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POLICY INTERVENTION TO R&D BASED VALLEY CREATION IN LITHUANIA

Birutė Mikulskienė
Mykolas Romeris University

Abstract

Globalization challenges are pushing research universities as knowledge creation institutions to take a new role in state economic development. This role is to take innovation and entrepreneurship culture creator and facilitator in the region. Seeking the way to fill the existing gap between knowledge creations and the knowledge transfer in Lithuania, the main role must be devoted to excellence research performed by universities. The purpose of this paper is to analyze new trends in Lithuania R&D policy development concerning research infrastructure concentration and founding integrated research, study and business centers (Valleys) by comparing with world widespread tendencies of research based high technology centers creation. The main objective of this study is to draw the success factors for centers flourishing and find out the main obstacles for further Valley development.

Recent studies indicate the progressive development of Lithuanian R&D sector with several black spots concerning business partnership and commercialization activities. The crucial point for policy intervention is to maintain the existing R&D capabilities and put more emphasis on the diffusion that Valley ideology is seeking to cover. At beginning of 2007, the concept of Valley creation has been converted to the policy decision at 2008. The investigation has revealed that the main factors for successful high technology centers development could be named as following: research excellence in certain research areas; high skilled personnel; partnership. The role of R&D intensive universities for technology industry centers formation is discussed. Others factors such as availability of technology transfer instruments (spin–offs), geographical location, public and private funding accessibility, policy support, life time cycle, leadership and cross disciplinary interaction are expressed as crucial attributes that effects the new policy driven Valley creation. Further success of Valley concept implementation lay on the progress of accompanying policy measures regarding research excellence and environment for commercialization.

Keywords:

R&D policy intervention, tacit knowledge, Lithuania.

Introduction

Globalization challenges are pushing research universities as knowledge creation institutions to take a new role in state economic development. This role is to take innovation and entrepreneurship culture creator and facilitator in the region. Seeking the way to fill the existing gap between knowledge creations and the knowledge transfer in Lithuania, the main role must be devoted to excellence research performed by universities and on partnership with business. Such understanding comes from the USA and as good practice was spread up around the world.

Many empirical studies demonstrate that high technology industry centers tent to form locally on R&D intensive universities and other high excellent R&D performing institutions (Smilor et al, 2007, Woodward et al, 2006, Bucci, 2003). Such type of geographical located center development contribute high added value to economic and social development through the regional and urban development (Woodward et al., 2006). Many developed countries (UK, USA, Denmark, Netherland and etc.) or countries in their increasing development stage (China, India, Taiwan) have the prominent examples of such kind of very successful R&D output exploited centers.

During programming 2007-2013 financial perspective, Lithuania R&D policy has faced the chance to generate breakthrough as substantial funds (around 2 billion litas) were allocated to R&D sector. Taken in to account national peculiarities of R&D sector (low investment (2007 – 0,8% of GDP, disperse human capacity along large network of universities and research institutes, old fashion research infrastructure including scientific equipment) (MES, 2007), the idea of concentration of research infrastructure and incentive public R&D cooperation with business via policy driven founded technology centers were discussed and at late 2007 were transformed to policy decision concerning integrated centers, based on research university.

The purpose of this paper is to analyze new trends in Lithuania R&D policy development concerning research infrastructure concentration and founding integrated research, study and business centers (Valleys) by policy comparison with world widespread tendencies of research based high technology centers creation. The main objective of this study is to draw the success factors for centers flourishing and find out main obstacles for further Valley development.

Research method includes comparative and systematic analysis of scientific literature and Lithuanian legal base regarding creation of integrated research, study and business centers, interviewing experts and personal observation by intermediate participation of the valley creation process. The personal observation is used to describe the undocumented stages of policy creation.

The factors influencing the success of high tech centers development

R&D infrastructure concentration and clustering mechanisms analysis is largely based on case studies. The main preconditions which are necessary for high technology centers to occur could be named as follows:

- Research excellence in certain research areas
- High skilled personnel
- Partnership

The minor, but not less important success factors could be discussed.

University: There are plenty of studies supporting the idea that R&D intensive university or their association is the statistical significant factor for innovation development (Smilor et al, 2007). There are different channels to promote R&D by policy intervention: direct subsidies to R&D activities, subsidies on the use of R&D outputs and promoting the international spillover through trade liberalization (Ghosh, 2007). This study demonstrates that the most successful one with the positive impact on economy growth is direct subsidies for R&D activities. Since the research institution main activity is R&D, it seems reasonable to invest in to public institutions through specifically diverse instruments under certain conditions. On the other hand, strong and excellence R&D performed university based technology center, avoid conflict of interest trying to outsource R&D and use special incentives policy schemes, especially for high concentrated, monopolistic markets (Mukherjee, 2007).

*Technology transfer instruments***.** It is proved that technology transfer is more effective when it go under responsibility of university which possesses tacit knowledge. The main instrument to tackle tacit knowledge and make possible to diffuse and transfer knowledge to new product, service or technology is spin-offs. The spin-off activities demonstrate boom in regional innovation and development, when entrepreneurial spirit becomes a social norm and supported by institutional behavior (Smilor at al, 2007). Entrepreneurial socialization and peers with startups experience make strong influence on the boost and fall of number of spin offs. The chrestomatic example of spin off activities is Massachusetts Institute of Technology (MIT). MIT experience have enhanced the understanding of favorable circumstance – five main perspectives for spin off generation: individual perspective (personality, motivation and disposition in academic entrepreneurship); social R&D infrastructure (R&D funding, local research management, institutional orientation, institutional physical infrastructure); supportive institutional altitude; legal basis regarding intellectual rights (when invention assignment is balancing between institution and individual inventor). Special MIT emphasis on spin off prove that university "can achieve twin objectives of excellence in academic research and contribution to economic development (O'Shea et al, 2007)

Location. Geographical localization of research university and innovative companies concentration is the fact proved by many empirical studies (Johansson et al, 2007; Woodward et al., 2006). Woodward et al has shown that certain distance from the source of knowledge is essential. Actually the particular distance depends on some factor the most substantial from them are the level of R&D funding and type of industry concentrated in the region. Empirical studies and mathematical modeling have proved that distance up to 120 km around university is the effective zone for innovative industry development and even for new technology plant opening. However, the distance for knowledge creation institution is critical when the diffusion of knowledge is taking place or in other words, is on the first stage of knowledge creation chain. The geographic factor becomes crucial for knowledge transferring companies to be close to tacit knowledge specifically to research universities, when spillover tend to be substantial (Van Geenhuizen, 2007) and for most technologically advanced types of goods and make influence on regional export base (Johanson et al, 2007).

Partnership and social networking. Usually the complex and delicate network structure takes place in prosper technology centers, mainly in spontaneous centers. Such networking culture is tightly dependent on the participants in the clusters (Su, 2008) and effects on evolution of the cluster (He at all, 2009). Socialization is precondition for sharing the tacit knowledge. It leads to the flexibility, especially when center participants are in tight connection with each other in production chain (customers, providers of customized or specific components or machinery, suppliers, supporting services). Shared tacit knowledge let to pick up "weak

signals of change" (Garrett-Jones, 2004; Roveda, 2008). Partnership secured effective knowledge sharing thanks to reciprocal trust and convenience of communication being in the same geographic area.

Policy support. There are plenty of examples, when high technology research centers developed spontaneously over the years (Silicon Valley, Rout 128), on the other hand there are not less examples, when such kind of centers become prosperous after careful planning and coordination (Research triangle park, Austin, San Diego) (Smilor et al, 2007). The interesting phenomenon is observed: the most spontaneous clusters exist in western countries (for instance USA, United Kingdom, France) and policy driven clusters appear largely in the Asian countries (China, Japan, Taiwan) (Meyer, 2005). Though the two approaches of center creation (spontaneous versus Governmental intervention) are reasonable, the policy driven must cope with additional challenges, and mainly with social networking. If for spontaneous clusters tight networking between research, companies and venture capital forms turn to form by self demand, policy intervention cannot generate artificial demand. Along different types of intervention such as funding instruments, intermediate institutions and institutional infrastructure to provide appropriate local conditions is the object for policy issues (Hirch-Kreinsen, 2006).

Funding level. When previous mentioned factors are present, the substantial funding mechanisms availability is important. Appropriate balance of basic and competitive public funding schemes together with funding available for new risky, R&D oriented companies establishing, including pre-seed capital, seed capital, venture capital and governmental funds are require.

Life time cycle. Looking through the development of the most successful center e.g. self developed Silicon Valley or policy driven Research triangle park in North Carolina (founded in 1958), Austin in Texas (founded in 1950), San Diego in California (founded in 1950) (Smilor et al, 2007), there are evidence that the first prominent commercialization activities and attraction of companies have started after 15 years of founding technology parks and strengthening the research universities. Al these regions are still acting as worldwide class technology clusters. That is over 50 years of activities.

Leadership. Not the last issue is leader of cluster. The manager with high competence in managerial approach is an important factor for make partnership of with academia world and burst the entrepreneurial spirit. Leadership and outstanding individuals change visions and shape the attitudes. (Su, 2008).

Cross disciplinary interaction. The most successful clusters are based on cross disciplinary interaction (Smilor et al, 2007).

Presumption for policy intervention

Research excellence. Recent studies on Lithuania research excellence, e.g. annual assessment institutional R&D activities and mapping of research excellence (Bar auskas, 2008), comparison studies of Estonian, Latvian and Lithuanian bibliometric indicators (Alik J. 2008) evidenced the progressive development of Lithuanian R&D sector with several black spots concerning business partnership and commercialization activities. The crucial point for policy intervention is to maintain the existing R&D capabilities and put more emphasis on the R&D output diffusion as Israel (Breznitz, 2006) demonstrated and made huge progress in moving from low technology to high technology industry case.

*Market imperfection***.** Costly innovation activity and demand of R&D based new technology and product development correlated with market competition level. When business sector is competitive enough, there exists positive correlation between share of resources invested in R&D and economic grow (Bucci, 2003). Any market competition imperfection diminishes the demand of R&D, lowers the speed of new technology adoption and raising the R&D investment can afford lower R&D output. Taking in to account the economic grow correlation with market competition and demand to R&D, the special approach for Lithuania R&D policy streamline should be elaborated with special focus on start ups and that is more essential on spin-off, companies originated from the research groups of university. Since the macroeconomic environment has strong influence on innovation capacities and R&D application for innovation progress (Cammett, 2006), composition and structure of Lithuania economy (small and medium size enterprise is rather week, dominant position in the national economy has monopoly like large companies) face Lithuanian policy makers to seek new, worldwide proved out, policy driven measures, which deepening the existing R&D capabilities and elaborating R&D output for more competitive globalize export market with higher abilities for commercialization. The crucial point for policy intervention is to maintain the existing R&D capabilities and put more emphasis on the knowledge diffusion that the policy of integrated centers (Valleys) ideology is seeking to cover.

Policy intervention: integrated research, study and business centers (Valleys) creation

At beginning of 2007 Government adopted resolution for Concept of the Integrated Science, Studies and Business Centers (Valleys), as economy clusters, accelerating the development of knowledge society and consolidating the long-term foundation for the competitiveness of Lithuania's economy, creation. The geographical **localization** in one territory for

concentration and shared or interrelated infrastructure are highlighted as main attributes for Valley. The Valley initiators were announced by research and study institutions and knowledge intensive businesses or associations acting as **network of partnership**.

The threefold synergy as study, research and business collaboration was conceptualized for the first time on the action plan as legal document. The main goal was set to concentrate, upgrade and optimize the research infrastructure that would facilitate the development of high technologies, consolidate the links with research and studies, and training of researchers and other experts; to provide favorable environment for the transfer of scientific know how and technology to the business sector; to set up centers for promoting research, studies and knowledge intensive business synergies, capable of competing on the international arena.

Among different tasks, how to build the Valley, the primary one was mentioned to upgrade the equipment of institutions established in Valleys and to establish modern scientific research base employed for general research, studies and development purposes. In broader sense, Valley creation policy focus on knowledge infrastructure, what sharply described by Smith: infrastructure is the complex of publicly-supported organizations that produce, maintain and distribute knowledge and new technologies (Smith, 2005).

Intentionally or not, the term of cluster was avoided in legal act content, although clusters attributes ate mentioned in Valley concept. If cluster is described as "geographical proximate group of interacted companies and associated institutions in particular field, including product manufacturers, service providers, universities" (Su, 2008), the geographic, **university based** factors are clearly underlined for Valleys. Though the policy intervention for Valley creation was done by Government as top down approach roughly drafting the main principles of Valley creation, the initiative to propose content and details of Valley creation and implementation was nominated to legal bodies of Valleys initiators and could be comprehensible as bottom down approach for policy creation.

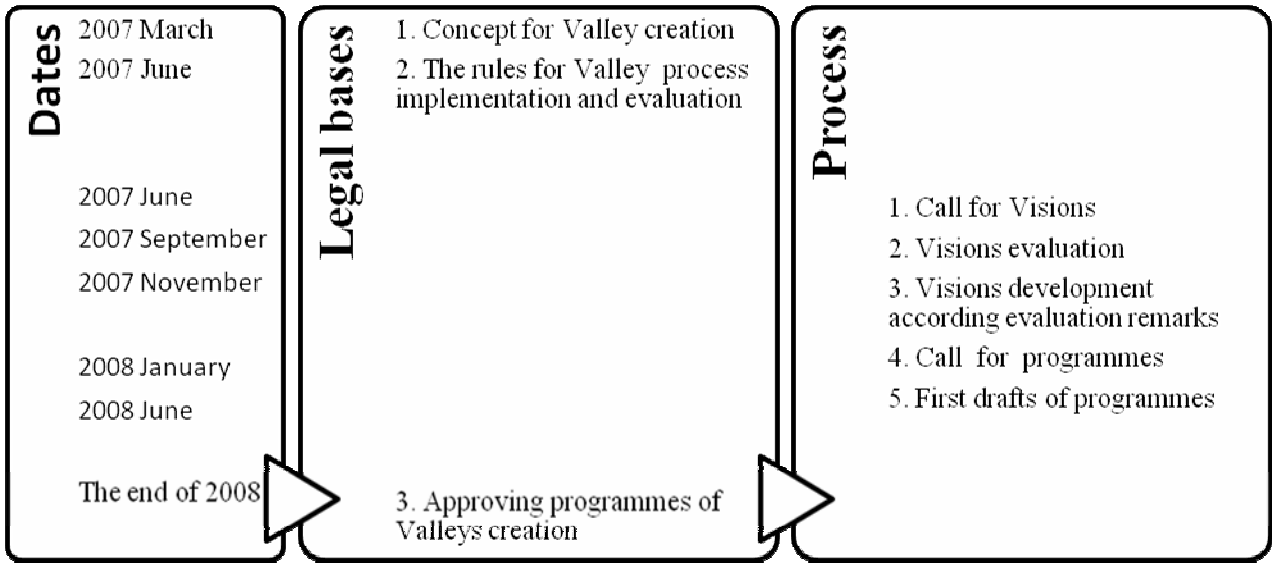

Fig. 1. The chronology representation of Valley policy creation

The Valley creation policy drafting was broken down to several steps (Fig.1): Call for Visions, Visions evaluation together with both national and international experts, guidelines for programme development, programme evaluation. Decision to issue Valley creation programme depends on the level matching the conditions outlined in advance: to proof ability to conduct excellence research by formal excellence measurement criteria's (ISI publication, number of patens, level of attracting external funding), to attract technology oriented innovation intensive companies, to have clear vision on Valley based technology priorities. The process runs for almost two and half year, started from summer of 2006 and finalized on late 2008, including preparation (undocumented) phases.

The main factors, such as central R&D performing university, high skilled personnel, geographical concentration, cross disciplinary, which influence the success of integrated center are conceptualized in policy However, certain obstacles are presented.

Obstacles of policy intervention

Spillover. Looking deeper to the Valleys programmes and funding criteria's, one may notice R&D being strengthening via building research university capacity, since competitive business dimensions are just rhetoric in objectives section but no supported by any direct measure. That was the main obstacle underlined by foreign experts. The spillover occurs when tacit knowledge is generated

in one company and is exploited in other (Kirchhoff, 2007). Taken in to account the Lithuanian market constitution and imperfection, companies orientation to less competitive markets and the fact that present R&D are concentrated in public institutions, spillover effect could be design slightly artificially between universities and companies instead of company to company.

Management. The challenge for policy management was the subject of Valley management that all interest (academia, companies, funding organizations, government and municipalities) would be taken in to consideration. The association was chosen as appropriate interaction and secured the objective development. Hopefully association will materialize the different Valley development options, such as face to face interaction of different interest, share financial, managerial ant others responsibility, implement equality and political discretion, stimulate motivation in share public and private source of funding both to pure R&D and commercialization and diffusion of knowledge.

Leadership. Acknowledging leadership as success factor for technology center creation is typical managerial approach for technology centers creation regardless policy driven or spontaneous centers are founded. It is underlined describing USA experience. Contrary to that approach, Lithuanian policy creation tendencies are based on the impersonal approach. Therefore the whole policy of Valley creation process was design from the point of institutional view (Government from the one side and research institutions together with business association from other side). This caused long and hard negotiation process which took almost two years of drafting policy directions. Leadership as additional option is still missed from the stage of process of Valley creation.

Conclusions

Recent studies indicate the progressive development of Lithuanian R&D sector with several black spots concerning business partnership and commercialization activities.

The investigation has revealed that the main factors for successful high technology center development could be named as following: research excellence in certain research areas; high skilled personnel; partnership. The role of R&D intensive universities for technology industry center formation together with others factors such as availability of technology transfer instruments (spin–offs), geographical location, public and private funding accessibility, policy support, life time cycle, leadership and cross disciplinary interaction are expressed as crucial attributes that effect the success of new policy driven Valley creation. The main goal of Valley policy is mislead for international community acting as possible investors, since it give the feeling that it is the policy action to foster the clustering. Meanwhile the integrated centers creation is the policy intervention which makes background for future public and private partnership through increasing the role and capacity of national research infrastructure and pursuing the high research performance in certain promising R&D area.

Further success of Valley concept implementation lay on the progress of accompanying policy measures regarding research excellence and environment for commercialization and coping main obstacles concerning Valley management, leadership and stimulation of spillovers. Market imperfection limits use of R&D outputs and does not stimulate market oriented R&D. However the Valley policy with strong emphasize on new companies creation strategies could be the starting point for breakthrough for R&D output commercialization.

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