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Economics and management of innovation simple (for real)

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# Course introduction

The course will be focused on innovation, ecosystems innovation and different sources/types, firm strategies/competition and case studies.

Innovation as a concept is the perception of something different given to customers and people, having a competitive advantage over old ideas and marking a difference for customers and their relationships. This is made creating products and services, targeting customers overtime and helping the existing ones.

(Notes not for exam) The City Vision event (present in the course schedule) is important, can give bonus points if one is there. It’s present on the end of Moodle in the “Events” section. If one manages to be present at least 1.5 h. into the City Vision event, one can get 1 point for the exam. Remember to sign before entering and signing before going out. Link to the event: <https://city-vision.it/evento/city-vision-2023/>

Key points about inquiring with startups:

1. Founding team
2. Where did the idea come from
3. Main obstacles
4. Main facilitators

About the exam:

**FOR ATTENDING STUDENTS**

The final exam consists of two parts.

1. The first part consists of a written test which includes 3 open questions on the content of the textbook. Each question will be evaluated with a maximum of 8 points.

2. The second part includes one group-work ppt presentation of 8-10 slides (evaluated with a maximum of 8 points). The presentation of the teamwork (composed of possibly 5 students) is made by companies.

Details on point 2 are available on the Moodle Platform in due course.

**FOR NON-ATTENDING STUDENTS**

The final exam consists of a written test which includes 4 open questions on the content of the textbook. Each question will be evaluated with a maximum of 8 points.

To form a group, there is a “Build your team” link.

Innovation in general can be considered synonymous with technology, future, progress and improvement.

# Chapter 1 – Introduction

The innovation is a key factor in driving competing success, where enabling rapidly a new design, short production times, lifecycles, segmenting the market towards niches, allows impactful change and news all over the world. Many innovation help industries differentiate themselves.

Advances in information technology have enabled faster innovation, enabling rapid design and shorter production. Innovation and advances in information lead to shorter product lifecycles, creating more rapid new product introductions and having greater market segmentation. This enables a wider range of goods and services to be delivered to people worldwide.

Successful innovation requires specific strategies and implementation processes, creating an *innovation funnel*, a pipeline starting from the idea generation, then accompanying the screening idea, concept development, testing, analysis and commercialization. Specifically:

1. Foundations of technological innovation
   1. Sources of innovation (internal/external)
   2. Types and patterns of innovation (product/process/business model)
   3. Battles to assert industry dominance
   4. Timing of entry in the market
2. Formulating Technological Innovation Strategy (part 1)
   1. Define the mission core, the overall vision and the strategic intent to reach
   2. Choosing innovation projects, a portfolio of new ones, studying risks and decision-making stages
   3. Collaboration strategies, between partners of various kinds and alliances
   4. Protecting innovation competitively, having defensive strategies and creating patents
3. Formulating Technological Innovation Strategy (part 2)
   1. Create dedicated innovation structures to support innovation
   2. Fostering a innovation culture, promoting cross-functional collaboration
   3. Manage the product development, allocating resources accordingly, creating good teams, maintaining leadership and motivation
   4. Crafting a development strategy, carefully planning the enter in the market of services and products, while generating overall brand-awareness

Some natural questions that we may ask ourselves are (coming from the slide, I try to give my take giving just a few keywords, helping the overall discussion):

1. Why is innovation so important for firms to compete in many industries?
   1. It plays a crucial role, whereas the market differentiates, allowing efficiency in costs, adapting to changes, having a long-term sustainability, new growth in revenue and attracting talents
2. What are some of the advantages of technological innovation? Disadvantages?
   1. We may have as drawbacks high costs, fast obsolescence, security and ethical concerns depending on the context and workforce disruption
3. Why do you think so many innovation projects fail to generate an economic return?
   1. Many reasons, like the poor execution, lack of market fit in time and needs, resistance to change or understanding the overall market, being constrained in financial and competitive factors.

The source of innovation arises both from the company/industry vision and from the individuals themselves, which determine how a dominant design will be selected above others.

# Chapter 2 – Sources of innovation

The development of cultured meat, also known as "clean meat," is a clear example of innovation stemming from both internal and external sources in the food industry, introducing entirely new ways of producing meat without traditional methods.

Jason Matheny founded New Harvest, an organization dedicated to promoting research in this field. Collaborations with Dutch scientists and the government highlight external sources of innovation, having a clear understanding of the environmental problem and posing itself as a new solution to this overall issue and challenge, using very few calories and having new startups bringing this problem to the overall attention.

This overall is a sustainable choice, ethically good and healthy for the market, while at the same being technologically complex and expensive to both produce and have the market accepting it. Even here, market creates links between corporations, organizations and institutions, to create a good perception of both laws, market companies’ vision and people buying alike.

Innovation can arise from many different sources and the linkages between them is strong, central and decentralized at the same time.

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It’s interesting to analyze creativity as the ability to produce useful, novel work based on personal development and knowledge in a specific environment, but not only that (having a mix of knowledge and culture to create new ideas overtime, both with personality and motivation).

We might manage to categorize organizational creativity as creativity of individuals within the organization, crafting new social processes that help shape new forms of interactions and trainings, encouraging creativity in action (Google for example, encouraging spending time to think new ideas).

Innovating means then implementing creative ideas into new devices or processes, taking for example *inventors*, people who essentially mastered the basic tools and operations of specific fields, always keen of finding new problems to stimulate their sense of unified knowledge, questioning assumptions and then creating as a whole process of giving and taking, this way developing many new devices but commercializing very few.

This way we can see innovations are made with faith into realistic actions, made of hard work, modest means and constant self-teaching. Paraphrasing: the key to success is made by making, thinking by thinking and proving yourself wrong overtime. When the time is right, you will be right too.

Many other times, innovation can come by users (*innovation by users*), because they have a deep understanding of their own needs practically and tend to solve their problems themselves. Also, there is *research and development by firms (R&D)*. Research refers to both basic and applied research:

* *Basic research* aims at increasing understanding of a topic or field without an immediate commercial application in mind
* *Applied research* aims at increasing understanding of a topic or field to meet a specific need (more likely to have commercialization than the basic one)

*Development* refers to activities that apply knowledge to produce useful devices, materials, or processes. In this case, we have two specific approaches:

* *Science Push* approaches suggest that innovation proceeds linearly:
  + Scientific discovery → invention → manufacturing → Marketing.
* *Demand Pull* approaches argued that innovation originates with unmet customer need:
  + Customer suggestions → invention → Manufacturing.

Most frequent collaborations are between firm and their customers, suppliers, and local universities, on which the firms have linkages. These are the usual percentages:

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There are also *complementors*, which are businesses, products, or services that, while not direct competitors, provide value by enhancing or complementing the offerings of another company. They often work in conjunction with a company's products or services to create a more complete and attractive solution for customers.

Complementors and suppliers serve distinct roles in a company's ecosystem. Complementors enhance the value of a company's products or services (you don’t always need them), often in a cooperative relationship, while suppliers provide the necessary inputs for a company's core operations in a transactional relationship (you need them).

Innovation can be *External* or *Internal* Sourcing, which are complements.

* Firms with in-house R&D also heaviest users of external collaboration networks
* In-house R&D may help firm build absorptive capacity (capacity to exploit external knowledge, using tools efficiently in new ways) that enables it to better use information obtained externally

Many universities encourage research that leads to useful innovations, with small revenues, but contributing to innovation trough publication of research results. Governments invest in research through:

* Their own laboratories
* Science parks and incubators
* Grants for other public or private research organizations

Many nonprofit organizations do in-house R&D, fund R&D by others, or both (there are a good number of organizations doing this). The R&D Business expenditure is very much the biggest one, while government spend (apart from India where it’s huge) a good amount of funds on this; also, higher education represents a good investment especially in European countries.

Such collaborations include (but are not limited to):

* Joint ventures (more companies coming together and creating new things)
* Licensing and second-sourcing agreements (patents/intellectual property)
* Research associations (collaborative groups or research and expertise)
* Government-sponsored joint research programs (funding in various sectors)
* Value-added networks for technical and scientific exchange (provide platforms for exchange)
* Informal networks (collaborations of individuals across common interests)

Collaborative research is especially important in high-technology sectors where individual firms rarely possess all necessary resources and capabilities. This allows the size and the structure of networks changing and adapting according to alliance activity and broadening the overall spectrum of collaboration:

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We can describe collaborative networks between firms in this way:

1. **Collaborative Relationships:** Firms often engage in collaborative relationships, which can take various forms, such as partnerships, alliances, or joint ventures. These relationships involve two or more organizations working together for mutual benefit.
2. **Network Formation:** When firms enter these collaborative relationships, they become part of a larger network. This network includes not only the collaborating firms but also the connections and interactions they have with other organizations, suppliers, customers, and stakeholders. There networks can have many forms, social, communication, supply chain ones, etc.
3. **Information and Resource Diffusion:** Within this collaborative network, information and resources flow between the participating firms. This flow of information can include knowledge sharing, best practices, technological innovations, and market insights. Additionally, resources such as capital, human resources, and technology may be shared or accessed through these relationships. In this way, information and ideas can flow depending on the influence and the impact this can have.
4. **Network Dynamics:** The size and structure of this collaborative network are not static; they change over time. This change is driven by shifts in alliance activity, such as forming new partnerships, ending existing ones, or altering the nature of collaborations. These changes can have a significant impact on the network's effectiveness in promoting innovation and resource diffusion.

The environment plays a huge role in boosting creativity by ideas of individuals, allowing people to engage in research and networks, making the whole society aware in the innovation process. What’s important is stimulating a collaborative network, making people stay where they are.

There are two sources of risks: technological and economical uncertainty, given the acceptance of the market. In a network, the more comes out from a node, the more powerful it is.

*Technology clusters* are regional clusters of firms that have in common a connection to a technology, made by a variety of actors coming from different fields, coming together for provision of new knowledge (may work with the same suppliers, customers, or complements). It must be something that facilitates knowledge exchange, attracting other firms to area, making supplier and distributor markets help the growth of services cluster and make local labor pool valuable, for example leading to infrastructure improvements.

It depends on the nature of the technology, for example if that can be protected by copyrights or patents, requiring close and frequent interaction. The more the market is concentrated towards fewer players, the more difficult is to enter that market. This is the main downside, increasing fewer competition, polluting the market with fewer solutions possibly copying with only slight improvements the successful ones and leaking the knowledge, congesting the market.

Likelihood of innovation activities being geographically clustered depends on:

* The nature of the technology
  + For example, its underlying knowledge base or the degree to which it can be protected by patents or copyright, the degree to which its communication requires close and frequent interaction
* Industry characteristics
  + For example, degree of market concentration or stage of the industry lifecycle, transportation costs, availability of supplier and distributor markets;
* Cultural context of the technology
  + For example, population density of labor or customers, infrastructure development, national differences in how technology development is funded or protected.

Technological spillovers are an important concept, and they occur when the benefits of research or innovation conducted by one entity extend to benefit other entities. The likelihood of these spillovers can be influenced by several factors, as you mentioned:

1. Strength of Protection Mechanisms
   1. Intellectual property protection mechanisms like patents, copyrights, and trade secrets play a significant role. If an entity has strong legal protection for its innovations, it can control and limit the spillover to other entities. This may reduce the likelihood of spillovers.
2. Nature of Underlying Knowledge Base
   1. The type of knowledge being generated or transferred matters. Tacit and complex knowledge, which is hard to articulate and codify, can be less likely to spill over because it's difficult to transfer without direct interaction or collaboration. On the other hand, explicit and easily documented knowledge is more prone to spillovers.
3. Mobility of the Labor Pool
   1. The movement of skilled individuals can also impact spillovers. If highly skilled professionals move between entities, they can carry knowledge and innovations with them, increasing the likelihood of spillovers. Additionally, collaborations and knowledge sharing between entities are more likely when there is labor mobility.

# Social innovation

Social innovation (SI) concerns the implementation of a wide range of activities and addressing of *social problems* and *human needs*. According to the EU definition, “social innovations are new ideas, meeting people and creating new collaborations”. There is a strong relationship between places and innovations, especially considering social ones because societal needs that Social Innovations (SIs) aim to alleviate are *place-specific* (depending on the area, the region, etc.).

The concept itself is debated, but scholars agree on:

* emerging of social innovation as a *response to social needs*
* emerging in *different places*, usually happening in *rural* or *remote* areas, possibly escaping from marginality, given the need of conditions.

The term was *politically* charged and associated with *social reform*, leading to development of further social and physical technology; in recent times, this also led to “technical innovation”. For example, we can quote many programs on this, for example by President Obama in the USA, the EU itself, with flagship initiatives and sustainability programs, while raising awareness.

Innovation mainly addresses economic issues, like:

* products/services
* processes
* organizational structures
* marketing strategies

Innovation also addresses social objectives, like:

* roles (of individuals/firms/institutions)
* relations in all kinds of environment (in private/professional ones, networks, communities),
* formal/informal norms
* giving values, ethics and customs.

*Innovation* is then seen as the “new combination” of production factors, like land, labor, capital, entrepreneurship, while *social innovation* is seen as a new combination of social practices to solve societal challenges, adopted and utilized by individuals, social groups and organizations alike. Both create value equally, among the professional practices followed in any context.

Continuing with definitions, the EU Commission defined social innovations as “new ideas that meet *social needs*, creating *social relationships* and form *new collaborations*, creating products, services and models as innovations, to meet unmet needs effectively and encouraging *market* uptake of new solutions, stimulating *employment*”.

The Commission’s actions on SI and the Social Investment Package induce uptake and scaling up of SI solutions, having as main objectives:

1. promoting social innovation as source of *growth* and *jobs*
2. *sharing information* about social innovation
3. supporting *innovative entrepreneurs* and mobilizing *investors* and *public organizations*

The EU commissions actions relate to:

* *Networking*, helping organizations across Europe to connect
* *Competition*, having an yearly competition for supporting new solutions to societal challenges
* *Funding*, directly funding different programs
* *Ecosystems*, improve the condition for social innovation and social enterprises in Europe, attracting also private investors
* *Impact*, gathering and disseminating evidence about the ben innovation actions and methodologies
* *Incubation*, supporting structures EU-wide of incubators for innovation
* *Exploring*, looking for new ideas and applications in different fields

There are several approaches on how SI is seen:

* a pragmatic approach, as a complex of “innovative activities and services that are motivated by the goal of meeting a *social need* and are predominantly developed and diffused through organizations whose *primary purposes are social*”
* a systemic approach, as a *complex process* through which process or programs are introduced, leading to a *deep change* in daily routines, resource streams, power relations and values within the *system* affected by the innovation
* a managerial approach, as a new solution to a social problem, which is more *effective, efficient, sustainable or fairer* compared to existing solutions, generating *value for the society*
* a territorial approach, as a process of empowerment and political transformation targeting a bottom-up transformation in terms of *stakeholders* and *distribution* of resources

There are many societal levels according to the Bureau of European Policy (BEPA):

* micro level, where the *social demand* level tackles specific problems faced by *specific groups of the ground* that are traditionally not addressed by the market itself, impact vulnerable people
* meso level, where the *societal challenge* tackles challenges affecting people at a larger scale and across whole sectors, often manifesting through complex *social, economic, environmental and cultural* factors that require new forms of *relations*
* macro level, where the *systemic change* enquires some *fundamental transformation* of the way *society* behaves, in institutions, actors and structures, empowering different sources of well-being (new crafting governance techniques and ideas)

There can be socio-economic drivers, like:

* new sources of competition
* changes of investor confidence
* changing values of assets
* alterations in demand/supply
* employment/unemployment
* poverty

SI addresses social needs and new social needs, for example technological advancements like:

* automation
* digitalization
* platforms advent
* access to information
* ethical and privacy-related issues
* balancing home/work mix
* altering value of property rights

There are also cultural drivers:

* changing local traditions
* fundamentalisms vs democracies
* generational or cultural gaps
* altering values and norms
* role of media in opinions, attitudes and behaviors of people

SI addresses social needs and new social needs:

* Sustainability drivers
  + Environmental awareness (climate change)
  + Social pressures
  + Population changes: demographic dynamics and migration patterns
* Single events
  + Financial and economic crisis
  + Natural disasters
  + Health emergencies

Societal changes can create problems and new needs as:

* Societal and economic inequalities
* Economic decline
* Institutional and political distrust
* Digital divide
* New labor structures displacing previous ones
* Generational gap
* Gender (pay) gap

A possible categorization is born:

1. Objectives
   1. SIs satisfy societal need, including the needs of *particular social groups* (aiming at *social value creation*)
   2. SI does not produce conventional innovation outputs such as patents and publications
2. Actors and actor interactions
   1. SIs are created by actors who usually are not involved in “economic innovation”, including informal actors
   2. SIs often involve predominantly *new types of social interactions*, achieving common goals and/or innovations that rely on *trust* rather than mutual-benefit relationships
   3. SIs often involve different action and diffusion processes but ultimately brings *social progress*
3. Outputs/Outcomes
   1. Early SI definitions strongly relate to production of social technologies (bring at time “intangible innovation”, so advancements not directly tangible or physical
   2. Others indicate social innovation changes in the attitudes, behaviours, perceptions of actors involved, while others stress the public with the good SI creates
   3. SI is often associated with long-term institutional/cultural change
4. Innovativeness
   1. It involves “the implementation of a new or significantly improved product/service/process/marketing method/new organizational method in business practices, workplace organization or external relations”

There can be some related concepts:

* *Corporate Social Responsibility* (CSR), involving initiatives which *extend beyond* meeting immediate interests of stakeholders of enterprises, offering potential to enhance performance, ensuring open-source and sustainable, while also maintaining ethical values
* Adopting a business approach *social entrepreneurs* focus on brining improved social outcomes, creating new solutions in education and healthcare
* The underlying driver is creating social value as opposed to personal/shareholder wealth, characterizing the creation of new solution that benefit communities while also promoting diversity and positivity

Useful tools to check such research cases in SI: ISI Web of Knowledge, ESID

Some slide examples to social innovation cases here:

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Immagine che contiene testo, schermata, Carattere, documento

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Immagine che contiene testo, schermata, design

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Immagine che contiene testo, Carattere, schermata

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Immagine che contiene testo, biglietto da visita, vestiti, persona

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Immagine che contiene testo, schermata, uomo

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Immagine che contiene testo, schermata, Carattere, algebra

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# Invited speakers: Mobisec

We have as guests Mobisec, which offer custom cyber security services, concentrating as the name suggests on mobile devices. The lesson starts with a QR code which actually redirects to a questionnaire and it’s used as an example of malicious data encoded in a “easy” way; this is usual phishing, but in the case of leveraging QR codes, it’s actually called “quishing”.

Mobile devices today are an essential part of our lives, from communicating with loved ones to managing business on the go. However, there is the flipside of this technology: cyber attacks, which can lead to potentially devastating consequences such as data breaches and financial losses. A malicious attack requires knowledge context and possess of personal information (might be users’ personal data and sensitive data, customer behaviors, profiling, know-how of corporates, compromises in economic transactions).

This can lead to potentially high costs for a company, especially for data breaches context. Most organisations are investing heavily in securing their network and infrastructure. However, a significant shift is underway. Over the past 5 years, organisations large and small have been moving from in-house / on-premises solutions to cloud-based alternatives.

Mobisec presents itself as a company founded for mobile cybersecurity purposes, working with potentially high clients across all of Europe and Italy. The company intersects in all sectors, e.g. IOT/physical security/mobile security/endpoints safety/automotive/etc. The platform is structured with tracking agents (real-life devices), training AI/ML models in order to get services data and then reporting continuosly everything (Configuration Managemente – DevOps). So, the company potentially analyzed a lot of data in vulnerabilities and recent breaches, leading to financial losses and damages to brand reputation (also, being careful to avoid other kinds of attacks).

The company examines the development logic of the app as well as its security by testing it on actual devices in our laboratory. Mobisec DSA detects vulnerabilities by analyzing the actual functioning of devices, identifying weaknesses that would otherwise remain hidden if conducted statically. At a high level, this analysis is made of:

* Analyses native, hybrid and API gateway applications
* Performs static and dynamic analysis
* Vulnerability testing from design to provisioning
* Integrates with your organization's configuration management systems
* Apps are tested in a real-world usage context
* Checks every app data, function, transaction and component
* First full report in 5 days, for subsequent testing in just 2 days

The cybersec tests are commonly of two kinds:

* Vulnerability Assessment (VA) aims to identify known issues to prevent common industry mistakes
* Penetration Testing (PT), also known as Web Application Penetration Testing (WAPT), conducts a thorough examination of code, algorithms and logic to uncover potential vulnerabilities such as data leakage, account takeover and privilege escalation

These commonly follow the OWASP standards, keeping data updated continously. The company also developed a product called Hiwave, to supervise and manage IoT devices, apps, users and data directly into enterprise systems and devices. This can be integrated into any device and can provide continuous supervision and direct control over, across all devices (Mobisec UEM - Unified Endpoint Management). There is also a tool proprietary to them, called Mobile App Scraping, which monitor the main market channels for Android applications.

For the proper presentation to be posed with groups, they propose two kinds of challenges:

* Market Research Challenge
  + Objective
    - Conduct in-depth market research in mobile / IoT cybersecsector
  + Task
    - Analyze market trends, prospects behavior and competitive landscape
  + Data Collection
    - Gather data through surveys, interviews, and secondary research
  + Analysis
    - Interpret findings to identify opportunities, challenges, and potential market gaps.
  + Presentation
    - Prepare a report in order topresent findings
* Communication Strategy Challenge
  + Objective
    - Develop a communication strategy for Mobisec
  + Task
    - Create a compelling narrative and messaging plan
  + Audience Analysis
    - Identify target audiences and their preferences
  + Channels
    - Choose appropriate communication channels (e.g.social media, traditional advertising…)
  + Budget
    - Allocate a hypothetical budget to maximize impact
  + Presentation
    - Prepare a report in order topresentthe strategy