

## **ECONOMICS OF TECHNOLOGICAL INNOVATION AND ENTREPRENEURSHIP (ECON 369)**

**Tuesdays and Thursdays from 1:15-2:30**

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### **Required Text**

Shane, S. Forthcoming. Technology Strategy for Entrepreneurs and Managers, Englewood Cliffs, NJ: Prentice Hall. (Download from Blackboard)

Course pack available from <http://Xanedu.com>

### **Course Description:**

Established businesses in technology intensive industries, like telecommunications and pharmaceuticals are an important part of the world economy. Moreover, new high growth companies are found in disproportionate numbers in these industries. Therefore, anyone interested in understanding the economics of business needs to understand how firms in these industries operate. These businesses are different from those found in other industries. They tend to rely more on intellectual property, manage systematic technical research and development, and launch new-to-the-world products. They are often subject to increasing returns and network externalities.

This course focuses on the particular economics of new and established businesses in technology-intensive industry. It provides frameworks for analyzing key aspects of these industries and teaches students how to apply these frameworks. The course focuses on four themes: (1) the source, discovery, and evaluation of opportunities (2) the provision of products and services that satisfy the needs of customers, (3) the development of mechanisms to appropriate the returns from the exploitation of the opportunity; and (4) the organization of efforts to innovate.

### **Class Format**

The course will meet twice a week and is comprised of both lectures and discussions. On each topic, at least one class session will be a lecture. The other class session will be a case or an exercise to reinforce the material presented in the lecture and the readings.

It is important that you participate in the non-lecture sessions. To encourage participation, class discussion counts for part of your grade. Students start off with zero participation points (i.e., an "F") and accumulate points through their contributions to classroom discussions. Attendance does not equate to participation.

Students will be randomly called upon to identify the key issues. Class presentation points are based on the quality (not simply quantity) of the student's discussion of those issues.

### **Assignments**

There will be three tests in this class. You are also required to hand in the answers to the discussion questions prior to each case discussion, and you will be graded on that. Finally, you will be graded on class participation.

To have an effective discussion of the cases and exercises, everyone in the class needs to do the reading and be prepared to discuss it. To ensure that you do that, you are required to hand in written answers to the discussion questions BEFORE the discussion of each case or exercise. If you hand in the answers after the time that the discussion begins, do not hand in the answers or do not answer the questions, you will be graded with a "0" (not answered).

### **Grading Criteria**

Test 1	25%
Test 2	25%
Test 3	25%
Discussion Questions	12%
Class Participation	13%

### **ACADEMIC INTEGRITY:**

All students in this course are expected to adhere to university standards of academic integrity. Cheating, plagiarism, and other forms of academic dishonesty will not be tolerated in this course. This includes, but is not limited to, consulting with another person during an exam, turning in written work that was prepared by someone other than you, and making minor modifications to the work of someone else and turning it in as your own. Ignorance will not be permitted as an excuse. If you are not sure whether something you plan to submit would be considered either cheating or plagiarism, it is your responsibility to ask for clarification. Either ask me about it or consult credible sources of information on the subject. Two useful internet sites are <http://www.indiana.edu/~wts/pamphlets/plagiarism.shtml> and <http://www.unc.edu/depts/wcweb/handouts/apa.html>. Please remember that you have agreed to Standards Regarding Academic Integrity (a copy of which can be found at <http://weatherhead.case.edu/pdpao/policy/policyhome.html>) which outlines your responsibility in greater detail.

## ASSIGNMENTS

- 1/16/07            Overview of Class
- Read:* Introduction, [Technology Strategy for Entrepreneurs and Managers](#)
- 1/18/07            LECTURE:        IDEA GENERATION
- Read:* Chapter 2, [Technology Strategy for Entrepreneurs and Managers](#)
- 1/23/07            CASE: THREE DIMENSIONAL PRINTING
- Discussion Questions:*
- Why did the entrepreneurs discover opportunities in the 3DP process?
- Why did so few people discover opportunities to exploit MIT's 3DP Process?
- Why did the different entrepreneurs in the case discover such different business opportunities for the 3DP Process?
- How are the entrepreneurial opportunities to exploit 3DP different? What effect do those differences have on the evaluation and pursuit of those opportunities?
- 1/25/07            GUEST LECTURE: EVALUATING TECHNOLOGY OPPORTUNITIES
- Mike Kennedy, MRK Technologies
- 1/30/07            UNDERSTANDING CUSTOMER NEEDS
- LECTURE:        UNDERSTANDING CUSTOMERS FOR NEW TECHNOLOGY
- Read:* Chapter 3, [Technology Strategy for Entrepreneurs and Managers](#)
- 2/1/07             CONJOINT ANALYSIS
- Download Sawtooth Software's SMRT v4.7 Demonstration Software at:  
<http://www.sawtoothsoftware.com/downloads.shtml#ssiweb>
- EXERCISE: MOUNTAIN BIKE TIRES
- Your task is to conduct conjoint analysis as a team at Michelin responsible for the development of a new mountain bike tire. Michelin competes with two other producers of mountain bike tires – Tioga and Electra. Obviously, you would like to introduce a product that competes effectively with your competitors' products. You have conducted a survey of 30 customers to gather information about their preferences for different mountain bike tires. In addition to the effect of brand name on customer preferences, you have sought to examine the effect of (1) tire type (very firm puncture proof solid foam core; somewhat firm puncture proof solid foam core, less firm puncture proof solid foam core, and standard inner tube tire), (2) tread type (off road tread, on-road tread, and off/on

road tread), (3) tire weight (2, 3, or 4 lbs), and (4) tread wear (tire lasts for 1000, 2000, or 3000 miles).

You should first look at the questionnaire that has been presented to customers so that you can get a sense of the types of information that you have collected. In the Sawtooth software package, this means that you need to select the “Tires1.smt” simulation, and then go to “compose”, and pull down on “run questionnaire”. Answer the questions as they come up to get a feeling for the market research information that you have gathered.

Once you are done with that, you need to answer 4 questions for your boss:

1. The engineers at your company have launched a product with very firm puncture proof solid foam core tires with off road tread and less than 2 pound tires that last for 1000 miles. Your boss wants to know what the customers purchase likelihood is for a product of this type from Michelin in comparison to the same product from its two major competitors Tioga and Electra. Please tell her the purchase likelihoods for the products launched by the three companies. (Hint: Go to market simulator in the Sawtooth software. Add a scenario. Put in three products, each with the product features that your product will have. For the first product put in the Michelin brand name. For the second product put in the Tioga brand name. For the third product put in the Electra brand name. Under simulation method, select purchase likelihood).
2. Your boss also wants to know how the purchase likelihood of the product will change if you keep all other things the same, but you change each of the other dimensions of the product. Which tread type will give you the highest purchase likelihood for a Michelin tire with very firm puncture proof solid foam core tires and less than 2 pound tires that last for 1000 miles? Which weight will give you the highest purchase likelihood for a Michelin tire with very firm puncture proof solid foam core tires with off road tread tires that last for 1000 miles? Which tread wear will give you the highest purchase likelihood for a Michelin tire with very firm puncture proof solid foam core tires with less than two pound off road tread tires? Which tire type will give you the highest purchase likelihood for a Michelin tire with less than two pound off road tires that last for 1000 miles? (Hint: Go to market simulator in the Sawtooth software. Add a scenario. For the first scenario vary the tread type across the three products and hold the other dimensions constant. For the second scenario, vary the tire weight and hold all of the other dimensions constant. For the third scenario, vary the tread wear and hold the other dimensions constant. For the fourth scenario, vary the tire type and hold the other dimensions constant. Under simulation method, select purchase likelihood).
3. Your boss has asked the engineers to design a product with the highest purchase likelihood for a Michelin tire on all four other dimensions. What is the purchase likelihood of that tire? If that purchase likelihood is not higher than the purchase likelihood for other tire combinations, why is that the case? (Hint: Go to market simulator in the Sawtooth software. Add a scenario. For each product feature, put in the value with the highest purchase likelihood your analysis under point two. Under simulation method, select purchase likelihood).
4. Your boss wants to know the purchase likelihood of your mountain bike tire (a very firm puncture proof solid foam core tires with off road tread and less than 2 pound tires that last for 1000 miles) in comparison to the purchase likelihoods of competitor products. Tioga’s product is a somewhat firm puncture proof solid foam core tire with on road tread that weighs three pounds and lasts for 2000 miles. Electra’s product is a less firm puncture proof solid foam core tire with on/off road tread that weighs four pounds and lasts for 3000 miles. What is the purchase likelihood of different competitive products? (Hint: Go to market simulator in the Sawtooth

software. Add a scenario. Put in three products, each with the product features described above. Under simulation method, select purchase likelihood).

2/6/07

## MARKET RESEARCH

### EXERCISE: MARKET RESEARCH ERRORS

Your task is to answer the following questions about market research efforts and be prepared to discuss them.

1. A charter school company wants to find the average number of school-age children per family having schoolchildren. It selects a random sample of school age children and asks them how many children are in their family. Is this a good research design? Why or why not?
2. A greeting card company is considering a development of a new type of card, called "alternative cards", designed to appeal to young, urban consumers. They want to know what changes they need to make to their standard card line. They change the artwork, the text of the message, the price, and the materials used to make the card. They test the new cards on a random sample of young, urban consumers by making the cards available for sale alongside their old cards in a store frequented by the target market. They obtain sales information on the old and new cards. Does this market research effort tell them what changes to make to their old cards?
3. A company is in the on-line music download business. Its management thinks that the price of music downloads affects the decisions of teenagers to download music. From their operations from 2000-2003, they know the likelihood that teenagers will download songs at their price of \$2.99 per download. In 2004, they are considering reducing the download price to \$0.99 per download. They test the effect of their new price by reducing the cost of a song download to \$0.99 for the first 3 months of 2004. They find that the download rate is no higher for the first 3 months of 2004 than it was for the average of the first three months of the year in 2000, 2001, 2002 and 2003. What can they conclude about the effect of the price reduction on the downloading of their music?
4. A company producing valves for use in many types of industrial machinery is considering a new product which they believe will be 50 percent less expensive to produce than their current valves. They believe that introducing this product will increase their sales dramatically, but they would like to test the product concept out on potential customers first. They send a survey to their customers describing the new product and its benefits and ask the customers if they will increase their valve purchases if they could have the new valve. The results come back, indicating that none of the customers will increase valve purchases if the new product were introduced. The company decides not to go ahead with the development of the product based on this market research. Was this a wise decision? Why or why not?
5. McDonald's is interested in knowing what consumers think of its brand to determine whether it should launch a new restaurant concept under its brand name. The company identifies a random sample of the population aged 18-70 and sends them a survey. The survey asks the respondents to rank order five fast food brand names: Wendy's, Burger King, McDonald's, Pizza Hut, and KFC. The results show that McDonald's has the highest ranking of the five brand names. McDonald's interprets the results of this market research to mean that it has the strongest brand name of all fast food chains and that it should launch a new restaurant concept under its brand name. Was this a good interpretation of the market research results? Why or why not?

6. An auto insurer is considering offering a new insurance product that cuts auto insurance rates by 25 percent if the customer agrees to install a speed monitor in his or her vehicle that records the speed of the vehicle at all times. The company wants to know if customers would be interested in the product. In particular, it is important to know if customers who tend to speed, and so have more accidents, would purchase the product. If they cannot attract customers who speed, the product won't be profitable because it won't do anything to reduce accident claims. The company sends out a survey to a random sample of people with driver's licenses that they obtained from the departments of motor vehicles in all 50 states. They receive responses from 26 percent of those surveyed. Is there anything that they should be concerned about when they analyze their market research data?
7. A company that makes toy airplanes is considering introducing a new version of its toy airplane product. The company has a limited budget for product improvements and is considering whether to improve the propeller, fuselage, or wheels. During the two years that the product has been on the market, fully 80 percent of all the products returned for repair had wheel problems. For this reason, the company is considering putting its money into improving the wheels. Is this a good idea? Why or why not?
8. A company that makes remote sensing devices wants to develop a device that works at very long distances, which no one has been able to do before. They find out that a bunch of customers who need remote sensing have been frustrated by the lack of such devices and are working on their own solutions. The company decides to hold a lead user seminar to get the customers together with their engineers and marketing staff to develop a new product that meets the customers' needs. Did the company take the right approach? Why or why not?
9. A company developing a new device for playing music downloaded off of the Internet conducts some focus groups with teenagers to find out what features they think are important in a portable music player. The focus group participants tell them what features they want and the company goes back and designs the product to provide those features. Is this a good approach to market research? Why or why not?
10. A computer company has developed a new technology to do computing at the level of individual atoms. While the company has made the technology work, it does not know what applications to develop for it. So the company conducts a survey of computer users to ask them about their needs for an atomic computer. The company then uses the results of this survey to develop a new product. Did the company take the right approach to market research? Why or why not?

2/8/07

LECTURE: DEVELOPING NEW TECHNOLOGY PRODUCTS

*Read:* Chapter 3, Technology Strategy for Entrepreneurs and Managers

2/13/07

CASE: SWEET WATER

*Discussion Questions:*

What are the most important user needs in the water purifier market?

How should Platter gather information about user need?

How can you structure this user needs data to assist Platter in creating his product concept?

How does Sweetwater's product compare to competitors' products in meeting customer needs?

2/15/07 TEST 1

2/20/07 EVOLUTION OF TECHNOLOGY

LECTURE: TECHNOLOGY EVOLUTION, INCREASING RETURNS, NETWORK EFFECTS, AND STANDARDS

*Read:* Chapters 5 and 7, Technology Strategy for Entrepreneurs and Managers

2/22/07 CASE: ELECTRIC VEHICLES: PIPE DREAM OR PRODUCT OF THE FUTURE?

*Discussion Questions:*

Where is the technology headed? Why?

If you were managing a conventional car company, what technology would you invest in to replace the internal combustion engine? Why?

Would you invest in an electric car company start up? Why or why not?

If you were to invest in an electric car company, where would you invest? How would you invest?

2/27/07 EVOLUTION OF MARKETS

LECTURE: UNDERSTANDING DEMAND FOR NEW PRODUCTS

*Read:* Chapter 6, Technology Strategy for Entrepreneurs and Managers

3/1/07 BASS MODEL

EXERCISE: Satellite Radio

Your boss has several questions for your team about forecasting demand, and she has asked your team to provide him with some answers. Using satellite radio data that we discussed in class, answer the following four questions she has posed:

1. Will cutting the price of the radio to \$100 and the price of the service to \$2 speed the pace of customer adoption of the product? If yes, how will the pace of adoption change? If not, what effect will it have on adoption of the product?
2. If you lower the radio price to \$100 what will happen to demand for the product? Is the effect of cutting the price on stimulating demand proportionately greater for a reduction in the radio price to \$100 than it is for cutting it to \$200?
3. To stimulate demand, is it better to cut the price of your radio or your service?
4. Assume that your satellite radio company has one competitor with 50% market share. How does that change adoption patterns? How assume that your satellite

radio company has three competitors accounting for 90% share of the market. How does that change adoption patterns?

3/6/07

#### CASE: FORECASTING THE ADOPTION OF E-BOOKS

##### *Discussion Questions:*

Assume that you are making a prediction from the time e-books first became available (year 2000). Although early unit sales data for e-books are available, construct your forecast irrespective of these sales?

What do you expect the long-run total adoption of e-books to be?

Do you expect the market for e-books to be guided more by imitators or innovators? Why?

Once you have modeled the first-time adoption of e-books, create a 5-year annual forecast of the overall demand for e-books.

What role will hardware devices play in the adoption of e-books?

3/8/07

#### PROTECTING INTELLECTUAL PROPERTY

LECTURE: PATENTS, TRADE SECRETS, TRADEMARKS, COPYRIGHTS AND DOMAIN NAMES

Read: Chapters 8 and 9, Technology Strategy for Entrepreneurs and Managers

3/20/07

#### CASE: CVD VS. A.S. MARKHAM CORPORATION

##### *Discussion Questions:*

What are the critical legal issues in this case?

As a juror, what decision would you reach on each of these issues? On what facts do your decisions hinge?

With the benefit of hindsight, what could A.S. Markham have done to prevent this case from occurring?

3/22/07

#### INNOVATION STRATEGY

LECTURE: INDUSTRY ANALYSIS, COMPETITIVE ADVANTAGE, AND APPROPRIABILITY

Read: Chapters 10, Technology Strategy for Entrepreneurs and Managers

3/27/07

#### CASE: CONTINUOUS CASTING INVESTMENTS AT USX CORPORATION

##### *Discussion Questions:*

Do you think Kappmeyer should sign the proposal? Why or why not?

What position should USX take with respect to CSP technology?

How did Nucor and the other minimills exploit USX's strategy to their advantage?

3/29/07

Test 2

4/3/07

ORGANIZATIONAL FORM

LECTURE: LICENSING, STRATEGIC ALLIANCES AND ACQUISITIONS

*Read:* Chapter 11, Technology Strategy for Entrepreneurs and Managers

4/5/07

CASE: BETA GOLF

*Discussion Questions:*

Which business model should Beta Golf adopt?

What factors should Zider and Krumme consider in selecting between the alternative business models?

4/10/07

MANAGING INNOVATION

LECTURE: CULTURE, PEOPLE, STRUCTURE, AND TOOLS

*Read:* Chapters 12, Technology Strategy for Entrepreneurs and Managers

4/12/07

CASE: CORPORATE NEW VENTURES AT PROCTOR AND GAMBLE

*Discussion Questions:*

How does Proctor and Gamble encourage creativity? What do they do that is effective and ineffective?

Is it possible to encourage entrepreneurial activity within a large, established company? Why or why not? If yes, how do you do it? If not, what should you do instead?

Is CNV the right model for Proctor and Gamble? Why or why not? What are the costs and benefits of the model?

Evaluate the CNV processes. What would you keep? What would you change? Can they be scaled up to the level of the entire organization?

4/17/07

ORGANIZING FOR INNOVATION

LECTURE: CORPORATE VENTURING AND OTHER MODELS OF ORGANIZING

*Read:* Chapter 13, Technology Strategy for Entrepreneurs and Managers

4/19/07

CASE: INTEL CAPITAL: THE BERKELEY NETWORKS INVESTMENT

*Discussion Questions:*

How does Intel engage in corporate venturing? What alternative models could it have adopted? What are the advantages and disadvantages of the approach Intel took?

Why did Intel decide to invest in Berkeley networks? Why did Berkeley networks invite Intel to invest? If you were a founder of a start-up, would you want Intel as an investor in your company? Why or why not?

How does Intel Capital's investment process differ from that of a private venture capitalist?

Is external investment in R&D a complement or a substitute to internal investment in R&D?

What, if anything, is Intel learning from its investment in Berkeley Networks?

4/24

GUEST LECTURE: INFRASTRUCTURE FOR ENTREPRENEURSHIP

Chris Varley, Nortech

4/26

TEST 3