

# **ENMG 661**

## **Strategic Management OF Technology**

(Spring 2017)

Economic history and prosperity of nations and companies has been linked traditionally to technological changes. This is true now more than ever before, with the overwhelming rapid technological changes and their radical impacts affecting all aspects of economy and society. Currently, the world is going through a stage of very rapid and radical technological changes that may lead to what is labeled as “Technological Singularity”, as a result of converging paths of many emerging technologies. Those who can cope would survive while those who fail to adapt will fall behind.

Technological changes are seen by many like a series of explosions labeled creative destructions, with innovations concentrating around leading-edge industries that provide new bases for prosperity, replacing each other in long periodic technological waves, whereby a set of superior technologies supplants inferior technologies and becomes dominant. Lagging sectors fall behind while the new set of technologies surge ahead, leading to new economic revitalization.

An organization cannot isolate a unit named “technology management” and say its concern is technology, while the rest of the organization ignores such issues. In a world globalized economy, “Value-Added” is the key issue for the firm: the role of technology and innovation process is to add value to the business with the profit motive, this would be the concern of everyone in the firm. In focusing on value creation the manager must recognize that there is a need for technology to provide a visible and timely creation of value by all parts in the firm.

Businesses are no longer willing to invest in technology if the strategic and performance benefits of technology are not clear, based on sound analysis and forecast to justify investment. Strategic management is a firm’s effort to analyze its environment and its internal capabilities so as to choose the competitive path it follows, where it seeks to build its strength and address weaknesses. The strategic perspective is usually separated into 3 steps: planning, implementation and evaluation and control.

In this fast changing technological environment “competitiveness” has become the key to success to companies. Competitiveness is the strategy a firm needs in order to deliver “value” to customers – where “value” is defined as the ability to meet or exceed customers’ needs and desires – and to do

so ahead of others and more effectively than competitors. “Competitiveness” is a set of institutions, policies, measures and factors that determine the level of “productivity” at the firm level. Productivity determines the rate of **return obtained on investment of resources** (financial, human or natural). There are 5 forces that affect productivity: the traditional competitors, the customers, the suppliers, the potential new entrants and the substitute products and processes.

Early waves of technological changes were dominated by the electro-mechanical manufacturing sectors. But towards the last quarter of the twentieth century the ICT revolution changed drastically this pattern leading to what was called post-industrial society, in fact post-manufacturing society, where by the “Embedded Knowledge”, or Information, became the leading factor of economic progress and prosperity.

Recently, new emerging technologies, mostly benefiting from the IT revolution, started affecting radically the “knowledge and Technology” theatre. Those includes: Biotechnology – Medical and Genetics –; Neuro-science and technologies; Alternative Energy; Clean technologies ; Artificial Intelligences and Robotics; Material Sciences and Nanotechnology. Though many experts many give different ordering and/or labeling to these technologies, taking together they are now shaping the future of humanity.

Innovation is part of technology management, but because of its “newness” it has to be differentiated from other aspects of technology management. The management of technology may be defined as “the linking of different disciplines to plan, develop, implement, monitor and control technological capabilities to shape and accomplish the strategic objectives of a firm. In contrast the management of innovation is defined as “a comprehensive approach to managerial problem- solving and action based on interactive problem-solving framework and as understanding of the linkages among innovation streams, organizational teams and organization evolution”. It is about implementing and managing politics, control, and individual resistance to change.

Strategic management of a firm involves the formulation and implementation of major goals and initiatives taken by top management based on consideration of resources and assessment of the internal and external environment in which the organization competes. The industrial strategic management deals with issues, such as: competitive advantages, resources allocation, economy of scale and role of technology and technological innovation.

The seminar is conceived to be flexible presentations and discussion sessions, so as to better respond, in an interactive way, to participating students’ interests. It would cover major conceptual and practical issues in Strategic Management of Technology, within wider frameworks, such as Globalization and Rapid Technological Changes.

The seminar is proposed to be structured, for the Spring 2017, as follows:

1- Introductory presentation of selected issues, to allow participating students to have a better picture of the seminar conceptual framework and to initiate thinking on specific topics for their term presentations and papers.

2- Elaborate presentations and deliberations of selected topics. Presentations are usually open to interactive discussions.

3- Each student is expected to prepare, during the term, a presentation and a paper covering a topic of his/her choice.

Students' presentations and papers are to be relate to the seminar topics, even if not discussed in class during the term.

4-The term grade is proposed to be allocated as follows:

- |   |                                    |
|---|------------------------------------|
| - Class participation ( 2 Written +<br>Vocal interaction during the class ) | 10 %                               |
| - Midterm test  | 20 % (during the term)             |
| - End of Term test  | 20 % (at the end of the term)      |
| - Presentation  | 15 % (one presentation /student)   |
| - Term paper (10-25 pages)  | 35 % (could be prepared in groups) |

## INSTRUCTOR

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**Recommended Text Books**

- 1- **The management of Technology and Innovation** : a Startegic Approach ;  
Margeret A. White and Garry D. Bruton ; 2<sup>nd</sup> edition 2013 ; Thomson - Southwestern;  
ISBN13.978-0538-47822-9.
- 2- The Future of Technology Management ; 2015 ; Alfred Marcus ; PEARSON

Relevant References

- 1- Think Like an Engineer ; Mushtak Al-Atabi ; 2014 ; Creative Commons
- 2- The Future of Technology Management ; 2015 ; Alfred Marcus ; PEARSON
- 3- Physics of the Future ; Micio Kaku ; 2012 ;Anchor Books
- 4- Strategic Management an integrated approach; C.W.L. Hill &G.R. Jones; South Western.
- 5- On Competition ; Micheal Porter ; 2008 ; Harvard Business Review Books ;  
ISBNH 978-1-4221-2696-7
- 6- Managing Innovation : Integrating Technological and Organizational Change ;  
Joe Tidd and John Bessant ; 2009 ;Wiley
- 7- The coming convergence; Stanley Schmidt ; 2008 ;Prometheus Books
- 8-The New Digital Age ; Eris Shmidt and Jared Cohen. 2013 ; Knop
- 9- Exploring Your Future: Living, Learning and Working in The Information Age.  
Edward Cornish; 2004, Word Future Society.
- 10- The Techno-Human Condition; Allenby and Sarewitz; MIT Press;2011
- 11- Teaching about The Future; Bishop and Hines;Palgrave-macmillan;2012

## **General Criteria for papers**

- 1- Innovative Topic & ideas;
- 2- Developmental aspects;
- 3- Relevance to Lebanon and to the Arab countries;
- 4- Possible impact/implications to Lebanese industrial sector;
- 5- Multitude of references (one is not enough); and proper referencing in the text;
- 6- Internet search (with proper referencing). All webpages quoted must be dated
- 7- Good outline, logical sequencing of ideas;
- 8- Text coherence and logical conclusions;
- 9- Critical analysis
- 10- Conclusions and recommendations relevant to the text;
- 11- Properly placed figures, tables and captions