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Innovation Management in the Globalized Digital Society

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Abstract

Innovation is by far the trendiest management issue nowadays and the rhetoric of innovation has reached every sector of the economy and society, as well. Increasing competitiveness implies economic change through the introduction of new technologies and new methods of production, as well as, the development of new skills. Innovation is the core of this process. Innovation management is focused on the systematic processes that organizations use to develop new and improved products, services and business processes. It involves development of creative ideas within the organization and the networked environment. Focusing on the management of innovation implies also the management of talents among the employees. The knowledge captured in new technologies and processes has led to growth and competitiveness. Developing knowledge-based society requires adequate levels of investment in research, development, education, as well as creating a favorable environment for innovation. Reengineering in terms of innovation has helped many companies to improve their productivity and consequently to grow in competitiveness. Hereby we discuss the management of innovation in the circumstances of market globalization, digital revolution, and dynamic development of technology, products and services. Management of innovation is a complex task of leadership that aims at a systemic process of change throughout strategic and operational approaches. In this paper we discuss a model of innovation management based on the analysis of the driving forces of change and a framework in which domain and problem definition play an important role. The paper presents also the National Innovation Systems with a special view of Romania's position within the European Union in terms of innovation.

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1. Introduction

At the heart of all activities is innovation. Within a company, innovation may occur from unexpected occurrences, incongruities, process needs, and industry and market changes. Outside the company the driving forces for innovation are the demographic changes, changes in perception, new knowledge, globalisation and digitised world. Innovation can be viewed as an uncertainty reduction process in which accurate problem and domain definition play an essential role. Being a trendy management issue, the rhetoric of innovation has reached every sector of the economy and society, as well. Besides that, increasing competitiveness implies economic change through the introduction of new technologies and new methods of production as well as, the development of new skills. Innovation is the core of this process. Innovation management is focused on the systematic processes that organisations use to develop new and improved products, services and business processes. It involves development of creative ideas within organisations. The reminder of this paper is organised as follows: in chapter 2 we discuss basic concepts on innovation and innovation systems, chapter 3 analyses certain driving forces that can be regarded as incentives for innovation such as: the digital revolution and the global society as well as a model and framework for innovation management. In chapter 4, we present national innovation systems, and the case of Romania. In chapter 5 we draw conclusions and future work.

2. Basic Concepts on Innovation and Innovation Systems

2.1. Innovation

Innovation represents the “implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations” [1]. According to this definition four types of innovation can be identified:

- Product innovation (the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses, including relevant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics);
- Process innovation is the implementation of a new or greatly improved production or delivery method, including important changes in techniques, equipment and/or software);
- Marketing innovation (the implementation of a new marketing method encompassing important changes in product design or packaging, product placement, product promotion or pricing) and
- Organisational innovation (the implementation of a new organisational method in the company’s business practices, workplace organisation or external relations).

2.2. Driving forces for change and innovation strategies

In order to develop a deep understanding of the key strategic issues of the organisations and the history that has brought them into existence, and to develop the right strategic guidance for the innovation process, Langdon Morris [2] has elaborated the innovation master plan in which he defined the driving forces for change. Such driving forces are: commoditization, the digital revolution, social mediatisation through society, globalisation, the turbulent world, the acceleration, meaning running faster to stay in the same place.

Government policies aimed at fostering innovation have to pay heed to changes in the global economy and the transformation of innovation processes. In order to turn an invention into an innovation, several complementary activities are called forth, such as organisational changes, firm-level training, testing, marketing and design. Innovation nowadays is not only limited to research and development (R&D), though this remains an essential element.

The main priorities for innovation policy, as part of an innovation strategy are:

- Empowering people to innovate;
- Unleashing innovations;
- Creating and applying knowledge;
- Applying innovation to address global and social challenges;
- Improving the governance and measurement of policies for innovation.

The actions that need to be taken with a view to unlocking innovations are:

- Foster entrepreneurship;
- Enhance access to finance;
- Build the foundations for innovation in business with sound framework conditions;
- Foster markets for innovative goods, services and processes;

- Foster strong and effective public research;
- Invest in a knowledge-supporting infrastructure;
- Foster efficient knowledge flows, networks and markets;
- Unleash innovation in the public sector;
- Foster international co-operation;
- Tackle key challenges through innovation: climate change, health and food security;
- Bridge the gap in economic development through innovation.

3. Innovation framework in the digital global society

3.1. The digital revolution

The increase of computing power has led to a digital revolution that brought new forms of competition to large corporations and small and medium size companies, as well. Digital revolution hit the computer makers first, then it moved on to attack other companies too, because cheap computing power suddenly enabled small companies to deploy the computational resources that only big ones previously had, and a major barrier to entry abruptly disappeared. Companies all over the world lowered their operating costs, increased their IT capabilities, and improved their own business models by creating better products and services at lower prices. Many of these new players emerged from the edges of traditional markets, and because they came from the edge they were able to develop and refine their business models without attracting the attention of the larger firms. This new digital power has resulted in significant growth across the entire economy, but has also brought new competitors for the world's corporate giants. This process of digitization also accelerated the trend toward larger-scale commoditization, as goods that had once been considered luxuries became so cheap to make that they became available at mass market prices due to digitized design, manufacturing, and distribution systems. This new computer-driven world of manufacturing and distribution became essential to the successes of Tesco, Carrefour, Wal-Mart and Home Depot, as they were among the first to grasp how to exploit the new capabilities of computers to help manage a tremendously complex global enterprise [2]. Today's Internet War between Google, Microsoft, and Facebook marks just another step in the digitisation of the economy, showing us that the digital revolution will continue to change the tools we use to create and consume information, and will therefore continue to have enormous influence on which business models are successful and which are not. Digitisation impacts all aspects of the arts, entertainment, business, and society, and it's crucial to how products are designed, manufactured, and distributed. It's also essential to how consumers gather and share information, and how they get entertainment, as it is central to how companies manage their finances and operations. It's even a basic resource for farmers, who plough and fertilize their fields according to what they learn from satellites, and it also tells them how, where, and for how much they can sell their produce. This is as true in the corn belt of Nebraska as it is in rural India, coastal China, and central Brazil. In fact, there is no aspect of society that is not significantly affected by digitization [2]. Innovation is mandatory in the digital age.

3.2. Globalized society

Digital technology becomes progressively more significant as it's applied to more and more functions of life, business, and society. Business today is inconceivable without the Internet, and the countless software tools that we use to manage the modern enterprise. And now hundreds of millions of people are using social media platforms like Facebook, MySpace, Twitter, and LinkedIn to communicate with one another, which constitutes a trend with enormous momentum, and perhaps enormous importance. Yet as a social phenomenon and an industry, social networking is so new that although the consequences seem to be important, they're also entirely unpredictable.

It's impossible to know where these trends are going, or what they might mean two, three, or five years in the future. Will it be expected that every business must have a presence on Facebook (or its newer, cooler offspring) in a few years, just as it's mandatory today for every company to have a web site? It's entirely possible. But what else could it mean? Will social media become a force for social change, or merely a bunch of "places" to connect with friends? Will Facebook's new currency become a powerful economic engine, or merely a curiosity? Will anything be different when the number of Facebook users passes a billion?

Globalisation has drawn every nation into a single economic system, and through social media, many of us are now participating in a mediated social system as well. As a result, every company's strategy must address a globalised market in which increasing numbers of people are participating in social and business communities that transcend national boundaries.

With impacts throughout the manufacturing and supply chains, globalisation is a vital driving force that has a great

impact on the operations and positioning of every company. The power and impact of globalisation means that it's essential for every company to understand the current and future impacts of worldwide trends on operations, to develop a globalisation strategy, to optimize learning opportunities through exposure to various markets around the world, and perhaps also to extend its reach to new customers [2].

3.3. Pillars for innovation in the globalised digital world

Finding novel solutions to important problems is not only hard, but complex. There are, after all, a myriad of important problems at any given time and countless potential approaches to each one of them. Tim Kastelle has defined two pillars for innovation: competency and commitment [3]. **Competency:** Every organization has its own history and set of capabilities, which determine its innovation competency. An old-line industrial firm can't just wake up one day and decide to operate like a hot Silicon Valley tech start-up overnight, nor should they try. However, every enterprise can improve. Tim Kastelle has built a framework for innovation based on competence and commitment, fig. 1.

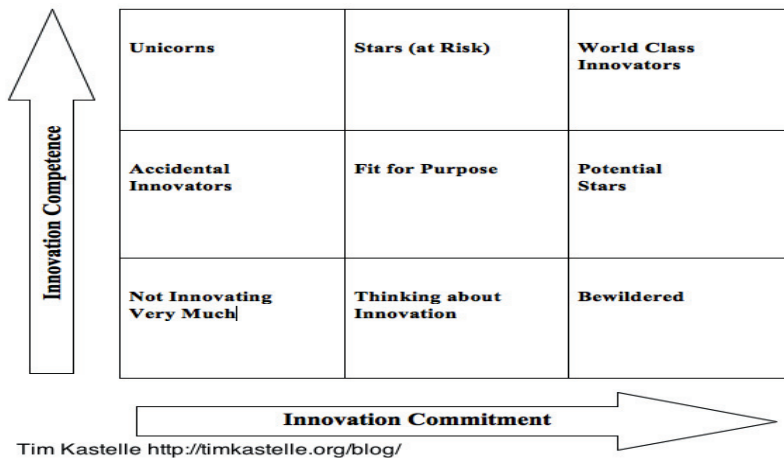


Figure 1. Innovation framework as defined by Kastelle [3]

Kastelle also proposes a three horizons model, which suggests a 70/20/10 split between improving existing products and processes, searching out adjacencies and exploring completely new markets. The three horizons model provides thinking about innovation across three time frames. The first horizon (H1) involves implementing innovations that improve current operations, horizon two (H2) innovations are those that extend current competencies into new, related markets, and horizon three (H3) innovations are the ones that will change the nature of your industry. In general, H1 innovations tend to be incremental, while H3 are more often radical innovations. However, a balanced portfolio does not mean 1/3 or our resources in each area: Google uses a 70/20/10 split – most of their innovation resources are put into improving what they are currently doing – H1 initiatives. They have relatively less invested in the longer-term ideas. In most cases, these seem like reasonable investment proportions. If your environment is particularly turbulent, you can increase the investments into H2 and H3 innovation – it all depends on the situation you face. The tricky part in all of this is management. It takes different skills to innovate in H1, where most of the ideas are incremental, than it does to innovate in H3, where many of the ideas are more radical. Nevertheless, organisations that are successful over time figure out how to do this well. Thinking of innovation as a portfolio is one good way to manage the process more effectively.

4. Innovation Management Systems

4.1. Innovation Matrix

Greg Satell [4] proposed an innovation management matrix that is based on domain and problem definition and identifies four basic types of innovation as in fig.2:

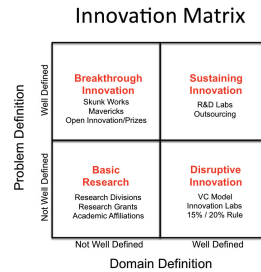


Figure 2. Innovation matrix

Basic Research: The aim is to discover something truly new, neither the problem nor the domain is well defined. While some organisations are willing to invest in large-scale research divisions, others try to keep on top of cutting edge discoveries through research grants and academic affiliations. Often, the three approaches are combined into a comprehensive program.

Breakthrough Innovation: Sometimes, although the problem is well defined, organisations (or even entire fields of endeavour) can get stuck. For instance, the need to find the structure of DNA was a very well defined problem, but the answer eluded even Linus Pauling, the most talented chemist of the day. Usually, these types of problems are solved through synthesizing across domains. For instance, Watson and Crick solved the DNA problem by combining insights from chemistry, biology and X-ray crystallography. In a similar vein, many companies are learning to embrace open innovation in order to pull in diverse resources.

Sustaining Innovation: Every year, our cameras produce more pixels, our computers get more powerful and our household products become new and improved. Large organisations tend to be very good at this type of innovation, because conventional R&D labs and outsourcing are well suited for it.

Disruptive Innovation: The most troublesome area is disruptive innovation, because its value isn't always immediately apparent. Notably, Yahoo and Blockbuster had the opportunity to invest in Google and Netflix early on, but missed the opportunity because they didn't see the potential. Disruptive innovations generally target light or non-consumers of a category, so require a new business model and therefore have high failure rates. Venture capital firms who focus on disruptive investments expect to that most will fail. One growing trend is for companies to establish innovation labs, where they can test and learn without excessive risk.

Satell formulated that the Innovation Management Matrix reflects that successful innovators tend to focus on one area of the matrix [4].

4.2. National Innovation Systems

Through the concept of '*national innovation systems*' (NIS), we broadly understand a network of stakeholders who have a vested interest in creating, developing and promoting science and technology outputs. The interactions among the various stakeholders involved are of key importance in translating these 'inputs' and 'outputs' and the study of this web of interactions is a direct concern of NIS. There is no single, widely-accepted definition for NIS. Two common definitions of the above concept:

- "... the elements and relationships which interact in the production, diffusion and use of new, and economically useful, knowledge ... and are either located within or rooted inside the borders of a nation state." [5]
- "... that set of distinct institutions which jointly and individually contribute to the development and diffusion of new technologies and which provides the framework within which governments form and implement policies to influence the innovation process. As such it is a system of interconnected institutions to create, store and transfer the knowledge, skills and artefacts which define new technologies." [6]

An understanding of NIS helps identify leverage points and pinpoint mismatches that Government policies need to address so as to boost the overall innovation performance and competitiveness of a nation. The measurement and assessment of core knowledge flows is centred on:

- Industry Interactions e.g. joint research activities and technical collaborations, such as the Co-operative Agreements and Technology Indicators database of the Maastricht Economic Research Institute on Innovation and Technology.

- Public/Private Interactions among enterprises, academia and research institutes e.g. co-research, co-patenting, co-publications, citation analysis, exchange programs and firm surveys.
 - Knowledge Distribution Power of and technology e.g. technology, use of advanced machinery and equipment adoption rates.
 - Personnel mobility e.g. movements of skilled personnel to and from various enterprises and institutions.
- Countries tend to evolve along technological paths, known as ‘trajectories’, dependent of past, present and future patterns of knowledge accumulation that usually are country specific.

4.3. National Innovation System in Romania

- We will present below the situation of our country as compared to other European countries, in terms of innovation, by five dimensions: *Innovation drivers* (which measure the structural conditions required for innovation potential, *Knowledge creation* measures the investments in R&D activities), *Innovation & entrepreneurship* (which measures the efforts towards innovation at the firm level), *Applications* (which measures the performance expressed in terms of labour and business activities and their value added in innovative sectors), and *Intellectual property* (which measures the achieved results in terms of successful know-how).

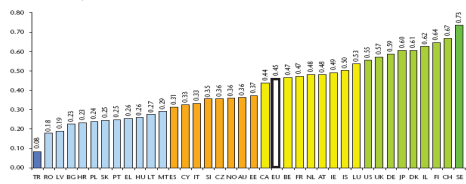


Figure 3. The 2007 Summary Innovation Index (SII).

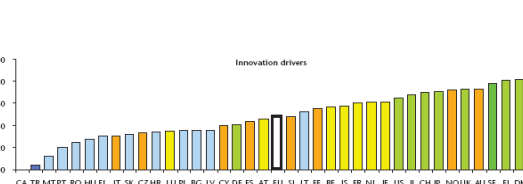


Figure 4. Innovation drivers.

Source: The European Innovation Scoreboard 2007, p.07.

As can be seen from the above figure, Romania is the worst performer, with the lowest score, out of all the catching-up countries, i.e. 0.18, followed by Latvia and Bulgaria. As for the catching-up countries, mention should be made of the fact that, although below EU average in all of the dimensions there are some noteworthy exceptions, such as on Applications where Malta has the highest ranking and where Slovakia ranks above some innovation leaders. In both cases these countries rank highly on sales of new to market products, which may be a reflection of the relatively small markets that companies in these countries operate within. In both cases the high score on Applications is also partly due to the structure of their economies, as Malta has high exports of high technology products and Slovakia a high share of employment in medium-high and high tech manufacturing. Although Turkey’s overall performance is below that of EU Member States, it has a stronger performance than some Member States on Knowledge creation.

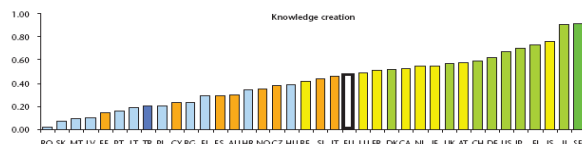


Figure 5. Knowledge creation.

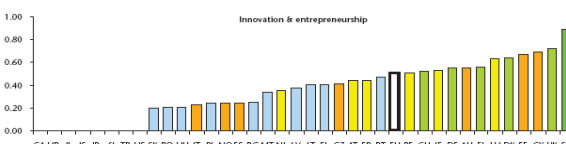


Figure 6. Innovation and entrepreneurship.

Source: The European Innovation Scoreboard 2007, p.07

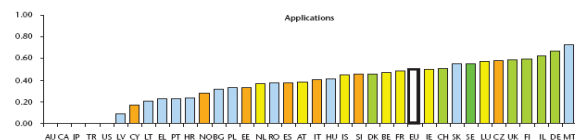


Figure 7. Applications.

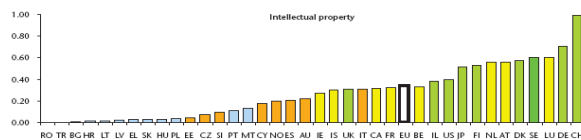


Figure 8. Intellectual property

By looking at the five dimensions, Romania scores not so badly on innovation drivers, particularly because the number of S&E graduates is still high and youth education is still widespread. The worst score is in the case of knowledge creation. However, it is quite encouraging that the business sector is starting to finance Research and

Development carried out by universities.

5. Conclusions

One of the important ideas that follow from managing innovation is that one needs to manage a portfolio of different innovation initiatives, a mix of incremental and radical innovation ideas being required. One way of building an innovation portfolio is to use the three horizons model. Innovation must be linked to strategy: tools like the 3 Horizons framework are good ways to connect innovation with strategy. As you develop strategy, it will provide some guidance about where you want to end up in the future – you can then orient your H2 & H3 efforts in alignment with these future goals. Innovation can help in the process of recovery and put countries back on a track to sustainable growth and development. Innovation policies are therefore of crucial importance for emerging from the crisis, even in countries with limited scope for public investment. It has been proved that in order to sustain innovation governments need to develop a strategic approach adapted to different contexts and settings. It calls for a combined effort to bridge disciplines, technologies and organisational structures through country-specific assessments, tools and policies. Policy coherence is paramount if we want to benefit from innovation locally, regionally and nationally, as well as at global level.

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