

Competitiveness of Nano Technology: General Approach

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Abstract

Nano- and new materials technology are strong research and product development targets, and new applications and solutions arise all the time. Nanotechnology will profoundly influence the competitiveness of companies in every industry. Adoption of technology and its competitiveness is a research topic within the nano-technology area. When examining the adoption of technology, there are various stakeholders and contexts to consider. The competitiveness of nano-technology is very important. However, competitiveness is a complex and multidimensional concept, encompassing various aspects that are difficult to measure. The aim of the research is to discuss the competitiveness of nano technology. The main methods applied by the authors are analysis of the scientific and other literature and logical approach. Evaluating competitiveness in nanotechnology industry is a complex process. This paper provides findings about factors of competitiveness and a managerial framework of nano- technology

Keywords: Advanced technologies, Nano technology, Competitiveness, Innovation

Introduction

During the last 100 years, a truly breathtaking scientific and technological development has taken place. The ongoing trend for miniaturization of different devices and improvement of property of materials require improvements in technology. Many such tasks are solved by means of nano-technology and nano-materials.

Nanotechnology is concerned with materials and systems whose structures and components exhibit novel and significantly improved physical, chemical, and biological properties—that enables the exploitation of novel phenomena and processes due to their nanoscale size. Faster computers, advanced pharmaceuticals, controlled drug delivery, biocompatible materials, nerve and tissue repair, surface coatings, better skin care and protection, catalysts, sensors, telecommunications, magnetic materials and devices – to name but a few of the areas where nanotechnology will have a major impact. In effect, nanotechnology is a radically new approach to manufacturing. It will affect so many sectors that failure to respond to the challenge will threaten the future competitiveness of a large part of the economy.

Adoption of technology and its competitiveness is a research topic within the nano-technology area. Under the pressure of market forces and the influence of many global and regional players, applications of different nano- technologies are becoming more and more competitive. It is well recognised that without major effort for innovation in industrial practices, organisations, R&D, marketing and financial approaches any sector will stagnate and lose its competence as well as its competitiveness.

Competitiveness has relevance at many levels from country and industry and firm up to product/service level. By analysing the different definitions of competitiveness provided by scholars, institutions and practitioners, it is possible to set a common definition. Competitiveness is the ability of an 'entity' – a country, a region, an industry, a firm – to produce products or services of a superior quality and/or at lower costs than other entities that act in the same economic context (i.e. a competition market or sector). Therefore, concept of competitiveness may be defined and analysed at different levels, each one measured by different variables: micro level – a single firm or plant; meso level – a cluster of firms (i.e. an industry, a sector, a branch or a local productive system, e.g. an industrial district); macro level – a territorial context (i.e. international/national, i.e. a country or a region). From the abovementioned authors can see also three different "dimensions" of competitiveness: International competitiveness; National competitiveness and Local competitiveness. There are quite a lot different scientific papers about nanotechnology and competitiveness. Many authors investigate and describe nanotechnology competitiveness in different countries [Kanama, 2013; Momaya, 2008; Staube, T., Ciemleja, G., Geipele. I. (2014a,b)].

Methodology of Research

The main methods applied by the authors are analysis of the scientific and other literature and logical approach.

Findings/Results

Emerging industries such as nanotechnology offer a huge potential applications and economic benefits for countries and firms. Many researchers have addressed different dimensions of competitiveness across levels: country, industry and firm.

The findings of this research are indicative only, yet have clues for key strategists in governments, industry and academia. Emerging industries such as nanotechnology are increasingly receiving attention for competitiveness in many countries. The evaluation of nano technology competitiveness in such specific contexts is often needed, but is less addressed and overall technology ranks are of limited utility.

The process of developing a technology strategy must actively consider technology options in every step as a means to achieving the business strategy – and therefore attaining competitive advantage.

The role of technology monitoring and analysis is to strengthen the company's competitiveness by delivering relevant intelligence at the right moment to support decision-making. In the specific case of technology monitoring, the actions include the following:

- Buy/sell/licensing technologies;
- Make technological partnerships;
- Protect against technological and market threats;
- Start/stop projects and optimization of the resource allocation; and
- Transfer a successful technology project to production.

Effective technology analyses not only offer conclusions but also report residual uncertainty using the appropriate levels of granularity. Reporting findings to decision-makers within the firm require special care, as information about new technologies can be as disruptive as the technologies being reported.

Conclusions

There is need for considerable research to understand the dynamics of competitiveness across levels and strategic management to implement cooperative strategies to bring promised benefits of nanotech to many.

Developers of nanotechnology are facing many problems. On the one hand, new nanotechnology-based products have been produced and commercialized, but on the other hand, the understanding of the underlying properties of nanoscale structure and materials is still in many areas at a fundamental level.

The innovation derived from the collaborative effort of different organizations speaks for itself. The collaborative approach between academia and the public technology sector is not new. While having the tool, the laboratory, and the academic background in engineering, material science, and other disciplines plays a significant role, these are not the only factors necessary to further nanotechnology R&D. Nanotechnology can find its ways into commercial applications only through interaction, networking, and collaboration among industry, academic, government, and investment entities.

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