invest in growth segments
  o Acquire competitors and remove excess capacity/ Consolidate to gain scale economies
  o Super segmentation/brand proliferation
  o Re-pioneer a segment
  o Quick imitation
  o Innovate to disrupt equilibrium
  o Manage costs aggressively

• Broader Specialist (good option for small players)
  o Focus on a small but significant number of segments.
  o Broaden product line within focus.
  o Dominate the segments/geographic area.
  o Can be either high value added or low cost.
**Niche strategy (an option for smaller players)**
- Narrow focus
- Maintain leadership within niche
- Increase penetration.
- Block others
- Can be high value or low cost.

**Harvest.**
- Improve product mix.
- Raise price.
- Withdraw from unprofitable segments.
- Reduce R&D, other spending.

**Divest.**
- Sell the operation.
- Collect royalties by licensing the name.

**DECLINING MARKETS**

**Causes of decline:**
- Technological change, substitution
- Demographic changes
- Shifting consumer tastes.

**Strategic options;**
- Seek maximum share
- Niche
- Harvest
- Quick Divest

**Choosing among options**
- *Leadership or niche* if:
  - Favorable industry conditions
  - Strong competitive position.
- *Niche or harvest* if:
  - Unfavorable industry conditions
  - Strong competitive position.
- *Harvest or quick divest* if:
  - Favorable industry conditions
  - Weak competitive position
- *Divest* if:
  - Unfavorable industry conditions.
  - Weak competitive position.

**Summary**
- Competitive brand strategies in *mature* markets depend critically on strategic objectives and competitive position.
- Strategies in *declining* markets depend on industry conditions and competitive position.
### Summary Page

1. **Definition of Marketing Research**  
   Marketing research is an organized way of developing and providing information that relates the organization with its market environment and aids in decision making process. Market research process includes: problem formulation and specification of research objectives, research design, data collection, data analysis and report.

2. **Research Design**  
   A research design is used to guide the implementation – data collection, sample design – of the research toward the realization of its objectives. The different types of research designs differ significantly in: purpose/objective, type and precision of hypothesis and data collection methods.

   There are *three* types of research design:

   - **2.1 Exploratory Research**  
     Qualitative research designed to explore and increase familiarity with the problem domain, gain insights into the nature of the problem, and help to formulate the hypothesis to be later confirmed by subsequent *descriptive* or *causal* research.

   - **2.2 Descriptive Research**  
     Quantitative research designed to provide numerical information relevant to marketing decision.

   - **2.3 Causal Research**  
     Experimental research designed to establish cause-and-effect relationship between research variables. Attention must be given to validity of conclusion about causality, as it may be threatened in many ways. (see detailed description).

3. **Data Source**  
   Data source may be either *primary data*, gathered for the specific problem at hand, or *secondary data*, previously gathered for some purpose.

4. **Sample Size and Selection**  
   An important factor in the quality of the research is the size and selection of the sample of the population. As the size of the sample increases, the error in measurement is reduced, while the resources (cost) required for the research increases.

5. **Conjoint Analysis – Measuring customer value, perceptions and preferences**  
   Conjoint – Consider **Jointly**. Conjoint analysis is based on the premise that consumers do not consider one product/service attribute, feature or characteristic at a time to evaluate their options, and instead consider multiple attributes jointly in making their choice decisions.

   Conjoint analysis help understand how consumers make trade-offs among features or characteristics, and the implications of changes in design and offerings of such products or services.
1. Exploratory Research

Exploratory, qualitative research is designed to explore and increase familiarity with the problem domain, gain insights into the nature of the problem, and help to formulate the hypothesis to be later confirmed by subsequent descriptive or causal research.

*Exploratory research* is less structured and more flexible than descriptive research, and involves smaller number of respondents.

*Exploratory research* may be done in several ways, differing in depth of results and costs associated. Most common ways are personal interviews with “experts” – people who are knowledgeable of the field, and focus group discussions.

Focus groups can be used to bring up many issues, while personal interview can serve as a tool to deeper understanding of a specific topic.

Focus groups have the advantage of being a relatively inexpensive mean to get desired information quickly, but due to very small sample size it is hard to quantify the results and generalize them to the whole population.

A “rule of thumb” for exploratory research:

- Keep members of focus group as homogenous as possible (usually according to market segments.)
- Perform at least 2 focus groups with each market segment. The information gathered in the second focus group is used to replicate and verify the views and information gathered in the first focus group.
- Perform at least 8-12 one-on-one in-depth interviews.

2. Methods of data collection:

- Personal interview
- Telephone interview
- Mail survey
- Public location (mall, airport, convention) intercept survey

3. Guiding issues for preparing a questionnaire:

- “Can the objective be fulfilled without asking this question?”
- “How is the data generated by this question going to be used?”
- “Can the respondent understand the question?”
- “Can the respondent answer the question?”
- “Will the respondent answer the question?”

  Ask questions that can be answered easily and accurately; avoid errors of computation.
  Ask separate questions for separate issues.
  Avoid questions that are subject to interaction with interviewer.
  Avoid questions with answers built-in the question.
  Minimize number of options; make options mutually exclusive, but collectively exhaustive.
  Organize questionnaire in different categories:

  - Screening, qualifying questions.
  - Warm-up questions.
  - Difficult and complicated questions.
4. **Sample size and selection**

An important factor in the quality of the research is the size and selection of the sample of the population. As the size of the sample increases, the error in measurement is reduced, while the resources (cost) required for the research increases.

Steps to draw a sample:
1. Define the population
2. Identify sampling frame – listing of population elements from which sample is drawn
3. Define sample size (n)
   - Define margin of error (E). Typically (+/-) 3%, 5%, 10%
   - Define confidence level: 95% - 1.96 sigma, 99% - 2.58 sigma
   - “Known” sample sizes:
     - +/-5% error, 95% confidence => 400
     - +/-3% error, 95% confidence => 1100
     - +/-10% error, 95% confidence => 100

4. Define sampling scheme
   - *Random sampling* scheme:
     - Simple random sample
     - Systematic sampling (select every k\textsuperscript{th} element of the population)
     - Stratified sampling
       - Parent population is divided into mutually exclusive subsets.
       - Simple random sample is chosen from each subset.
       - Sample size allocation to strata may be proportionate or disproportionate to size of strata.
   - *Non random* sampling scheme:
     - Convenience sampling; e.g. get a sample of doctors in a convention.
     - Judgment sampling; Pick specific samples based on judgment.
     - Quota sampling: Divide the population into sub groups, and select from each group by convenience or judgment sampling and not by random sampling.

5. **Causal Research**

*Causal research* involves several steps of measurement, typically before and after applying the change to the subject of the test - the independent variable.

The *treatment group* is the portion of the population that is exposed to the manipulation of the independent variable.

For better results, it is preferred to have a *control group* for which the independent variable is not changed.

**Pitfalls of causal research – threats to validity of causality**

- **Environment** – change in variables other than the ones manipulated by the experiment that occur between the measurements and affect the results.
- **Instrument** – changes in the measuring instrument that might account for differences in the measurement.
- Pre-measurement and interaction – taking a measurement affects performance, sensitivity or responsiveness of or to subsequent measurements.
- **Selection bias** – error occurs due to method of selection of respondents.
- **Surrogate situation** – the population, the environment or the test treatment are different from those that will be encountered in the actual situation.
● **Measurement timing** – if times of measurement are inappropriate to indicate the effect of the test treatment.

6. **Conjoint Analysis - Measuring customer value, perceptions and preferences**
Consumers perceive a product or service as a bundle of attributes, features or characteristics. Conjoint measurement takes data on consumer’s overall preferences for a number of different alternatives, and decompose these preferences into utility values or part-worths that the consumer is attaching to each level of each attribute.

*Conjoint analysis* helps to assess:
- Which features are important?
- Which trade-offs do customers make in making a choice between products? I.e. which desirable features a customer would sacrifice in order to obtain other desirable features.
- How do changes in features impact customer preferences or likelihood of purchase of a product?

Applications of conjoint analysis:
- Evaluation of new product/service offerings
- Product/service positioning
- Pricing, price sensitivity
- Market segmentation
- Competitive analysis
1. Cost Management
   - The business environment is always confronted with:
     - Decreasing prices, Increasing costs, Improving technology, Eroding margins
     - Follow the 50% rule: Var. cost/sales revenue >50%, focus on reduce cost. If <50%, focus on sales
   - Follow the 4 M’s
     - Measure right; ABC: Activity Based Costing
     - Monitor for continuous improvement through Benchmarking
     - Manage; ABM: Activity Based Management
     - Maximize profitability (Long Term vs. Short Term)

2. Planning Phase and Models
   - (1) Manage Planning through CVP: Cost Volume Profit analysis models.
   - (2) Multiple Product Mix.
   - (3) Managerial Constraints.
   - (4) Allocation issues

3. Managerial Control
   - Objectives: (a) Manage product costs, (b) Exert managerial control
   - Use standards and standard costs as a yardstick to benchmark company performance.
   - Context determines the material price variance
   - Levels of variances and appropriateness
   - Limitations of variance analysis for behavior

4. Short term; Long term Decision Models
   - Short Term is Deterministic and Quantitative. Long term is Probabilistic and Qualitative. Do not neglect the long term.
   - Relevant Costs and Contribution Margin are preferred attributes for decision making
   - Focus on total benefits and total costs
   - Not all variable costs are relevant; not all fixed costs are irrelevant
   - Relevant costs analysis helps focus on decision alternatives, but irrelevant costs must also be included in total costs analysis

5. Allocation and ABM: Activity Based Management
   - Tax and financial accounting require Cost Allocation. Two Cost Allocation systems:
     - Common costs allocation: Arbitrary basis (Sqm; direct labor; machine time etc.);
       Arbitrary method of allocation; Duel Methods (Direct; Step Down; Reciprocal)
     - Joint costs allocation: Joint product costs (Raw material and conversion costs allocated by many methods); by products and separable costs to be tracked.
   - Managerial decision requires ABC and ABM
     - (1) Every cost is manageable. (2) Variable costs are not constant. They vary with volume (and maybe with other factors as well). (3) Fixed costs vary with cost drivers. (4) Identify and match activities to non volume cost drivers (5) Manage and contain costs. (6) Do not allocate like “peanut butter”

6. Transfer Pricing
   - Should large companies purchase semi-finished goods & services from within the company or from outside, and if the latter, what should the transfer price/cost allocation be?

7. Incentives
   - Incentives should be designed carefully, and if implemented and coordinated correctly, should facilitate the company meeting its objectives at every level.
   - Do Cost Manage; Do Not Cost Allocate
The course covered how to collect, monitor, communicate and evaluate information about our business environment in order to remain competitive, efficient and successful businesses in the long run, and had a direct link to Prof. Zemel’s Operations Management course. It carried very important lessons regarding the management of operations in any for profit organization and the process needed in order “to do the right thing” in decision making.

1. Definitions – Types of “costs” – Fixed and variable … Direct and Indirect

Need to breakdown Total Costs into Fixed Costs and Variable Costs. Fixed costs are costs unrelated to production volume, e.g. machines, factory, equipment, etc. Sometimes, Fixed Costs are “stepped”, e.g. after 1,000 units, need to by another machine for production. Here, it’s clear that the name “fixed” is misleading, as they often do increase, and can therefore be referred to as “Super Variable Costs”, instead of simply “Fixed Costs”, which reminds us that they are often the first place to look to cut costs, often because they are uncontrolled within an organization.

Direct costs - Costs incurred directly related to producing a product, e.g. the 5 types for a car.

Indirect costs - Costs to be jointly shared by all products (and therefore to be allocated amongst them), e.g. plumbers, company jet, etc.

2. Break-Even Analysis

1) Single product: Consider hotel with 600 rooms, available 365 days/year = 219,000 room nights per year. How many room nights must be used per year for breakeven?

\[
s = \text{Ave. selling price} = 95, \quad v = \text{Average variable cost} = 15, \quad s-v = \text{contribution margin} = 80, \quad F = \text{fixed cost} = 10m \text{ per year}
\]

\[
Q = \frac{F}{s - v} = \frac{10m}{80} = 125,000
\]

2) Desired target Pretax Profit (P): Now \(Q = \frac{F+P}{(s-v)}\), where P = desired pretax profit.

Say, P = 6% of F, so for the above example, P = $600,000. So, \(Q = \frac{10 + 0.6}{95-15} = 132,500\)

3) Desired target after tax profit (AP): P = AP/(1-T), where T = Tax rate.

So, \(Q = \frac{F + P}{(s-v)} = \frac{F + AP/(1-T)}{(s-v)}\), and for AP = $600,000 and T = 40%, Q = 137,500

4) Multiple products – Where multiple products share fixed costs:

\[Q = \frac{F}{(f_1(s_1-v_1) + f_2(s_2-v_2))}\], where \(f_1\) and \(f_2\) represent respective % sales of each product.
5) Break even sales ‘vs’ Break even quantity: It makes more sense to look at former rather than latter, as former is product independent, whereas latter, for multiple, yet different products, makes little sense to compare. Take simple example from (1), above:

\[
\text{Know } Q = \frac{F}{(s-v)} = \text{break even quantity.}
\]

\[
\text{Break even sales } = Q \times S = \frac{F \times s}{(s-v)} = \frac{F}{\left(\frac{s-v}{s}\right)} = \frac{F}{\text{Contribution Margin Ratio}}
\]

(Reminder: \(s=\) expected total sales revenue, \(v=\) expected total variable cost)

3. Cost Management

Every executive manager in a for profit organization thinks he lives in a “unique time” which he describes as:

\textit{Dropping prices + increasing costs+ technology race \rightarrow eroding margins & profitability}

However this is always almost the case and not a unique situation at all. The proper managerial way to confront this “state of business” is to manage costs.

Managing costs in the traditional sense used to be cutting overheads and labor, cutting inventory, cutting “non profitable” products and delaying investments. These are all short term remedies that taken alone will not help a business survive in the long term.

Instead managing costs should include the 4Ms: Measurement according to ABC principles, Monitoring for continuous improvement, Managing by ABM principles and Maximizing profit in the long term.

4. Maximizing Profit and the “50% rule”

Profit = (Sales revenue – Variable Costs) – Fixed costs = Total contribution margin – Fixed costs

So, to maximize profit, maximize Total Contribution Margin and minimize Fixed Costs.

Maximum profit = Maximum Total Contribution Margin – Minimum Fixed Cost

- If variable cost/sales revenue > 50%, focus on reducing cost.
- If variable cost/Sales revenue < 50%, focus on maximizing sales

So, when looking at whether to attack cost or sales, “divide and conquer”, i.e. look for which products have Variable Cost less than 50% of sales revenue, and which have greater than 50% of sales revenue, and can then conclude, for each product, whether to focus on reducing cost or on increasing sales.

5. Planning Phase and Models

The managerial planning stages of a mature production or services business are often based mistakenly on linear relationship assumptions. Some of these (wrong) assumptions often made by accountants for purposes of break even analysis may be:
Section 2: Accounting
Finance Information for Management Planning & Control – Prof. Bala Balachandran

<table>
<thead>
<tr>
<th>Assumption of linear relations</th>
<th>Common reality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable costs fractions are constant with production level</td>
<td>Variable costs may decrease with volume (economies of scale) or increase with volume when reaching 100% capacity and losing redundancy. Remember Zemel and TOC (Theory Of Constraints)</td>
</tr>
<tr>
<td>Fixed costs are fixed</td>
<td>Fixed costs are constant only on very limited time scales. In reality no cost is fixed.</td>
</tr>
<tr>
<td>Efficiency and productivity metrics are constant with production level</td>
<td>Efficiency metrics constantly change and if not Monitored and Managed will probably worsen</td>
</tr>
<tr>
<td>Sales mix is constant</td>
<td>Sales mix will change over the medium and long term due to multiple effects of complex supply demand curves.</td>
</tr>
<tr>
<td>Inventory level is constant</td>
<td>Inventory levels are one manifestation of invested capital. The level itself is not the important metric, but rather the fraction of value of a product maintained in its related inventory.</td>
</tr>
</tbody>
</table>

Although we would like to have both low fixed costs and large contribution margins, or put bluntly: produce cheap and sell expensive, we often need to compromise a trade off between fixed costs and contribution margins.

We make money from gross profit, which is the excess of sales over COGS. But gross profit is a comprehensive average metric of the organization, which is not suitable as a metric for single product decision. In order to decide on product mixes we need to consider contribution margin, which is the excess of sales over total variable costs including direct variable costs and variable operating expenses.

The main lesson from the above complex sentence, which is sometimes difficult for accountants who are not trained in ABC to digest, is:

“If the business has available production capacity, it should produce, even products that do not cover their total share of fixed costs, if they do provide a positive contribution margin”

6. Managerial Control

Managerial control of costs is run through a flexible budget.

A flexible budget takes in account a range of expected activities in the product mix. It contrasts with a static budget, which is the conventional budget system that allocates predetermined funds for predetermined activities.

A flexible budget should consider two types of budget variances:

- Sales volume variance is the delta between static and flexible fund allocations
- Flexible budget variance is the delta between a flexible budget and the actual results.

The results a business wants to achieve needs a yardstick according to which it will benchmark its performance. The yardsticks are standards or standard costs:
Perfection or ideal standards define the absolute theoretical minimum cost of a product conceivable by current or future technology. They should not be used as benchmarks for workers due to their “unachievable in the foreseeable future” nature. However, they should be defined for the purpose of drawing the roadmap for management.

Currently attainable standards are the costs that are conceivably attainable under very efficient operations with existing or soon available technology. These standards, while allowing a certain level of scrap and waste, are suitable as benchmarks for operations since although hard to achieve, they are achievable under reasonable circumstances. They therefore contribute to employee motivation.

7. Short term; Long term Decision Models

Decisions can be
- Long term or short term
- Qualitative or quantitative
- Probabilistic or deterministic

Accountants are expected to prepare as much quantitative information as possible in order to reduce the unpredictability of the predictive power used for decisions for the long term.

When preparing information for management decision regarding product mix, plant utilization, and special sales decisions, it is important to differentiate between relevant and non-relevant data.

Historical costs (and other operational parameters) may be good for predicting future costs and performance, but are in principle irrelevant for the decision itself. Only the predicted costs are relevant for making the decision.

The relevant cost approach is helpful in decision taking in the following situations (And more):
- Deciding to accept or reject special orders at reduced prices when production capacity is available
- Deciding on addition or deletion of new products, new plants, new departments etc.
- Deciding on production order when capacity is limited in a multi-product plant

8. Allocation and Activity Based Management (ABM)

Responsibility accounting by responsibility centers
- Cost centers. Departments where costs are accumulated and reported
- Profit centers. Departments that generate revenues and expenses
- Investment centers. Departments responsible for invested capital as well as revenues and expenses.

Responsibility accounting is based on the controllability of costs, meaning that the manager has some degree of control over the costs of his function.
Cost allocation is the accounting assignment of costs to cost objectives. Cost allocation should provide prediction power of economic effects of decisions; promotion of goal congruence among employees; measurement of profitability of individual products and determination of output prices based on production costs.

Direct variable costs should be allocated according to actual usage.

Fixed costs should be allocated according to their proportion of usage among products. Allocation of service department outputs to revenue or production departments can be done according to three methods:

Direct allocation method allocates all service department costs to production departments and does not allocate any cost to other service departments. This is the simplest method but carries an inherent discrepancy because value added along the way by other service departments may be mismatched with the costs inquired by producing this value.

Step down allocation method allocates service department costs to other service departments partially. However the flow of cost computation flows only upstream, while in reality departments do provide services to each other reciprocally, so this method also contains a discrepancy.

Reciprocal allocation method allocates all service department costs to every other service department that uses its output. By this method the total costs of services are allocated among all service departments first and then these costs are allocated to the departments and products that utilize the services to generate revenues.

Joint product cost allocation is required in most complex manufacturing plants where some production steps are joint for all products (For instance raw material purchasing, warehousing of RM etc.). In this case a split off point is determined, after which the costs can be directly attributed to specific products.

Joint costs are usually incurred at processes that enjoy economies of scale and appear to be "efficient" and therefore profitable. However the decision if to go on and process the product downstream or sell it at the split off point should not be influenced by the relative size of the joint costs.

The decision how much to further process a product from the split off point should be decided only by the incremental margin provided by revenue from the next step compared to the cost of the next step.
A very important consequence:

The allocation of joint costs between products A, B and C should not affect the decision if to process or sell beyond the split off point.

9. Transfer pricing
Transfer pricing is a very complex issue in a large organization. In its basis stands a question:

Should production units in the organization purchase semi finished goods and services from other units of the company or should they purchase them outside? If they do purchase these products internally what should the transfer price or the cost allocation be?

There are many managerial and behavioral dilemmas in the method of determining transfer prices. The basic guidelines should be:

• Set transfer prices that benefits the firm as a whole. In general internal sourcing should be preferred due to the better utilization of overhead fixed costs of the corporate.
• Set cost allocations in a manner that will share the value added by internal suppliers to their internal customers who then go on and generate revenue outside.
• If the internal supplier has no free capacity use market price as a basis for transfer prices. This would represent correctly the opportunity cost of selling in the market
• However if the internal supplier has spare capacity use variable costs to sell to internal customers before selling to external customers.

Minimum Transfer Price = Outlay Cost + Opportunity Cost to the Whole Firm

10. Incentives
• Incentives should be designed carefully, and if implemented and coordinated correctly, should facilitate the company meeting its objectives at every level.
• Management incentives & performance should be Strategy Driven (Top Dwon) and linked (Bottom Up)
• Controllable actions & effort are influenced by incentives
• Cost allocation and transfer prices should be designed to promote goal congruence, and not conflict.
• Reward on achievements of sales, profit and effort, as appropriate
• Link salesman’s bonus to their forecast, to maximize forecast accuracy, facilitating company to make informed decisions.
• Beware of a single performance measure
• External and financial measures are good ways to incentivise top management.
• Any business needs a balanced, integrated and coordinated set of performance measures
1. Financial Accounting vs. Managerial Accounting

Managerial Accounting – Developing accounting information for internal decision makers


2. Inventory Valuation

Inventory valuation involves the following: (1) applying the cost principle to identify the amounts that should be included in inventory and the matching principle to determine cost of goods sold; (2) choose the most favorable inventory costing methods to determine the appropriate amounts to report as inventory and COGS; (3) keep track of inventory quantities and amounts in different circumstances.

3. Reporting and Interpreting Long-Lived Assets and A Few Words about Receivables

Long-lived assets are primarily operational assets that provide an economic benefit to the firm for a number of future periods. We can break them down into two basic types: Tangible (e.g. PPE) and intangible. The reporting of long-lived assets is associated with the following problems: (1) the cost at which the assets are initially recorded; (2) the rate at which the cost should be allocated to future periods; (3) the accounting treatment of repairs, maintenance & improvements.

There are two types of receivables – accounts receivables, which are open accounts owed to the business by trade customers; notes receivables are written promises that require another party to pay the business under specified conditions (amount, time, interest). A change in receivables can be a major determinant of a company’s cash flow from operations. Credit policy related to receivables may cause bad debts.

4. Reporting and Interpreting Liabilities (Current & Long-Term)

The main concern here is reporting of long-term debts, which includes such private debt as loans from banks, financial institutions, suppliers, parent company or a major shareholder, and public debt, i.e. bonds issued to the public. Techniques of valuation of bonds and recording bond transactions will be the major concern here.

5. Reporting and Interpreting Owner’s Equity

On the balance sheet, owner’s equity contains contributed capital and retained earnings. Separate accounts are kept for the above two items as well as for each type of common and preferred stock that has been issued.

6. A Brief Summary of Financial Ratios

More Details from Tom Lys’s Security Analysis Course
1. Financial Accounting vs. Managerial Accounting

The output of Financial Accounting includes the following:

(1) The **Balance Sheet**: a snapshot of the business’ assets and liabilities at a given point of time. The accounting equation applied here is \( \text{Assets} = \text{Liabilities} + \text{Owners' Equity} \). The order of presentation of assets on the B/S is according to the liquidity of different items. There are three different approaches for asset valuation – market value, value to the business and historical cost. Objectivity/consistency/conservatism/materiality principles should be applied when deciding which approach to use in recording the assets. An important assumption underlying the financial statements is the Going Concern assumption. A reminder about the owners’ Equity is that a corporation is not allowed to pay dividends in excess of its retained earnings.

(2) The **Income Statement**: a flow of revenues and expenses during the period. Accrual based accounting and matching principle applied when we recognize revenues and expenses, whereat revenues are recognized when the products or services are sold, not necessarily when cash received, and expenses are recognized when they are incurred in earning revenues, not necessarily when they are paid.

(3) The **statement of Changes in Retained Earnings**: a link between the B/S and the I/S that explains the changes occurring to the retained earnings balance from the beginning of the period to its end.

(4) The **Statement of Cash Flows**: a flow of cash during the period in the categories of operations, investment and financing. Cash flows from operations include collections from customers, payments to suppliers and payments of operating expenses (including tax). Cash flows from investing activities describes the cash flows relating to acquisitions of non-current assets, marketable securities and other investments as well as the proceeds from the sale of such assets. Cash flows from financing activities include inflows from borrowing and equity issuances as well as the outflows associated with retiring debts and dividend payments.

2. Inventory Valuation

Different lines of business keep different types of inventory, Merchandisers hold merchandise inventory and Manufacturers hold raw materials inventory, work-in-process inventory and finished goods inventory. There are four different ways to valuate inventory: FIFO (first in, first out), LIFO (last in, first out), weighted average cost and specific identification. Different methods would result in different income and inventory amounts, and the weighted average cost method give figures that are between the FIFO and LIFO extremes. As long as inventory quantities are constant or rising, the following effects would hold:

<table>
<thead>
<tr>
<th>Normal Financial Statement Effects of Rising Costs</th>
<th>FIFO</th>
<th>LIFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>COGS on Income Statement</td>
<td>Lower</td>
<td>Higher</td>
</tr>
<tr>
<td>Net Income</td>
<td>Higher</td>
<td>Lower</td>
</tr>
<tr>
<td>Inventory on Balance Sheet</td>
<td>Higher</td>
<td>Lower</td>
</tr>
</tbody>
</table>
Normal Financial Statement Effects of Declining Costs

<table>
<thead>
<tr>
<th></th>
<th>FIFO</th>
<th>LIFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>COGS on Income Statement</td>
<td>Higher</td>
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<tr>
<td>Net Income</td>
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</tr>
<tr>
<td>Inventory on Balance Sheet</td>
<td>Lower</td>
<td>Higher</td>
</tr>
</tbody>
</table>

Determining ending inventory is a key in all the four costing methods mentioned above. Periodic system determines the ending inventory through physical count, while perpetual system maintains a detailed inventory record recording each purchase and sale during the accounting period. Under periodic system, there’s a special “purchase” account.

3. Reporting and Interpreting Long-Lived Assets (or Operational Assets)

   Long-Lived Assets:

   (1) **Tangible Assets**: acquisition cost of assets should be recorded based on costs incurred during the purchase. Costs incurred subsequent to purchase, such as ordinary repair and maintenance costs, should be expensed. Extraordinary repairs and additions are classified as capital expenditures and therefore should be recorded to related assets account. The underlying assumptions for depreciation are useful life and residual (salvage) value. Useful life of different types of assets are illustrated as follows:

<table>
<thead>
<tr>
<th>ASSET TYPE</th>
<th>TYPICAL RANGE OF YEARS USED FOR DEPRECIATION CALCULATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings &amp; improvements</td>
<td>10 – 40 years</td>
</tr>
<tr>
<td>Machinery &amp; equipment</td>
<td>5 – 10 years</td>
</tr>
<tr>
<td>Furniture and fixtures</td>
<td>5 – 20 years</td>
</tr>
<tr>
<td>Automotive equipment</td>
<td>3- 4 years</td>
</tr>
</tbody>
</table>

There are three different depreciation methods; straight-line depreciation, units of activity (or units of production) and accelerated methods (sum-of-the-years’-digits and double-declining balance). **Straight-line depreciation** is the method that allocates the cost of an operational asset in equal periodic amounts over its useful life, i.e. annual depreciation expense = (cost – salvage value) / useful life.

**Units-of-production depreciation** is the method that allocates the cost of an operational asset over its useful life based on its periodic output related to its total estimated cost, i.e. annual depreciation expense = (cost – salvage value) / (actual annual production/estimated total production).

**Accelerated depreciation method** results in higher depreciation expense in the early years of an operational asset’s life and lower expense in the later years, and its DB method is based on a multiple (often two times) of the straight line rate, i.e. annual depreciation expense = [(cost – accumulated depreciation) x 2] / useful life.
(2) **Intangible Assets:** Intangible assets are recorded in conformity with the cost principle *only if they are purchased*. Allocation of the acquisition cost of an intangible asset over its useful life is called *amortization*. Examples of intangible assets include goodwill (recorded as cost in excess of net assets acquired), patents, trademarks, copyrights, franchises, leaseholds, etc.

**Receivables & Bad Debts:**
Receivables can be further divided into *trade* or *non-trade receivables* (arising from transactions other than sales of merchandise or services), and *current* or *non-current* receivables. Those uncollectible receivables will reported as *bad debt expense* on financial statements. There’s always a trade-off between profits on additional sales and any additional bad debts. Bad debt expense is the expense associated with estimated uncollectible receivables, and is measured using *allowance method* based on estimates of the expected amount of bad debts – to record bad debt expense estimates in a contra asset account called *Allowance for Doubtful Accounts*, and to write off specific accounts determined to be uncollectible during the period. The recording of bad debt expense affects both the income statement and the balance sheet, while write-offs will affect neither of the two financial statements when being recorded. There are two methods estimating bad debts – *percentage of credit sales*, which bases bad debt expense on historical percentage of credit sales that result in bad debts; *aging of accounts receivables*, which estimates bad debt expense based on the age of each account receivables.

4. **Reporting and Interpreting Liabilities**

(1) **Current & Long – Term Liabilities:** *Current liabilities* include accounts payable, accrued liabilities, deferred revenues and service obligations, notes payable and current portion of long-term debt. *Long-term liabilities* include all of the entity’s obligations not classified as current liabilities.

(2) **Valuation of Bond and Accounting Treatment:**

a. *When effective interest rate = coupon rate, then bonds are sold at par.* On the date of issue, record the receipt of cash and an increase in long-term debt of the same amount. Each interest payment will be recorded in two accounts with the same amount – reduction in cash and increase of interest expense.

b. *When effective interest rate > coupon rate, then bonds are sold at a discount,* i.e. cash received less than par value. The discount can be amortized using straight-line or effective-interest method. *Amortization of the bond discount increases the bond interest expenses.* A new contra-account will be created here – *discount on bonds payable*. Cash payment plus the amortized discount on bonds payable will equal the bond interest expense. Such an accounting treatment will result in the maturity amount being equal to the book value.

c. *When effective interest rate < coupon rate, then bonds are sold at a premium,* i.e. cash received more than par value. The premium can be amortized using the straight-line or effective-interest method. *Amortization of the bond premium decreases interest expense.* A new account is created – *premium on bonds*
payable. Bond interest expense plus premium on bonds payable equal cash payment. Such accounting treatment results in the maturity amount being equal to the book value.

d. **Effective interest method:** under this method, the discount or the premium is amortized over the life of the bond in such a way as to result in a constant rate of interest when applied to the amount of outstanding at the beginning of any given period. The interest expense is equal to the market rate of interest at the time of issuance multiplied by this beginning figure. The difference between the interest expense and the cash paid represents the amortization of the discount or the premium.

e. **Early retirement of bond:** The bond indenture includes a call premium if the bonds are retired before the maturity date, and this call premium is often stated as a percentage of the par value of the bonds. A new account, *loss on bond call*, is created in this case, and this loss is reported on I/S as an extraordinary item.

5. **Reporting and Interpreting Owner’s Equity**

Capital stock includes **common stock** and **preferred stock** (*no voting rights*). When a company buys back issued stocks, they create **treasury stocks** that can be sold again later on. There are two different types of dividends – **cash dividend** and **stock dividend**. Reporting cash dividend involves 3 accounts – cash, dividend payable and retained earnings, while reporting stock dividend involves only the retained earnings and common stock, no cash involved. There are three important dates related to dividends - **the date of declaration, of record and of payment**. Journal entries are done only on the date of declaration and the date of payment. Remember that **stock splits** are not dividends, but an increase in the number of authorized shares by a specified ratio, and it doesn’t decrease retained earnings as dividends do.

6. **A Summary of Financial Ratios.** See also Section 3.2, Tom Lys’s *Security Analysis* course

<table>
<thead>
<tr>
<th>Name</th>
<th>Formula</th>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price/earnings ratio</td>
<td>Market price/net earnings</td>
<td>A measure of expected company growth.</td>
</tr>
<tr>
<td>Debt-to-equity ratio</td>
<td>Total liabilities/stakeholders’ equity</td>
<td>Reflecting a company’s level of risk assumed by financing the business through debt.</td>
</tr>
<tr>
<td>ROI</td>
<td>Net income/average stockholders’ equity Or (Net income + interest expense net of tax)/total assets</td>
<td>A common measure of profitability. To evaluate the effectiveness of the management.</td>
</tr>
<tr>
<td>EPS</td>
<td>Net income/weighted-average number of shares of stock outstanding during the period.</td>
<td>A measure of an investors’ ROI in terms of the number of shares outstanding.</td>
</tr>
<tr>
<td>Financial Ratio</td>
<td>Formula</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Current ratio</td>
<td>Current assets/current liabilities</td>
<td>A risk parameter, measuring a company’s ability to meet its currently maturing debts.</td>
</tr>
<tr>
<td>Gross profit percentage</td>
<td>Gross profit/net sales</td>
<td>Measuring the excess of sales prices over COGS as a percentage.</td>
</tr>
<tr>
<td>Receivables turnover ratio</td>
<td>Net credit sales/average net trade accounts receivables</td>
<td>Measuring the effectiveness of credit-granting and collection activities.</td>
</tr>
<tr>
<td>Bad debt expense as a percentage of sales ratio</td>
<td>Bad debt expense/net sales</td>
<td>A measure of the restrictiveness of the company’s credit policy</td>
</tr>
<tr>
<td>Inventory turnover ratio</td>
<td>COGS/average inventory</td>
<td>Measuring the liquidity (nearness to cash of inventory.</td>
</tr>
<tr>
<td>Fixed asset turnover ratio</td>
<td>Sales/[(beginning net fixed asset balance + ending net fixed asset balance)/2]</td>
<td>A measure of efficiency of the company’s utilization of its investment in PPE</td>
</tr>
<tr>
<td>Payable turnover ratio</td>
<td>COGS/accounts payable</td>
<td>A measure of how quickly a company pays its creditors.</td>
</tr>
<tr>
<td>Times interest earned ratio</td>
<td>(net income + interest expense + income tax expense)/interest expense</td>
<td>Measuring a company’s ability to generate resources from current operations to meet its interest obligations.</td>
</tr>
<tr>
<td>Dividend yield ratio</td>
<td>Dividend per share/market price per share</td>
<td>A measure of the dividend return on the current price of the stock.</td>
</tr>
<tr>
<td>Dividend payout ratio</td>
<td>Dividends/earnings</td>
<td>Measuring the percentage of earnings paid as dividends. Companies with rapid growth have relatively low dividend payout ratios.</td>
</tr>
<tr>
<td>Quality of earnings ratio</td>
<td>Cash flow from operations/net income</td>
<td>Indicating what portion of income was generated in cash that then can be used for investing activities.</td>
</tr>
<tr>
<td>Capital acquisitions ratio</td>
<td>Cash flow from operations/cash paid for PPE</td>
<td>Measuring the ability to finance purchases of PPE from operations.</td>
</tr>
</tbody>
</table>
1. **Discounted cash flow - DCF**
   A dollar *today* is worth more than a dollar *tomorrow*. A safe dollar is worth more than a risky one.

2. **Investment Decision – methods**
   The net present value method leads to better investment decisions than any other criteria.

3. **Risk and Return**
   Investors can eliminate unique risk by holding a well-diversified portfolio, but they cannot eliminate market risk. *All* the risk of a fully diversified portfolio is market risk.

4. **The Capital Asset Pricing Model (CAPM)**
   If there is no superior information, each investor should hold the same portfolio as everybody else; in other words, everyone should hold the market portfolio.
   
   \[
   \text{Expected risk premium} = \text{beta} \times \text{market risk premium} \\
   r - r_f = \beta (r_m - r_f)
   \]

5. **Company Cost of Capital**
   
   \[
   WACC = r_D \left(1 - T_c\right) \frac{D}{V} + r_E \frac{E}{V}
   \]

6. **Modigliani and Millare**
   *Perfect capital market* - The firm's overall market value (the value of all its securities) is independent of capital structure (debts or equity).

   *The value of the firm in the presence of taxes:*
   
   Value of a levered firm = Value if all-equity financed + PV (tax shield) – PV (costs of financial distress)
1. Interest

**Nominal Interest vs. Real Interest:** \((1 + r_{\text{nominal}}) = (1 + r_{\text{real}}) \cdot (1 + \text{inflation rate})\)

**Stated Interest vs. Effective Interest:** \(\left(1 + \frac{r_{\text{stated}}}{m}\right)^m = 1 + r_{\text{effective}}\)

Where, \(m\) = number of periods per year to calculate interest.

2. Discounted cash flow DCF:

**Present value:** \(PV = \sum \frac{C_t}{(1 + r)^t}\)

**Net present value:** \(NPV = C_0 + PV = C_0 + \sum \frac{C_t}{(1 + r)^t}\)

**Perpetuity:** An investment that makes a steady stream of payments **forever**.

Present value of perpetuity (where \(C\) is a constant): \(PV = \frac{C}{r}\)

Present value of **growing perpetuity** at a constant rate "g" (if \(r > g\)): \(PV = \frac{C}{r - g}\)

**Annuity:** A constant stream of payments for a **limited** period.

When \(C\) is constant, \(PV = C \left(1 - \frac{1}{r(1 + r)^t}\right)\).

The expression in brackets is the **annuity factor** that can be found in the tables.

3. Stock Valuation

- All securities in an equivalent risk class are priced to offer the same expected return.
- A share value is equal to the discounted stream of dividends (= cash payments) per share.
- The discounted rate is the rate of return that investors expect to receive on comparable securities.

Share value = \(P_o = PV = \sum \frac{Div_t}{(1 + r)^t}\)

When expected dividends grow forever at a constant rate of \(g\): (Gordon Model)

\(P_o = \frac{Div_1}{r - g}; \text{ when } (r > g)\)

4. Growth stock and income stock:

\[ P_o = \frac{(1)}{EPS} + \frac{(2)}{PVGO} \]

where, \(PVGO\) = net present value of growth opportunity.

If (1) > (2), income stock. If (2) > (1), growth stock
5. Investment Decision – methods

1. **The net present value** method leads to better investment decisions than any other criteria below (see next paragraph for more details).

2. **The payback period**
   The payback period is found by counting the number of years it takes before the cumulative forecasted cash flow equals the initial investment.
   Disadvantages:
   - Ignores all cash flows after the cutoff date.
   - Gives equal weight to all cash flows before the cutoff date.

3. **The book rate of return**
   The book rate of return is defined as:
   \[
   \text{book rate of return} = \frac{\text{book income}}{\text{book value of investment}}
   \]

4. **The Internal Rate of Return (IRR)**: IRR is defined as the rate of discount at which a project would have zero NPV.
   \[
   \text{NPV} = C_0 + \frac{C_1}{1 + \text{IRR}} + \frac{C_2}{(1 + \text{IRR})^2} + \cdots + \frac{C_T}{(1 + \text{IRR})^T} = 0
   \]
   The IRR rule states that companies should accept any investment offering an IRR in excess of the opportunity cost of capital. The problem is that this model is easily misapplied.

6. Steps for calculation according to Net Present Value Method:

   1. Forecast the cash flows generated by the projects over its economic life.
   2. Determine the appropriate opportunity cost of capital.
   3. Discount the future cash flows of the project. The sum of the discounted cash flows is the Present Value (PV).
   4. Calculate the Net Present Value (NPV) by subtracting the original investment from PV.
   5. Invest in the project if its NPV is greater than zero.

Following are some rules that can minimize mistakes:

   1. Concentrate on cash flows after taxes. Be wary of accounting data masquerading as cash-flow data.
   2. Always judge investments on an incremental basis. Tirelessly track down all cash-flow consequences of your decision.
   3. Treat inflation consistently. Discount nominal cash-flow forecasts at nominal rates and real forecasts at real rates.
   4. Remember to track changes in working capital, and stay alert for differences between tax depreciation and the depreciation used in reports to shareholders.

When mutually exclusive choices involve different lengths or time patterns of cash outflows, comparison is difficult unless you convert present values to equivalent annual costs. Think of the equivalent annual cost as the period-by-period rental payment necessary to cover all the cash outflows. Choose A over B, other things equal, if it has the lower equivalent annual cost. Remember, though, to calculate equivalent annual costs in real terms and adjust for technological change if necessary.
7. Risk and Return

Market risk premium = \( r_m - r_f \). (See also CAPM in section 8)

where \( r_m \) = market rate of return on an investment and \( r_f \) = return on risk free investment

According to Brealey and Myers in the U.S.:

Market risk premium: 6-8.5% (above risk free rate)

Even though both \( r_m \) and \( r_f \) change, \( r_m - r_f \), the market risk premium, does not change significantly

Even if the expected return of a stock is known, the stock market is risky because there is a spread of possible outcomes for the stock's expected return. The usual measure of this spread is the standard deviation or variance, which is considered as the risk of the stock.

The risk of any stock can be broken down into two parts: the unique risk that is peculiar to that stock, and the market risk that is associated with market-wide variations.

Investors can eliminate unique risk by holding a well-diversified portfolio, but they cannot eliminate market risk. All the risk of a fully diversified portfolio is market risk.

Diversification is a good thing for the investor. This does not imply that firms should diversify. Corporate diversification is redundant if investors can diversify on their own account.

8. The Capital Asset Pricing Model (CAPM)

The capital asset pricing theory is the best-known model of risk and return. It is plausible and widely used but far from perfect.

The basic principles of portfolio selection according to CAPM:

1. Investors like high expected return and low standard deviation (= risk). Common stock portfolios that offer the highest expected return for a given standard deviation are known as efficient portfolios.

2. If the investor can lend or borrow at the risk-free rate of interest, one efficient portfolio is better than all the others: the portfolio that offers the highest ratio of risk premium to standard deviation. A risk-averse investor will put part of his money in this efficient portfolio and part in the risk-free asset. A risk-tolerant investor may put all her money in this portfolio or may borrow and put in even more.

3. Suppose everybody has the same information and the same assessments. If there is no superior information, each investor should hold the same portfolio as everybody else; in other words, everyone should hold the market portfolio. In other words, according to the efficient market theory, competition between investors produces an efficient market. In such a market, prices impound all the information, old and new, published and unpublished, so that it will be difficult to realize a consistently superior return.

Regarding the risk of individual stocks:

4. Don't look at the risk of a stock in isolation but at its contribution to portfolio risk. This contribution depends on the stock's sensitivity to changes in the value of the portfolio

5. A stock's sensitivity to changes in the value of the market portfolio is known as beta. Beta, therefore, measures the marginal contribution of a stock to the risk of the market portfolio. A security with a beta of 1.0 has average market risk—a well-diversified portfolio of such securities has the same standard deviation as the market index. A security with a beta of .5 has below-average market risk—a well-diversified portfolio of these securities tends to move half as far as the market moves and has half the market's standard deviation.
If everyone holds the market portfolio, and if beta measures each security's contribution to the market portfolio risk, then the risk premium demanded by investors is proportional to beta.

\[ \text{Expected risk premium} = \beta \times \text{market risk premium} \]

\[ r - r_f = \beta (r_m - r_f) \]

The CAPM is widely used to estimate discount rates.
Examples: Expected project return = \( r = r_f + (\text{project } \beta)(r_m - r_f) \)

9. Company Cost of Capital

The most commonly used discount rate is the after-tax weighted-average cost of capital, or WACC:

\[ \text{WACC} = r_D (1 - T_c) \frac{D}{V} + r_E \frac{E}{V} \]

Here \( r_D \) and \( r_E \) are the expected rates of return demanded by investors in the firm's debt and equity securities, respectively; \( D \) and \( E \) are the current market values of debt and equity; and \( V \) is the total market value of the firm (\( V = D + E \)).

The disadvantage of this formula is that it works only for projects that are carbon copies of the existing firm—projects with the same business risk that will be financed to maintain the firm's current, market debt ratio. But firms can use WACC as a benchmark rate to be adjusted for differences in business risk or financing.


Modigliani and Miller's (MM's) famous proposition I states that the firm's overall market value (the value of all its securities) is independent of capital structure (debts or equity).

Any shift in company structure can be duplicated or "undone" by investors. Why should they pay extra for borrowing indirectly (by holding shares in a levered firm) when they can borrow just as easily and cheaply on their own accounts?

MM agree that borrowing increases the expected rate of return on shareholders' investments. But it also increases the risk of the firm's shares. MM show that the risk increase exactly offsets the increase in expected return, leaving stockholders no better or worse off.

Proposition I applies not just to the debt-equity trade-off but also to any choice of financing instruments. For example, MM would say that the choice between long-term and short-term debt has no effect on firm value.

The formal proofs of proposition I all depend on the assumption of perfect capital markets.


As a continuation of the MM theory, the traditional trade-off theory emphasizes taxes and financial distress (caused by an imperfect capital market). The value of the firm is then broken down as:

\[ \text{Value if all-equity financed} + \text{PV (tax shield)} - \text{PV (costs of financial distress)} \]

According to this theory, the firm should increase debt until the value from \( \text{PV (tax shield)} \) is just offset, at the margin, by increases in \( \text{PV (costs of financial distress)} \).
1. **What do you have to know about “Free Lunch”? Diversification!**

   Diversification allows risk reduction to be achieved without affecting the expected returns of the portfolio. As an investor, always diversify your investment and invest for the long run (also from tax reasons). Ideally, invest in the *market portfolio* and if you are a risk lover (beta=1, does not satisfy your needs), borrow money and invest in the market portfolio.

   Unless you have inside information, which is illegal to use, don’t invest in one share, don’t believe your gut feeling that a certain stock is cheap, and **remember**: the market is very efficient, so there are no cheap stocks!

   As a CEO don’t diversify, your shareholders can diversify cheaply on their own. As a worker who has stock options, sell your stock options as soon as they are vested - **remember**: your whole human capital is invested in this company.

2. **Who is a “Good Performer”?**

   Two things drive good performance: (1) Good operational management and (2) Good financial management. Hence, in order to be an outstanding CEO, do your best to hire top notch COO and CFO!

3. **Think about Bankruptcy at day one!**

   Bankruptcy filing (chapter 11) allows borrowers to obtain concessions from lenders in deviation of absolute priority rules (APR). Therefore, as a lender always make sure your lending terms compensate you for that possibility. Thus, the borrowing rate should compensate lenders for the time value of money, risk, and borrowers option to deviate from APR. These concerns are particularly important in situations when a large part of borrowers assets are not “in place” but are future investment opportunities such as in high tech firms.

4. **Financial Analysis**

   When looking at financial statements don’t look only at the numbers. Also read the management discussion and read the notes, where you will find invaluable information about the company strategies, in addition to some private information.

   Numbers by themselves can mean one thing, whilst reading the information behind it, tells you a different story (e.g. A company that reports on a huge income, but reading the notes you notice it comes from one main customer, who has a close relationship with the cooperate, moreover, no cash was received, it is whole pure A/R).

   Most financial newspapers provide you with the P/E ratio. Please remember, the P/E ratio is only a starting point. Furthermore, it reflects the ratio as per to the last report.

5. **What should you take with you to a lonely island?**

   The most informative report is the *cash-flow* statement. Take it with you to the lonely islands, and you will never be there alone (See also section 3.4, Professor Eli Amir’s “Financial Analysis and Valuation” course).
Assessing the risk-return trade-off

- Definitions: Expected return and risk.
  
  **Expected Return**: The weighted mean of the changes in the value of the underlying asset, while the weights used correspond to the probabilities of each outcome.

  **Risk**: Uncertainty about future outcomes. Higher volatility means higher risk, the standard deviation is often used as a measure of risk (rather than the variance).

- Diversification

  **Expected Portfolio Return**: The weighted sum of the expected return of each security in the portfolio, with the weights equal to the fraction of each security in the portfolio.

  **The Variance of a Portfolio Return**: is not the sum of the individual security variances. What matters is how asset values co-move with each other.

<table>
<thead>
<tr>
<th>E(R)</th>
<th>Var(R)</th>
<th>Risk-free rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset # 1</td>
<td>Cor = +1</td>
<td></td>
</tr>
<tr>
<td>Asset # 2</td>
<td>Cor = -1</td>
<td></td>
</tr>
</tbody>
</table>

Implications for:

- Investment decisions
  
  o The risk of a portfolio is determined to a large degree by the correlation of the individual assets.
  o **Free Lunch #1**: Risk reduction can be achieved without affecting the expected returns of the portfolio. (Only the non-diversifiable portion of the standard deviation is risk! The unique risk is diversifiable).
  o **Efficiency Frontier** – The efficient frontier represents all portfolios that combine the smallest risk for any level of expected return.
  o The highest diversification is achieved by selecting assets that have low correlations.
  o Empirical experience shows that in order to diversify a portfolio one needs only 10 to 15 stocks (NYSE) or 30 stocks at highly correlated market (e.g. NASDAQ)
  o Between 1926 and 1994, the chance of hitting a 12 month holding period in which one were to lose money was approximately 26.5%. This percentage declined to only 0.46% for 15 year holding periods. Thus, the stock market appears to be a much less risky place to invest in the long run than in the short run.
• Capital asset pricing
  - Total risk of an assets = diversifiable risk + non-diversifiable risk
  - Diversifiable risk (non-systematic risk) can be disposed off cheaply.
  - Non-diversifiable risk (systematic risk) is the risk that the asset contributes to a well-diversified portfolio
  - The expected return of asset j can be presented by Sharpe-Lintner model: $E(R_j) = E(R_f) + \beta_j (E(R_M) - R_f)$, while $\beta_j$ measures the systematic risk, $R_f$ is a risk free asset (5%-6%), and $R_M$ is the return on the market portfolio (~13%).

Fundamental analysis
Use of Financial Ratios to Understand:
• Corporate financing policies
  - Debt-to-equity and leverage (debt/total_assets) ratios are the two (stock) ratios used to measure capital structure
  - Times-interest-earned (NBIT/Int_exp) is the (flow) ratio used to measure capital structure.
  - The trade-off between the two stock ratios and the flow ratio is one of early warning versus false signaling. The flow ratio responds to troubles more rapidly than the stock ratios but also gives false signals more frequently
  - Current ratio (CA/CL) and Quick ratio ((CA-Inv.)/CL) are the two ratios used to measure short term financing. For most corporations, inventories are the current asset which is the most affected by whether the corporation will remain in business or not. Therefore, when going-concern issues arise, the quick, rather than the current ratio, is more likely to provide accurate assessment of solvency.

• Assessing Performance
  - ROA (Return on Assets) is the primary ration to measure performance.
  - There are few alternatives to measure ROA, such as: return on total assets $(NI/avg_total_assets)$.
  - ROA can be decomposed into two components: returns on sales and asset turnover. In competitive market, such as retail, low margin (low return on sales) is compensated by high assets turnover.
  - ROE (Return on Equity – NI/avg_shareholders’ equity) can be composed into two components: ROA and leverage. This relation shows the value drivers to good performance: Good operational management and good financial management!

• Efficiency in operation
  - Cash Cycle is the average length of time a $1 investment is turned back to cash.
  - A quick approximation of the cash cycle is the operating cash cycle. It is defined as: days in accounts receivable + days in inventory - days in accounts payable.

Pricing of debt
Definitions:
• Bankruptcy – is the inability of corporations to raise additional capital (Thus, bankruptcy occurs when the value of the company’s assets (relative to its debt) has fallen such that no new investors are willing to buy in).
• Liquidation – occurs when the value of the individual assets exceeds the going-concern value.
• Default – violations of covenants (e.g. failure to maintain a certain ratio), gives creditor the rights to demand repayments.
• Bankruptcy Costs - cost results from the bankruptcy, such as: lawyers, accountants, under investment problems.
• APR (Absolute Priority Rule) – determine the pecking order (senior claims, junior claims, all other creditors, finally shareholders).
• Chapter 11 – offers shareholders an option to postpone change of control. Hence, gives incentive to deviate from APR.

• An interesting result is that deviation form APR is not uncommon. Moreover, the deviations are large. Specifically, conditional on deviating from APR, the mean deviation is almost 10%.

**Bond Rating:**

• Commercial services typically distinguish between 7 rating classes (AAA through CCC). The yield to maturity is inversely related to the rating. Ratings correlate with key corporate ratios: Profitability, Interest coverage, Leverage.

• The value of a bond is determined by the following:
  - Par Value
  - Coupon Rate
  - Time to maturity
  - Payment frequency
  - Yield to maturity

**Accounting based valuation**

• Quality of earnings analysis
  - **Earning Persistent** – The larger the ratio of income from continuing operations to total income, the higher income quality.
  - **Cash component of earning** – The larger the accrual content of earnings, the lower earnings quality.

• Some other red-flags
  - Income-increasing accounting changes (such as: depreciation, inventory methods, and revenue recognition).
  - Income-increasing transactions such as debt-for-equity swaps, in substance defeasances, and dipping into LIFO layers.
  - Timing of accounting report issue date (companies is trouble often issue their accounting report late).

• P/E Models
  - Good as a starting point for companies who are currently don’t pay dividends. Based on the assumption that accounting earnings are the true economic earnings.

\[
\frac{P_0}{E_0} = \frac{1}{R - g}
\]

- Growth firms, for which, \(R - g\), is very small, will be very sensitive with respect to changes in the expected growth rate, \(g\).

• P/E Models for high-growth firm
  - Good as a starting point for companies who has two periods, the first period, which is characterized by a high growth rate \((g_1)\) combined with low-dividend pay-out, and a second steady period, with lower growth rate \((g_2)\) combined with high dividend pay-out.

\[
\frac{P_0}{E_0} = \frac{(1 + g_1) \times \left(1 - \left(1 + g_1\right)^n \left(1 + R_1\right)^n\right)}{R_1 - g_1} + \frac{(1 + g_1)^n \times (1 + g_2)}{(R_1 - g_2) \times (1 + R_1)^n}
\]
Valuation based on abnormal earnings

- **Residual Income** (RI) equals the earnings in excess of the amount that could be earned by “investing” the capital (C) and earning the cost of equity (RE).
- **Residual Income to Equity (RIE)**: \( RIE = NI - RE \times BV_{t-1} \)
- Residual income is often used to measure the **Economic Value Added** (EVA) in the period.
- Market value is estimated as the sum of beginning book value and present value of residual income.

\[
N \times P_t = B_t + \sum_{k=1}^{\infty} \left( \frac{E(RIE_{t+k})}{(1 + RE)^k} \right)
\]

- Residual income valuation for companies with perpetual growth rate (g).

\[
N \times P_t = B_t + \frac{RIE_t}{RE - g}
\]

Valuation based on price-to-sales ratios can be used to value a brand name.

### Cash flow based valuation

- The **free-cash-flows to equity** represents those cash flows that can be paid out without affecting any net present value investments. Cash flows available to shareholders for: Dividend payments, Stock repurchases. (Use cost of Equity \( RE \) to compute NPV).
- The **free-cash-flows to the firm** represents those cash flows that can be paid out to all claimholders, Including shareholders, debtholders, and preferred shareholders. (Use WACC to compute NPV)
- The **Shareholders Value** can be computed in two ways:
  - Direct: NPV of free cash flows to equity.
  - Indirect: NPV of free cash flows to the firm minus (Market value of the Debt + Preferred Stocks).
  - Value of the Firm = Equity + Debt (see also Section 3.5, Professor Artur Raviv’s “Integration of the Finance Function” course)
### 3.3 SUMMARY PAGE

1. **Purchasing Power Parity (PPP)**
   
   Purchasing Power Parity (PPP) was first stated in a rigorous manner by Gustav Cassel in 1918. It was to be used as a basis for recommending a new set of official exchange rates.

   **Absolute version of PPP:** In its absolute version it states that price levels should be equal worldwide when expressed in a common currency. Absolute PPP is based on the assumption that free trade will equalize the price of any good in all countries, however it clearly disregards the effects on free trade of quotas, restrictions, product differentiation etc. The absolute version of the PPP is inconsistent with the empirical evidence.

   **Relative version of PPP:** States that the exchange rate between the home currency and the foreign currency will adjust to reflect changes in the price levels in the two countries. This version of the PPP is closer to the observed data.

2. **Forwards and Futures:***

   A *forward contract* is a contract, which calls for the delivery at a fixed future date of a specified quantity against a payment the exchange rate of which is fixed at the time of the contract. A *future contract* is a standardized contract, which is traded on organized exchanges.

3. **Options:**

   An option is a financial instrument that gives the holder the right but not the obligation to sell (put) or buy (call) another instrument at a set price and expiration date. Option contracts are sold both on organized exchanges and over the counter markets. Like forward contracts OTC option contracts have specifications that are negotiated between the bank and its customers.

4. **Swaps:**

   A swap is a financial transaction in which two parties agree to exchange streams of payment over time. The reasons for swaps to exist and thrive are that they have risk reduction potential especially in international financial arrangements and often are also vehicles for cost savings. Swaps are mainly interest rate swaps or currency swaps.

5. **Investment Tools:**

   Various investment tools like ADR’s (American Depository Receipts), Spiders (SPDR) and Cubes (QQQ), Drips etc. are investment instruments that often have better risk return ratio than market-managed money.
1. Purchasing Power Parity (PPP)

a. If $i_h$ and $i_f$ are the rates of inflation for the home country and the foreign country, respectively, and $e_0$ is the value of the home currency at the current time and $e_t$ is the spot exchange rate in period t, then the relative version of the PPP gives the following equation:

$$\frac{e_t}{e_0} = \frac{(1+i_h)^t}{(1+i_f)^t}$$

b. The Fisher effect

The Fisher effect states that nominal interest rate, $r$, is made of two components:
- A real required rate of return $a$
- An inflation premium equal to the expected amount of inflation $i$

$$1 + \text{Nominal rate} = (1 + \text{Real rate})(1+\text{Expected inflation rate})$$

This is often approximated to $r = a + i$

The generalized version asserts that the real returns are equalized across countries through arbitrage. Thus is equilibrium:

$$\frac{1+r_h}{1+r_f} = \frac{1+i_h}{1+i_f}$$

where $r_h$ and $r_f$ are the nominal home and foreign currency interest rates, respectively.

If $r_f$ and $i_f$ are relatively small, then this equation can be approximated to:

$$r_h - r_f = i_h - i_f$$

In effect this version states that currencies of high rates of inflation should bear higher interest rates than currencies of lower rates of inflation.

International Fisher Effect: Combining the concepts of PPP and the Fisher effect, the following equation is known as the International Fisher Effect:

$$\frac{e_t}{e_0} = \frac{1+r_h}{1+r_f}$$

where $e_t$ is the expected exchange rate.
2. **Forwards and Futures**

Basic differences exist between forwards and futures:

The bank individually tailors each *forward contract* for its customers as opposed to standardized contracts that are *futures*. Similarly the delivery dates are fixed for the *futures* and are the banks decision in the case of *forwards*.

*Forward* settlements occur on the date agreed upon while *futures* are settled daily via the regulatory clearinghouse. This practice is known as marking to market. Most *forwards* are settled on the delivery date while very few *futures* are settled by delivery.

Transactions costs entail brokerage fees for buy and sell orders for *future* contracts, while for *forwards*, are based on the bid-ask spread.

In the case of *forwards* each party bears risk for the contract. The regulatory board becomes the opposite side to each *future* contract and therefore limits the credit risk.

3. **Options**

An option that would be profitable to exercise at the current price is said to be *in-the-money*.

Conversely, *out-of-the-money* option is one which is priced more than the option price.

The price at which the option is exercised is called the *exercise price* or the *strike price*.

An option whose price is the same as the strike price is termed *at-the-money*.

Listed options are standardized contracts that have predetermined exercise prices, standard maturities and fixed delivery dates.

Buying a *Call* option and selling a *Put* option can be used to create a synthetic forward.

By buying and selling *call* and *put* options various other positions can be created.

4. **Swaps**

In interest rate swaps, no principal is exchanged, either initially or at maturity, but interest payments are exchanged according to predetermined rules.

The main types would be fixed rate to floating rate (coupon swaps) or floating rate against one reference rate to floating against another reference rate (basis swaps).

In the case of currency swaps, the parties at the outset, exchange specific amounts of the two currencies and repay over time according to predetermined rules that includes both amortized capital and the interest payments.
5. **Investment Tools**

Instead of buying foreign stocks overseas, investors can buy foreign equities traded in the form of ADR’s. These receipts are certificates of ownership issued by a US bank as a convenience to investors in lieu of the underlying shares it holds in custody.

**SPDR**: Standard and Poor’s Depository Receipt is an exchange traded fund managed by the State Bank which has the obligation of physical delivery. Other such funds are the:

- QQQ: Tracks the value of NASDAQ 100
- DIA: Tracks the value of DOW 30

In general an exchange-traded fund is a more efficient investment into foreign markets. It can be traded like a stock and has less tax implications when compared to mutual funds.
1. Valuation of a company using DCF or DAE model
   Forecast is split into parts. The first one is the short run, 3-10 years, depending on the industry, including the years from the present to terminal date or until the firm is expected to enter a phase of stable growth. We construct pro-forma financial statements for the short run. The second part is the long run forecasting, based on the forecasted long-term stable growth.
   - **The Discount Abnormal Earnings Model (DAE)** - Value of the firm’s equity = its value today (book value of equity) + future created value (present value of expected abnormal earnings).
   - **The Discount Cash Flows Model (DCF)** - Company value = sum of future discounted cash flows. Computationally complicated, depends on terminal value, needs many assumptions so error prone.

2. Valuation by multiples
   Common multiples are P/E (Price-Earning ratio), and P/B or M/B (Market-To-Book ratio). If P/E > 1/Re, abnormal earnings should be positive and grow. P/B = 1 means no expectations to have abnormal earnings.
   For quick valuation, compare P/E, P/B multiples of the company and a comparable company.

3. Ratio Analysis
   - **Ratio Analysis** helps in forecasting earnings. Using ratios may be an efficient way to identify “value-drivers” and a useful way to check whether our valuation is consistent. Comparing ratios across firms and over time may assist in identifying strengths and weaknesses of the firm under evaluation.
   - Different groups of ratios include Profitability ratios, Efficiency ratios and Leverage ratios.
   - **Du-Pont Analysis** is a powerful process to decompose Return on Equity (ROE) into constituent parts, allowing change in ROE to be better traced and understand whether value creation (ROE) is 1. due to cost savings, more efficient use of the assets or higher leverage.

4. Pro-forma or What do we forecast?
   - Forecast the ability of the firm to create value.
   - Three Balance Sheet amounts: Working Capital, Fixed Assets and Debt
   - Three Income Statement amounts: Sales Revenues Cost of Sales and SG&A Expenses
   - To forecast these amounts, we need to identify Value Drivers and Cost Drivers, translate them into future sales, using strategic analysis (Porter’s Five forces approach). Apply the knowledge accumulated in economics, strategy and more, understanding of the industry in which the firm operates, the markets and competitors. Using those forecasts, we can forecast all other numbers in the financial statements.

5. Accounting analysis and forecasting
   - Analyzing Permanent & Transitory components of Earnings – from financial statements
   - Identifying Revenue Drivers and forecast sales
   - Identify Cost Drivers and forecast expenses
   - Identify Value Drivers based on the competitive analysis
   Use ratio analysis to quantify value drivers

6. Steps in Valuation
   1. **Identify the model** – use either DCF or DAE model
   2. **Gather the information** – Gather all available info. and basic company ratio analysis and compare.
   3. **Forecast the payoffs** – projection of next 3-5 years of IS, BS, CF statements.
   4. **Select the discount rate** – from interest rates, D/E ratio, beta, calc the cost of Equity, Debt, WACC.
   5. **Valuation and sensitivity analysis** – Apply the models to get the value & check results.

7. Aggressive Accounting methods
   Even though revenue recognition performed to recognize Standards, aggressive accounting methods allow financial statements to be manipulated, and their quality reduced as a result.
Definitions: \( P=\text{Price}, \ M=\text{Market}, \ bv=\text{Book Value}, \ re=\text{Cost of Equity unleveraged}, \ NI=\text{Net Income}, \ OI=\text{Operating Income}, \ EBIT=\text{Earning before Interest and Taxes}, \ TA=\text{Total Assets}, \ D=\text{Debt}, \ E=\text{Equity} \)

Valuation by multiples

- **P/E** (Price-Earning ratio)
  If abnormal earnings are constant, then the \( \frac{P_0}{E_1} = \frac{1}{re} \). For P/E ratio to be higher than abnormal earnings should be positive and must also grow. \( E_1 \) is equal to the expected earnings for the following period.

- **P/B or M/B** (Market-To-Book ratio)
  \( P/B = 1 \) means the company is not expected to have any abnormal earnings. If the company is expected to have abnormal earnings, than \( P/B > 1 \), regardless of the growth in book value of equity. If accounting is conservative, than \( P/B \) is larger than 1. (Median was 2.7 in US 1993).

Ratio Analysis

- **Profitability Ratios**
  - **Book Rate of Return**
    1. Return on Equity: \( \text{ROE} = \frac{NI_t}{bv_{t-1}} \) Firm’s Net Value created divided by net invested capital
    2. Return on Assets: \( \text{ROA} = \frac{NI_t}{TA_{t-1}} \)

  Net Income is often replaced with operating income EBIT, and turns to be: \( \text{OROE} \) and \( \text{OROA} \).

  - **Profit Margins**
    1. Profit as percentage of sales. \( \text{PM} = \frac{NI}{Sales} \) and \( \text{OPM} = \frac{OI}{Sales} \)
    2. Quality of income : How much of the earnings are created by operations

  Common Earnings Ratio \( \text{CER} = \frac{NI}{OI} \)

- **Efficiency Ratios**
  Evaluate the effectiveness of the firm using its resources
  - **Generating Sales**

    - **Working Capital Turnover Ratios**
      1. Receivable Turnover: \( RT = \frac{Sales}{AR} \); Days of Receivable: \( DT = \frac{365}{RT} \)
      2. Inventory Turnover: \( IT = \frac{COGS}{Inventory} \); Days of Inventory: \( DI = \frac{365}{RI} \)
      3. Payable Turnover: \( PV = \frac{COGS}{AP} \); Days of Payable: \( DP = \frac{365}{RP} \)
      4. **Cash Cycle** measures the cycle that cash is needed and used = DR + DI + DP

    - **Long Term Assets Turnover Ratios**
      Higher turnover asset ratios suggest more efficient use of the assets, because a dollar of assets generates more sales.
      1. \( \text{FATO} = \frac{Sales}{Average \text{ Fixed Assets}} \)
      2. \( \text{ATO} = \frac{Sales}{Average \text{ Total Assets}} \)
      Those ratios are sensitive to accounting methods.
- **Leverage Ratios**
  May reveal a liquidity problem. Detect whether the firm will meet its short-term and long-term obligations. Higher ratios suggest a higher likelihood of meeting short-term obligations.
  1. **Current Ratio**, \( CR = \frac{\text{Current Assets}}{\text{Current Liabilities}} \)
  2. **Quick Ratio**, \( QR = \frac{(\text{Cash} + \text{Marketable Securities} + \text{Receivables})}{\text{Current Liabilities}} \)
  3. **Inverse Leverage ratio**, \( IL_t = \frac{\text{TA}_t}{\text{BV}_t} \)
  4. Measure leverage using Income statement. **Interest coverage** = \( \frac{\text{EBIT}}{\text{Interest Expense}} \)
  5. Measure leverage using CF statement. Cash from Operation / Interest Payment

- **Common Debt ratios**
  Most common debt ratio is Market value of Debt / Market value of Equity. Accounting version use Book Value instead of Market Value.
  1. **D/E** = \( \frac{\text{BV of Debt}}{\text{BV of Equity}} \)
  2. **D/TA** = \( \frac{\text{BV of Debt}}{(\text{BV of Debt} + \text{BV of Equity})} \)

- **Decomposition of ROE – Du-Pont Analysis**
  Du-Pont Analysis allow us to trace better the change in ROE

Value creation ROE can be due to cost savings, more efficient use of the assets or higher leverage:

\[
\text{ROE} = \text{PM}_t \times \text{ATO}_{t-1} \times \text{IL}_{t-1} = \left( \frac{\text{NI}_t}{\text{S}_t} \right) \times \left( \frac{\text{S}_t}{\text{TA}_{t-1}} \right) \times \left( \frac{\text{TA}_{t-1}}{\text{BV}_{t-1}} \right)
\]

  1. Improved income margin (PM) – more income per dollar of sales
  2. Improved Asset Management (ATO) – more sales for each dollar of assets
  3. Higher leverage (IL) – more dollars of assets supported by a dollar of invested equity.

Break ROE concentrating on operating Income:

\[
\text{ROE} = \text{CER}_t \times \text{OPM}_t \times \text{ATO}_{t-1} \times \text{IL}_{t-1} = \left( \frac{\text{NI}_t}{\text{OI}_t} \right) \times \left( \frac{\text{OI}_t}{\text{S}_t} \right) \times \left( \frac{\text{S}_t}{\text{TA}_{t-1}} \right) \times \left( \frac{\text{TA}_{t-1}}{\text{BV}_{t-1}} \right)
\]

  1. Common earnings ratio (CER) – the share of operating income retained by common shareholders
  2. Operating income margin (OPM) – more operating income per dollar of sales
  3. Improved Asset Management (ATO) – more sales for each dollar of assets
  4. Higher leverage (IL) – more dollars of assets supported by a dollar of invested equity

**Accounting analysis and forecasting**

1. **Analyzing Permanent and Transitory components of Earnings**
   Use the financial statements to separate components that are linked with value creation. The financial statements help up separate permanent components of earnings, that are expected to persist in the future, from transitory components such as: special items, discontinued operations, and extraordinary items, that are not expected to persist and are not associated with value creation (e.g., accounting changes and errors).

2. **Identifying revenue drivers**
   - Identify revenue drivers by analyzing the company’s products, markets, and segments. Relating sales to an operating indicator.
3. Identify Cost Drivers
A cost driver is a factor that causes costs to arise, for example, production volume, number of employees, labor hours, machine hours, plant square footage and more. For example, try to break COGS to variable production costs, employee benefits and fixed costs and then try to estimate variable production costs based on the number of units, employee benefits, and let fixed costs increase by the rate of inflation or based on level of PPE. Use Cost drivers to forecast expenses.

4. Identify value Drivers
Identify value drivers based on the analysis of competitive advantages. For example, if the value driver is linked to a production competitive advantage, say proprietary technology), you should forecast lower COGS per product relative to the industry. If it is linked to the quality of the product, forecast a higher sales price per unit

Use ratio analysis to quantify value drivers.

Cost of Capital
\[ R_w = \text{Weighted average cost of capital} \]
\[ R_w = 1 + w_{acc}, \text{ where } w_{acc}, r_w = r_E(E/D+E) + r_D(D/D+E) \text{ and Market Value is used for D, E} \]

If the proportion between D and E is changed over time, then wacc need to be changed as well over time.

When evaluating a company, calculate free cash flows as if company is financed with equity only.

The Discount Cash Flows Model (DCF)
The value of the company equals to the sum of its future discounted cash flows.

- Computationally complicated and require many assumptions that increase the chances of making errors
- Depends greatly on the terminal value of the company and since companies are expected to operate for many years, it is likely to be inaccurate.
- Relies on payoff measures, which may not be related to value creation. Cash flows represent value distribution, not value creation

\[ V_{F,t} = E \left[ fcf_{t+1} \right] (R_w)^{-1} + E \left[ fcf_{t+2} \right] (R_w)^{-2} + \ldots + E \left[ fcf_{t+n} \right] (R_w)^{-n}, \text{ for } 0 < n < \infty \]

Hence, free cash flows equals to Cash from operation plus interest payments minus cash flows from investments. \[ fcf_t = CFO_t + i_t (1- \tau) - CFI_t \]
The value of the company for the shareholders is the result when removing debt payment from the fcf.

\[ V_t = E[\text{fcf}_{t+1}] (R_E)^{-1} + E[\text{fcf}_{t+2}] (R_E)^{-2} + E[\text{fcf}_{t+3}] (R_E)^{-3} + \ldots + E[\text{fcf}_{t+n}] (R_E)^{-n}, \text{ for } 0<n<\text{Inf} \]

Depends greatly on the terminal value of the company and since companies are expected to operate for many years, it is likely to be inaccurate.

**The Discount Abnormal Earning Model (DAE)**

The value of the firm’s equity is equal to its value today (book value of equity) and value that will be created in the future (present value of expected abnormal earnings). Model relies less on the terminal value.

This model includes the book value of equity as the first term, the expected abnormal earnings over \( T \) periods and finally the terminal value. Since the book value is relatively a large term, the terminal value after \( T \) years must be relatively small. Value of the firm for the shareholders is:

\[ V_{E,t} = \text{bv}_t + E[\text{AE}_{t+1}] (R_E)^{-1} + E[\text{AE}_{t+2}] (R_E)^{-2} + \ldots + (R_E)^{-T} x E[\text{AE}_{t+T+1}]/(r_E - g) \]

Abnormal earnings equals to net income (NI\(_t\)) minus the cost of equity capital times book value of equity at the beginning of the period. AE\(_t\) is the abnormal or residual earnings.

\[ \text{AE}_t = \text{NI}_t - (r_E \times \text{bv}_{t-1}) \]

The value of the entire firm, \( V_{F,t} \), (E + D) is a function of free abnormal earnings (FAE):

\[ FAE_t = (\text{EBIT}_t x (1-\tau)) \]

\[ V_{F,t} = \text{bv}_t + D_t + E[\text{FAE}_{t+1}] (R_w)^{-1} + E[\text{FAE}_{t+2}] (R_w)^{-2} + \ldots \]

\( R_w = \text{Weighted average cost of capital} \)

*If done correctly, DCF and DAE models give exactly the same value of the firm. When evaluate Value of Equity, discount cash flows by “cost of equity” When evaluate Value of the firm, discount cash flows by wacc.*

**Steps in Valuation**

1. **Identify the model** – use either DCF or DAE model
2. **Gather the information** – collect all relevant information (including: Past financial statements, press releases, industry information, analysts’ reports, stock price behavior, strategic information on the company and its competitors, information companies major products. Do basic **ratio analysis** to the company and to a comparable company.
3. **Forecast the payoffs** – projection of next 3-5 years of IS, BS, CF statements, using the collected information. Specify the method of calculating the terminal value. Prepare pro-forma financial statements.
4. **Select the discount rate** – using information on interest rates, market value of D/E ratio and beta, calculate the cost of Equity, the cost of Debt, and WACC.
5. **Valuation and sensitivity analysis** – Apply the models to get the value. Check your valuation by changing the assumptions and see what happens. Value the company using multiples and use it that as a check of your valuation.
Aggressive Accounting methods
Revenue recognition is done according to SAB. 99,100,101 and SFAS No. 121. Nevertheless, there are several aggressive accounting methods to manipulate the financial statements that reduce its quality. Accounting methods could be used to capitalize expenses and depreciate them over time, instead of expenses them immediately or they could increase expenses for the short run and be modified in bad times. Such accounting methods are sometimes used when reporting: R&D accounting, restructuring, off-balance sheet financing (capital leases), acquisitions (goodwill) and more. Examples of accounting manipulations:

- **Capitalization of R&D and marketing expenses**
  Capitalized R&D and marketing expense and depreciate it over time or when revenue is recognized, instead of immediate expense them.

- **Big Bath**
  In bad years, when company loses, add high construction costs and write-offs. Following years reverse the costs and add money to profits.

- **Acquisition**
  When acquisition occurs, amortization of goodwill reduces the profits of the acquire company during the next few years. To avoid it, companies are using creative accounting to write-off those amounts immediately by reporting them as R&D.

- **Cookies-Jar**
  The discount rate, which is used for discounting the Pension liabilities, may be subject to accounting manipulations. Discount rate may change to effect the financial statements. The difference between discount rate of 9% to 8.5% is 7-8%.

- **Revenue Recognition**
  Revenue recognition is done according to SAB. 101, but in some cases the transaction may not occur, due to: sale incomplete, product is not delivered or customer can walk away from the deal.

- **Off-Balance Sheet Financing - Capital Leases Vs. Operating Leases**

  **Operating Lease** – The asset is leased for a relatively small portion of its economic life.

  **Capital Lease** – The asset is leased for a long period of time. Most of risks and rewards are transferred to the lessee. Hence, there are similarities between purchase an asset and capital lease transaction. According to accounting classifications guidelines, Capital Leases are not reported on the Balance Sheet. But they should be taken into consideration as company assets and financed by increasing company’s debt. As a result interest expense and depreciation should be increased. The result is a change in the debt-to-capital ratios, interest coverage; funds flow to debt, and operating margins.
This course consists of financial approaches and techniques that help managers to develop, evaluate, and implement value-creating strategies. It develops a framework for estimating project and firm related cash flows, discusses issues associated with raising capital at a minimal cost, and analyzes allocation of this capital to value creating projects.

A. INVESTMENT EVALUATION

1. The 2 key decisions of the Finance Function
   - Financial decision – related to where the money comes from and manages the cash flow
   - Investment decision – How much to invest within the company, and on what.
   Cost of Capital key to both decisions, and sometimes dictated by the type of financial decision (Property = high debt financing, but high tech mostly equity financing)

   The objective of the financial managers by making investment and financing decisions is to maximize the current value of shareholders wealth.

2. Investment Evaluation in 3 basic steps
   - Forecast all relevant after tax expected cash flows generated by the project
   - Estimate the opportunity Cost of Capital, r, reflecting the time value of money and the risk
   - Evaluate – Use DCF and look at NPV and/or IRR to decide if to accept or reject project. Be careful when other methods are used (payback, ROA, ROFE, ROI, ROCE, ROE).

3. The Ten Commandments
   Use the “Ten Commandments” as a structured approach to forecasting Cash flows.

4. Value if the Firm
   Value of Firm = Present Value of Operating cash flows (short term + terminal) + Excess cash balance + Excess marketable securities + Excess real estate - Under funded pension

   Value of Equity = Value of the firm - Value of Debt, or E = V – D, or V = D + E
   Calculate share price by dividing Value of Equity by number of shares outstanding

B. CAPITAL STRUCTURE DECISIONS

5. Leveraged ‘vs’ unleveraged firms
   - Increasing Leverage (debt) increase risk, which is balanced by increased expected rates of return.
   - Leverage (debt) increases value of firm due to tax shields, but also increases expected bankruptcy costs.

6. Valuation methods
   - Three methods of valuing a firm, being: WACC, APV and Cash to Equity Holders, discussed in detail below.
   - Essential to use market value of equity and not book value of equity when estimating the cost of capital.
A. INVESTMENT EVALUATION

The Finance Function
The Finance Function focuses on 2 key decisions:

- The financial decision, which depends on the external financial environment, which is the financial market. It considers where will the money come from = raising funds, including ratio of debt to equity, and type of debt, e.g. short or long term
- An investment decision depends on the internal environment, i.e. the operation of company itself. It considers how much to invest and in what assets, e.g. plant, equipment, projects, etc = Capital Budgeting

Both decisions (Investment decision & Financing decision) depend on the COST OF CAPITAL.

The objective of the financial managers by making investment and financing decisions is to maximize the current value of shareholders wealth.

In evaluating any investment three basic steps should be followed:
1. Forecast all relevant after tax expected cash flows generated by the project.
2. Estimate the opportunity cost of capital \( r \), reflecting the time value of money and the risk
3. Evaluate the project by using discounted cash flow (DCF), net present value (NPV). Other methods include the internal rate of return (IRR), payback, profitability index, return on assets (ROA), return on equity (ROE), return on investment (ROI), etc.

Forecasting Cash Flows: Cash flows from Operations
Revenue
- Cost of goods sold
- Depreciation
- Selling, general and admin.

= Operating profit
- Cash taxes on Operating Profit
= Net operating Profit after tax
+ Depreciation
- Capital Expenditures
- Increase in Working Capital
= Cash flow from Operations

Use the “Ten Commandments” as a structured approach for forecasting cash flow
1. Depreciation is not a cash flow, but it effects taxation
   - Depreciation is an “accounting fiction” and not a real cash flow. Subtract it early in Income Statement as tax deductible, but then add it back later.
   - Use the depreciation figure used in tax calculations, as it directly affects cash flows. Do not use the depreciation figure used in accounting reporting.
   - Higher depreciation results in payment of less taxes, so high depreciation increases cash flow, even though for accounting purposes, ‘net income’ reduces (as high depreciation to subtract)
   - Above also applies to amortization, if it’s tax deductible (forget otherwise)
2. Do not ignore investment in fixed assets (Capital expenditures).
• Capital expenditures is “money spent this year”, e.g. purchase of machinery, equipment, know how, etc.

3. Do not ignore investments in *net working capital*.
   • Include changes only in *OPERATING working capital* (= Current Assets – Current liabilities). Do not account for short-term debt, excess cash & marketable securities.
   • Increase in *Working Capital* = Increase in accounts receivable – increase in inventory + increase in accounts payable.
   • Note: The accounting and economic definition of working capital differ related to what they consider as relevant cash flows forecast. We are interested only in the *operating working capital* (see 4th commandment, above) and not the operating and financial working capital.

4. Separate *investment & financing* decisions. Evaluate as if entirely *equity* financed, i.e. ignore impact of loans, interest, etc.

5. Estimate flows on an *incremental* basis
   • Incremental cash flow = total firm cash flow with the project – total firm cash flow without the project
   • Forget sunk costs, as costs incurred in the past are irreversible.
   • Include all *externalities*, i.e. the effects of the project on the rest of the firm, e.g. cannibalization (introduce new product might cannibalize old product) & erosion. For example, if it will take 2 years for competition to create competitive product, record 2 years of erosion = incremental impact of decision to go ahead.
   • Example: If spent $60 in the past on R&D, and now need to spend $100 to make $120, then it’s correct to go ahead, as the $60 is a historic sunk cost, and even though would like to recover all costs ($60 + $100), will make $20 and therefore lose $40 instead of $60 on the whole project.

6. *Opportunity costs* cannot be ignored
   • What other uses could the resources be put to. Remember, the cost of any resource is the foregone opportunity of employing the resource in the next best alternative use.

7. Do NOT forget continuing value (residual or terminal value).
   • Liquidation value – Estimate proceeds from sale of assets after explicit forecast period.
   • Perpetual growth – Assume cash flows expected to grow at a constant rate, perpetually.
   • Continuing value = terminal value = \( C_{t+1}/(r-g) \)
   • *Estimating Terminal Value* – Estimate Terminal Value = 12.5 \( \times C_{t+1} \), so \( r-g = 8\% \). If believe \( r \) = cost of capital will be, say, 15%, then conclude this formula suggests \( g = 15\% - 8\% = 7\% \). This assumes a growth rate of 7% per year forever, which is very aggressive as in long term, economy unlikely to grow at such a high rate. So, conclude, estimate terminal value of 12.5 \( \times C_{t+1} \) is an over estimate, as ‘g’ more likely to be, say, 3% than 7%, giving terminal value of \( C_{t+1}/(15\% - 3\%) = C_{t+1} \times 8.3 \).

8. Be consistent in treatment of inflation.
   • *Nominal* cash flows (including inflation) – use a *nominal* cost of capital, \( R \)
   • *Real* cash flows (without inflation) – use a *real* cost of capital, \( r \).
   • It’s a common mistake to use nominal discount rate to discount real cash flows.
   • Nominal rate is approx = to real rate + inflation.

9. Overhead costs
   • Include overhead & other indirect costs in “SG&A”

10. Include excess cash, excess real estate, unfunded (over-funded) pension fund, large stock option obligations & other relevant.
Operating Working capital
Divide company into finance and operations. Here, we deal only with operations. When accountants refer to working capital they mean operating working capital + financial working capital. We are only interested in the former.

Operating working capital = Current Assets – Current Liabilities

Current assets consist of Accounts receivable, Inventory, and Cash required for operations.

Current liabilities consist of Accounts payable, accrued taxes, and accrued wages

We ignore 'excess cash and marketable securities' from current assets. For example, if Microsoft has $20bn sitting in the bank, it’s excess over the cash needed for operation, and is therefore not considered part of working capital.

We ignore short-term debt from current liabilities, to ensure we are dealing only with OPERATING working capital.

Value of the Firm
Present Value of Operating cash flows (short term + terminal)
+ Excess cash balance
+ Excess marketable securities
+ Excess real estate
- Under funded pension
= Value of Firm

NOTE: Assets/liabilities not required supporting operations

Value of Equity
Value of the firm - Value of debt = Value of Equity
Or V = D + E

Calculate share price by dividing Value of Equity by number of shares outstanding

Net Present Value (NPV) & Internal Rate of Return (IRR)
• Net Present Value (NPV) is the sum of all cash flows, adjusted by the discount rate. As the discount rate increases, the PV of future cash flows reduces, and so the NPV also reduces. Accept project if NPV > 0.

• Internal Rate of Return (IRR) is the discount rate that sets the NPV to zero. Accept the project if IRR > Opportunity cost of Capital

• NPV measures absolute performance, whereas IRR measures relative performance.

B. CAPITAL STRUCTURE DECISIONS
In above section, considered Operations, and ignored Finance. Here, we consider Finance and assume Operations is “fixed”. Remember, V = D + E.

Unleveraged Firm: A firm that uses only equity to finance operations. (100% Equity, 0% Debt)

Leveraged Firm: A firm that uses sources of financing other than equity, typically debt. Value of firm belongs to lenders and the shareholders.
Effects of Leverage

There are 4 important effects of financial leverage. The first 2 offset each other (increased rate of return due to increased risk) and are therefore not relevant. The last 2 need to be considered closely:
1. Increase expected rates of return on equity and expected earning per share (EPS).
2. Increase risk of equity, both variance and beta.
3. Increase the probability of bankruptcy and bankruptcy costs.
   - Higher leverage increases interest payments, and therefore increases risk firm could get into financial difficulties, and therefore bankruptcy, as a result.
   - Bankruptcy costs = difference between value of assets before and after bankruptcy. Include court fees, legal fees, cost of customers not willing to purchase products, losing employees, etc. Relatively low in real estate firm, as land value does not change, but very high, in say, consultancy firm.
4. Leverage increases the interest tax shields.
   - As interest payments on corporate debt are deductible from taxable income, debt provides a tax shield for corporations.
   - Example: if borrowing interest rate = 10%, and tax rate is 40%, effectively only pay 6% interest. The tax shield provides a government-subsidized loan!

If you ignore effects 3 and 4, \( V_L = V_U \) (m-M theory)
Including the other effects, \( V_L = V_U + PV \text{ of tax shield} - EBC \), where EBC = Expected Bankruptcy Costs.

- EBC increases with increasing Debt
- For constant debt, \( PV \text{ of tax shield} = T.D \)
- Real estate companies use high leverage (debt), as EBC is relatively low.

Types of valuation methods

There are three types of valuation methods, discussed below. All 3 give same results for constant financing. For the first 2 (WACC and APV), look at cash flows without considering (i.e. ignoring) interest), so value includes debt, as \( V = E + D \):

1. **WACC – Weighted average cost of capital** is the expected rate of return on the market value of all of the firm’s securities. Anything that increase the value of the firm reduces the weighted average cost of capital, if operating income is constant. **WACC is used if proportion of debt remains constant.** WACC method incorporates benefit of debt financing (tax shields and subsidies), by adjusting the cost of capital. Calculate NPV of cash from operations, at WACC. Note, this ignores financing and treats firm as if all equity financed. Use market value of equity and not book value of equity, in order not to miss value creation.

To calculate WACC, first need \( r_E^L \), where \( r_E^L = r_E^U + (r_E^U - r_D)(1 - T) \times \frac{D}{E} \)
(Formula valid only for perpetual cash flows and perpetual debt)

\[
WACC = \frac{D}{V} \times r_0 \times (1-T) + \frac{r_E^L \times V}{V}
\]

Remember, use WACC as the discount rate to calculate NPV, and therefore to make investment decision. Note, if WACC is too low, will calculate an over valuation of the project, making the wrong decision.
2. **APV – Adjusted Present Value** explicitly adjusts cash flows and present value for costs or benefits (value) created by financing. This method looks at value created by operations (as if all equity, ignoring finance) and then adjusts for value created by finance. This method decomposes information, separating by value created by operations and value created by finance, and therefore provides additional insight. For example: Value unleveraged and PV of tax shield.

\[ \text{APV} = \text{Value under all equity financing (NPV of cash from operations discounted at } \text{R_E (unleveraged)} \text{) + adjustment for value created by financing (tax shields, subsidized financing, expected bankruptcy costs, etc).} \]

\[ V_L = V_U + T.D \]

From example section below, \( V_L = -500 + 120(1-0.4)/0.15 + 400 \times 0.4 - \text{EBC} = (-500 + 480) + 160 = 140. \) But note, that without the value of the tax shield of 160, i.e. if this project had been equity financed only, this investment would have had a negative NPV value of -20, i.e. a bad investment. This is an example of how APV method allows cash flows to be broken down and greater insight secured.

*THE APV approach does not suffer from many problems associated with the WACC approach, and therefore usually, APV is the best and most informative method to evaluate projects.*

3. **Cash to Equity Holders** is cash from operations adjusted for financing, interest and principle.

Cash to equity holders = NPV of cash to equity holders at \( \text{R_E (cost of levered equity capital)} \)

**Example of applying the 3 difference approaches:**

For an investment of $500, of which $400 secured via perpetual debt and $100 via equity (as management wanted 80% (book value) debt financing, in this case). Cost of debt, \( r_D = 10\% \). Cost of unleveraged equity, \( r_E = 15\% \). Tax rate, \( T = 40\% \). Expected EBIT = $120 forever (Earnings Before Interest & Tax).

The first 2 approaches (WACC and APV) ignore financing, i.e. treat firm as equity financed only. They would record “year 0” (startup cost) cash flow of -$500 (i.e. the full investment), and year 1, 2, 3 … as $72 per year, i.e. EBIT of $120, less 40% tax = $72.

However, the 3rd approach, Cash to Equity Holders, will include all finance considerations. So, in “year 0”, would record cash flow of -$100 only, and for year 1,2, 3 … as $48, i.e. EBIT of $120, less $40 interest (10% of $400 debt) = $80, less 40% tax = $48.
1. **Competitive Advantage through people.**
   Top-performing firms need to keep their advantage over time in a way that must be difficult to imitate. To do that, firms rely not only on technology, patents, or strategic positions, but also on how they manage their workforce. The increasing pace of product change means that a technical edge, even once achieved, will erode quickly and must be renewed. The need for continuous innovation and rapid response to market and technological changes virtually requires a workforce that delivers superior performance.

2. **Managerial Decision Making**
   Competitive decision-making means that choices are often influenced by the format in which information is presented (or framed) and not by the data itself. “Framing” changes the “problem” but NOT the data.

   Several heuristics, cognitive biases, cause decision-makers and are used by them to take decisions. Knowledge of, and awareness to, these heuristics and biases can be used to make more objective decisions.

3. **Managing Teams and Team Leadership**
   Several factors affect the way teams and groups are managed, and determine the way these teams will function: successfully and with competitive advantage over similar groups, or not.

   Success factors of managing a team include: creating commitment between all members, dividing the work and sharing and disseminating the information.

   Failure of a team may arise from the following: groupthink, risky-shift, social loafing and free riders.

   Key factors in managing a team are: having well defined norms and roles, creating a cohesive group that motivates the team members to follow and complete the team goals.

4. **Social Networks and Social Capital**
   Social networks define one’s social capital. Network contacts are the social capital, being a cache of opportunity. Size and diversity of one’s network is key and optimized network.

   Two types of networks: clique network, entrepreneurial network. A clique structure can be used to maximize cohesiveness, homogeneity of thought, speed of decision and each of implementation, while an entrepreneurial structure can be used to reduce groupthink and cognitive biases.

   Evaluate, maintain and upgrade your position in your team and network: broker, monopolist, client, alliance.

5. **Organizational Culture**
   Culture is a major reason for success in competitive industries. Organizational culture generates commitment and motivation in employees, and is a key competitive driver for firms in resource tight environments.

   Culture is a set of artifacts, jargon/language, stories, ceremonies and rituals, costumes and uniforms, beliefs, values, and behavioral expectations shared by the organization’s members and builds symbols of reward that people will be motivated to achieve.
1. Managerial Decision Making

- "Framing" changes the “problem” but NOT the data; different frames of the SAME problem lead to different choices.
- **Gains**: we seek certainty in problems framed as gains: certain outcome is preferred over gamble with equal or greater expected value.
- **Losses**: we seek risk in problems framed as losses: certain outcome is rejected in favor of a gamble with equal or lower expected value.
- We are **risk averse** to gains and **risk seeking** to losses.
- **Gaining** $100 is not as pleasurable as **losing** $100 is painful.
- A gain of 100 to 200 “seems more valuable” than a gain from 1100 to 1200.

**Judgmental Heuristics**

Decision-makers deviate systematically from rationality because they use heuristics to simplify the world and to save time.

(1) **Availability heuristic**

The frequency, probability, or likeliness of an event is influenced by the degree to which instances or occurrences of similar events that are readily “available” in memory.

Recent, vivid or easily imagined events (that may be less common) get highly weighted.

(2) **Representativeness heuristic**

The likelihood of an event is judged according to the manager’s stereotypes, without paying enough attention to probability.

Judgmental biases of this type include:

- Ignoring base rate
- Inappropriate sample size
- Misconception of chance, ignoring the independence of multiple, repetitive events; “gambler’s fallacy”, “hot hand”.
- Regression to the mean – eventually everything evens out; you can’t expect over or under performance all the time.

(3) **Conjunctive and disjunctive events**

We over-estimate the likelihood of events that might occur together (conjunctive) and we under-estimate the likelihood of events that occur independently of one another (disjunctive).

The conjunction fallacy predicts that a conjunction of events will be judged more probable than one of these events, when the conjunction of the events “appears” more representative than the component descriptor.

To explain the conjunction fallacy using one of the fundamental probabilistic terms: the probability of a subset (a bank teller and a feminist) cannot be more likely than a larger set that completely includes the subset (a bank teller). Therefore the chance of the smaller subset must be smaller or equal to that of the bigger set.
Over estimation of conjunctive events cause many large, complex, multistage projects to miss the estimated budget and time.

In a complex system, one may estimate the probability of failure of each one of the components, but under-estimate or overlook the overall probability of failure – the disjunctive event. In other words, even if the probability of failure in each component is slight, the probability of an overall failure can be high if many components are involved.

(4) Anchoring and adjustment

We develop estimates starting from an initial anchor, based upon provided information, and do not adjust the estimate sufficiently.

First-impression syndrome – not adjusting the opinion of a person that was set when meeting him for the first time.

Meet the expectations – ‘a self fulfilling prophecy’ - when categorized to a specific level, a person will adapt to performance of that level; e.g. performance level of child in school.

Salary negotiations and adjustments:

- Previous salary of job applicant is used as an anchor for adjustment to set current salary.
- If initially under-paid, a percentage salary increase will leave employee under-paid.

(5) Confirmation trap

We seek confirming evidence for our hypothesis and exclude the search for disconfirming information from our decision process; decisions become self-fulfilling prophecies. In fact, the search of challenging, or disconfirming, evidence will provide the most useful insights.

(6) Hindsight bias and the curse of knowledge

“The Monday morning quarterback syndrome”; “the knew-it-all-along effect”

We are typically not good at recalling the way an uncertain situation appeared to us before finding out the results of the decision.

Claiming that what has happened was predictable based on foresight knowledge puts us in a position of using hindsight to criticize another’s foresight judgment. Hindsight reduces our ability to learn from past and to evaluate objectively the decisions of ourselves and others.

The “curse of knowledge” happens when predicting others’ knowledge; people are unable to ignore knowledge that they have that others do not have. This “curse” explains the difficulty of teaching because it is hard to imagine how much students know, and the frequency of product designers’ over-estimating how easy it is for the average person to master high-tech devices.
2. Managing Teams and Team Leadership

Several factors affect the way teams and groups are managed, and determine the way these teams will function: successfully and with competitive advantage over similar groups, or not.

In building a team/group, one must get a diverse set of experts, to get the full dimension of the problem. Group members should be homogenous in terms of culture and common ground of values. Create norms and roles that will guide the work of the group.

Use the team objective, (“the end user” – in many cases), that is free of any interest that may bias the team, to create high level of commitment (“buy-in”) and enable collaboration between the members.

Enable the transfer and dissemination of the “private” (expert) information that each member holds to other group members.

Build group cohesion that will motivate team members to follow and complete the team goal. Cohesion enables resource pooling, raises accountability and serves as a social support and a buffer for stresses.

Avoid groupthink! Groupthink occurs when the drive for cohesion creates conformity and suppresses self, critical thinking.

Create “the Devil’s Advocate”: Demand full explanation of alternate plans, look for disconfirming evidence and use outside experts.

Create “impartial” leader by avoiding clear statement of your preferences, creating competition between subgroups.

Competitive decision making skills are useful in teams, because team members tend to interpret a problem from their narrow area of specialization. Advantage of guiding the process can be an opportunity for management to control premises and decision. One can use the tools of framing the decision, defining anchoring starting point, and representativeness and availability biases to influence team members views, opinions and expectations.

A leader of a team may be in one several situational roles:

- Involving, participating – an integral part of the group.
- Attending, challenging – guiding, promoting the group from a side.
- Defining, telling – pulling, governing, commanding the group.
- Clarifying, selling – pushing the group.

3. Social Networks and Social Capital

Social network is about information, control and exchange of information and control between network “nodes”. The network supports information exchange, creation and enforcement of the group’s norms and roles, and enables reciprocity.

Structure of networks:

- **Entrepreneurial network**: centralized, few primary contacts with non-redundant contacts of other networks, connects disconnected groups, has many structural holes and low level of redundancy. Has access to diverse resources and information. Requires significant maintenance.
Clique Network: closed group of contacts, everyone is linked to everyone, network ties sustain one another, has no structural holes and high redundancy. Produces social support, but low (minimal) information benefits, may create/cause groupthink.

Optimize your social network by selecting few (preferably – one) non-redundant contact person to each dense cluster.

Evaluate, maintain and upgrade your position in your team and network:

<table>
<thead>
<tr>
<th>What position do you hold?</th>
<th>How can you maintain and upgrade your position?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broker</td>
<td>• Fill structural holes;</td>
</tr>
<tr>
<td></td>
<td>• Build network bridges between disconnected groups;</td>
</tr>
<tr>
<td></td>
<td>• Eliminate the ability of other brokers to compete – become monopolist.</td>
</tr>
<tr>
<td></td>
<td>• Strengthen your position – eliminate “clients” ability to form direct relationships with each other.</td>
</tr>
<tr>
<td>Monopolist</td>
<td>• Maintain unique resources or information;</td>
</tr>
<tr>
<td></td>
<td>• Minimize competition from other brokers (substitutes).</td>
</tr>
<tr>
<td>Client</td>
<td>• Try to reduce (your) redundancy by:</td>
</tr>
<tr>
<td></td>
<td>• Creating unique identity with broker; circumvent brokers by creating direct links to resource providers; link to other clients;</td>
</tr>
<tr>
<td>Alliance</td>
<td>• Increase mutual dependence with exchange partners.</td>
</tr>
</tbody>
</table>

4. Organizational Culture

Culture is a major reason for success in competitive industries. Organizational culture generates commitment, motivation in employees, and is a key competitive driver for firms in resource tight environments. Needless to add while appropriate culture could be a source of competitive advantage, inappropriate culture could derail the firm’s performance.

Typical components of culture are the language, which communicates the ideology of the firm, the artifacts which reinforce this ideology, the stories that make ordinary actions into role models, the rituals that foster the cohesiveness, costumes and uniforms and special settings or locations.

Planned organizational culture begins at the recruitment process, which identifies the “fit” candidates and goes through a life process of adherence and absorption. It is by no means a cheap process and needs to be planned in order to succeed.

Pitfalls

Organizational culture can be a primary reason for the downfall of any firm. Amongst other things it promotes groupthink and is likely to be a cause for inertia in the firm. Indeed culture needs management attention in order for it be beneficial to the organization. With changes in time or environment, a monitored or mentored organizational culture is likely to remain a source of competitive advantage.
1. **Four major sins of negotiation**
   1) Lose/lose – leaving money on the table
   2) Winner’s curse – Settling for too little
   3) Hubris – Walking away from the table
   4) Agreement bias – Settling for terms worse than your alternative

2. **Three fundamental approaches to resolving disputes**
   1) **Interests** - Concerns underlying both parties’ underlying interests & needs.
   2) **Rights** - Enforcing legal rights & socially accepted standards of behavior & fairness
   3) **Power** - Using greater economic, military or physical strength

3. **Distributive Tactics for Slicing the Pie**
   - **B.A.T.N.A.**
     - The next best alternative to the negotiated agreement.
     - Develop a good BATNA
     - Usually the primary source of power within negotiations
   - Reveal your BATNA only when it is in your strategic interest to do so, being usually when at an impasse, with the purpose of revealing your BATNA being a threat to turn to it. Once you’ve used your BATNA, you’ve lost it!
   - Assess the other party’s B.A.T.N.A.
   - Set High Aspirations
     - Assess your bargaining zone, other parties’ reservation price and aspiration level, and beware of the “mythical fixed-pie”, and don’t be competitive.
   - Anchor/Re-anchor
     - Open first when you have good information, or anchor at the other extreme if others open first.

4. **Integrative Tactics for Enlarging the Pie**
   - Exchange Information
     - **Directly** by explicitly stating interests and priorities; build trust, ask questions, give some information to set expectation that other party will feel obliged to reciprocate, make an offer, or …..
     - **Indirectly** by inferring priorities and interests through multi-issue proposals, stories, third parties, signaling in the press, etc
   - Leverage differences in priorities for mutual gain
   - Search for trade-offs that increase size of the pie. Be prepared to lose a little on one point if have gained more on another.
   - Search for similarities (common interests)
   - Add compatible issues to the deal
   - Don’t leave money on the table, unless it builds a long-term relationship
   - Motivation
     - Keep searching for an even better solution, even if you’ve surpassed your BATNA
     - Look for post-settlement settlement

5. **Dispute Resolution**
   - Focus on how to bring rights and power based negotiators back to interests
   - Try mediation before exercising rights

**Prepare, Prepare and Prepare!!**
1. Introduction – Negotiation sins and myths!

*Four major sins* of negotiations:

1. **Lose/Lose – Leaving money on the table** – Occurs when negotiators fail to recognize and exploit win-win potential. Need to maximize the pie. An agreement is reached, but could have done better.

2. **Winner’s Curse – Settling for too little** – Occurs when negotiators make too-large concessions, resulting in too small a share of the total bargaining pie. For example, settling for 15% royalties when could have achieved 20%. If both parties are in a weak position, this presents a good opportunity!

3. **Hubris – Walking away from the table** – Occurs when negotiators walk away from terms offered that are demonstrably better than other available options. This is sometimes the result of hubris or overwhelming pride/emotion/saving face, and sometimes due to gross miscalculation.

4. **Agreement bias – Settling for terms that are worse than your alternative** – Occurs when negotiators feel obligated to reach agreement, even when the settlement terms are not as good as their other alternatives. Tendency to simply “get it over with”. However, objective must be to achieve more than could have been achieved via BATNA.

There are *three* primary causes for falling victim to the above four sins:

1. **Absence of relevant and diagnostic feedback** – Most people receive very little feedback on their negotiating effectiveness, which results in 2 human biases preventing them from improving their negotiating effectiveness. The *confirmation* bias leads people to selectively see what they want to see about their performance, resulting in a reduced view of reality, generating a focus on persuasion rather than trade-offs. *Egocentric* bias leads people to view their experiences in a self-flattering way, and to blame others when things go wrong, with the impact that negotiators walk away from deals they should have taken and inaccurately assess their own BATNA.

2. **Satisficing** – This is simply settling for less than people could otherwise have achieved, or in other words, the tendency to accept not the best negotiated position, thereby leaving money on the table.

3. **Self-reinforcement** – This is a reluctance to try something new or to change certain behaviours because of the risks associated with uncertainty and potential failure.

*Four myths* about negotiation:

1. **Myth 1 – Good negotiators are born** – Good negotiators are not born, as such, and learn via practice, guided experience and feedback, in a disciplined fashion. Remember, the most important negotiations are the ones you meet every day; at work, with the family, in business and not buying a car!

2. **Myth 2 – Experience is a great teacher** – Must have feedback to improve performance (which is why people have exams and tests). Selective memory means that people tend to remember successes and forget failures, which might be entertaining at parties, but does not help improve negotiation. Experience improves confidence, but not accuracy. Over confidence can be dangerous, enabling people to take unwise risks.

3. **Myth 3 – Good negotiators take risks** – Tough “take it or leave it” negotiators are rarely effective, even if they might appear impressive.

4. **Myth 4 – Good negotiators rely on intuition** – Effective negotiation involves deliberate thought and preparation, and is quite systematic, leading to proactive, rather than reactive strategies. Good negotiators therefore are usually good planners and do not rely on intuition.
2. **Bargaining Zone**
   - The overlap between the two parties limits’
   - There are often trade-offs that can be made for the benefit of both negotiating parties
   - Leveraging differences for mutual gain
     - Differences in assessments of the probability of future events
     - Differences in risk preferences
     - Differences in time preferences
   - Calculate and then subtract the net profit of an alternative deal from the net profit of your current option in order to calculate the net value of your bargaining agreement

3. **Negotiating considerations / preparation**
   - Having thought about and understood your own BATNA, decide on your own priorities and concerns, what’s important to you, what you want, what’s a “nice to have” and what you are willing to give in order to get what you want.
   - Think about the above, but for the other party.
   - When a negotiating partner states that something is very important to him, in offering it to him, clearly state the terms under which it can be provided.
   - Don’t develop the habit of giving unilateral gifts without reciprocation. You are not a charity!

4. **Negotiating Strategy #1: Slicing the Pie**
   - Know your BATNA and only reveal it when it is in your strategic interest to do so, being usually when at an impasse, with the purpose of revealing your BATNA being a threat to turn to it.
   - Assess other party’s BATNA. How powerful are they and how do they depend on you? Once you know your BATNA and that of the other party’s, you can establish the minimum and maximum outcomes of the negotiation.
   - Set high aspirations
   - Open first when you have good information, so you can anchor the bargaining zone in your favor. There’s a benefit to first mover proposal in negotiation.
   - Immediately re-anchor at the other extreme if other party opens high, thereby defining the low point.
   - Use objective-appearing rationale to support claims

5. **Negotiating Strategy #2: Expanding the Pie**
   - Try to maximize the buyer & seller’s total value, or if you can’t maximize it, increase it as much as possible. Analyze different possible outcomes of negotiations, and assess net value/income all parties would individually make, and the total value created. Assess which possible solutions are likely and unlikely to be acceptable to each of the parties, in order to assess the optimum or most likely acceptable solution.
     - Build trust and share information
     - Ask Questions
     - Give away some information, but not your BATNA
     - Make multiple offers simultaneously
     - Search for “post-settlement” settlements

6. **Company Negotiating Tactics**
   - Tit-for-tat
     - Don’t be the first to defect
     - Match your competitor’s moves
     - In a tit-for-tat price competition, an equilibrium will most likely be found, but the consumer will benefit most during the price war, and the relationship between the 2 (or more) involved parties is likely to be damaged as a result.
• How to lead your company into cooperation
  o Align incentives
  o Remove temptations to defect
  o Psychological contracts and norm of commitment
  o Communication – talking makes the difference!
  o Personalize others – Get other individuals committed, by some method (eg donor’s names are published)
  o Publicize commitments
  o Look for enforceable agreements

• How to lead your industry into cooperation
  o Keep your strategy simple
  o Signal an action
  o Don’t be the first to defect
  o Focus on your own payoffs, not on your payoffs relative to others
  o Be sensitive to egocentric bias
  o Consult your lawyer to make sure you are not crossing the line of illegal collusion

7. Dispute Resolution
• There are three fundamental approaches to resolving disputes:
  i. Interests – Concerns underlying both parties’ underlying interests, needs, and concerns, positions and rationale. The things people really care about or want.
     o “Let’s try to find a way to resolve this matter before both parties end up suffering. If you go on strike, the company will lose precisely needed income, and you will have to live on a vastly reduced income. There must be a better way, so how about ….”
     o To reconcile interests, it’s essential to probe for deep-seated concern, to devise creative solutions and to make trade-offs and concessions where interests are opposed.
     o Encourage simultaneous proposals.
     o Allowing a party to vent emotions can be instrumental in negotiating a solution, especially in interpersonal disputes. Acknowledgement by the other party of the validity of such emotions or even an apology can diffuse the situation significantly, opening the way to a resolution of the dispute.
  ii. Rights – Enforcing legal rights (contracts, agreements or laws) & socially accepted standards of behavior (reciprocity, precedent, equality & seniority) and fairness.
     o “If you do not do what I am asking you to do, I’ll force you to do it, because it’s in the contract”
     o Right are rarely 100% clear, as there are often different and contradictory standards apply. Consequently, a third party is often needed to resolve rights type disputes. Public adjudication is provided by courts and administrative agencies. Private adjudication is provided by arbitrators.
  iii. Power – Using greater economic, military, political or physical strength to get what you want. (Eg War, strikes, trade embargos, sanctions, etc)
     o “If you do not agree to my demands, I’ll organize a strike, and once you realize how dependant you are on us, you’ll be willing to meet our demands”
     o Power is the ability to coerce someone to do something he would not otherwise do.
     o Exercising power usually means imposing costs on the other party, or at least threatening to do so.
     o In relationships of mutual dependence, the question of who is more powerful is determined by who is less dependent on the other. (Valid for labor disputes, family disputes, management disputes, etc)
• Which approach is “best”?
  o The 3 different approaches to dispute resolution (interests, rights and power) generate different costs and benefits. Four criteria are used to compare them, being Transaction costs, satisfaction with the outcome, effect on relationship and recurrence of disputes.
  o **Transaction costs** – Consider a strike by miners, where economic cost is the most prominent. Management payroll and overhead costs had to be paid whilst no revenue was generated. Violence and destruction of property/assets has a cost. The miners lost wages. There’s a potential opportunity cost of lost contracts due to the strike. Even in a family dispute, there’s a cost of time and emotional energy cost
  o **Satisfaction with outcomes** – Can evaluate different approaches to dispute resolution by parties’ mutual satisfaction with the result. A party’s satisfaction is related to how much the resolution fulfils the interest that led to the dispute. It can also depend on whether the disputant believes the resolution is fair. Satisfaction also depends on perceived fairness of the dispute resolution procedure.
  o **Effect on the relationship** – The dispute, or the method selected to resolve it, might have a long-term effect on the parties’ ability to work together in the future.
  o **Recurrence** – Will the resolution stick or will similar disputes arise?
• How to Bring Rights and Power-Based Negotiations Back to Interests
  o A focus on interests can resolve the problem underlying the dispute more effectively than can a focus on rights or power. Too many disputes are resolved by rights or power, when they should have been resolved by interests, meaning that last resort became first resort, and that transactions costs could be too high, satisfaction from outcome too low, the effect on the relationship too negative and recurrence higher than necessary.
    o Don’t reciprocate
    o Don’t get personal
    o Reciprocate, but add an interests-based proposal
    o Try a process intervention
• When to Use Rights or Power
  o In order to *initiate* a dispute to be resolved by interests. Example: file a lawsuit in order to initiate a negotiation.
  o When the other party refuses to come to the negotiation table
  o When the negotiations are at an impasse and all attempts to focus on interests have been exhausted
  o When negotiations are moving toward agreement and the parties are positioning themselves
  o Use *rights* in order to clarify the rights boundaries within which a negotiated resolution can be sought.
  o To resolve questions of public importance

8. Emotional Styles
• Positive Negotiator
  o Always smiling
  o Never loses his/her temper
  o Believes “one can catch more flies with honey”
• Rational Negotiator
  o Believes in an economic model
  o Keeps a “poker face;” emotion is weakness
  o Doesn’t express emotions
• Persistent Negotiator
  o Is tough and tenacious
Section 4: Organizational Behavior  
Negotiations – Professor Jeanne Brett and Professor Leigh Thompson

4.2

9. Cultural Values
- Individualism vs. Collectivism
  People who define themselves outside of social groups ‘vs’ people who relate to groups
  - People, who use **adjectives** to describe themselves, define themselves independent of the groups to which they belong, i.e. as individuals.
  - People who use **nouns** describe themselves as part of the groups which they belong to.

- Egalitarian vs. Hierarchy cultures/social structures
  - **Egalitarian** (e.g. Western) cultures have social structures that are relatively flat and permeable, whereas **hierarchical** (e.g. Eastern) cultures have layered and relatively fixed social structures, where status is at least as important as BATNA.

- Low Context vs. High Context
  - **Low** – Western cultures – The meaning of the message is on the surface of the message, in that people generally mean what they say. People are comfortable asking questions and an implied reciprocity exists
  - **High** – Eastern cultures – The meaning of the message is embedded in the message, and you have a challenge to understand what is meant/signaled.

10. Negotiation Strategies
- Understanding cultural variability and overlaps is important so that one can predict the behavior of the other party.
- Do not go to the negotiation when your team is not in agreement.
- When you have to lose power, you lose it.

Advice for Cross Cultural Negotiations
- Anticipate differences in negotiation strategy that may cause misunderstandings
- Analyze cultural differences to identify differences in preferences that may create integrative potential
- Avoid distribution errors
- Avoid a personal standard to govern how you are willing to change
- Find out how to show respect in their culture. Do your homework!

11. Multi-party, multi-issue, multi-culture negotiations
- Set the **norms** before the meeting begins, of what type of information and feedback is required at the meeting, and by which parties, so the expectation is correctly set and people know beforehand what you want. Use questioning, proposals and feedback and equivalent proposals in order to identify the positions of each party.
- Form coalitions to integrate parties, where possible, but be careful, as easy to break/buy-out. Solve problems issue by issue, in order to reduce the size of the whole negotiation. Use third party mediation to facilitate 2 parties coming to an agreement, when appropriate.
- Prepare, prepare and prepare well before the meeting. Need to prepare interests, issues, positions, BATNA, information to be shared, information sought, both for oneself, and assess for other parties.
- If negotiations are cross-cultural, anticipate differences in negotiation strategy that may cause misunderstandings. Understand cultural differences to identify differences in preferences. Do not jump to conclusions from your own behavioral rules/experience. Japanese might not look you in the eye or might sit in silence, but it has different meanings from European interpretations. Find out how to show respect and how not to offend in other cultures.
1. Open systems
Open systems import inputs from the external environment and process them to create outputs. Open systems can accumulate reserves that prevent entropy and are responsive to feedback from the environment. The stability of the system needs to be preserved. Differentiation expressed in the specialization of functions and control, coordination, and integration mechanisms are critical to the system.

2. Organizational life cycle
The life cycle of an organization is characterized by four stages: entrepreneurial, collectivity, formalization, and elaboration. Progress from early stages to later stages depends on overcoming obstacles that are characteristic of that stage such as the need for leadership, the need for delegation, an overabundance of red tape, and the need for revitalization.

3. The external environment
An organization’s external environment consists of a myriad of elements that can be distributed in ten categories or sectors: industry, raw materials, human resources, financial resources, market, technology, economic conditions, government, socio-cultural, and international. Firms have to assess environmental risk and uncertainty and establish structures that facilitate dealing with dependencies and external factors.

4. Human resource management
Current trends in HRM involve empowerment, transformational leadership, and partnering with employees.

5. Organizational change
Four types of organizational change were examined: technological; product/service; strategic, structural, and cultural; human resources. The elements of successful change as well as strategies for coping with resistance to change were explored.

6. Organizational culture
Organizational culture consists of the values, beliefs, expectations, and norms shared by all the members of the organization. The culture provides employees with the sense of a common identity and creates a framework for commitment.

7. Organizational structure
Several types of organizational structure were presented: functional, product or divisional, matrix, hybrid. The four stages of international evolution (domestic, international, multinational, and global) and the elements of each stage were reviewed and models based on the different types of organizational structure were applied to the global stage of internationalization.
The course discussed the main issues relating to the design of organizations and the internal and external processes that shape them. Emphasis was placed on the external influences operating on the organization and dealing with processes essential to succeed in today’s dynamic environments. In the course of the discussion, theories, reference frameworks, and concepts were presented to provide a better understanding of the functioning and management of organizational systems.

Management Theories
Organizations are defined as social entities that are goal-directed, designed as deliberately structured and coordinated activity systems, and linked to the external environment. Henri Fayol proposed 14 universal management principles, many of which are still relevant: division of labor, authority, discipline, unity of command, unity of direction, subordination of personal interests to the organizational interest, compensation, centralization, chain of command, order, equality, stability, initiative, and team spirit. Max Weber constructed a structural model of management for organizational efficiency characterized by formalization, division of labor, integration – coordination and cooperation, hierarchy of authority, impersonal relationship, and recruitment of manpower on the basis of qualifications and technical knowledge combined with promotion based on performance. Taylor conceptualized the principles of scientific management as:

- Centralized division of work
- Separation of responsibility and authority between managers and workers
- Formalization of the work process
- Strengthening of the relationship between productivity and compensation
- Development of formal criteria for matching workers to tasks

The Open System
Ten elements of an open system were presented: Input; transformation; output; cycle of events; negative entropy; information input, negative feedback, and encoding; the steady state and the dynamic homeostasis; differentiation; integration; and equifinality. Open systems interact with the external environment transforming raw materials, people, information resources and financial resources into products and services.

In the natural cycle of events, an open system can experience gradual entropy. The stages of decline are defined as blindness, denial, faulty action, crisis, and dissolution. Since social systems are neither self-sufficient nor self-contained, entropy has to be counteracted by the importation of energy.

The Organizational Life Cycle
Organizations experience a natural life cycle divided into four basic stages: entrepreneurial, collectivity, formalization, and elaboration. At each stage there is the risk of a specific crisis. Resolving each crisis determines the fate of the organization.

The potential crisis at the entrepreneurial stage is lack of leadership. The collectivity stage entails the need for delegation with control. At this early stage, clear direction is essential. The
next stage has the potential for excessive red tape and requires the addition of internal systems in order for the organization to develop. The later stage crisis involves the need for revitalization and the importance of developing teamwork at this stage. Finally the organization may be revived at the end of the lifecycle or it may enter a process of decline.

The Environment

Every organization has to interact with its environment. The elements of the external environment can be categorized into the following ten sectors

1. **Industry**: Competitors, industry size and competitiveness, related issues
2. **Raw materials**: Suppliers, manufacturers, real estate, services
3. **Human resources**: Labor market, employment agencies, universities, training schools, employees in other companies, unions
4. **Financial resources**: Stock markets, banks, savings and loans, private investors
5. **Market**: Customers, clients, potential users of products and services
6. **Technology**: Techniques of production, science, research centers, automation of new materials
7. **Economic conditions**: Recession, unemployment rate, inflation rate, rate of investment, economics, growth
8. **Government**: City, state, federal laws and regulations, taxes, services, court system, political processes
9. **Socio-cultural**: Age, values, beliefs, education, religion, work ethic, consumer and green movements
10. **International**: Competition from and acquisition by foreign firms, entry into overseas markets, foreign customs, regulations, exchange rates

Environments can be characterized by varying degrees of uncertainty based on the extent to which they are complex or simple and stable or unstable.

Organizations can be differentiated based on the extent to which they are mechanistic vs. organic. In mechanistic organizations tasks are rigidly defined and highly specialized. The management is hierarchical and centralized with a high level of control. In organic structures, task definition tends to be fluid and knowledge and control of tasks occurs in a cross disciplinary way.

All organizations, as open systems, require external resources in order to exist. While organizations depend on the environment, they strive to attain control over resources and manage them to reduce this dependency (resource dependence perspective). Several strategies are commonly implemented to control scarce resources. These include influencing the environment they function in, establishing favorable linkages, and gaining control of the environmental domain. Strategic and equity alliances and joint ventures represent types of favorable linkages. Each of these types of partnerships has advantages and disadvantages.

A new type of organizational structure called hetrarchy resulted as a byproduct from rapidly increasing strategic partnerships. This type of alliance depends on the management of hierarchical equals. In Japan this need is answered by the *keiretsus*. These are organizations composed of several firms, each of which has a certain percent ownership in the other firms. *Keiretsus* are usually managed by a joint board of directors.
Human Resource Management (HRM)

There is a trend in HRM toward “empowerment”, meaning the sharing or delegation of power and authority to subordinates so that they can act autonomously. The development of transformational leadership characterized by the ability to bring about change, innovation, and entrepreneurship is gaining importance. Major change in organizations depends on the leadership’s ability to create a compelling vision, mobilize commitment, empower employees, and institutionalize a culture of change.

The concept of the ideal worker has gone through many changes since the beginning of the century:

- 1910: The worker as a bolt in the machine (Weber)
- 1920: The worker as a source of labor (Taylor)
- 1940: The worker as an individual personality (industrial psychology)
- 1960: The worker as a member of a group (industrial sociology)
- 1980: The worker as a socio-political entity (unions)
- 2000: The worker as a symbiotic partner

Today management emphasizes human capital and knowledge management. Employees are treated as partners that identify with the organization’s goals in the face of a competitive environment. Employees are expected to develop and share in the profits and losses of the organization and to be committed to the organization’s goals.

Organizational Change

Successful change has to follow a certain sequence of events starting with internal creativity and inventions leading to adoption of the idea, implementation, and finally a commitment of resources. Change has to be aligned with perceived problems and opportunities. Four types of organizational change were defined as:

- Technological: Change in production/services processes including knowledge bases
- Productive/service: Change in the organizational product
- Strategic: Change in structure, communication system, management strategy, attitudes, values, expectations, policies, reward systems, supervision and control
- Human resources: Change in the capabilities and behaviors of the organization’s members

Organizational Culture

Organizational culture is defined as:

- The philosophies, ideologies, values, beliefs, assumptions, expectations, attitudes and norms that are shared by all the members of the organization.

Culture imbues the members with a sense of common identity and creates a framework for commitment. There are various ways to express organizational culture including symbols, stories, myths, cultural heroes, rituals, and values.

Four basic types of cultures were defined:

- Adaptable/entrepreneurial: Norms and beliefs that enable organizations to dictate, interpret, translate, and respond to environmental signals.
- Mission: Focused on working together to achieve common goals.
• **Clan:** Based on the involvement and cooperation of the members and on rapidly changing expectations of the members toward the external environment.

• **Bureaucratic:** A stable orientation to the environment based on a consistent approach to profit making and cultivating symbols, heroes, and rituals that enhance cooperation, tradition, and well-established policy.

**Organization Structure**

There are many different types of structure, each with a unique set of strengths and weaknesses. The structures that were discussed are:

• **Functional** – A managerial hierarchy where the company president presides over functional managers, such as: R&D, manufacturing, accounting, and marketing.

• **Product or divisional** – The organization is built on product/project groups and each group has its own autonomous sub-organization composed of manufacturing, accounting, and marketing.

• **Matrix** – The matrix structure serves organizations where both the product focus and the function/geography focus are equally important. A horizontal and vertical grid is composed where function/geography lies on one axis and product occupies the other axis creating a dual hierarchy. This method of dividing authority equally is relevant when scarce resources have to be shared across product lines, there are two or more critical outputs, and the environmental domain is both complex and uncertain.

• **Hybrid** – These are mixed vertical and horizontal hierarchies.

**International Evolution**

Domestic companies usually develop internationally by first establishing a presence in one or two foreign countries, moving to a multinational presence, and eventually becoming global. The structure of the company evolves from a domestic, localized establishment with an export department to establishing an international division and then adapting a transnational matrix structure.
1. **Leadership - The Basics**  
Leaders are responsible for the effectiveness of the organization. People’s perception of the leader is a key to success! Leaders must have a **guiding vision**, being a clear idea of the heading, both professionally and personally. Leaders must have **passion and love** for what they do, inspiring **strength, hope and confidence** to followers. Leaders need to have **integrity and trustworthiness** and maintain **objectivity and fairness**. Leaders need to have **curiosity and daring**. Finally, **leadership is all about people and getting them on your side!**

2. **Leadership & Ethical Behavior In Organizations**  
A leader must be capable of motivating people, therefore generate **trust**. A perception of unfairness can be most destructive for organizations, thus ethical behavior must be **credible**. It is important for (a) Avoiding “career ending moves”. (b) Setting example and standards for the organization. (c) Establishing a personal and organizational identity. As a manager – **never create ethical dilemmas for others!**

3. **Leadership & Resolving Ethical Conflicts**  
Resolving ethical problems is a true challenge for a leader, as it defines **who he is** and **what are his values**. People will hear what he says, but more importantly watch **what he does**. Policies cover only about 2% of the problems; the rest is up to the leader when arise. There is no rulebook, so best advise is to take the time, have an open mind and look for creative, new ways for solutions. Trust instincts, communicate and keep things in the open. **Look in the mirror for the final decision.**

4. **Leaders And Followers**  
Leadership emerges from **natural social – psychological processes** in a normal social climate. **There are different styles**. (1) Leaders can lead through **fear and power**, having no teamwork and exploit people. While this way can be useful for short-term crisis or emergencies, it is not best for long-term relationship. (2) Leaders can, on the other hand, **make followers follow out of will**, meaning **getting them on their side**. It takes empathic leaders, **team oriented**, that **encourage opposing views** and are capable of inspiring **trustworthiness** and thus get **loyalty** out of will.

5. **Knowing Yourself as a Leader**  
- Be your **own teacher**
- Accept **responsibility**, don’t blame others.
- You can learn anything you want, **don’t be afraid of failure**.
- Your **instincts and experience** allow you to ask the right people, the right questions at the right time and to arrive to the right conclusions.
- Be (or at least appear to be) **optimistic**!
Normative ethical Views

There are many types of critical ethical thinking avenues. Three of the more important ones are discussed below:

- **Utilitarianism (Goal-Based Type)**
  The basic Utilitarian message is that moral common sense is to be governed by the single dominant goal: maximizing net expected utility for all parties affected by a decision or action. In the context of general management, Utilitarian reasoning frequently manifests itself as a commitment to the social virtues of the market system, both inside the organization and outside. It is argued that the greatest good for the greatest number comes from competitive decision making, and market forces can be relied upon to minimize social harm. The guideline for management is what action or policy maximizes benefit/cost?

- **Contractarianism (Rights-Based Type)**
  The central idea here is that moral common sense is to be governed by fairness. Fairness is explained as a condition that prevails when all individuals are accorded equal respect as participants in the social arrangements. The guideline for management is what action or policy most fairly respects right?

- **Pluralism (Duty-Base Type)**
  The governing ethical idea in this view is duty. According to Pluralism, fidelity and honesty are obligations not because they lead to more welfare or because others have a right to expect them; they are just basic duties. Not to live by such duties is simply to be corrupt, bad-willed. The guideline for management is what action or policy reflects the stronger duty?

More on handling ethical conflicts in organizations

Ethical problems are the hardest that executives have to deal with, for 2 major reasons: 1) there is no textbook solutions. 2) The influence on the organization is substantial. Failing on ethical issues can be crucial both on the personal and the organizational level. In general, handling ethical and moral issues require creative, “out-of-the-box” thinking. In many times it is a question of right versus right: (1) Truth vs. Loyalty. (2) Individual vs. community. (3) Short Term vs. Long Term. (4) Justice vs. Mercy. The solutions are context specific.

Principles for resolving ethical conflicts:

1. Stench Test
   - Is concealment required?
   - “Sunshine is the best disinfectant”

2. Consequentialist Analysis
   - What are the likely outcomes and who benefits and loses?

3. Deontological analysis
   - What rights and duties are involved?
   - Are they in conflict?
Which are most important?

4. Justice and Fairness

Is fairness an issue?
How do I know what is fair?
What standard should be used?

5. Caring

How do I protect the interests and promote the prospects of those involved?

Case study dilemmas: 1) Exposing personal problems of employees. 2) Backing employees against customers. 3) Romantic relationships at work! 4) Telling on a friend that embezzled.

Leadership - Definition

Leadership is the process of persuasion or example by which an individual (or leadership team) induces a group to pursue objectives held by the leader or shared by the leader and his (or her) followers. (John W. Gardner).

Amundson vs. Scott – A Case of Differences in Leadership Styles

The case of the Race to the South Pole well reflects 2 totally different styles of leadership. Scott was individualistic, militaristic, exploiting people and not caring for communication with them very well. E.g. the final team was only told in the last minute He was not open to learn. Rather, he was unable to break out of tradition in order the things necessary to succeed in the endeavor. His people found him to be less trustworthy.

Amundson, on the other hand, was team oriented, democratic, and open for learning. He learned everything possible about the trip in advance, e.g. driving dog teams and exploring clothing in Alaska. He communicated with his people e.g. telling them their roles well in advance. His people followed him out of trust.

EAP (Employees Assistance Programs)

Corporations have, in many cases, special programs for helping employees with personal problems (alcoholism, drugs etc.). EAP is believed to beneficial both for employees and the company, as solving the problems is less expensive then letting them go. EAP are usually managed in HR (Human Resources) departments. However, a major ethical conflict is in the background: should discreet and privileged information, shared by the employees, be transferred to management when promotion opportunities are at stake? If so, EAP and HR will immediately lose credibility. On the other hand, if not – crucial information will be missed in decisions regarding promotions and appointments. There is no clear solution here!

More on leaders and followers

There are reasons for people to follow a leader, as well as there are reasons for someone to become a leader and bear all associated costs. Stable relationships between leaders and followers are based on some kind of equilibrium or reciprocity. Leaders provide social and psychological needs of followers. They are expected not only to lead the way and make the right professional decisions (task-oriented), but also to develop and maintain the relationship within the group (social-emotion oriented).
The psychological exchange between leaders and followers is described below:

<table>
<thead>
<tr>
<th>Leaders provide followers</th>
<th>leaders get in return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction &amp; Vision (Sony, 3M, Disney)</td>
<td>Focus &amp; Self Direction</td>
</tr>
<tr>
<td>Protection &amp; Security (physical, economical, organizational)</td>
<td>Gratitude &amp; Loyalty</td>
</tr>
<tr>
<td>Achievement &amp; Effectiveness (a man on the moon…)</td>
<td>Commitment &amp; Effort</td>
</tr>
<tr>
<td>Inclusion &amp; Belongingness (Chicago bears fans…)</td>
<td>Cooperation &amp; Sacrifice</td>
</tr>
<tr>
<td>Pride &amp; Self-respect</td>
<td>Respect &amp; Obedience</td>
</tr>
</tbody>
</table>

**Downsizing – a painful challenge for managers**

Laying-off employees is an important challenge for managers, as it requires true leadership and have substantial affects on the organization for the short and long term. In essence, laying-off people break the sense of protection & security expected by employees. Thus, credibility of management and loyalty of employees are in serious danger! **One has to take into account that downsizing is affecting not only the people that are being laid-off, but also the ones that stay.** Thus, the process has to take into consideration many aspects:

- Maintaining credibility of management
- Having unbiased criteria for choosing laid-off employees
- Having reliable judgment of people’s performance
- Being very clear with people about what is going on and how
- Having a sense of fairness, taking into consideration special circumstances
- Treating people with respect and dignity throughout the process
1. **The Role of Strategic Analysis in Decision-Making**
   - Aids in identifying and understanding the main issues.
   - Orders and simplifies issues.
   - Helps in navigating complex and ambiguous situations.
   - Provides logic for linking action to outcomes.
   - Supports learning, innovation and adaptation.

2. **Porter’s Five Forces of Competition Framework**
   Porter’s model of industry analysis identifies 5 forces of competition framework:

   1) Bargaining power of **Suppliers**.
   2) Threat of new **Potential Entrants**.
   3) Threat of **Substitutes**.
   4) Bargaining power of **Buyers**.
   5) Rivalry among **Existing Firms**.

   Another important force to be taken into consideration is the **Government**.

3. **Competitive Advantage and Value Creation**
   - **Competitive Advantage** means that a firm achieves a rate of profitability that exceeds the industry’s average.
   - **Economic Value** = Buyer’s Perceived Benefit – seller’s cost.
   - In order to achieve Competitive Advantage, a firm must create more **Economic Value** then the average. Firms create value by increasing perceived benefits, lowering costs or both.

4. **Resources, Capabilities, and Value**
   - **Resources** are the assets, skills, and factors of production that underlie the ability of a firm to create value. **Capabilities** are the set of activities that a firm performs particularly well in transforming inputs into outputs. Together they are considered to be the **Strategic Assets of a company**. The **key questions** in managing these assets are:
     1) How to use these best for **creating higher value**
     2) How to **capture the value** that this creates.
     3) How to **subtain a position of advantage**

5. **Corporate Strategy**
   - **Corporate strategy** involves the choice and management of **resources**, **businesses** and **organization form** and **processes**, all guided by a **vision** of how to achieve corporate advantage.

   A coherent **vision** indicates that the firm has a **corporate strategy**. The **industry choice** is critical to its success, as it influences the **value** of the firm’s **resources** and the extent to which they can be **shared** across its **businesses**. **Corporate advantage** means superior profitability due to multibusiness activities. It stems from leveraging valuable **resources** across business to achieve cost and differentiator advantages. The **organization’s structure** (formal organization chart), **systems** (set of formal policies and routines), and **processes** (the informal elements of the organization’s activities), determine how it controls and coordinates its activities.
Definition of Strategy
Strategy is a set of objectives and policies, which collectively determine how a firm deploys resources and positions itself to succeed.

More on Competitive Advantage and Value Creation
Achieving Competitive Advantage is the ultimate goal of a business’s strategy. It requires the Creation of more Value than its rivals. 2 generic strategies for Value Creation are Differentiation and Low Cost Advantage.

You can gain a competitive advantage based on Differentiation if: (*) you provide higher perceived benefits at the same cost as other firms, or (*) you provide higher perceived benefits at a higher cost, so long as the benefit increase outweighs the cost increase. To exploit Differentiation Advantage, charge a price premium high enough to offset any cost disadvantages, but low enough to make the delivered value equal to that offered competitors. You can gain a competitive advantage based on Low Cost if: (*) you provide equal perceived benefits at a lower cost than other firms, or (*) you provide lower perceived benefits at lower cost, so long as the decrease in benefits is outweighed by the decrease in costs. To exploit a Low Cost Advantage, charge a price low enough to offset any perceived benefit disadvantage, but high enough to make delivered value equal to that offered by competitors.

DON’T FORGET: benefit advantages must be viewed from the consumer’s point of view!

Resources and Sustainable Competitive Advantage
One of the most important basic questions with regard to a firm’s strategy, is how does it use its Strategic Assets (resources and capabilities) in order to achieve persistent profits, or sustainable of competitive advantage.

As mentioned above, Resources of a firm are all the assets, skills, and other factors of production that underlie the ability of a firm to create value.

Different types of resources:
- Tangible: physical, financial.
- Intangible: technologies, reputation, culture.
- Human: skills, knowledge, social skills, and motivation.

Sustainability depends on:
- Resource durability.
- Resource mobility (or tradability): can it be bid away from the firm? Can it be acquired?
- Degree of competition: resource imitability, resource substitutability.
- Environmental stability: an environmental change can change the weights of resources (e.g. the appearance of the PC).
- Stability of the strategy.

One of the main ways to achieve sustainable competitive advantage is creating limits to imitability.
There are 2 types of isolating mechanisms that limit imitability:

1. **Barriers to Imitation** (prevent other firms from fully replicating the advantage):
   - **Legal restrictions** (e.g. patents).
   - **Access advantages to inputs, channels, customers** (e.g. customers lists).
   - **Scale economies and limited demand**.
   - **Intangible barriers**:
     - **Path dependency** (dependant on historical circumstances, e.g. Airline’s slots).
     - **Tacit knowledge** (e.g. routines).
     - **Social complexity** (e.g. trust, embedded resources).
     - **Causal ambiguity** (can’t pinpoint the cause of success).

2. **Early Mover Advantage. Examples**:
   - **Learning curve and market share effect**.
   - **Network externalities**.
   - **Switching costs that increase with length of use or use of product** (e.g. frequent flyer programs).
   - **Reputation for quality “experience” goods**
     - Buyer can’t assess quality without trial.
     - Reputation lowers risk for new buyers and experience attaches old ones.

**Managing Resources**

You might want to look at this 5-stage model for managing resources:

- **Stage 1**: Identify the firm’s resources and locate areas of strength and weakness relative to competitors.
- **Stage 2**: Identify the firm’s capabilities. (What can the firm do?)
- **Stage 3**: Appraise the rent-generating potential of resources/capabilities in terms of their potential for creating, sustaining and exploiting competitive advantage.
- **Stage 4**: Select a strategy that best leverages the firm’s capabilities relative to external opportunities
- **Stage 5**: Identify resource gaps that need to be filled. Invest in replenishing and augmenting the firm’s resource base.

**Some words about Culture**

A corporate culture is a set of collectively held values, beliefs, and norms that influence preferences and behavior. A strong culture can be a source of competitive advantage if it is:

- Valuable
- Uncommon (it must differentiate the firm).
- Hard to imitate (otherwise, it won’t be a source of sustained advantage). It must be tacit, complex, and hard to manipulate.

**A culture is valuable when it increases perceived benefits or lower costs.**

**How can culture increase perceived benefits?**

- If it leads to superior service or more positive experience for customers.
- If it matches core beliefs of consumers who want to buy from like-minded firms.
- If it spurs employees creativity and innovation.
How can culture decrease costs?

- If it increases productivity, reduces waste or motivates.
- If it facilitates cooperation and reduces coordination costs.
- If it reduces monitoring costs.
- If it reduces bargaining costs.

BUT: culture can impair performance if it inhibits change:

- When the environment changes, adaptation is required.
- Culture can lock firms into old routines and ways of thinking may no longer be appropriate.
- Because culture is not easily manipulated, it may be difficult to change.

It takes leadership to build and maintain culture, to well identify if and when a change is necessary and to carry it out properly. But this is another course... (See section 4.4, “Leadership & Ethics”, Professor David Messick)
1. **Definition of Operating Strategy**
   Operational Strategy involves configuring and developing business processes that will enable a firm to produce and deliver the products specified in the business strategy. This task includes selecting and combining activities and resources into network architecture that also defines the other elements of a process, such as inputs and outputs, flow units and information structure.

2. **Operational Strategy**
   - The Strategy/Capabilities/Process/Assets framework
   - Focus and Focuses Portfolio
   - The Product-Process Matrix

3. **Managing Business Flow - The basic framework**
   - Levers for managing Capacity and Throughput - **Think Bottleneck**!
   - Levers for managing Cycle Time – **Think Critical Path**!

4. **Quality Management**
   - Levers for managing quality
Definitions

1. **Flow Rate** – the number of flow units that flow through a specific point of the process per unit of time.
2. A **resource pool** is a collection of interchangeable resources that can perform an identical set of activities. Each unit in the resource pool is called **resource unit**.
3. The **theoretical capacity of a resource unit** is its maximum sustainable flow rate if it were fully utilized during its scheduled availability (without idle periods). Likewise, the **theoretical capacity of a resource pool** is the sum of the theoretical capacities of all the resource units in the pool.
4. Resource pools with minimum theoretical capacity are called **theoretical bottlenecks**.
5. The **Throughput** of a process is measured as the average number of flow units processed over a given period of time.
6. **Cycle time**
7. The **Theoretical Flow Time** of a process is the minimal amount of time required for processing a typical flow unit.
8. **Capacity Utilization** = Throughput/ Theoretical capacity. **Capacity Utilization** indicates the extent to which resources are utilized to generate outputs.
9. A **supply chain** refers to an entire network of interconnected plants of diverse ownership with flows of information and materials between them, with the objective of coordinating production and consumption of goods and services.
10. **Product Cost** is the total cost that a customer incurs to own and experience the product.
11. **Product delivery-response time** is the total time that a customer must wait before receiving a product for which he or she has expressed need to the provider.
12. **Product variety** indicates the range of choice offered to the customer to let the product meet his or her needs.
13. **Product quality** refers to the degree of excellence—it depends on what and how well the product performs.
14. **JIT** – Just In Time manufacturing involves ordering lower quantities (producing lower batches) which will reduce average inventory and flow time. A perfectly synchronized process always supplies just the right quality product, in just the right quantity, at just the right time, and in just the right place—just as desired by the customer. These four “just right” of synchronization lay at the heart of the **JIT** paradigm that stresses production of only necessary units in necessary at necessary times.

Operational Strategy

**Operating Strategy** involves configuring and developing business processes that will enable a firm to produce and deliver the products specified in the business strategy. This task includes selecting and combining activities and resources into network architecture that also defines the other elements of a process, such as inputs and outputs, flow units and information structure.
Focus: Concept

- Select a distinct Product/Service package
- Construct an operational system (processes and assets), which is optimized with respect to the required capabilities.
- Do not serve customers that require capabilities outside your focus.

Focused Portfolio: Concept

- Divide the (actual and potential) universe of tasks into homogenous sets in terms of capabilities required.
- Select sets you wish to satisfy.
- Designate each homogenous set to a focused system, which is optimized with respect to the required capabilities of the specific set.

Process Architectures or “Types”: Job Shop versus Flow Shop

Although processes differ along their four attributes (Process: cost, flow time, flexibility, quality) most fall somewhere on the continuum between two archetypes: the job shop process and the flow shop process. The two key differences between these two process types are:

- Resource types used to perform their activities, and
- Physical layout in the processing network.

At one extreme, a Job Shop uses flexible resources to produce low volumes of customized, high-variety products. Jobs Shop include artisan bakeries, tool and die shops, management consulting firms, law firms, and architectural and design companies. Jobs Shops uses general-purpose resources that can perform many different activities and locate resources with similar functional capabilities in close proximity. A Job Shop usually has many products simultaneously flowing through the process, each with its own route.

At the other extreme a Flow Shop uses specialized resources that perform limited tasks but with great precision and speed. The result is a limited variety of product produced in large volumes. The most famous example of Flow Shop is the Automobile assembly line pioneered by Henry Ford in 1913. An assembly line is actually an example of the discrete flow shop, where products are produced as disjoint items, such as bread, cars, and computers. In contrast, beverage companies, steel plants, oil refineries, and chemical plants are continuous flow shops. Sometimes called “processing plants” they produce outputs in a continuous fashion.

Real-world processes generally fall somewhere along the continuum between these two archetypes. In a simple process in which all activities are carried out sequentially, one following the other (A single path of activities) – the total time required to complete all of them equals the sum of their individual work contents.

A process usually consist of combination of sequential and parallel activities, resulting in process chart that graphs several paths running from start to finish. Now, a flow unit can exit the process only after all of the activities along all the paths are completed. Theoretical flow time of the process therefore must be the same as the theoretical flow time of the longest path(s) in the process flowchart. Any such path is called Critical Path, and activities on the critical path are called Critical Activities. The work content of these critical activities determines the total flow time of the process. Thus a delay in completing any critical activity results directly in a corresponding delay in processing the flow unit. As a result, management of critical path is of paramount significance.
The Work Cell
An alternative to the process-based functional layout is the product-based cellular layout, in which all workstations that perform successive operations on a given product (or product family) are grouped to form a “cell”:
- Workflow oriented layout.
- Small transfer batches.
- Visual control, team ownership and incentives.
- Dedicated equipment, flexible work force (not always).
- Moderate flexibility per cell; high overall flexibility.
- Very low inventory, cycle time, low overhead.
The Work Cell layout was experienced in class, in the California Shack Simulation

Process Flow Management
Relating Flow Rate, Flow Time and Inventory

\[ I = R \times T \]

This relation is known as Little’s Law. It relates to the average flow rate (i.e. throughput) \( R \), average flow time \( T \), and average inventory \( I \).

Levers for managing Capacity and Throughput- Think Bottleneck!
Increase the availability of the bottleneck:
- Increase the number of resource units.
- Increase the scheduled availability.
- Move non-bottleneck resources to the bottleneck.
Increase the size of the load batch on a bottleneck resource.
Reduce the unit load of the bottleneck resource pool:
- Increase the speed at which work is done (work faster).
- Eliminate non-value added work (work less).
- Reduce the amount of repeat work.
- Release unutilized resources :outer loop.
- Terminate loosing projects early.
Move work content off the bottleneck to non- bottleneck resources (balance load).
Decrease the availability loss factor of the bottleneck resource due to setups:
- Reduce setup time | Increase batch size | Reduce level of time-sharing.
Decrease the availability loss factor of a bottleneck resource due to interruptions.
- Out of service | Down for maintenance | Occupied with other activities.
Decrease the idle time of the bottleneck due to variability.

Levers for managing Flow Time – Think Critical Path!
The theoretical flow time and waiting time affect the total flow time of a process. Hence, the key managerial levers for reducing the total flow time are:
- Decrease waiting time.
- Decrease theoretical flow time
- Reduce the work content of critical activities (Increase the speed at which the activity is performed | Increase the speed at which the activity is performed | Reduce the number of repeat activities | Change the product mix.)
- Move some work content of the critical path (to non-critical loop or outer loops)
The course objective was to provide participants with the methods and tools necessary to make informed decisions in providing their organizations with a sound information technology (IT) infrastructure. The five main points of the course were:

1. **IT Infrastructure: Overview**  
   *IS Economic Framework*
   
   Three types of transfer: format, time (range), and place (reach)

2. **IT Infrastructure: Delineation (Business Processes and Scope)**  
   *The Systems Approach*
   
   The Systems Approach is a method for organizing one’s thoughts by breaking down complex objects into smaller collections of interacting elements, or sub-systems. The five key elements in describing any system are its environment, role, components, arrangement of components, and resources. These elements “map” a system, as shown below:

3. **IT Infrastructure: Data (“Range”)**  
   *Data Modeling: Entity-Relationship Diagrams*
   
   In order to run a business effectively, certain data are needed. Data Analysis is required to determine the entity types involved in a business, and determines the relationships among those entity types. An example is below:

4. **IT Infrastructure: Data Communications (“Reach”)**
   
   In order to run a business effectively, patterns of access to data needs to be established. Data Comm Analysis is required to determine where data originate and where data are consumed, and determines the relationships among those locations.

5. **IT Infrastructure: Utilization**  
   *The “people” component:*
   
   How to use the people resources effectively to accomplish the system goals—redeploying human capital to achieve maximum efficiency, based on the system analyses (business process, data analysis, and communications).
The course objective was to provide participants with the methods and tools necessary to make informed decisions in providing their organizations with a sound information technology (IT) infrastructure. The five main points of the course were:

1) **IT Infrastructure: Overview**

**IS Economic Framework**

This model follows the transformation of events in the environment into actions, through the IT infrastructure. An inquiry determines the “visible” details of an associated event and generates raw data from the environment, which then must be encoded and sent through the communications infrastructure. Once it reaches its destination, it must be decoded again. The raw data must be interpreted, making it into information. With the information, a decision can be made, which will lead to a specific action in the environment by the organization.

**An example:** An insurance company must collect data about earthquakes in various regions to make decisions about prices for earthquake insurance. When earthquakes (events) happen, they must react to these events with actions (payouts to customers, research and reevaluation of policy prices/conditions). This entails collecting data about earthquakes (regions, amount of damage done per region, number of homes affected, the types of homes affected, etc.). The insurance company stores this raw data and may send it to other offices or other machines within the same office. When sending this data, various different types of machines use certain protocols, or data communication languages, to communicate (encoding, transfer, decoding). Once this information has been transferred to the location of the analysis, the data is analyzed and reports are produced from this data. These reports are used for decision-making, such as changing insurance policy prices (an action). This action by the insurance company will determine how well it will perform in the insurance market, affecting its profitability (payoff). It will also try to minimize its IT costs of analysis and reporting.

In economic terms, events and actions in the environment lead to ‘payoff’ for the organization. Additionally, IT costs incurred by the organization include the inquiry, encoding/decoding, and decision.

**The economic framework has a basic message:** IT should help businesses interpret their environment to better make decisions, and the payoffs should always be greater than the costs if done effectively.

**Data Processing:** process of transforming events in the environment into raw data stored in the organizations systems

**Decision Support:** process of transforming raw data collected from the environment into information that can be used for decision-making

Finally, there are three types of ‘transfer’: format, time (range), and place (reach).
2) IT Infrastructure: Delineation (Business Processes and Scope)

The Systems Approach

The Systems Approach is a method for organizing one’s thoughts about objects that cannot be comprehended in a “single glance”. It is a philosophy of breaking down complex objects into smaller collections of interacting elements, or systems. The five key elements of any system are: environment, role, components, arrangement of components, and resources. These elements “map” a system, as shown below:

The Systems Approach breaks a system down into various levels of detail, as shown below:

Detail Level 1--Context Diagram: the system and its environment

![Diagram of Context Diagram]

In this level, we show the system as a ‘black box’, and show how this system interacts with its environment (what are the inputs and outputs to the system, and the resources used by the system).

Detail Level 2--The system itself

![Diagram of System Diagram]

In this level, we ‘open the black box’ and look internally at the system, at its major components and how these components interact.

Detail Level 3…n -- The sub-components broken down

![Diagram of Sub-Component Diagram]

After the first two levels, we break down each component into their sub-components and look at the interactions between these subcomponents. We do this as many levels down as is required to fully explain the entire system and all components, sub-components, sub-sub-components, etc.
3) IT Infrastructure: Data Management (Range)

Data Modeling: Entity-Relationship Diagrams
In order to run a business effectively, data are needed. Data Analysis provides a language for discussing data and helps to determine the entity types involved in a business, and the relationships among those entity types. An example is below:

Example:

![Entity-Relationship Diagram]

In the above simple Entity-Relationship Model example, we have defined a world where a student enrolls in many courses (s/he cannot enroll in zero or one course), and a course has many students (there are no courses with zero or one students). Additionally in our example, a student has zero or one spouse, and the spouse, and the spouse is married to zero or one student.

Once an Entity-Relationship Data Model is complete, we can then go deeper into detail by defining the attributes of the entities. An example here would be the student, who has attributes of name, student ID, address, phone number, etc.

4) IT Infrastructure: Data Communications (Reach)

Rudimentary data comm planning is the basis for discussing the pattern of access to data in the organization. Managers must be able to articulate an organization-wide data communications "map," with an emphasis on the designation of data origins (i.e., capture and generation) and critical destinations (i.e., use and access) functional locations. The method identifies for each “chunk” of data its functional origin (i.e., an internal or external component) and its functional destinations (again, inside or outside the system’s boundary) and the level of responsiveness associated with data availability. The consolidated linkages among origins and destinations define the overall connectivity required to run the business and serves as the basis for evaluating alternative levels of connectivity.

5) IT Infrastructure: Utilization

The “people” component: How to prepare and use the people resources effectively to accomplish the system goals—redeploying human capital to achieve maximum efficiency, based on the system analyses (business process, data analysis, and communications). Managers need to be able to inter-relate technology, tasks, rewards, organizational structures and personal skills in shaping the capability of the organization to use its IS.
1. **Common Law vs. Civil Law**  
   **Common Law:** This system is prevalent in regions originally governed by the English, and works on the principle of precedents. Judges who issued their opinions in deciding cases develop the law; the principles announced therein would then become precedents for judges deciding similar cases.  
   **Civil Law:** This system descends from the Romano-Germanic Civil law system, and uses the civil code and parliamentary statutes as the sole source of law.

2. **Tort:**  
   Tort is a French word for a wrong. Tort law protects a variety of injuries and provides remedies for them. Typically an injured party can bring a civil lawsuit to seek compensation for a wrong done to the person or the person’s property.

3. **Contracts:**  
   A contract is a promise or a set of promises for the breach of which the law gives a remedy or the performance of which the law in some way recognizes a duty.  
   
   The **offeror** is the party who makes an offer to enter into a contract; the **offeree** is the party to whom such an offer is made. A contract is created when the offeree accepts the offer.

4. **Fiduciary Duty:**  
   This is the duty of loyalty, honesty, integrity, trust and confidence owed by directors and officers to their corporate employers.

5. **Section 10(b) & Rule 10b –5:**  
   A provision and a rule of the Securities Exchange Act, 1934 that prohibits the use of manipulative and deceptive devices in the purchase or sale of securities in contravention of the rules and regulations prescribed by the SEC.
1. **Torts**
   a. Intentional torts: This requires that the defendant possessed the intent to do the act that caused the plaintiff’s injuries. Examples of this are
      i) To the Person: assault, battery, false imprisonment, defamation, tort of outrage etc.
      ii) To property: Trespass, conversion of personal property etc.

   b. Unintentional torts: A doctrine that says a person is liable for harm that is the foreseeable consequence of his or her actions. Breach of duty of care has to be proven in cases of negligence. Some examples of unintentional tort:
      i) Professional malpractice is the liability of a professional who breaches his or her duty of ordinary care.
      ii) Negligence per se is a tort where the violation of a statute or ordinance constitutes a breach in the duty of care.
      iii) Good Samaritan law relieves medical personnel from liability for ordinary negligence when they stop and render aid in emergency situations.

   c. Strict liability is liability without fault. This doctrine holds that there are certain activities that can place public at risk of injury even if reasonable care is taken and that the public should have some means of compensation if such injury occurs.

2. **Contracts**
   a. Objective theory of Contracts states that the intent to contract is judged by the reasonable person standard and not by subjective intent of the parties.

   b. **Elements of an enforceable (valid) contract:**
      i) Agreement: There has to be an offer by the offeror and an acceptance by the offeree.
      ii) Consideration: The promise must be supported by a consideration that is legally sufficient
      iii) Contractual Capacity: The parties to the contract must have contractual capacity, some people like minors, people adjudged insane etc. do not have this capacity.
      iv) Lawful object: The object of the contract must be lawful. Contracts to accomplish unlawful activities are void.

   c. **Types of contracts**
      i) Bilateral Contract: A promise for a promise
      ii) Unilateral Contract: A promise for an act
      iii) Express Contract: A contract expressed in oral or written words.
      iv) Implied in-fact Contract: A contract inferred from the conduct of the parties
      v) Quasi Contract: A contract implied by law to prevent unjust enrichment.

   d. **Promissory Estoppels:** An equitable doctrine that prevents the withdrawal of an offer by an offeror if it will adversely affect a offeree who has adjusted his or her position in justifiable reliance on the offer

   e. **Agreement**
      i) Rejection: Any express rejection terminates the offer
      ii) Counteroffer: A counteroffer simultaneously terminates the offeror offer and creates a new offer.

      iii) Mirror Image rule states that in order for there to be acceptance the offeree must accept the terms as stated in the offer.
iv) **Mailbox rule** states that the acceptance is effective when it is dispatched even if lost in transmission.

f. **Consideration:** Something of legal value given in exchange of a promise
   i) **Bargained for exchange:** The contract must arise from such an exchange, gratuitous promises or gift promises are not enforceable. Nominal considerations are also not considered sufficient.
   ii) **Illegal or illusory consideration:** A contract cannot be supported by an illegal consideration. An illusory consideration is said to exist when in a contract both parties can choose not to perform their contractual obligations.
   iii) **Moral consideration** is not treated as legal consideration
   iv) **Preexisting duty:** A contract lacks legal consideration if a person promises to perform such acts that he or she is already under obligation to perform.
   v) **Past Consideration:** A prior act or performance will not support a new contract.

3. **Fiduciary Duty:** In general the courts are heavy handed if the duty of loyalty or obedience is in question. In the case of duty of care, sufficient leeway is given in order not to make officers overly risk averse.

   a. **Duty of Obedience** – The officers must act within the authority conferred upon them by the state corporation statute, the articles of incorporation, the corporate by laws and the resolutions adopted by the board of directors.
   b. **Duty of Care** – This requires that officers must use care and diligence when acting on behalf of the corporation, however the business judgment rule says that the officers are not liable for honest mistakes of judgment.
   c. **Duty of Loyalty** – This states that the directors and officers have not to act adversely to the interests of the corporation and to subordinate their personal interests to those of the corporation and its shareholders.

4. **Section 10(b) & Rule 10b-5:** One of the main purposes of this section is to prevent insider trading.

   a. **Insiders** are defined as
      i) Officers, Directors end employees at all levels of the company
      ii) Lawyers, accountants, consultants and other agents and representatives who are hired by the company on a temporary and non-employee status to provide services or work to the company
      iii) Others who owe a fiduciary duty to the company

   b. **Insider trading** is when an insider makes a profit by personally purchasing or selling shares of the corporation prior to public release of favorable or unfavorable information. It is the deemed duty of the insider to either abstain from trading in the securities or to disclose the information to the other side of the transaction.

   c. **Tipper-Tippee** liability: A person who discloses material non-public information to another person is known as a tipper. The person who receives such information is known as a tippee. Both tipper and tippee are liable for any profits made on the basis of such information. If the tippee further discloses this information the entire chain of people is liable if this information is used to generate profits.
1. **Price setting questions – “do’s and don’t”**
   - When setting prices, some types of questions _should_ be asked and some _should not_ be asked.
   - When deciding which questions should and should not be asked, the 3 major factors of pricing, as summarized below, need to be understood:
     - Costs
     - Customer needs and wants based on their perception of what is useful
     - Competition

2. **Price as an Element of the Marketing-Mix**
   
   This course explores the psychological and economic basis which will enable the manager to make more effective pricing decisions. The cost of the product is considered in addition to different competitive and psychology aspects. It views price as part of the marketing mix; product, price, promotion and place.

3. **Psychological Foundations of Pricing – Price Elasticity Price Sensitivity**

   _Implications of price sensitivity_ – Price is the level measure of sacrifice in microeconomics. It is not necessarily a benefit issue. In order to support a low price, we need to make our consumers more price sensitive. If you want to support a high-priced item you must distinguish it in some way so that consumers are less price sensitive.

4. **Perceived Value to the Customer**

   When making purchases, the customer incorporates certain psychological/behavioral value processes. There are different types of value to the customer:
   
   a. **Value in Use**
      - Value to the customer from having and using the product vs. doing without
   
   b. **Value in Exchange – Compute This**
      - Value to the customer vs. Competitive Alternative
   
   c. **Perceived Value – Convince This**
      - Value which the customer actually recognizes, is convinced of, and believes
   
   d. **Expressed Value**
      - Price that the customer is willing to pay communicated by the customer as part of price negotiation.
1. **Definition**

“Marketing is the human and societal process of satisfying needs and wants through the exchange process.”

2. **Price setting questions – “do’s and don’t”**

When setting prices, some types of questions should be asked and some should not be asked.

a) The following types of questions are **commonly** asked, but **should not be asked**:
   - What price will cover costs and achieve our profit objective?
   - What price is the customer willing to pay?
   - What price will enable us to achieve our sales and market-share objectives?

b) **Three** major factors influence price:
   1. Cost
   2. Customer needs and wants, based on their perception of what is useful
   3. Competition

   The following types of questions, which focus on these three major factors, **should be asked**:
   - What changes in our prices or product mix would increase the contribution available to cover our costs and increase our profits?
   - What prices are justified by the value of our product/service to the customer?
   - How can we better *segment the market* for pricing to reflect differences in value to different types of customers?
   - What level of market share can we most profitably achieve?
   - With what weapons can we most effectively compete? Advertising, R&D, Relative Advantage

3. **Economic Foundations of Pricing**

“The coefficient of price elasticity of demand measures the percentage change in the quantity of the commodity demanded per unit of time resulting from a given percentage change in the price of the commodity.”

4. **Psychological Foundations of Pricing**

This aspect views how psychological factors can cause *price sensitivity* that can be differentiated from *price elasticity*.

<table>
<thead>
<tr>
<th>Price Elasticity</th>
<th>Price Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Level – Demand Curve</td>
<td>Individual based upon segmentation of consumers</td>
</tr>
<tr>
<td>Ignores individual Buyer</td>
<td>Relates to the individual Buyer</td>
</tr>
<tr>
<td>Ignores the rational for the decision to buy</td>
<td>Describes and explains the drivers</td>
</tr>
<tr>
<td>Quantitative</td>
<td>Qualitative</td>
</tr>
<tr>
<td>Precisely defined but lacks in meaningfulness</td>
<td>Somewhat fuzzily defined but potentially insightful and actionable</td>
</tr>
</tbody>
</table>
There are several price sensitivity factors:

1. **Unique Value Effect** –
   Buyers are less sensitive, the more they value unique attributes

2. **Substitute Awareness Effect** –
   Buyers are more sensitive if there are suitable substitutes

3. **Difficult Comparison Effect** –
   Less sensitive if it is difficult to evaluate competing offer

4. **Total Expenditure Effect** –
   Buyers are more sensitive when expenditure is larger

5. **End-Benefit Effect** –
   Buyers are more sensitive when sensitive to cost-benefit

6. **Shared Cost Effect** –
   Buyers are less sensitive the smaller the portion of the price paid

7. **Switching Cost Effect** –
   Buyers are less sensitive, the greater added costs of switching

8. **Price-Quality Effect** –
   Buyers are less sensitive, if higher price = higher quality

9. **Inventory Effect** –
   Buyers are more sensitive if they can hold inventories

10. **Fairness Effect** –
    Buyers are more sensitive, when the price is outside the “fair” range

5. **Prospect Theory**

   Consumers tend to set a reference point for valuing the price.

   **Passing on Costs** – A table is set at a certain price. If the cost of materials is raised by $30 it is deemed “fair” to raise the price by $30 but no more. Although - If there is a decrease in the cost, it is deemed “fair” if the seller does not reduce the price to reflect the reduced cost.

6. **The Dual Entitlement Principle**

   Each Party to an exchange is entitled to the terms of a reference transaction.

   A firm cannot arbitrarily increase profits but it can set new terms in order to protect its profit.

7. **Economic Value to the Customer - EVC**

   The economical value to the customer is a hypothetical price whereby a risk neutral customer will only consider the economic aspects and is otherwise indifferent between buying one product as opposed to another.
Example, suppose that you have to change batteries in a new product every four months instead of every ten days. How much more would you be willing to pay for that product? EVC- price of alternative is used as reference point and add differentiation value of replacement savings of batteries to arrive at EVC price. If your price is lower, the customer will buy your product. Of course, this is a simplified example. You would have to add the cost of added sales expenses and subtract negative differentiation values such as your risk factor.

8. **The Role of Costs in Pricing**

*Cost-driven pricing* is very problematic from many reasons, among others:

- It refrains us from using Price Leverage (Based on Fortune 1000 research, 1% increase in Price creates operating profit improvement of 12.3%)
- It assumes that cost causes Sales (Product->Cost->Price->Value->Q), while in reality Price causes quantity and therefore costs (Customer->Value->Price->Q, Cost).
- While successfully reducing the cost, using Cost+ you are penalized, by giving more to the customer.
- Sales people, whom there commission is a margin of the price, are quicker on the trigger in reducing price.
- Last but not least, mostly, we use wrong cost data.

While looking at costs we should look on the following *relevant* costs:

- **Forward Looking**: not historical costs, not FIFO, not LIFO, but NIFO (Next In First Out)
- **Incremental**: Those costs that change because of changes in pricing and sales.
- **Avoidable**: Costs that have not yet been incurred or that can be reversed.

In general when calculating costs remember: “It is better to be approximately right than precisely wrong!”

Variable cost is very important when deciding on price change (up or down), while keeping profitability level (or improving it). Changes in price drive changes in quantity, hence, in order to keep profit as constant we need to understand the required change in the quantity (ΔQ). Comparing this to the market elasticity will give us a clear answer as to whether to change the price.

(e.g. when *variable* costs are low, reducing the price required only slight change in the quantity, hence, if the demand curve is elastic we should go for it…)

9. **Competition in Pricing**

Competition in Pricing is a *Negative-Sum Game*, which means that even the winner loses. It even reminds us of the Prisoner’s Dilemma: while both criminals can be better off by not confessing, in reality they will both confess and therefore will sit in prison (Nash’s equilibrium). The same is true when competing on price; while both companies can be better off (larger profit), they will both lose margins and will lose the game.

The main difference between the Prisoner’s Dilemma and Price Competition is that Price Competition is a repeated version of the Prisoner’s Dilemma. As such, players should take a *TIT for TAT Strategy*, which in general says cooperate on move 1, and do whatever the other player did in the previous move. In such situations you are signaling that you are Nice, Forgiving, Provoked, and Clear. Signaling is a very important action in price-competition and using a TIT for TAT strategy will signal the other that you better keep prices high and you will both be better off.
A. Practical implications of game theory

Every time when you find yourself in an interactive situation where the payoffs of each participant depend on the actions of all the persons involved, you are engaged in a Game.

1. Basic rules
   - When you are engaged in the game, you’d better recognize it, analyze it, to your own benefit.
   - If the analysis shows that you cannot benefit from the game, consider a change of the rules.
   - If you want some people to behave in a certain way, don’t ask – design a game that leads them to the desired behavior.

2. Understanding other people’s behavior

Dominant strategies – examples
   - Prisoner’s dilemma
   - Mass transportation and other common resources
   - Second price auctions

Nash equilibrium – examples
   - Battle of sexes, Chicken game (crossroad, hawk-dove situation)
   - Other examples: coordination games, load games.
   - Building a new road

   *Building an additional road can make traffic situation worse rather than better!*

Games without perfect information
   - The story about two tribes: Supplying one party with more information didn’t benefit this party. In fact, it hurt both of them. It is the lack of information that makes insurance work.

3. Setting the rules and influencing other people
   - Mediation
   - Judgment of Solomon
   - Matchmaking

B. Game Analysis

1. Analysis of the Game in Simple form

2. Analysis of the game in Extensive form

3. Cooperative games

C. Concepts and Principles glossary
A. Practical implications of game theory

Every time you find yourself in an interactive situation where the payoffs of each participant depend on the actions of all the persons involved, you are engaged in a Game.

Basic rules

- When you are engaged in the game, you’d better recognize it, analyze it, to your own benefit.
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Understanding other people’s behavior

Dominant strategies – examples

- Prisoner’s dilemma - In prisoner’s dilemma, confessing is a dominant strategy
- Mass transportation and other common resources
  - Using private car (as opposed to bus) is a dominant strategy, but if everybody rode by bus, they could spend less time than they do. Other examples for use of common resources: Air pollution, overpopulation, fishing areas
  - In the examples mentioned above each player can choose an action which is both harmful and beneficial. The benefits are player’s only, whereas the harm is shared by all players.
  - Choosing this action is a dominant strategy for each player. If all players abstained from this action, their benefit would be higher.
- Auctions
  - In a sealed-bid, second-price auction, bidding the value is a dominant strategy.
  - The second price is maximum what the seller can expect to get in any type of auction.

Nash equilibrium – examples

- Battle of sexes, Chicken game (crossroad, hawk-dove situation). In both of these games, there are two equilibria. In battle of sexes equilibria are “both go to the football” and “both go to ballet”. Problem is to choose between the two.
- Building a new road: Building an additional road can make traffic situation worse rather than better, as in the example.

Games without perfect information

The story about two tribes: Supplying one party with more information didn’t benefit this party. In fact, it hurt both of them. This is how insurance works. Insurance system is based on lack of information. If some people had more information about future accidents, the others wouldn’t insure and nobody could share the risks. Other example for the same principle: the stock market can not operate properly when there is inside information.
Changing the rules and influencing other people

Mediation
By using a mediator, who recommends to each of the players what action to choose, it is possible to achieve better payoffs to all player, than in Nash equilibria. Sometimes the recommendation can be fully known to all the players, as in the traffic light at the crossroad, which is a mediator that chooses between two equilibria: stop-go and go-stop. Sometimes only partial information should be revealed to each player, concerning the recommendation to the others.

Judgment of Solomon
The idea of Solomon’s Judgment is to design the rules of the game so that the game will lead to a desired result. Condition: You should be able to enforce participation in the game.

Matchmaking
Stable matches in a two-sided market are hard to achieve by standard market mechanisms. A central clearing-house can generate one. A person who doesn’t have a match in a stable matching, will stay alone in any stable matching. This refers to unemployed and unmarried people.

B. Game analysis

Analysis of the game in a simple form

Look for the dominant strategies
Concepts and Principles:
- Strategy, strongly dominant, weakly dominant

Examples and implications:
- Prisoner’s dilemma, second-price auction, mass transportation, common use of resources

Iterated elimination of dominated strategies
Concepts and Principles:
- Strongly dominated, Weakly dominated, interactive epistemology

Examples and implications:
- Common use of resources

Look for the Nash equilibria
Concepts and Principles:
- Best reply, Nash Equilibrium

Examples and implications:
- Battle of sexes, Chicken, Load games, Coordination games

Look for equilibrium in mixed strategies
Concepts and Principles:
- Pure strategy, Mixed strategy, Nash Equilibrium in mixed strategies, Correlated equilibrium
Examples and implications:
  - Penalty kicks, Princess’ bride

**Analysis of the games in extensive form**

**Games with perfect information**

Concepts and Principles:
  - Zermelo’s theorem, Perfect equilibrium

Examples and implications:
  - Chess

**Games without perfect information**

Examples and implications:
  - Red or black?, Insurance and information

**Cooperative games**

**Matching**

Concepts and Principles:
  - Stable matching, deferred acceptance algorithm, match feasibility

Examples and implications:
  - Medical interns, spin-dating club

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**C. Concepts and principles - glossary**

**Strategy**

Interactive situation, the result of which depends on the actions of its participants, is a game. Participants in the game are players. Actions available to the players are strategies.

**Strongly dominant strategy**

A player’s strategy is strongly dominant if it yields the player a payoff higher than any other strategy, for any combination of other players’ strategies.

**Weakly dominant strategy**

A player’s strategy is weakly dominant if it yields the player a payoff not lower than any other strategy, for any combination of other players’ strategies, and for some combination of other players’ strategies, a higher payoff than any of his strategies.

**Strongly dominated strategy**

A player’s strategy is strongly dominated by another strategy if the first yields the player a payoff lower than the second one, for any combination of other players’ strategies.

**Weakly dominated strategy**

A player’s strategy is weakly dominated by the another strategy if the first yields the player a payoff not higher than the second one, for any combination of other player strategies, and for some combination of other players’ strategies, a lower payoff than the second one.

**Iterated elimination of dominated strategies**

See example in reference part
Interactive epistemology
The term refers to thinking about what the others think. When a player thinks about what her opponents think, she thinks, in particular, what they think about what she thinks, and what they think about what she thinks about what they think, and so on ad infinitum. Sometimes, one does not have to go all the way to infinity to reach a conclusion, as in iterated elimination of dominated strategies. Sometimes the infinite hierarchy of thoughts about thoughts is reached instantaneously, as in knowing your name once you told me, knowing that you know that I know and so on.

Common knowledge
Common knowledge is a fact that is known to several people, and the fact that it is known to everybody is known to everybody, and the fact that it is known to everybody that it is known to everybody is known to everybody, and such to infinity. Common knowledge is impossible to get without direct communication.

Best reply
Player’s strategy is a best reply in a given combination of strategies, if he cannot gain by deviating to another strategy.

Nash Equilibrium
Strategy combination in which each player’s strategy is a best reply is Nash Equilibrium.

Pure strategy
Player plays pure strategy if he chooses one strategy from a fixed set.

Mixed strategy
A player plays a mixed strategy if he chooses pure strategies according to some probability distribution over his pure strategies.

Nash Equilibrium in mixed strategies
Mixed strategy combination in which none of the players can gain by changing to another mixed strategy is a Nash Equilibrium.

Nash theorem
Every game with finitely many strategies and players has an equilibrium in mixed strategies

Correlated equilibrium
Consider a distribution over combination of pure strategies. Assume that a mediator chooses a strategy combination according to this distribution, and recommends to each of the players to play his part in the combination. If obeying this recommendation is an equilibrium, than the probability distribution is a correlated equilibrium.

Zermelo’s theorem
Games without tie
In a two-player game with perfect information, in which one of the players wins and the other loses, one of the players has a strategy that guarantees him a win (a winning strategy).
Games with a tie
In a two-player game with perfect information, in which one of the players wins and the other loses, or there is a tie, either one of the players has a winning strategy or each has a strategy that guarantees a tie.

Perfect equilibrium
A strategy combination is a **perfect equilibrium** if the strategy combinations induced in each sub-game is an equilibrium of the sub-game.

Matching
Process of matching is possible in two-sided markets like employers-employees, universities-applicants, matchmaking, and in single-sided markets like teaming up of the roommates.

**Matching** is a set of pairs (matches) from the two sets of participants (for the two-sided markets) or one set of participants (for the one sided market)

Stable matching
Matching is stable if there is no pair of participants who object to it. Pair of participants object to the matching if they prefer each other to their current matches

Deferred acceptance algorithm (DAA)
Suppose there are N boys and N girls, each boy has preferences over girls and each girl has preferences over boys. DAA algorithm proceeds as follows:

On the first day each boy goes to his most preferred girl. The girls who have more than one boy come to them send away all the boys except one who is asked to come tomorrow. Next day the boys that were asked to come do so, and those who were rejected come to the second preferred girl, and so on. The process ends when no one is rejected. This process always ends in a stable matching.

Described algorithm is a DAA with boys proposing. DAA with girls proposing (girls come to the boys) will also give a stable matching, which can be different from the first one.

Match feasibility
A girl is feasible to a boy and he to her, if there is a stable matching in which the boy and the girl are matched. Some facts:
- The girl matched to the boy in the DAA with boys proposing is the most preferred among those feasible to him
- The girl matched to the boy in the DAA with girls proposing is the least preferred among those feasible to him
- If there are unequal numbers of girls and boys, those who stayed alone in one stable matching, will be unmatched in any stable matching.
1. **Definition**

   **International Business Technology Transfer** is the sale or concession, in order to make profit, of a written or oral set of knowledge, which will allow the buyer to use tools, techniques and methods, in the same way than the seller for him to be able to manufacture and to make profit out of this operation.

   The course addressed challenges regarding international Technology Transfer (TT) process, opportunities and threats, as well lessons learned from the multinational companies that had implemented the process successfully.

2. **Overview**

   This course summary is based on the following *five* sections:

   1. International technology transfer management
   2. Licensing - Managing transtech within and through Joint Ventures
   3. Managing “Coopetitions”
   4. Managing technology Intelligence and competitive intelligence.
   5. Applications of Innovation and technology management Managing innovation within European Multinational (Nestle, Nokia)
(a) International technology transfer management

**Definition:** The art of transferring progressively and in an order fashion, within a product and/or market expansion plan (internationalization, delocalizations, diversifications), and with a view to making profit: technologies, knowledge, know-how, formalized methodologies (technical documentation, software, trademarks, licenses) or implicit methodologies (organizational learning), enabling the receiver to appropriate and benefit from new processes (production, innovation), technique (marketing, management, accounting) and key competencies.

Technologies are sets of know-how. They can relate to both technologies and processes.
- A “product technology” is a set of know-how relating to a particular product, and
- A “process technology” is a set of know-how related to a type of operation.

People make technologies and knowledge transfer, therefore internal and external organizational communications is critical, and is to be managed over long periods and in continuity.

The management of technology transfer process follows *five* basic principles for the issuer and receiver: building trust and the quality of the human resources, risk limitations, selection process for the right partner and the transfer mode, progressive within a milestone transfer plan, cross fertilization and network management of the joint entities.

The **five steps of Technologies transfer** are: Show-How, Know-How, Know-Why, Know-Everything and Boomerang Effect.

The transfer of Technologies also evolve through **five phases:**

1. **Initial phase – Incubation**
   Evaluation of technological capabilities, technologies life cycle, human abilities, competitors (competitive intelligence), know-how formalization, Hierarchy Country / AREA.

2. **Strategic choice – Anticipation**
   During this stage the points to anticipate are Price of Technology, Transfer Mode, Choice of Potential Partners and of Potential clients, Typical agreements like protection of Know-How.

3. **Phase of Negotiation – Confrontation**
   This phase included: Negotiation, Risk Management and Technology Transfer and Cross-Cultural matters.

4. **Realization – Implementation**
   Phase of Realization included: transmission of know-how, training and technical aid, Financing, Project Management, and Adaptation of Technologies to local specificity.

5. **Follow-up - Permanent assistance**
   Follow-up phase (accompaniment) included: Collection of Royalties, Technological expertise of the Partner, Diffusion (technological, external), feedback about technological improvements realized by the Buyer, contract and Agreements, Involvement of the Buyer in the Licensee Network.
Progression of technology transfer is measured in time by the depth in Know-How transferred in Technical, Production, Management, Marketing and R&D fields. The Transfer Progressively can be achieved through:

- **Minimal transfer (JV)** where the technology is not the fundamental issue.
- **Partial transfer** where quite a large part of its technology and know-how is transferred to the receiver, usually based on previous cooperation.
- **Open Transfer** where the strategy is to transfer a “package” of know-how and doesn’t fear the boomerang effect, usually depends on the will to cooperate without binding agreements.
- **Integration Transfer** is based on long-term Partnership agreements between the partners.
- **Total Transfer** where the transmitter carries out a complete transfer of all the key competencies and benefits in return from all the technological developments of the receiver.

The Technologies Transfer is implemented to achieve the strategic objectives of the transmitter, on the level of technological control based on the short terms to long term’s relationships and financial and management involvement through: Patents transfer, Turnkey project, License, Alliances, Franchising, Joint Venture and Merger & Acquisition.

**Networking: Be careful!** Using open licensing policy, the licensor may become isolated if it does not manage the licensing network carefully, with its partners.

**International technology transfer risk management**

The risk that the companies may face during a project that required international TT can be technological and commercial. In addition, in some countries there’s no tradition in respecting intellectual property. The other threat is the boomerang effect that can allow the current partner to become your main competitor. Some defense strategies are:

**Contractual weapons**

- Create partnership with local manufacturers, to reply to the bids of the neighboring countries to avoid direct economic war.
- Extend partnership agreements to other manufactures in the region to spread the TT and to maintain the role of integrator
- Consider partnership with a strong competitor for futures bids in a respective geographic area.

**How to resist to the boomerang effects**

- Transfer Know-How progressively and measure strategic impact at each step.
- Reach agreements concerning allocation of production quotas between partners
- Keeping the technological advance by an efficient R&D activity.
- Control the dissemination of technology through close co-operation with subcontractors and in particular with those providing training
- Total control of the Supply Chain Management
- With restrictive clauses concerning the use of technology
- With restrictive clauses concerning the access to certain markets
- With restrictions to the extent of technology transfer
- With partnership in Research and Development.
- Good contract associated with an excellent layer
- R&D investment and improvement of processes
- “Train the trainers” program
- Technical assistance
- “Business intelligence” and “Technology watch”
- Permanent human contact
(b) Licensing - Managing transtech within and through Joint Ventures

General definition of licensing: Contractual business relationship between a holder of technology and a third party wishing to use the technology. The term of technology may include: patents, trademarks & logos, copyrights & know-how. Possible strategy of licensing:

- **No license (Monopoly strategy)** – keep their own patents and technologies for their own use to sustain a competitive advantage for their products
- **Purchase of license** – companies preferring to focus on the manufacturing side with up-to-date technologies.
- **Peace of patents** – Seeking cross-license agreement
- **Income** – Companies wishing to “cash in” on their patents and technologies.

Decision factors for the selection of a licensing strategy:
Type of products, Concentration of the business, Product life cycle, Strength of the R&D of a Company, Manufacturing activities, Enforceability of the IP rights, Openness of the countries where the company wants to sell its products, Standardization issues (Sony Betamax versus JVC, Apple versus Windows), Market size and/ or market share

How to estimate the value of a License agreement? Technology pricing
The technology pricing is impacted by numerous factors as follows:

1. **Technology offers:**
   - **Embryonic technologies** – require significant development before being able to be used for production in an economically profitable way.
   - **Already develop technologies** - proven in other fields, require limited development for their adaptation and integration.
   - **New, already developed & marketed products** – being able to be quickly implemented, require only an adaptation of the production & marketing structure
   - The above technologies can be exploited in different ways like: Patent registration, developing and marketing new products, company creation and licensing, industrial franchise, technology exchange, technical assistance, Joint venture and Company sale.
   - **Confidentiality is fundamental:** know-how exists only when not known to the public.
   - **Pre-select marketable technologies** is based on evaluation of scientific and technical validity, degree of maturity, technical performance, economic advantages, levels of protection (patents, registered trademark and models) and their marketing potential.
   - **For new technologies** the evaluation requires a more detailed procedure that request evaluation of: Legal aspects, scientific and technical assessment, commercial evaluation (which are the applications of this technology, competing products, market size, who are the end users)

2. **Marketing plan**
Know the objectives of the sale of this technology, characteristics of the international markets of this technology and the segmentation of the potential customers. **Reject** the project if the potential income is not very much higher than the transaction costs!

3. **Financial provisions** – the method of calculating the license price is generally twofold:
   - **Payment of fixed amounts** (on signing the contract or fix payment per item). Cash payment is preferred.
Section 5: General Management & Strategy
International Business Technology Transfer - Professor Daniel Rouach

- **Payment of royalties** (variables sums linked to operating results). License royalties usually vary from 0.5% to 10% of net sales. (Exceptionally may reach 15%) Depends on the extent of the competitive edge afforded by the license, the period during which the competitive edge lasts linked to the quality of the protection provided by the patent, the profitability of the licensed activity and the size of the market open to the licensed products.

- Other aspects such as maximum royalties, penalties, taxation as well accounts audits should be agreed to allow the licensor to exercise a right of sales inspection.

(c) Managing “Coopetitions”

**Co-opetition** can be defined as an *alliance* activity between one or more partners that decide to work together (in ideal case towards a true partnership by combining brains and resources) to create enough value for each to be satisfied with the return. To keep this alliance healthy, a continuous process of monitoring of the partner relationship, adjust payoffs, watch for “strategic space” collisions, between alliances and parents, manage carefully the interfaces with the partner, manage the cultural differences, do not “micro” manage from the parent level and finally if the alliance has served its purpose, end it!

(d) Managing technology Intelligence and competitive intelligence.

Business intelligence is defined as “*the art of locating, collecting, processing and storing information to be made available to people at all levels of the firm with the view of shaping its future but also of protecting its present against competitive threat*”.

(e) Applications of Innovation & technology management, interaction of R&D & Intelligence Management within European Multinational companies

1 Nestle - Food industry

In the modern economy, multinational firms (such as Nestle) are highly decentralized, with each business unit enjoying a high level of autonomy. Despite such decentralization, the strength of the organization lies in its *cultural* and *operational* homogeneity internationally.

To maintain the right balance between high decentralization, and common business goals of the BU, the Nestle World Trade Corporation is divided into *three* main units:

- **Nestle SA** Parent organization – holding company that controls the financial assets of all Nestle owned businesses, oversees the profitability of each business unit and allocates the financial resources across the group
- **Nestec SA** provides on a contractual basis a range of support services to the entire group consisting of: technical, scientific, commercial and administrative.
- **Nestle World Trade Corporation** is responsible for all import / export activity and drives the International business development of the group.

Nestle corporate mantra is “*Think global, act local*”. Its strength is to embrace the world as a single market and yet create space in its business strategy for local and regional market characteristics. *Local adaptation is critical.*

It is corporate priority that the Nestle Group of companies maintains technological leadership in all of its area of research, industrial activities and distribution. Nestle has developed a network system for the management of its technology base. Nestec SA sits as a brain center of the system and oversees the corporate hold on Group-wide technological resources and know-how. Nestec has also responsibility for Nestlé’s products patents, which it makes available to the Group business units on a royalty basis. Operates as internal
consultancy unit provide access to R&D knowledge, processes, facilities, quality standard and performance benchmarks, technical assistance of qualified experts. Group to leverage the corporate technology base and technological know-how group-wide to optimize the technological base.

The kind and amount of technology transfer from Nestle to a business unit will vary somewhat, however Nestle will get unlimited, unrestricted access to the knowledge and know-how of each and every Nestle business unit world-wide.

Nestle organizational approach to know-how dissemination incorporates numerous benefits including: Faster reaction time than the competition; Better, more consistent service; Better product quality; Greater control of risk; Cost savings; Cross-fertilization with direct impact on innovation, a key factor of Nestlé’s competitiveness.

Improved competitive intelligence - The know-how dissemination approach strengthens Nestlé’s strategic information and competitive intelligence flow of strategic information through the organization. A continuous flow of information guides decision making, enabling business units to anticipate competitor’s moves and market changes and to focus on innovation.

R&D is the key to globalization - In the food industry – international dialogue and teamwork is critical to innovation.

Interaction of R&D and Intelligence Management
Model of large companies with small domestic markets with little R&D resources in their home country.

Nestle R&D model stands at the crossroad of the hub model and the integrated R&D network: R&D at Nestle is characterized by its minimal stands towards decentralization and a strong corporate control over the R&D agenda. Organization of R&D at Nestle is a Worldwide Network with Centralized Decision-Making.

R&D center tightly coordinates decentralized R&D activities by means of an R&D framework program. As a consequence, efficient technology transfer and permanent technical assistance are guaranteed.

The R&D center in the home location establishes a worldwide lead in most technological fields and remain the main laboratory for R&D activities; local R&D sites focus their researches on specific technological areas. The research centers: worldwide specialization with local sensitivity.

Applied research is being conducted by the central R&D Division, which manages a network of 17 Research Companies (RECO) with 20 R&D centers.

Major issues for global R&D management at Nestle:
1. Realize synergies between decentralized R&D competence centers.
2. Link research with business development.
3. Move towards a learning organization (knowledge management).

The mission of the RECO is twofold: (a) develop new product and production processes; (b) improve existing products through the optimal of all technological knowledge, nutritional science and socio-economic analyses available at Nestle.

The projects are classified according to theirs strategic weight and their short or medium-term influence on the business.
SBU role is to define the long-term orientation in R&D and marketing; lend assistance to subsidiaries. SBU are reviewing and approve the “brief” on the proposed projects that was issued by the Operational entities and if approved the project manager and the people involved in it communicate freely with the relevant operational companies.

R&D team are project focused, sometimes manage by a project manager attached to R&D for most important projects or directly between the SBU and the R&D centers. Consistency between SBU and subsidiaries is supported by a standardized IT system that play the role of a global communication network as well as a knowledge bank.

**Nestec as Knowledge management system**

Nestec is open to its environment. Nestle considers technology as an asset. Therefore, acquiring additional knowledge constantly appeared as a key factor in establishing the group as a key player. Nestle uses an information system that gathers information from outside the company, including technological breakthroughs and socio-economic trends. Indeed, market and fashions constitute the external side of the driving forces for innovations. In addition, competition stands among the sources of innovation.

**Technology watch**

Nestle resorts to external sources and sub-contractors in disciplines of basic research, which are deemed core competencies. Cooperate with laboratories and University around the world, organize technologies workshops and recruitment of high-profile personnel as a strategy to collect additional knowledge.

**Market Intelligence: Feeding R&D**

It is a continuous flow of information, including consumer behavior as well as political, legal, sociological factors among the external constrain that weight the innovation. Scientists are made aware of market trends, are actively involve in market analyses and sometimes are moved in marketing position.

**Nestec as a knowledge management tool**

Nestec is an internal consulting company, which operates at all levels of Nestlé’s value chain. Nestec is a self-financing unit and manage the patents and royalties pay out by the subsidiaries for the use of new technologies or processes.

Nestec’s role in technologies transfer offers two main advantages with regard to R&D (a) Keeping a tight control over technology in phases such as the foundation of a subsidiary, or the transfer of production to a third company. (b) It circulates technological innovation and processes throughout the group at a global scale.

**Knowledge Management and information protection**

Nestec is the engine of know-how transfer. It was created with a view to transferring knowledge, experience and know-how to all Nestlé’s subsidiaries. At the same time this organization provides central R&D with technological feedback from the various part of the company. This system guarantees an effective allocation of resources and know-how.

**2. Nokia’s lesson – High tech industry**

To manage the key success factors like: Innovations, Time-to-Market and Customer responsiveness better than competitors.

Management of Innovation and Technology based on gathering Systematic Business Intelligence combined with Strategic vision and Innovative culture and applying Strategic

Nokia’s proactive approach is to learn carefully market trends and observe competitors in parallel to listen to main customers and to be involve and drive technology initiatives.

To transform intuition into strategy, and Intelligence by commitment to learning and coopetition.

Nokia’s long-term vision is oriented towards the future:

**Corporate principles:**
- Strong & stretching corporate mission
- Long term anticipation of opportunities plus structured actions to achieve goals
- Freedom and flexibility to innovate
- Open mind to change to learning and to being fast

**Nokia’s mission impossible**
- Consistency in the long term
- Focus in the medium term
- Inventiveness in the short term

**Approach to competitive innovation**
- Building layers of competitive advantages
- Changing the current terms of engagement
- Competing through collaboration / win without fighting

**Nokia’s innovative climate** - Almost not firing people, collegiality, autonomy for new recruits, Decentralized structure, Risk and uncertainty accepted, Rotating top managers, Conjure up a sense of fear and urgency, Removing people from their comfort areas, Avoid inertia, Keep top managers flexible

**Nokia’s R&D organization** combines central planning and control with a decentralized and diverse research activities: Nokia’s R&D HQ in Finland (assuring central control of long term R&D plans in Finland) and decentralized R&D partnerships and research centers around the globe

**Nokia’s long term Innovation Strategy** is based on 3 main attributes: Focus, Leadership, and Coopetition. Defending leadership position means managing business and technology life cycles by constant innovation. Nokia has opted for a heterogeneous approach to technological development based on internal R&D for core competencies products, subcontracting & vertical integration, strategic acquisitions and strategic alliances to get access to complementary technologies.

To explore ways of implementing its long-term strategies, Nokia manages a whole range of medium-term project and programmes (market entry, service improvement, listening to clients). Over the short-term, speed and creativity in the introduction of new products & services make the difference, as the market premium in the mobile industry is cashed in by the fastest and most creative company (before the margins shrinks). To dominate the future of PCS, Nokia is building strong alliances with companies that have wireless knowledge in devices, technology infrastructures and applications.
1. Consumer Demand
- Good’s sales are being influenced by several factors, such as its price, consumer’s income, population etc.
- Consumer demand is estimated by sampling data, and converting it into the demand function, as a result of econometrics calculations, such as regressions.
- There are several types of goods: a good is normal if an increase in income results in an increase in its consumption (a car). A good is inferior if an increase in income results in a decrease in its consumption (public transportation).

The demand function is usually drawn as a line in the dimension of price and quantity:

![Diagram showing demand curves D1 and D2, with D1 less price sensitive compared to D2.]

2. Firm’s Costs
- Total cost of the firm = Variable Costs (VC) + Fixed Costs (FC).
- Average costs (ATC) = TC/Q.
- Marginal costs (MC) = \( \frac{\Delta TC}{\Delta Q} \). It is the additional expense the firm incurs by increasing output by one more unit.
- Sunk costs are an expenditure that cannot be recovered.

3. Profit maximization
Profit = Total Revenue – Total Costs.

Finding maximum profit according to a certain output level (Quantity):
- Taking the first derivative of the above Profit equation and set it equal to zero:
  \[ \frac{\Delta \text{Profit}}{\Delta Q} = \frac{\Delta \text{TR}}{\Delta Q} - \frac{\Delta \text{TC}}{\Delta Q} = 0 \]
- Or, can find at what level of quantity, marginal revenues will equal marginal costs:
  \[ MR(Q) = MC(Q). \] This is called “The profit maximization condition”.

4. Pricing strategies
The firm can increase its profits above and beyond the above profit maximization condition by choosing a more sophisticated pricing strategy, which enables it to capture more of the customer’s surplus.

Examples for pricing strategies are Price Discrimination and Bundling.
1. Consumer Demand

**Demand Elasticity**

*Elasticity* is a measure of sensitivity of one variable to another. The *slope* of the *demand curve* reflects the sensitivity of the quantity demanded to change in price, but this is only an element of what we call “the Elasticity of demand”.

*Demand elasticity* is given by: \( E_p = \frac{P}{Q} \left( \frac{\Delta Q}{\Delta P} \right) \).

For example: If a 10% Price increase results in a 5% drop in Quantity demanded, then the price elasticity of demand is \( E_p = -1/2 \).

**Note:** Price elasticity can vary along a linear demand curve:
- Suppose the demand curve is given by \( Q_D = 8 - 2P \). We infer that \( \frac{\Delta Q}{\Delta P} = -2 \).
- When \( P = 1\) \( Q_D = 8 - 2 \times 1 = 6 \).
- Price elasticity when \( P = 1\) is: \( E_p(1/6)(-2) = -1/3 \).
- When \( P = 2\) \( Q_D = 8 - 2 \times 2 = 4 \).
- Price elasticity when \( P = 2\) is: \( E_p(2/4)(-2) = 1 \).

When \( E_p = 1\) we define demand as “unit elastic”

When \( |E_p| > 1\) we define demand as “elastic”

When \( |E_p| < 1\) we define demand as “inelastic”

A “good” will likely have elastic demand if there are close substitutes to it.

2. Firm’s Costs

Usually, up to a certain point, the average costs tends to get lower when the quantity increases, and after a certain quantity they tend to increase:

![Price vs. Quantity graph showing ATC, MC, AVC curves]

Note that MC intercepts ATC and AVC at their minimum.

3. Profit maximization

**Monopoly power**

One way to measure the “monopoly power” of a firm is by calculating \( \frac{1}{|E_p|} \), where \( E_p \) is the elasticity of demand for that firm’s products.

*The higher \( |E_p| \) is, the lower \( \frac{1}{|E_p|} \) is, and therefore, the lower the monopoly power of the firm is.*

**The rule of thumb for pricing:**

Marginal Revenue, (MR), is the additional revenue the firm generates by increasing output by one more unit. It can be shown that at every point on the demand curve \( MR = P(1 - \frac{1}{|E_p|}) \).
Recall the profit maximization condition: \( MR(Q) = MC(Q) \), so \( MC = \frac{P}{1-1/|E_p|} \), and therefore for profit maximization, the firm will charge the price: \( P = \frac{MC}{1-1/|E_p|} \). This formula is an excellent “rule of thumb” for pricing.

4. Pricing Strategies

a. Price Discrimination

Price discrimination is defined as “the sale of technically similar goods at prices that do not reflect differences in costs”. In other words: the firm charges a different price for the same good, from different consumers.

For example, an airliner may charge students a lower price for flight tickets.

There are three types of price discrimination:

1. First degree: Charging individual price from each customer
2. Second degree: Charging different prices for different quantities of the same good
3. Third degree: Dividing consumers into two or more groups with separate demand curve for each group

The following three conditions are essential for a third degree price discrimination to work:

1. There are different segments in the market, with different demand elasticities, and:
2. The seller is able to infer consumer’s willingness to pay, and:
3. The seller is able to prevent arbitrage.

b. Bundling

Bundling is pricing more than one good in a package, which the customer values more than each of the goods individually.

Note: Bundling will be profitable only if the relative values of the goods are reversed.

Example:

Suppose there are two goods (A, B) that we need to price, and two customers (1, 2). For simplicity, we assume that there are no production costs:

- Customer 1 is willing to pay maximum of 12,000 for A and 3,000 for B.
- Customer 2 is willing to pay maximum of 10,000 for A and 4,000 for B.

Pricing goods separately:

- If we price good A at 12,000, only customer #1 will buy it. If we will price it at 10,000 then both customers will buy it, and the revenue will be 10,000 x 2 = 20,000.
- If we price good B at 4,000, only customer #2 will buy it. If we will price it at 3,000 then both customers will buy it, and the revenue will be 3,000 x 2 = 6,000.

Maximum revenues from pricing goods separately are 20,000 + 6,000 = 26,000.

Bundling the goods:

- Note that customer #1 is willing to pay 12,000 + 3,000 for both goods, and that customer #2 is willing to pay 10,000 + 4,000 for both of them.
- So, if we will bundle goods A and B, we will be able to charge 14,000 to a package that includes both of them. This package will be purchase by both customers.

Maximum revenues from bundling the goods are 14,000 x 2 = 28,000
Introduction

Macro economics deals with the behavior of the economy as a whole (aggregates, prices, interest rates, human capital, labor, unemployment, and more). The players in the macro market are: consumers, firms and governments.

A macro economic model is based on assumptions and applied research results. It considers relevant variables such as interest rates, inflation, and GDP growth. The Macro model aims to simplify reality, and to predict the implications of government policies and exogenous variables on other (endogenous) variables in the model.

Relevance of Macro Economics to business decisions:

- Understand government policy.
- Forecast of relevant variables.
- Forecast the effect of Government policy on business environment and decisions.
- Understand the effects of international trade and capital flows on business.

1. National Income Accounting
   
   Definition: GDP (Gross Domestic Product) is the value of all final goods and services produced in the country within a given period.

   Variables: Y: GDP; C: private consumption; G: government consumption; X: exports; IM: imports.

   On the national level: [Uses] = [Resources]. That is: C+I+G+X ≡ Y+IM, or:
   
   \[ Y \equiv C+I+G+[X-IM] \]

   Another angle: savings equal investment \[ S \equiv I+(X-IM) \] .

2. Aggregate Demand (AD) - Aggregate Supply (AS) model:

   The model solves for the equilibrium of aggregate demand and aggregate supply. That is it determines equilibrium price and GDP.

3. Money

   There are several definitions of money stocks (M1, M2…). For example: M1 = cash + demand deposits + other checkable deposits (see definitions in the detailed page).

   Definitions of money stock may differ across countries.

   **Money is demanded for:** 1. Transactions; 2. Precautionary.

   **Money supply** is a function of, among others, the optimal behavior of the banks.

   Bank liabilities are subject to **reserve ratios** (\( \delta \)), which are determined by the central bank (in Israel: ~6-12%, long term-short term).

4. Monetary Policy

   The central bank determines most of the nation’s monetary policy. Its main role:
   - Regulation of the banks;
   - Setting the discount rate and the rates on monetary loans;
   - Determining reserve ratios;
   - Apply open market operations. Influencing M2: decreasing cash supply by selling bonds, or increasing cash supply by buying bonds.
1. National Income Accounting

*Measuring GDP:* We summarize the value added (Gross) of each firm. For example:

**Gross value added** = Sales + Change in inventories – Purchases from another firms.

**Net value added** = Gross value added minus depreciation.

*Identity of uses and resources:* An identity exists between net value added and national income (summation of wages, taxes, dividends and retained earnings).

*Inflation:* Inflation is the percentage change in local currency that is required to purchase same “basket” of goods in the new prices. For example, when:

\[
\text{Inflation} = \frac{\text{New Price} - \text{Old Price}}{\text{Old Price}} \times 100\%
\]

<table>
<thead>
<tr>
<th>Basket</th>
<th>1998</th>
<th>1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Kg tomatoes</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>10 chocolate bars</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>25</strong></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

The inflation is \((30-25)/25 = 5/25 = 25\%\).

2. Aggregate Demand (AD) - Aggregate Supply (AS) model

**Aggregate Demand:** Price and GDP levels such as that the real sector (goods and services) and money market are in equilibrium.

**Aggregate Supply:** The quantity of GDP that firms (producers) are willing to supply for each price level.

![AD and AS Diagram]

**Aggregate Demand function:** \(Y = \gamma A + \beta \left[ \frac{M}{P} \right] \), were:

- \(Y\): Production function;
- \(A\): Fiscal policy and Consumer confidence;
- \(M\): Nominal money supply;
- \(P\): Price level.
- \(\beta, \gamma\): Parameters, \(\beta > 0, \gamma > 0\).

**Aggregate Supply function:** \(P = P_0 \{1 + \lambda(Y-Y^*)\} \), were:

- \(P\): Price level
- \(Y\): GDP
- \(Y^*\): Full employment GDP
- \(\lambda\): Parameter, \(\lambda > 0\).

**Example:** If consumer confidence will increase, then aggregate demand will be higher. This will result in higher Price level and higher GDP:

![AD and AS Example Diagram]
3. Money

There are several definitions of money stock (M1, M2…). M1 is the most liquid; M2 is less liquid, and so on (from the most to the least liquid).

**Definitions:**
- M1: Cash + demand deposits + other checkable deposits.
- M2: M1 + overnight purchase agreements + MMMF (money market mutual funds) to households + other “short term” small deposits.
- M3: M2 + large “short term” deposits (more than 1 day) + large MMMF (to institutions).
- M4: M3 + longer term deposits + government bonds + commercial paper + other.

**Money supply:**

Money supply is a function, among others, of several of the liabilities of the bank. They, in turn, are subject to reserve ratios ($\delta$) as determined by the central bank.

**Example for $\delta=0.2$ (20%)** (for simplicity – consider only demand deposits):

a. Cash=100 (obtained from central bank), liability=100 (demand deposit of a customer)
b. Reserve = 20% of 100, so the bank can loan 80 and hold reserve of 20, and so on…

Formula for total money:  
\[
100 + 100(1- \delta) + 100(1- \delta)^2 + \ldots
= 100\left[1/(1-(1-\delta))\right]
= 100/\delta = 100/0.2 = 500.
\]

Final balance sheet: 
- **Assets:** [Reserves = 100] + [Loans = 400];
- **Liabilities:** [Demand Deposits = 500].

4. Money market model

The model describes equilibrium between money demand and supply in the money market. The equilibrium determines market interest rate ($r$).

**Interest (r)**

<table>
<thead>
<tr>
<th>Interest (r)</th>
<th>L (Y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$r^*$</td>
<td>$M/P$</td>
</tr>
<tr>
<td>$r_0$</td>
<td>$M/P_0$</td>
</tr>
</tbody>
</table>

**Money Demand:** $M^d/P = f(Y, r)$, where:
- $M^d$: Quantity of money demanded;
- $P$: Price level;
- $M^d/P$: Money demand in real terms: a function of $Y$ (GDP) and $r$;

**Money Supply:** $M/P$, where:
- $P$: Price level;
- $M$: Money supply. It is fixed, since it is determined by the central bank's policy.

**Example:** Central bank increases $\delta$, resulting in a decrease of money supply and higher $r$. 

- **Interest (r)**
  - $r_1$
  - $r_o$
  - $L (Y)$
  - $M/P_1$
  - $M/P_0$
1. Behavior of firms in risky market environment leads to “Strategic Inertia”. Market prices may rise higher than the cost of capital and yet new firms will not enter the market. Market prices may drop far below the cost of capital and yet firms will not exit the market. This phenomenon is due to the option price firms pay when they take action.

2. Herd behavior and cascades when full information is not available When full information is available, the market eventually converges to the “truth”, when only actions are visible, the result is cascading.

3. Price warfare can destroy profitability to all Parties Static incentives for price-cutting, such as gain in market share, may not take into account competitors’ reactions that can lead into destructive pricing dynamics. The danger in static incentive arises by misjudging competitors’ reactions and misreading their actions.

4. Strategic cost analysis Understanding what drives the cost of the competition vs. the cost of the firm allows the firm to make intelligent pricing decisions.

5. Capacity preemption First movers in the market can capture the market using the capacity preemption strategy. Moving aggressively, forces others to take a less aggressive position.

6. Natural monopolies and competition effects A market that is characterized by large entry costs, up front, the cost structure ensures that only one firm is viable. Competition in some markets is dissipating profitability and socially wasteful. Competition on dominance in a natural monopoly market can result in a “war of attrition”.

Summary

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Behavior of firms in risky market environment leads to “Strategic Inertia”.
Market prices may rise much higher than the cost of capital and yet new firms will not enter
the market. Market prices may also drop far below the cost of capital and yet firms will not
exit the market. The explanation is related to the option value these firms have when they
delay their decision of exiting the market if they are in or entering the market when they are
out. The opportunity to defer their commitment and the level of the uncertainty in the market
is what determines the option value.

When firms invest in a project, they abandon the option of not investing now, and using the
cash for other projects in the future. The same is true when firms exit a “losing” project, they
abandon the option of waiting and making the decision in the future. This “option” price may
drive firms to maintain their current status, i.e., “strategic Inertia”.

Herd behavior and cascades
When full information is available, the market eventually converges to the “truth”, when only
actions are visible, the result is cascading in the market, i.e., the market may eventually
converge to a particular behavior that may not be correct. A few initial movers, or opinion
leaders can shift the market to a certain direction as well. Cascades are fragile, i.e., may shift
in direction as a result of a few contradicting signals or market “gurus”. Another interesting
phenomena is the fact that a few early accidents can lead to large effects and market direction.

Price warfare can destroy profitability to all Parties
Static incentive for price-cutting such as gain in market share, may not take into account
competitors’ reaction that can lead into destructive pricing dynamics. Each player should take
into account the competitor reaction function. Eventually the market would end in a Nash
equilibrium, which may not represent maximum collective profit point. Each party should
think of the other side’s best response function given his move. The danger in static incentive
arises by misjudging competitors’ reactions and misreading their action.

Differentiations of products or services compared with the competition limits this problem
although makes the information on the competitions’ actions less clear.

To eliminate the danger of price war, firms must take the long-term view. The long-term view
includes taking into account:
• Price decisions should reflect dynamic incentives.
• Tacitly coordinate with competitors on a punishment strategy –tit-for-tat.

Strategic cost analysis
Understanding what drives the cost of the competition vs. the cost of the firm allows the firm
to make intelligent pricing decisions. This is done by identifying key cost drivers (e.g.
cumulative experience, unit size, scale…) and isolating the impact of each driver on the total
cost function. The next step would be to find the “slope” of each driver, i.e., the effect on the
total cost from a change in a single driver parameter. Knowing the slope allows the firm to
compute cost elasticity and from that, cost advantage. In an industry where the prices are not
transparent, deals are complicated and products are customized and different from each other,
it is harder to analyze the cost drivers.
Capacity preemption

First movers in the market can capture the market using the capacity preemption strategy. Moving aggressively, forces others to take a less aggressive position.

The main driver for capacity preemption is the irreversibility of the move, i.e., once the firm has made a capacity commitment, it can no longer able to reverse that decision. Sunk costs, investing resources that can’t be reallocated is a source of such irreversibility that stops competitors from making similar decisions. The credibility of the commitment the first mover does in the eyes of the competition is dependent on the fact that he can’t re-deploy these resources elsewhere. Such strategic bets have a direct effect, which is the result of the large capacity it has in the market but also a strategic effect that deters other firms in expanding their capacity in this market.

Natural monopolies and competition effects

A market that is characterized by large entry costs, up front compared to the market size, the cost structure ensures that only one firm is viable.

Competition in some markets is dissipating profitability and socially wasteful. The competition in the market duplicates cost expenditures and this would explain regulation of some markets, such as the energy market.

First movers advantage is only effective if the entry cost are relatively high to the market opportunity. If the relative costs of entry are low compared with the market size, market preemption is futile. Optionality in uncertain market conditions also erodes first-mover’s advantage.

Competition on dominance in a natural monopoly market can result in a “war of attrition”, in which who ever can fight the longest, wins! At each moment in time, each competitor can either withdraw and leave the market to the competition or stay a little longer, at a cost. The strategy of deciding to stay in the competition can be explained by the fact that staying a little longer at a small incremental cost, can become a big win. This strategy leads to exhausted losers and winners.
## SUMMARY PAGE

### 1. Psychological effects
Several psychological effects are influencing the way we deal with uncertainty, (Kahneman-Tversky), introducing bias in decision processes:

- **Loss/gain asymmetry**: people prefer *not to gain* rather than lose money. Therefore, it matters if the risky part is framed as “gain” or as “loss”. Risk-averse people may take risks to avoid losses. Most people are risk averse.

- **Framing effect**: the way information is framed makes a difference (this is fundamental for marketing and politics: positioning, promotion of products, influencing people).

- **Availability heuristics**: If you have to estimate the probabilities of two events, you will give a higher estimate to the event that happens to be more conspicuous in your memory (perhaps just because of getting more attention, as in the case of traffic accidents). Detailing all the cases when the event occurs increases the value of the estimate. Insurance agents use this, by detailing all the situations when the insurance can be activated.

The usage of *formal models* - conditional probabilities, Bayes formula, Law of Large Numbers, usage of variance, covariance and the concept of independence, Binomial and Normal Distributions, Central Limit Theorem - and awareness of the common fallacies may improve the quality of decision making under uncertainty.

### 2. Definitions

- **Conditional Probability of A given B**: \( P(A|B) \)
- **Bayes Rule**: \( P(D|T) = \frac{P(D \text{ and } T)}{P(T)} \)

A and B are **correlated** if: \( P(B|A) > P(B|\text{non}(A)) \) (in which case \( P(B) \) is in between the two)

A and B are **independent** if: \( P(B|A) = P(B) \)

**Implications of the Law of Large Numbers**:

- **Insurance** – if there are many policy holders (customers), and if they are independent and identically distributed, the insurance company practically doesn’t face any risk.

- **The Gamblers Fallacy** – if you believe that the roulette is fair, you should be indifferent between red and black, no matter how many blacks were in series before. “Catching up” violates the rule of independence. Infinity is big enough to “beat” any finite number of past observations.

**Correlation does not imply causation.** Correlation is a necessary condition for causal relationship, but not a sufficient condition.

**Covariance** zero doesn’t imply independence. Independence implies covariance zero.

**Diversification** – is not increasing the expected value. You diversify to reduce risk!

\[
\text{Var}(0.5 \times X + 0.5 \times Y) = 0.25 \text{Var}(X) + 0.25 \text{Var}(Y) \quad \text{if } X, Y \text{ are independent.}
\]

**Normal Distribution** – a family of continuous distributions – bell shaped. \( X \sim N(\mu, \sigma^2) \)

\( \mu \) – expectation \( \sigma \) – standard deviation

**Central Limit Theorem** – for any distribution, if you take the average of \( n \) independent and identical distributed (i.i.d) random variables – the distribution of the average looks more like a bell-shaped curve as \( n \) grows to infinity.
1. Probability and Conditional Probability

Definitions:

**Event** – a proposition that might be TRUE or FALSE.

**Probability** – is assigned to events.

- $P(A)$ – the likelihood of event A (the relative frequency of A, if data exist).
- $S$ – the sure event $\rightarrow P(S) = 1$
- $\emptyset$ – Impossible event $\rightarrow P(\emptyset) = 0$

Operations on events:

- Union (or)
- Intersection (and)
- Complement (not)

DeMorgan rules:

- $not(A \ or \ B) = not(A) \ and \ not(B)$
- $not(A \ and \ B) = not(A) \ or \ not(B)$

A ‘included in’ B $\leftrightarrow$ not(B) ‘included in’ not(A)

Objective probabilities (say, relative frequencies) satisfy the following rules:

1. $P(\emptyset) = 0$
2. $P(S) = 1$
3. $P(A \ and \ B) = P(A) + P(B)$, whenever $A \ and \ B = \emptyset$

(hence, we agree that subjective probabilities should satisfy the same rules.)

The Law of Addition:

$P(A \ and \ B) = P(A) + P(B) - P(A \ and \ B)$, for any A, B

Conditional Probability of A given B: denoted: $P(A|B)$

Defined: (Bayes Rule)

$P(D|T) = P(D \ and \ T) / P(T)$

Example:

D – the patient has a disease
T – the test is positive

It is given that: $P(T|D) = 0.9$, $P(T|\non(D)) = 0.05$

We are asked $P(D|T) = ?$

$P(D|T) = P(D) * P(T|D) / [ P(D) * P(T|D) + P(\non(D)) * P(T|\non(D)) ]$

A and B are correlated if: $P(B|A) > P(B | \non(A))$ (in this case, P(B) is in between)
A and B are independent if: $P(B|A) = P(B)$

Intuitive meaning of independence: Knowing A doesn’t change the likelihood of B. Independence is symmetric.
A may be statistically dependent on B if:
- B is a cause of A
- A is a cause of B
- Something else causes both A and B
- By chance, the equality is not satisfied: \( P(A \text{ and } B) = P(A) \times P(B) \)

We can generate independent events through sampling.

2. Expectation and the Law of Large Numbers

**Random Variable** - The value of a random variable depends on the occurrence of a certain event. A random variable has a distribution (need not be numerical) – a table describing all the possible values of the random variable and their probabilities of occurrence.

**Expectation** – \( E(X) \) for a random variable \( X \) -- is the weighted sum of its possible values, with probabilities of each value as weights (one may use the distribution of the random variable to calculate).
- Expectation has the same units as the variable itself
- Is always between the highest and the lowest value of the random variable
- Takes into account both the values and the probabilities
- Linear behavior:
  i. \( E(a \times X) = a \times E(X) \)
  ii. \( E(X + Y) = E(X) + E(Y) \)
- The value of the expectation might be a value that the random variable can never take (like the average family that has 2.3 kids). The concept of expectation is important because of the **Law of Large Numbers**.

**The Law of Large Numbers**
Assume there are many random variables such that:
- They all have the same distribution
- They are all independent (not only pairs!)

Then, with a high probability, the average of the random variables will be very close to the expectations of the random variables.

3. Variance, Independence

**Variance** of a random variable -- the most commonly used measure of risk (uses squared deviation).

\[
\text{Var}(X) = E\left( [X - E(X)]^2 \right) \\
\text{Var}(X) = E(X^2) - [E(X)]^2
\]

**Standard deviation** – in the units of the random variable:
\[
\sigma = \text{SquareRoot}(\text{Var}(X))
\]

**Joint distribution** – of two random variables \( X, Y \) - For each pair of values, the probability that \( X \) will assume the first value and simultaneously \( Y \) will assume the second value. Do they go together up or down?
Joint distribution is important in calculating \( \text{Var} (X + Y) \). We cannot find the joint distribution from the distributions of \( X \) and \( Y \) separately. The joint distribution contains more information.

\( Y \) is \textbf{independent} of \( X \) if the conditional distributions of \( Y \) given different values of \( X \) are all the same (in this case, they have to equal the marginal distribution of \( Y \)).

Equivalently, every entry in the joint distribution matrix equals the product of the corresponding entries in the marginal distributions.

If \( Y \) is independent of \( X \), then \( X \) is independent of \( Y \).

\[ 4. \text{ Covariance. The Binomial Distribution} \]

\textbf{Covariance of} \( X,Y \): the expected value of the random variable \( (X - \text{E}(X)) \cdot (Y - \text{E}(Y)) \)

\[ \text{Cov} (X,Y) = \text{E} [ (X-\text{E}(X)) \cdot (Y - \text{E}(Y)) ] \]

\[ \text{Cov} (X,Y) = \text{E}[X \cdot Y] - \text{E}(X) \cdot \text{E}(Y) \]

\textbf{Correlation coefficient:}

\[ \rho_{xy} = \text{Cov} (X, Y) / (\sigma_x \cdot \sigma_y) \]

Covariance is unit-less (between –1 and 1). Positive and negative correlation values exist. Zero – uncorrelated.

Covariance zero doesn’t imply independence. Independence implies covariance zero.

\[ \text{Cov} (a \cdot X + b, c \cdot Y + d) = a \cdot c \cdot \text{Cov}(X, Y) \]

\[ \text{Cov} (X,X) = \text{Var} (X) \]

\[ \text{Cov} (X,c) = 0 \]

\[ \text{Var} (X + Y) = \text{Var}(X) + \text{Var} (Y) + 2 \cdot \text{Cov} (X, Y) \]

\[ \text{Var} (X+Y) = \text{Var} (X) + \text{Var} (Y) \quad \text{if Cov} (X,Y) = 0 \]

\textbf{The Binomial Distribution}

Repeat an experiment with two outcomes: success/ failure \( n \) times. Count the number of overall successes.

Assumptions:

- In each trial the probability of success \( p \) is the same.
- All trials are independent

Then \( X \) – the \textbf{random variable that counts successes} is \textbf{binomially distributed} with parameters \( n \) and \( p \).

\[ X \sim \text{B}(n,p) \]

\[ \text{E}(X) = n \cdot p \]

\[ \text{Var}(X) = n \cdot p \cdot (1-p) \]
5. The Normal Distribution and the Central Limit Theorem

**Normal Distribution** – a family of continuous distributions – bell shaped.

\[ X \sim N(\mu, \sigma^2) \]

Where: \( \mu \) – expectation, \( \sigma \) – standard deviation

**Central Limit Theorem** – for any distribution, if you take the average of \( n \) independent and identically distributed (i.i.d) random variables – the distribution of the average looks more like a bell-shaped curve as \( n \) grows to infinity.

The random variables don’t have to be identically distributed, and not even exactly independent.
1. **Descriptive Statistics**
   The area of statistics that deals with ways to collect, summarize and present raw data.

   Data may be presented in three ways:
   - Tabular (frequency distribution of the data)
   - Graphical (using bar charts, pie charts and histograms)
   - Numerical (calculating measures representing the data such as mean, median, mode, range, variance, standard deviation, and others)

2. **Statistical Inference**
   The process of inferring from a sample of the population on the entire population. The process involves:
   - Sampling
   - Estimating
   - Testing hypothesis.

3. **Relationship between variables**
   Using regression analysis to determine the relationship between variables.
DESCRIPTIVE STATISTICS

*Descriptive Statistics:* the process of collecting, summarizing and presenting raw data. Often initiates the data analysis process. Descriptive statistics results may be presented in three different ways: *Tabular, Graphical*, and *Numerical.*

1. **Tabular**
   Summarizing the data by means of *frequency distribution* of occurrences of data items, either absolute frequencies (number of occurrences) or relative frequencies (in proportion to the total number of observations). Tabular presentation of data can be for one variable or two variables (cross tabular).

2. **Graphical**
   Presenting the frequency distributions of data in a *Graphical form*, either *Histograms* (quantitative data by frequency), *Bar Charts* (qualitative data by frequency) or *Pie Charts* (relative frequency – pie indicating the whole).

3. **Numerical**
   Representing the data by means of several measures denoting the *central tendency* of data, the *dispersion* of data and the *association* between data elements.

   **Central tendency**
   - The *Mean* (Average) is the sum of all observations divided by the number of observations.
   - The *Median* is the value of the absolute center of all data (e.g. 5 numbers are sorted in ascending order, the 3rd number is the median. If there are an even number of occurrences, the median is the average of the middle two).
   - The *pth Percentile* divides the data such that p% of the data have values less than the pth percentile. For example, say the 85th percentile of the salary level is 6000 IS. Then, 85% of the observations have salary levels that are less than 6000 IS.
   - The *Mode* is data value which occurs most frequently (mainly used for qualitative data).

   **Dispersion**
   - The *Range* represents the difference between the largest and smallest value.
   - The *Variance* $s^2$ is the average of the squared deviations of the variable values around the mean.
   - The *Standard Deviation* $s$ is the square root of the variance.
   - The *Z-Score* denotes the number of standard deviations that the variable is away from the mean. Items with large z-scores are considered outliers.

   **Association**
   - The *covariance* $s_{xy}$ and *correlation coefficient* $r_{xy}$ measure the linear relationship between two variables (e.g. $r_{xy} = 0$: no relationship, $r_{xy} = 1$: perfect linear relationship).
STATISTICAL INFERENCE

- A population is the set of all the elements of interest in a study.
- A sample is a subset of the population.

Statistical Inference is the process by which conclusions about the population are made from information contained in a sample.

Issues to consider for Statistical Inference:

- Choosing the observations for the study – sampling procedure (simple random, stratified, cluster sampling), the sample size.

- Estimating parameters – averages and variances may not be known and need estimation from the sample.
  - Point estimation - estimating a (point) value for the parameter based on the sample (not accurate).
  - Interval estimation – estimating an interval that covers the true value of parameter with given probability (the confidence level).
  - The interval is known as the confidence interval, with two boundaries \( L_1 \) and \( L_2 \). The confidence level CI\% indicates that the true parameter lies within the interval with CI\% assurance. Confidence interval may be two-sided, or one-sided.
  - Complementary to the confidence level is the risk level, which defines the probability that the true parameter falls outside the confidence interval. The risk level is commonly referred to as the level of significance.

- Statistical inference requires that we find the sampling distribution of the point estimate involved in the study. Most common of the sampling distributions is given by the C.L.T – Central Limit Theorem – as \( n \) (sample size) becomes large, the distribution of the sample mean becomes closer to the normal distribution, with parameters: \( \mu \) (the expected value of the population), and \( \sigma^2 \) (the variance of the population). Approximation is “good enough” when sample size is greater than 30. Other sampling distributions are the t, Chi-square and the F distributions.

- Testing Hypothesis – test is performed regarding the value of a parameter in the population (the null hypothesis), either to accept the null hypothesis or to reject it and accept the alternative hypothesis. The results of the test may fall into one of two mutually exclusive intervals (regions): an acceptance interval, or a rejection interval. If the value of the (calculated) statistic of the test falls in the acceptance interval, the null hypothesis is accepted, otherwise it is rejected.

- The decision regarding the acceptance and rejection intervals depends on the errors involved:
  - Type I error: probability of rejecting the hypothesis even though it is true.
  - Type II error: probability of accepting the hypothesis even though it is not true.

- It is impossible to minimize both Type I and Type II errors. Usually, test is designed for a known value of Type I error, selecting the rejection region such that it minimizes the Type II error for the given Type I error.
Regression is the way to calculate and express the relationship between a dependant variable and one (simple regression) or more (multiple regression) independent variables.

For example, simple regression may depict the relationship between sales (the dependent variable) and advertising (the independent variable).

In multiple regression, one may consider the impact of other variables on sales (in addition to advertising), such as price level, size of sales force, quality of product, and others.

The dependent variable is the variable whose value we want to predict. It is usually denoted by the letter \( y \). The independent variables are the variable(s) used to predict the value of the dependent variable, and are usually denoted by the letters \( x: x_1, x_2, x_3, \ldots \).

It is important to note the regression analysis does not establish a cause-and-effect relationship between variables. It can only indicate to what extent variables are associated with each other. Whether there is a cause and effect relationship between the variables depends on the application.

The most simple of all regression models is the linear one. In this case, the relationship between the dependent variable and independent variable(s) is given by a linear equation. For example, in simple regression with one independent variable \( x_1 \):

\[
y = b_0 + b_1 x_1
\]

\( b_0 \) – the y intercept  
\( b_1 \) – the slope

\( r^2 \) – the coefficient of determination, expresses the percentage of the variations (measured by sum-of-squares) that can be explained by the regression. It measure the degree of association between the dependent and independent variables, the closer the value of \( r^2 \) to 1, the stronger the relationships.

The correlation coefficient is another measure of the strength of the linear association between the independent variable(s) and the dependent variable, given by the square root of the coefficient of determination. The sign of the correlation coefficient denotes the direction of the relationship between the variables, either positive (increasing the value of \( x \) increases the value of \( y \)), or negative (increasing the values of \( x \) decreases the value of \( y \)).

Values of the correlation coefficient are always between –1 and +1.

Values of +1 or –1 indicate that the variables \( x \) and \( y \) are perfectly correlated, either in a positive or negative linear sense.

Value of the correlation of zero, or close to zero, indicate that \( x \) and \( y \) are not linearly related.

\( t \) tests can be used to test the significance of the regression coefficients (i.e., that they are significantly different than zero).

\( F \) test is used in order to test the significance of the overall regression model.

\( F \) and \( t \) values can be found in the output of Excel regression analysis.
At the start of the 2-year KR04 course, even the professors did not know that they would be performing an additional role! In addition to having taught their respective course, they were asked to individually review, comment and finally approve the KR MBA Handbook Course Summary for their respective course. In doing so, they acted as an informal Advisory Committee to the KR MBA Handbook publication, ensuring that the content is of the highest quality, and the value that can be gained from it, would be maximized. The following table summarizes which professors taught which courses. Latest professor contact information can be found as summarized below:

- Kellogg - [http://www.kellogg.northwestern.edu/](http://www.kellogg.northwestern.edu/)
- Kellogg-Recanati - [http://kr-emba.tau.ac.il/](http://kr-emba.tau.ac.il/)

### 1. Marketing
- 1.1 Strategic Marketing
- 1.2 International Marketing Channels
- 1.3 Marketing Strategy
- 1.4 Market Research

*Professors*
- Lakshman Krishnamurthi
- Anne Coughlan
- Lakshman Krishnamurthi & Gregory Carpenter
- Dipak Jain

### 2. Accounting
- 2.1 Financial Info. for Mgt. Planning & Control
- 2.2 Financial Reporting Systems

*Professors*
- Bala Balachandran
- Dan Givoly

### 3. Finance
- 3.1 Managerial Finance
- 3.2 Security Analysis
- 3.3 International Economics & Finance
- 3.4 Financial Analysis & Valuation
- 3.5 Integration with the Finance Function

*Professors*
- Aharon (Roni) Ofer
- Thomas Lys
- Avner Kalay
- Eli Amir
- Arthur Raviv

### 4. Organizational Behaviour
- 4.1 Managing Individuals & Groups in Orgs.
- 4.2 Negotiations
- 4.3 Organizational Design & HRM
- 4.4 Leadership & Ethics

*Professors*
- Brian Uzzi
- Jeanne Brett & Leigh Thompson
- Orly Yehezkel
- David Messick

### 5. General Management & Strategy
- 5.1 Operating Strategies for the General Mgr
- 5.2 Operations Management
- 5.3 Information Systems Management
- 5.4 International Business Law
- 5.5 Profitable Pricing Strategies & Tactics
- 5.6 Strategic and Managerial Decisions
- 5.7 International Business Tech. Transfer

*Professors*
- Margaret Peteraf
- Eitan Zemel
- Gadi Ariav
- Moshe Bar Niv
- Dr Meir Karlinsky
- Dov Samet
- Daniel Rouach

### 6. Business Economics
- 6.1 Managerial Economics
- 6.2 Macroeconomics envir. in the Middle-East
- 6.3 Competitive Strategy & Indust. Structure

*Professors*
- Jacob (Kobi) Glazer
- Asher Tishler
- Nabil Al-Najjar

### 7. Statistical Decision
- 7.1 Analytical Approach to Uncertainty
- 7.2 Statistical Decision Analysis

*Professors*
- Izhak Gilboa
- Jacob Zahavi
My sincere thanks to the following KR04 MBA Graduates, who summarized the courses as shown below.

Stuart Ballan
Editor
Kellogg-Recanati MBA Handbook

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