ABSTRACT
Interest in the concept of innovation has increased during recent years. Innovation management includes a set of tools that allow managers and engineers to cooperate with a common understanding of goals and processes. The focus of innovation management is to allow the organization to respond to an external or internal opportunity, and use its creative efforts to introduce new ideas, processes or products. The main innovation management dimensions are process, organization structures, strategies and people. Innovation is not just a fantasy it’s the concept of either innovate or die. Its main definition is to recognize the main problem, to solve the problem, to find the best solutions. To invest in innovation and just hope for the success is just the old concept, now the new concept is to invest in innovation and expect fully for the success. Optimum profitability can be obtained by having a balance between innovation pressure and ability to innovate. Innovation processes can either be pushed or pulled through development. A pushed process is based on existing or newly invented technology, that the organization has access to, and tries to find profitable applications to use this technology. A pulled process tries to find areas where customer’s needs are not met, and then focus development efforts to find solutions to those needs. Common tools include brainstorming, virtual prototyping, product lifecycle management, idea management, TRIZ, stage-gate process, project management, product line planning and portfolio management.


1.1 INTRODUCTION
There is no dispute on the relevance and usefulness of the innovation management (IM) methods and tools to the innovation process. This paper presents a basic research conducted on the obstacles that can hinder the process of innovation. In simple words we can say that innovation is often about small, incremental changes to products, services and processes. It involves all managers in every department from Finance to Customer Services. It should be planned and managed as a core business process covering all parts of a business. It needs to be integrated into the business at both strategic and operational levels. It is THE core business skill and process for the 21st Century and also for the coming future generations.

So what is holding us back? There are several myths. We should not restrict innovation only to, big ground-breaking ideas, creative jumps of the imagination which cannot be planned, the research department in the organization, creativity ‘workshops’
Various innovation Dimensions are incremental innovation, additive innovation, radical innovations and new applications (Fig.1). These can be explained as follows:-

### Figure 1: INNOVATION DIMENSIONS

- **Incremental innovation**  
  An incremental innovation builds upon existing knowledge and resources within a certain company. It involves modest technological changes and the existing products on the market will remain competitive.

- **Radical or Breakthrough innovation**  
  It requires completely new knowledge and resources so it involves large technological advancements, rendering the existing products non-competitive and obsolete.

- **Additive innovation**  
  More fully exploiting already existing resources, such as product lines extensions and can achieve good results. Here opportunities are treated as high priority efforts.

- **Complementary innovation**  
  It offers something new and changes the structure of the business.

### What is Innovation Management?

Innovation Management = Ideas + Concept + Mindset + Strategy + Insights.  
Innovation management includes a set of tools that allow managers and engineers to cooperate with a common understanding of goals and processes. The focus of innovation management is to allow the organization to respond to an external or internal opportunity, and use its creative efforts to introduce new ideas, processes or products. To invest in innovation and then hope for the success is an older concept. While on the contrary the new concept is to invest and expect for the regular innovative results. In order to have optimum profitability we must have the optimum balance between innovation pressure and our ability to handle it.

The main innovation management dimensions are process, organization structures, strategies and people. Its main definition is to recognize the main problem, to solve the problem, to find the best solutions.
This paper presents a synopsis of basic research conducted on innovation obstacles as well as the relevant results of some accessible surveys in conjunction with the INNOPSE survey (i.e., Innovation studio and exemplary developments for product service engineering), results.

1.1 The INNOPSE survey in brief

Over 2000 Small and Medium Size companies (SMEs) Europe wide were surveyed under the context of the EU project INNOPSE on the topic of Innovation Management. The results of 216 companies were considered. The aim of the survey was to lay the grounds for a scientific work in finding ways to overcome the obstacles in front of innovation. The survey questionnaire was reviewed and accepted by the European Commission (EC) and was carried out by the whole project consortium who are located in six EU countries. The 216 companies that have been considered are organizationally categorized as follows: 42 % small companies (less than 100 employees), 37 % medium sized companies (between 100 and 1000 employees), and 21 % large companies (over 1000 employees) (Fig 2).

Figure 2 CLASSIFICATION OF SURVEYED COMPANIES ACCORDING TO THEIR SIZE

1.2 Why do companies implement Innovation management methods and tools?

The survey covered a wide array of topics that relate to IM, i.e. expectations and motivations, structure and organization, human resources, methods and tools, and finally the deficits and needs companies face in pursuit of innovation.

A particular interest in the findings of the survey in general is that there is greater awareness, and consequently implementation, in large companies for the value and importance of IM methods and tools with diverse expectations and motivation for the application of such methods and tools. Figure 2 summarizes these findings showing the drivers that companies consider key factors behind implementing IM methods and tools, these are:

• External Factors
  It includes factors like the application of IM for new business fields and technologies, establish networks and synergies, provide a steady flow of new products, hedge a leading position or reduce risk.
• Internal Factors
Some companies consider themselves to be motivated to use methods and tools for the purpose of improving their products and/or processes. That includes factors like cost savings, idea generation, intra firm networking, information gathering, problem solving and knowledge building.

**• Better Customer Relations**
The smaller the company in size the more it is concerned with, and dependent on, the approval of its markets and customers regarding its products and/or services.

**• Improving the human capital**
In this respect companies are interested in providing training, spreading a culture of innovation, increasing the individual motivation, extracting the expert’s tacit knowledge and sharing it with other employees and establishing formal and informal networks.

**• Flexibility**
Here the companies need to use IM methods and tools to help them decide faster and shorten the time to market in the very fast developing and dynamic technologies and markets and to be able to detect market trends and respond quickly and accordingly.

2. LITERATURE REVIEW

Innovations imply a substantial change of structures, processes, and functions to organisations and are major drivers of current developments and future success. However, expected success may be reduced through some barriers. Many people have researched in this regard. Innovation has attracted the interest of many scholars, professionals, businessmen and statesmen like Corsten(1989), Von Braun(1994), Christensen(1997), Christiansen(2000), Klein (2002), Strina(2003), Corsten et al.(2006). To avoid repetition of work, innovation is here shortly introduced and briefly defined leaving the details of different versions of definition to other available literature (see table1).

<table>
<thead>
<tr>
<th>Author</th>
<th>Field of Research / Restrictions</th>
<th>(Classification of) Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corsten (1989)</td>
<td>Typical weaknesses in innovation processes, a literature survey</td>
<td>• organisational</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• personal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• environmental</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• planning</td>
</tr>
<tr>
<td>von Braun</td>
<td>factors influencing R&amp;D</td>
<td>• not influenceable marginal conditions</td>
</tr>
<tr>
<td>(1994)</td>
<td></td>
<td>• influenceable marginal conditions</td>
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<tr>
<td></td>
<td></td>
<td>• control values</td>
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<tr>
<td></td>
<td></td>
<td>• effect variables</td>
</tr>
<tr>
<td>Christensen</td>
<td>impact of technologies developed by competitors</td>
<td>• sustaining technologies</td>
</tr>
<tr>
<td>(1997)</td>
<td></td>
<td>• disruptive technologies</td>
</tr>
</tbody>
</table>
Christiansen (2000) internal influences on innovation activities and success • corporate-related • project-related

Klein (2002) internal barriers affecting on the level of “individual” or “organisation” • ability barriers • knowledge barriers • functional barriers • intentional barriers • affective barriers

Strina (2003) types of problems in internal innovation processes • inadequate analyses of competitors • unsystematic proceeding • not using strategic alliances • products in spite of systemic solutions

Corsten et al. (2006) innovation barriers caused by the corporate culture • strict focusing division targets • dominant hierarchy • selective and restrictive information Politics

IBM (2006) survey of some 765 CEOs • internal • external

3. INNOVATION BARRIERS
To understand the multiple causes and effects of innovation barriers, it is important to note their multidimensional character. In order to improve the innovation capability, we have to systematically take into account the different fields of innovation activities, to involve the innovation environment, and to develop a holistic view. (Fig.3) presents a possible structure of innovation barriers.

Figure 3: BARRIERS TO INNOVATION
• **Person-related Barriers**

Resistance against change is not a common human reaction. It mostly results from fears of uncertainty. This reaction depends on the individual involvement, personality structure and experiences. Resistance against innovations have not always to be understood as negative reactions. They may also be warning signals caused by possible deficits of information or missing inclusion (Fig. 4).

![Figure 4 PERSON RELATED BARRIERS](image)

**Organisational Barriers**

The internal structure of a company, expressed by the organisational chart, is designed to achieve its primary goal. Different functions, languages, preferences, and goals as well as asymmetrically distributed information are channelled within these horizontal and vertical organizational units. Internal interfaces between departments frequently represent an important barrier to innovation. In some cases, even oppositional groups and alliances may develop. These alliances do not only mutually block each other, but also hinder innovation paths. Companies are not composed as closed systems as they have various mutual relationships to their environment. Increasing complexity of innovations requires new forms of division of labour. Extensive and heterogeneous knowledge components can hardly be made by single companies, thus, cooperation become inevitable.

Barriers that can be overcome by some techniques and enhancement initiatives (from the point of view of using methods and tools), *(Table2)* they are:

1. Economic factors
2. Human resources factors
3. Supporting factors
4. Organizational factors and some other factors
### Table 2: SUMMARY OF THE OBSTACLES HINDERING THE INNOVATION PROCESS

<table>
<thead>
<tr>
<th>Category</th>
<th>Factor (From Basic Research and surveys)</th>
<th>“Symptoms of the IM obstacles”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic Factors</td>
<td>High costs</td>
<td>Risk averse</td>
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<td></td>
<td>High risk</td>
<td>Lack of R&amp;D activities</td>
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<td></td>
<td>Lack of funds</td>
<td>Loss of Experts</td>
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<td></td>
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<td>Lack of knowledge</td>
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<td></td>
<td></td>
<td>Lack of resources</td>
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<tr>
<td>Human resources</td>
<td>Lack of top management skills</td>
<td>Lack of innovation culture</td>
</tr>
<tr>
<td>Factors</td>
<td>Lack of knowledge</td>
<td>Lack of knowledge</td>
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<tr>
<td></td>
<td>Lack of skilled labour,</td>
<td>Lack of strategies</td>
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<td></td>
<td></td>
<td>Inability to catch up with technology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lack of networks (social and technical)</td>
</tr>
<tr>
<td>Supporting Factors</td>
<td>Lack of information</td>
<td>Lack of knowledge</td>
</tr>
<tr>
<td></td>
<td>Lack of networks</td>
<td>Lack of opportunities</td>
</tr>
<tr>
<td></td>
<td>Lack of technology</td>
<td>Low competitiveness</td>
</tr>
<tr>
<td></td>
<td>Not using IM methods and tools</td>
<td>Lack of methods and tools</td>
</tr>
<tr>
<td>Organizational</td>
<td>Centralized rigid structure</td>
<td></td>
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<tr>
<td>factors</td>
<td>Lack of “human based” management principles</td>
<td></td>
</tr>
<tr>
<td>Other factors</td>
<td>Government regulations and policies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increasing competition and globalisation</td>
<td></td>
</tr>
</tbody>
</table>

In order to mitigate the obstacles in front of innovation, the characteristics of a given method or tool must be mapped to the identified IM obstacles. In other words, a given method or tool must be able to provide solutions, aid in overriding or eliminating the obstacles. Thus, this section is presenting the key characteristics or elements of indispensable success factors, these characteristics referred to as the “benchmarking algorithm”, that are envisaged to benchmark or scrutinize the validity of the major methods and tools that are intended to serve innovation in firms.

#### 3.1 TOOLS TO OVERCOME THE OBSTACLES IN THE INNOVATION PROCESS:
• **Brainstorming**-Brainstorming is an idea generating method widely used by teams for identifying problems, alternative solutions to problems or opportunities for improvement.

• **Technology Audit**-The technology audit is a method for identifying through a short interview visit to a company, the major company requirements, needs, weaknesses and strengths on both human resources and infrastructure

• **Virtual Prototyping**-Virtual Prototyping goes beyond simply creating product designs in 3D. By simulating and validating the real-world performance of a product design digitally, manufacturers often can reduce the number of physical prototypes they need to create before a product can be manufactured, reducing the cost and time needed for physical prototyping.

• **Product Lifecycle Management**-Product lifecycle management (PLM) is the process of managing the entire lifecycle of a product from its conception, through design and manufacture, to service and disposal. PLM integrates people, data, processes and business systems and provides a product information backbone for companies and their extended enterprise.

• **TRIZ**-This process is used for creative problem solving (Fig 5). Here a problem is first defined in terms of the ideal solution. The problem is analyzed into its basic, abstract constituents according to a list of 39 items (for example, the weight of a stationery object, the use of energy by a moving object, the ease of repair etc.), and reframed as a contradiction between two of these constituents.

![Figure 5 TRIZ PROCESS](image-url)
- **Stage-Gate Process**

New product screening is the process of filtering or screening new product developments before they enter the stage-gate process and start to consume significant resources. The Stage-Gate process was created by Dr. Robert Cooper and is a method described by Cooper and Kleinshmidt of a systematic moving of a new product through various stages from the screening process to product launch. A **stage-gate model** is a technique in which a (product, process, system) development process is divided into stages separated by gates. At each gate, the continuation of the development process is decided by (typically) a manager or a steering committee. The decision is based on the information available at the time, including business case, risk analysis, availability of necessary resources (money, people with correct competencies), etc.

A common model is composed of the following stages: ideation, preliminary analysis, business case, development, testing, launch. A stage-gate model is a conceptual and operational road map for moving a new project from idea to launch - a blueprint for managing the new-product process to improve effectiveness and efficiency. The traditional Stage-Gate process has five stages and five gates (**Fig 6**). The stages are:-

1. Scoping
2. Build Business Case
3. Development
4. Testing and Validation
5. Launch

![Stage-Gate Process Diagram](image)

**Figure 6 STAGE GATE PROCESS**
• **Project Management**

Project management is the discipline of planning, organizing, securing and managing resources to bring about the successful completion of specific engineering project goals and objectives.

• **Product Line Planning**

Product line planning is an organizational lifecycle function within a company dealing with the planning or forecasting or marketing of a product or products at all stages of the product lifecycle.

• **Portfolio Management**

Portfolio management is the dynamic decision-making process of evaluation, selection and prioritization of new projects; active project can be fostered, put on hold or even killed; their priorities and allocation of resources can change.

5. **CONCLUSION**

Precisely identifying the problem is more than its solution. Methods and tools are not “usually” used for fun, but rather to solve problems, open new opportunities and, consequently, gain a competitive advantage. How wonderful it would be, one day, to have an algorithm of methods and tools where if you input information it will output innovation! Such “wishful thinking” would not come close to reality without scientific steps and measures that guarantee the effectiveness and adequacy of such an algorithm. A great emphasis shall be given to the human values of the firm’s organizational attitudes “which has to be innovation proponent”.

6. **REFERENCES**

• Kanavi Shivanand “Research By Design Innovation And TCS” Edition 2007

• Chadha Parmit ”Innovative India” Edition 2007, Publisher-Penguin Books India, The importance of innovation for organizations to grow in a corporate environment that is constantly changing and fiercely competitive.


