VENTURE CAPITAL IN NANOTECHNOLOGY.
CENTRAL AND EASTERN EUROPEAN PERSPECTIVE

Przemyslaw POMYKALSKI
Lodz University of Technology, Piotrkowska 266, 90-924 Lodz, Poland, EU, ppomykalski@gmail.com

Abstract
Venture capital financing is considered to be of primary importance in fostering national innovation and economic growth. In this article, I analyse recent changes in venture capital firms operating in Central and Eastern Europe. Although at present venture capital funds shouldn’t be perceived, as a primary source of financing for nanotechnology companies in the long-term their managers should understand the specifics of this source of financing. An overview of venture capital cycles may be of key importance to successful commercialization and may enable exceptional returns to entrepreneurs.

Keywords:
venture capital, nanotechnology, Europe

1. INTRODUCTION
The link between investments, financing and nanotechnology received some attention at the turn of the millennium [1]. Although research into nanotechnology is already some decades old, research into nanotechnology investments and commercialization is relatively new and encounters significant obstacles resulting from a variety of approaches to nanotechnology and resulting statistical data. Research focusing on nanotechnology investments in Central and Eastern Europe is even more limited [2, 3, 4, 5].

Nanotechnology can be perceived as both an enabling technology and a technology in its own right. Nanomaterials and nanotechnology principles can be found in many commercial products from almost every economic sector from chemistry to textiles.

European Patent Office (EPO) defines nanotechnology as entities with a controlled geometrical size of at least one functional component below 100 nanometres in one or more dimensions susceptible of making physical, chemical or biological effects and has created a separate class (symbol B82Y) with eight subclasses:

- Nanobiotechnology or nano-medicine;
- Nanotechnology for information processing, storage and transmission;
- Nanotechnology for interacting, sensing and actuating;
- Nanotechnology for optics;
- Nanomagnetism;
- Nanotechnology for materials and surface science;
- Methods or apparatus for measurement or analysis of nanostructures;
- Manufacture or treatment of nanostructures.
U.S. Patent and Trademark Office’s (USPTO) has created a separate class (Class 977, Nanotechnology) and over 250 cross-reference art collection subclasses to identify and store relevant data. This class provides for disclosures:

- related to research and technology development at the atomic, molecular or macromolecular levels, in the length of scale approximately 1-100 nanometer range in at least one dimension,
- that provide a fundamental understanding of phenomena and materials at the nano-scale and to create and use structures, devices and systems that have novel properties and functions because of their size.

Although nanotechnology is clearly defined and treated by patent offices as a technology in its own right, venture capital associations treat it as enabling technology in their statistics. This is not surprising taking into consideration that venture capital funds are focused on marketability, cash flow and valuation.

2. **VENTURE CAPITAL AND NANOTECHNOLOGY**

The European Venture Capital Association (EVCA) defines venture capital as “professional equity co-invested with the entrepreneur to fund an early-stage (seed and start-up) or expansion venture. Investors expect higher than average return on the investment offsetting the high risk. Venture capital is a subset of private equity”. Private equity is defined as “providing equity capital to enterprises not quoted on a stock market”. In the United States (National Venture Capital Association, NVCA) venture capital is currently also regarded as a subset of private equity asset class (statistics however are prepared for each class independently).

Prior research indicates that venture capital is:

- Return on investment oriented. Achieving high return on investment is by definition the only goal of venture capital funds seeking to justify high risk associated with their investments. This unfortunately is still often misunderstood by entrepreneurs who seem not to understand that venture capital is a relatively high cost source of financing compared to traditional sources. Although venture capital is regarded as medium and long term financing source funds will strive create value as soon as possible.
- Cyclical. For venture capital as a whole peaks of investment activity were observed in 2000 and 2007 (and previously in 1983 and 1987).
- Industry cyclical. Venture capital funds focus on selected industries. This focus changes on a cyclical basis. The effect of those cycles may be stronger than venture capital market cycles as a whole. Entrepreneurs should observe those cycles and benefit from periods of growth [6].
- Geographically concentrated. Although most venture capital funds declare a country, or even a group of countries as the area of their operations, research results indicate that current investments are positively associated with historical investments in terms of regions of countries [7]. This is particularly visible in biotechnology venture capital investments [8].

3. **VENTURE CAPITAL EU AND US PERSPECTIVE**

Venture capital is an interesting area of study surrounded by powerful myths [9], related to early success stories of companies such as Intel, Apple, Google of Facebook. Venture capital is cyclical [10] and its current state reflects the recent economic crisis.

More recent changes indicate that venture capital investments (measured in USD) have fallen in the US (Fig. 1) and EU (Fig. 2).
In the EU total investments fell from almost 6 billion euros in 2007 to 3.2 billion in just two years. The extent of this drop can be compared to the effects of the “internet bubble” in the United States (years 2000-2002).

The decrease in total amount invested is substantial yet uneven and requires further inquiry. The number of companies that received financing actually grew in 2008 and the drop is definitely not as sharp as in amounts invested. This indicates lower valuations rather than decreasing number of investments (on average financed companies received less money from the funds).

A further look into investments by stage indicates that the number of early stage investments (seed and start-up) actually grew (Fig. 3). Amounts invested in later stage ventures dropped significantly yet the impact of lower valuations was extremely visible. For nanotechnology companies these changes indicate that financing from venture capital funds is available but lower valuations makes this source of financing even
more expensive then usual. In other words venture capital funds will ask for a bigger share of the company’s equity in exchange for their financing.

![Graph showing EU venture capital investments by stage 2007-2012. Source: Own, data: Eurostat, EVCA.](image1)

**Fig. 3** EU venture capital investments by stage 2007-2012. Source: Own, data: Eurostat, EVCA.

Venture capital funds are also changing the sectors in focus. Some sectors (e.g. energy and environment, life sciences and computer and consumer electronics) are receiving an increasing share of investments while others (e.g. business and industrial products, communications and construction) are decreasing faster (Fig. 4).

![Graph showing changes in EU venture capital investments 2007-2012. Selected sectors. (amount invested in 2007=100). Source: Own, data: Eurostat, EVCA.](image2)

**Fig. 4** Changes in EU venture capital investments 2007-2012. Selected sectors. (amount invested in 2007=100). Source: Own, data: Eurostat, EVCA.
For nanotechnology companies these changes indicate:

- Decreased investments and valuations;
- Life sciences, chemicals and materials, energy and environment are increasing their share in total venture capital investments.

4. **VENTURE CAPITAL CEE PERSPECTIVE**

While the focus of private equity has long been on larger emerging market countries (especially China and India), smaller emerging market countries – such as Poland – have built flourishing private equity industries [11]. Unfortunately these markets are still unpredictable. In 2009 investments dropped to 5,6 million euros. (Fig. 5) The upturn of early stage investments in Hungary was primarily due to the eight new Jeremie initiative funds set up in early 2010 as a combination of community funds and equity from private sector investors. These venture capital funds selected their portfolio companies across a wide spectrum and financed a wide range of Hungarian startups and early stage companies having promising growth potential [12].

![Fig 5. Changes in CEE venture capital investments 2007-2012. Based on Eurostat, EVCA data](image)

Geographic location is important in venture capital. Funds tend to focus on countries or regions. For high technology companies however geography may be a secondary factor to fund’s management know-how. Corporate venture capital (CVC) funds may be an interesting source of funding for nanotechnology companies but they differ in characteristics.

For nanotechnology companies these changes indicate:

- Unpredictable venture capital market;
- Increasing investments fuelled by EU funding.

5. **CONCLUSIONS**

Venture capital is not the main source of funding for nanotechnology companies and it’s not likely to be in the foreseeable future as funds are oriented at maximizing their returns. Currently financing sources for nanotechnology are to a large extent dominated by EU funding for R&D, start-ups and indirectly through venture capital managed funds (e.g. Jeremie initiative in Hungary) but sectors related to nanotechnology (life
sciences, chemicals and materials, energy and environment) are attracting increasing attention of venture capital funds. Understanding the venture capital investment process and valuation principles can be very helpful once entrepreneurs attempt to market their innovations.

REFERENCES