

ENMG 655

Contemporary Issues in Management of Technology and Innovation

Fall 2017

Economic history of nations, companies and individuals has been linked traditionally to technological changes and innovations. This is true now more than ever before, with the overwhelming rapid technological changes affecting various aspects of economy and society. Among the most affected areas of technological change is the nature of careers and the jobs market. Within less than a decade thousand of careers are becoming obsolete and others are being created.

The world is going through a stage of very rapid and radical economic, social, technological and cultural changes... that may lead to what is labeled as "Technological Singularity", as a result of convergence of many emerging technologies. Those who can cope would survive, while those who fail to adapt will fall behind.

In this fast changing technological environment "**competitiveness**" has become the key to success to individuals, companies and nations. Competiveness is the strategy a firm (and a person) 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 based on a set of institutions, policies, measures and factors that determine the level of "**Productivity**" at the firm or country level. Productivity will determine the rate of return obtained on investment of resources (financial, human or natural). There are 5 forces that affect the productivity: the competitors, the customers, the suppliers, the potential new entrants and the emerging substitutes.

All new products and processes begin with an idea or a concept: a vision for a solution to a societal need or problem, or an improvement/replacement to an existing device or process. The challenge is to take the "bright idea" and translate it into a tangible and marketable product or service. As difficult as may be to design and develop a new product or process, there are many important "non-technological" steps - and many "unexpected surprises" - on the way of moving the "successful design" into a "successful product or process" in the market place. "The Bright Idea" is only a small part of the innovation path.

In the harsh competitive market environment, a young graduates, including engineers, may have to change his/her career many times in his active life, for the nature of "jobs and careers"

is changing rapidly with technological changes, and the entailing changes in societal environment. Many functions are being automated, but successful professionals will still find creative ways of using their “*human*” skills and talents to make a living.

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 managing “Technology and Innovation”, within wider frameworks, such as : Globalization; Role of Technological Innovation; entrepreneurship; National Industrial Policies, etc...

Discussions will refer frequently to the Lebanese Industrial sector as a case study.

The seminar is proposed to be structured, for the Fall term2017 , 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 +
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 ; 2nd edition 2013 ; Thomson - Southwestern;

ISBN13.978-0538-47822-9

2-Managing Technology Entrepreneurship and Innovation; 1st Edition

By Paul Trott , Dap Hartmann , Patrick van der Duin . Victor Scholten J. Roland Ort

ISBN 978-0-415-6722-6

Seminar proposed Topics

Introduction: the role of technology and industry in national economy; what are the options open to a young engineer in a fast changing technological environment.

Why Engineer can think creatively and in an organized way?

Part I- The Global Environment:

- 1- **Introduction** to Management of Technology and innovation; “the engineer approach”.
- 2- **Historic setting:** The great Transformation and the converging technological revolutions: the coming “Technological Singularity”.
- 3- **Forecasting Technological Change:** Patterns and waves of Technological changes and innovation: Development and diffusion of innovations.
- 4- **Global setting:** Globalization of production and trade: the changing New Rules of Global Production. Competing in a global economy: Embedded knowledge, value-added Productivity; comparative and competitive advantages: concepts and framework.
- 5- **Local setting:**
 - a- The Role of the State: Industrial Policy and The business Environment.
 - b- Links between the production and services sectors and the academic and research institutions; support institutions, incubators and technology parks;
- 6- Management of Technology: processes, role of technology management.

Part II- Impact of Technology Innovations:

- 1- The conceptual framework: Entrepreneurship and innovation
- 2- Management of Innovation, role of innovation management.
- 3- Inventing the future: creativity and ideas generation
- 4- Role and advantages of SME
- 5- Process Innovation: management under crisis

Part !!! Thinking Like an Engineer

- 1- What is an engineer's approach: practical problem solving techniques.
- 2- CDIO methodology
- 3- Learning from failure
- 4- Problem solving.

Part IV- From Concept to consumer:

- 1- New world rules: new products with shorter life-cycle. The basics for development of a "new product".
- 2- Creativity: Developing new ideas for products, processes and services.
- 3- Steps in moving from concept to commercialization, including the "Industrial Design"
- 4- The manufacturing process: The role of China/Asia
- 5- Marketing, distribution and after-sale services.
- 6- Business Plan

Part V- The Lebanese Business and Industrial Environment:

- 1-The Lebanese industrial sector: status, problems and perspectives.
- 2- Lebanese industry innovation survey.

Part VI:-Additional topics

- 1- Changing Job Market: Hyper Human careers.
- 2- Standardization, certification and accreditation.
- 3--Total Quality Management and Quality Standards.

Relevant References

- 1- **Think Like an Engineer** ; Mushtak Ai-Atabi ; 2014 ; Creative Commons
(posted on the course Moodle page)
- 2- **From Concept to Consumer : How to turn Ideas into Money** ;
Phil Baker ; 2009 ; FT Press ; ISBN-10 :0-13-713747-8
(posted on the course Moodle page)
- 3- **The Future of Technology Management** ; 2015 ; Alfred Marcus ; PEARSON
- 4- **The Techno-Human Condition**; Allenby and Sarewitz; MIT Press;2011
- 5- **Physics of the Future** ; Micio Kaku ; 2012 ;Anchor Books
- 4- **The Lean Startup** ; Eric Ries ; 2011 ;Crown Business ISBN 978-0-307-88789-4
- 6-**The Theory and Practice of Sustainable Engineering** ; Braden R. Allenby ; Pearson ; 2012 ; ISBN10 ;
0-273-75216-2
- 7- **On Competition** ; Micheal Porter ; 2008 ; Harvard Business Review Book ;
ISBN 978-1-4221-2696-7
- 8- **Out of the Box** : 101 ideas for thinking creatively ;Rob Eastaway ;2007
- 9- **Managing Innovation : Integrating Technological and Organizational Change** ;
Joe Tidd and John Bessant ; 2009 ;Wiley
- 12- **The coming convergence** ;Stanley Schmidt ; 2008 ;Prometheus Books
- 13-**The New Digital Age** ; Eris Shmidt and Jared Cohen. 2013 ; Knop
- 14- **Futuring: Exploring and Managing Your Future**: Living, Learning and Working in The Information
Age. Edward Cornish; 2004 (World Future Society)

Useful web pages

<http://www.iso.org/iso/en/ISOonline.frontpage>

<http://www.escwa.org.lb/>

<http://www.unep.org/>

<http://www.unido.org/>

<http://www.weforum.org/>

<http://www.oecd.org/publications/>

<http://www.industry.gov.lb>

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 date**
- 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