



VII Balkan & Black Sea Conference

DANI KLASTERA 2016
DAYS OF CLUSTERS 2016
ДЕНОВИ НА КЛАСТЕРИТЕ 2016

September 22-24, 2016, Ohrid, Macedonia

WELCOME TO THE LEADING CLUSTER EVENT IN THE SE EUROPE
BALKAN & BLACK SEA CLUSTER FAMILY TOGETHER!



VII Balkan and Black Sea Conference
DAYS OF CLUSTERS

**Creating Cluster-Based Economic Development
for a Sustainable Region**

Conference Proceedings

Ohrid – the city of clusters in the Balkans 2016

22 – 24 September 2016
Ohrid, Macedonia

VII

Balkan & Black Sea
Conference

DAYS OF CLUSTERS 2016

September 22-24, 2016, Ohrid, Macedonia



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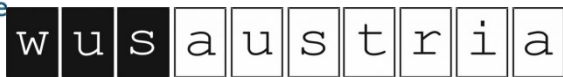
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H.E. Dr. Gjorge Ivanov
President of the Republic of Macedonia

Dear participants,

It is my great pleasure to welcome you in the Macedonian and Balkan pearl, our spiritual and cultural centre, the city of Ohrid.

I am pleased that the regional initiative started six years ago in Nis, Serbia by Cluster House became a leading cluster event in South-East European countries and continuously confirms its international character. The success of this initiative is further affirmed by this **7th Balkan and Black Sea Conference** which offers an excellent opportunity to participants from more than 30 countries to share best practices and experiences, to gain insight in the cutting-edge knowledge and to learn the latest achievements.

At a time when the world still recovers from the global economic and financial crises, it is more than obvious that the only manner in which we can successfully overcome the crisis and create sustainable economy based on free market, competitiveness and quality, is to encourage the successful work of cluster organizations, which are the driver for private-sector development of every prosperous country.

Cluster organizations have long been known for their positive contribution to local, national, and regional development. They facilitate engagement with a diverse group of stakeholders for acting on underlying policy issues jointly. The development of such joint platform of private and public sector stakeholders is crucial for starting comprehensive economic reform processes in developing countries. This approach enables the policy debate and actions to be more strategic and incremental, focusing not only to competitiveness and growth, but also toward sector-specific challenges for leveraging additional benefits of positive knowledge spillovers. Hence, I believe that the clusters are essential for the development of every national economy, while opening doors to regional and international collaboration.

The **7th Balkan and Black Sea Conference “Days of Clusters 2016: Creating Cluster-Based Economic Development for a Sustainable Region”** represents a platform for such exchange and triggers the synergy among the scientists, the policy-makers and the private-sector practitioners, on national and regional levels.

These efforts surely contribute to the fulfillment of the vision of European Union and symbolize the dedication of the Republic of Macedonia to further regional and European integrations.

Therefore, I wish the participants of this important international conference successful work and fruitful cooperation.

Dr. Gjorge Ivanov



Република Македонија Претседател

Почитувани учесници,

Особено задоволство ми е да ви посакам добредојде во македонскиот и балканскиот бисер, нашиот духовна и културна престолина, градот Охрид. Срекен сум што регионалната иницијатива ошточната пред шест години во Ниш, Србија, од страна на Cluster House, прерасна во водечки настан за кластери во земјите од Југоисточна Европа во континуитетот потврдувајќи ја својата меѓународна природа. Успехот на оваа иницијатива е дојдовно афирмиран со оваа 7. Балканска и црноморска конференција која им нуди одлична можност на учесниците од повеќе од 30 земји да сиodelат најдобри практики и искуства, да добијат увид во најновиите врвни знаења и да се запознаат со последните достигнувања. Во време кога светот се уште закрепнува од глобалната економска и финансиска криза, повеќе од очигледно е дека единствениот начин на кој ќе можеме успешно да се справиме со кризата и да создадеме одржлива економија заснована врз начелата на слободен пазар, конкурентност и квалитет, е да се охрабри успешната работа на кластерските организации, кои се движечката сила на развојот во приватниот сектор на секоја напредна земја.

Кластерските организации веќе долго се препознатливи по својот позитивен придонес кон локалниот, националниот и регионалниот развој. Тие го олеснуваат работењето со разновидна група на чинители за заеднички активности сврзани со одредена политика. Развојот на една таква заедничка платформа на чинители од приватниот и јавниот сектор е од суштинско значење за оштотчување на сеофайтни економски реформски процеси во земјите во развој. Овој процес овозможува раширањето во врска со политиките, како и конкретните активности, да бидат истражени и побројни, насочени не само кон конкурентноста и расојот, туку и

секторскиот предизвици за обезбедување додолжителни придобивки и пренос на знаења.

Општо, верувам дека класиериите се од суштинско значење за развојот на секоја национална економија, припоа отворајќи ги вратиите за регионална и меѓународна соработка. 7. Балканска и црноморска конференција: „Денови на класиериите 2016: создавање на економски развој заснован на класиери за одржлив регион“ претставува платформа постојано за таква размена и ја поттикнува синергијата помеѓу научниците, креаторите на политики и приватниот сектор на национално и регионално ниво. Овие напори, секако, ќе придонесат кон остварувањето на визијата на Европската Унија и ја симболизираат посветеноста на Република Македонија за понајмошна регионална и европска интеграција.

На сите учесници на оваа важна меѓународна конференција им посакувам успешна работа и плодна соработка.

д-р Горге Иванов





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Dear Cluster Family,

The best way to predict the future is to create it. We are here to contribute in creation of future in the Balkan and Black Sea (BBS) Region.

Welcome to the 7th Balkan and Black Sea Conference DAYS OF CLUSTERS!

Welcome to Ohrid –city of clusters in the Balkans in 2016!

We will have the great opportunity to exchange knowledge and experience, meet each other, create new partnerships and all of those together with enjoying in Macedonian hospitality, delicious food, wine, history, nature, music...If you want to fall in true love come to Macedonia.

The “Days of Clusters” conference is a leading cluster event in the Southeast Europe, which has been held in Nis Serbia 2010 – 2012; Sofia, Bulgaria 2013, Tekirdag, Turkey 2014 and Brasov, Romania 2015.

The Cluster House Nis Serbia is a founder and a co-organizer of the conference. The National Centre for Development of Innovation and Entrepreneurial Learning NCDIEL Skopje Macedonia is a host of this year’s conference. Conference co-organizers are the Ministry of Economy of the Republic of Macedonia and the Faculty of Mechanical Engineering, Ss. Cyril and Methodius University Skopje.

The conference Days of Clusters 2016 is organised under the patronage of the President of the Republic of Macedonia H.E. Prof. Dr. Gjorgje Ivanov. The Conference is supported by the Macedonian Academy of Sciences and Arts, Prof. Dr. Taki Fiti, President and the Governance of the Cyril and Methodius University, Skopje, Macedonia.

Mission of the “DAYS OF CLUSTER 2016” is to strengthen cross cluster collaboration between countries in the Balkan and Black Sea Region with aim to maximize the cluster concept capitalization in their economies.

The conference contributes to:

- Socially balanced economic development and employment creation in the BBS region.
- Enabling business environment for SME development based on collaboration between public sector, academia, financial organizations, media and business community.
- Establishment of the public-private dialogue for advocating for the needs of SMEs.
- Exchange of knowledge and experiences in the cluster based economic development in developed countries, countries in transition and developing countries.
- Transnational cross clusters networking.
- Efficient approach to EU and other development funds.

This year's conference consists of three main tracks:

- Practitioners track for cluster managers, managements and companies;
- Academic track with focus on academics and researchers, reviewed by Scientific Committee members from 16 countries, 2 continents, and
- Macedonian clusters track.

Cluster development is a unique concept that pro-actively includes the human side of management – emotions, humour, fun... Let's play cluster-based economic development game in our region and make the successful Balkan and Black Sea cluster story, and the region of proud people.

Clusters and their members from the Balkan and Black Sea Region, as drivers for economic development, will be able to present their successful stories and good practices. Special focus this year is devoted to tourism, wine and textile.

This year's conference gathers 65 cluster-based economic development experts from 4 continents: Asia with Oceania, North America, Africa and Europe; 21 countries: New Zealand, South Korea, USA, Malawi, France, Denmark, Germany, Austria, Check Republic, Poland, Slovenia, Hungary, Croatia, Romania, Bulgaria, BiH, Albania, Greece, Turkey, Macedonia and Serbia.

We will have an opportunity to attend two specially created cluster development workshops facilitated by Mr. Vedat KUNT, VEGO Consulting Izmir Turkey, a member of the Global TCI Network and Mr. Ifor FLOWCS-WILLIAMS, Cluster Navigators New Zealand, a member of the TCI Advisory's Board. After two-days conference we will continue our learning on the Wine Cluster Study Trip to Tikves Region, the oldest wine production region in the Balkans.

From our special guest Prof. Dr. Geunwoo Ryu, Keimyung University from Daegu South Korea, we will have an opportunity to hear how associative models, such as network, clusters, hubs, parks, can foster innovation in Korea, specifically the experience of KICOX, Mini-clusters in Mega Regional Economic Areas in the Republic of South Korea.

Cluster brokerage events will bring us closer and will make us more open for new partnerships and projects.

For locally acting and globally promoting we would like to thank for promotional support to the European Clusters Collaboration Platform, the Global TCI Network from Barcelona, HungarianInternational and Cluster Unit of the Ministry for National Economy; Romanian ClusteRo, Czech NCA, Turkish VEGO, France Clusters and the Balkan & Black Sea Cluster Network.

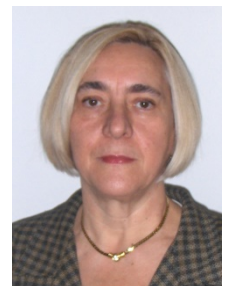
We hope that our efforts and love for the conference preparation will contribute to better life in the region through creation of plenty new friendships and partnerships, businesses and projects.

Wishing you a fruitful cluster days in Ohrid,

Your co-chairmen of the conference:



Dr. Danka Milojkovic
Director of the Cluster House Nis Serbia
Member of the TCI BoD Barcelona Spain



Doc. Dr. Nikolina Trajanoska
Head of Unit for Industrial policy
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A SUMMARY OF INNOVATION MODELS THAT PROMOTE CLUSTERING

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Abstract:

The literature on innovation models shows six known and widely accepted generations of innovation models on both company and economy level. Three out of six generations of innovation models explain the importance of networking and clustering. In this paper we give a summary of the generations of innovation models and show the transformation from linear to system, networking and open innovation models. The main goal is to give a framework that will be used as a foundation for creating a theoretical innovation model which should increase the company's innovation activity by using the concept of clustering and networking as a concept for improving the country's innovative performance. Companies can be clustered by regions (this will enable easier engagement and enrollment) and by industry (smaller and less competitive companies will be enabled to innovate) with a possibility of including government bodies and educational institutions in the process. Clusters have a certain dynamic and they need to be fit for long term adaptability within the regions, foster building trust and a continuous culture for innovation. The cluster policy also has an effect on the National Innovation System (NIS). For countries with low innovative activity as well as decreased funding and expenditures for research and development (R&D), it is of great importance that an innovation model is created which would help companies increase innovative activities, network and share not only the expenses, but knowledge and resources as well.

Keywords

Clusters, Generations of innovation models, Innovation, Innovation models, Networking.

1. Introduction

Regional innovation clusters have been mentioned throughout the literature dating back to the 1970's [1]. The importance of the geographic location in order to generate knowledge has proved to be a great motivator for companies to build their premises in places where technologies are being developed. Porter defines innovation clusters as a group of firms that are in a close geographic proximity [2]. According to OECD [3], the concept of the clusters is connected to the networking of the firms and enabling knowledge transfer. Clusters are associated with certain natural, human and other resources that are present in the region. We can also find terms such as "learning regions" and "collective learning" in the literature for clusters [4]. Before we start thinking of clustering and networking, we need to think of the reasons why stakeholders would want to collaborate in a cluster initiative. Cluster initiative is defined as an organized effort to increase the growth and competitiveness of a cluster within a region, involving cluster firms, government and/or the research community [5]. In

the further reading we will present the six generations of innovation models, give their transformation and focus on the models of networking and clustering.

2. Transformation of innovation models through generations

Innovation models help companies manage the order in which innovation activities are happening. They define resources and responsibilities, and also help in determining which methods and tools the companies will use. Innovation as a process has a very dynamic character, and that is why the models of innovations have transformed throughout the years. Although today there are six known generations of innovation models, there is also a seventh generation of innovation models being mentioned by Kotsemir et, al. that has “emerged” but is “not formed yet” [6]. Rothwell is the first one to introduce the initial five generations of innovation models, where he actually gives a historical perspective of innovations management which shows the path of transformation of innovation models from linear to complex interactive models [7]. Different researchers give their own typologies of innovation models that mainly use the chronology of Rothwell’s five generations of innovation models. In his classification Rothwell gives an approach to innovation management which relates to the evolution of organizations, the strategies of innovations management under various socio-economic and political circumstances. This doesn’t include the substantive development of the innovation models themselves [8]. Rothwell’s typology is based on models of innovation on a company level. Marinova and Phillimore present another typology of innovation models and explain their six generations of innovation models [9]. For this classification they use technological models that apply to the overall economy, with a theoretical background of the generations of the innovation models, as well as their positive and negative sides. Table 1 shows the generations of innovation models by Rothwell [10], Marinova and Phillimore [11] and Kotsemir and Meissner (also company level models) [12].

Table 1 Generations of innovation models, author’s adaptation of Rothwell (1992), Marinova and Phillimore (2003) and Kotsemir and Meissner (2013)

Generation	Period	Rothwell	Marinova & Phillimore	Kotsemir & Meissner
1	1950’s – mid 1960’s	Technology push model	The black box model	Technology push model
2	Mid 1960’s – early 1970’s	Market pull model	Linear models (technology push – need pull)	Market need pull model
3	Early 1970’s – mid 1980’s	Interactive or Coupling model	Interactive models (coupling and integrated models)	Coupling model
4	Early 1980’s – early 1990’s	Integrated innovation process (parallel development)	Models of innovation systems (networks and national innovations system)	Interactive model
5	Early 1990’s	SIN (Systems integration and Networking Model)	Evolutionary models	Networking model
6			Innovation milieu	Open innovation model

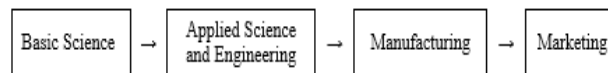
The transformation of the linear models occurs in the 3rd generation of innovation models on a company and economy level, where interaction and coupling of functions and phases take place. This evolves and transforms throughout the 4th generation of innovation models where we have the interactive models on a company level and systems models on an economy level. In the 5th and 6th generation of innovation models the networking is still an inevitable and crucial characteristic and element of the innovation models. To better understand how this happened we will explain briefly the characteristics of all the generations of innovation models, and then focus on the models that promote networking and clustering.

3. Linear models of innovation and interactive models

The linear model of innovation (technology push) model is a first generation innovation model on a company level and second generation model (together with the market pull model) on an economy level. This is a simple model, has no feedback loops, has predetermined phases and is of a consecutive nature (Figure 1). The main phases of this type of models are: 1) basic

science/fundamental research; 2) design and engineering; 3) manufacturing; 4) marketing and 5) sales [13] [14]. With emphasis put on R&D in companies, it was believed that the more R&D is done, then more new products will be out, which did push innovations forward, but did not give enough attention to the transformation process or the needs of the market place and the consumers [15] [16]. Similar innovation models are still being used by some companies mainly for defining the process of product and service development, and collaboration with suppliers. *The second generation* of innovation models or the *linear innovation model (market pull/demand pull/need pull)* is not much different from the first one, it lacks feedback loops, but does take the market and consumer needs in consideration by recognizing the fact that the only way to help drive performance is to include the market/consumer needs [17]. Both models are shown in Figure 1 and these are the technology push and need pull models suggested by Rothwell.

“*Technology-push*” model:



“*Need-pull*” model:

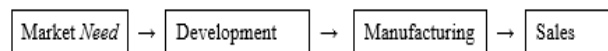


Figure 1 Rothwell's Diagram (Source: Godin, 2013)

The *stage-gate model* is one of the most popular practical innovation model on a company level of the second generation of innovation models in the USA, which was predominantly used by NASA in the 1960's. This model, further simplified and suggested by Cooper [18] consists of five relevant phases or stages (Figure 2). The decisions happen at the gates which are the added controlling element, positioned after each phase. This is done in order to be sure to follow the fulfillment of predetermined strict criteria before the process continues onto the next stage [19]. Research shows that this type of model has been adopted and used by many other companies as well [20]. Still of a linear nature and no feedback loops, it lacked to capture the dynamic characteristic of the innovation process.

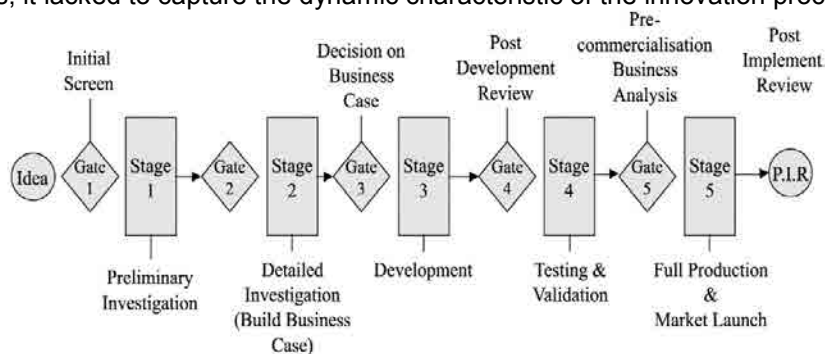


Figure 2 Cooper's Stage Gate Model (Source: Cooper, 1994)

The *third generation of innovation models* on both, company and economy level, are given the name *Interactive models*. They take into account the interaction feedback between marketing, R&D and manufacturing. This generation of innovation models treats innovation as a combination of technology pushes and market pulls [21]. They recognize the interaction between elements and feedback in the innovation process as a key for innovation's success [22]. These models could not differentiate the need from the demand [23]. *The Coupling model of Mayers & Marqis* (as shown in Figure 3) is a company level innovation model where the innovation activities are divided in subcategories under each phase, and are interacting [24].

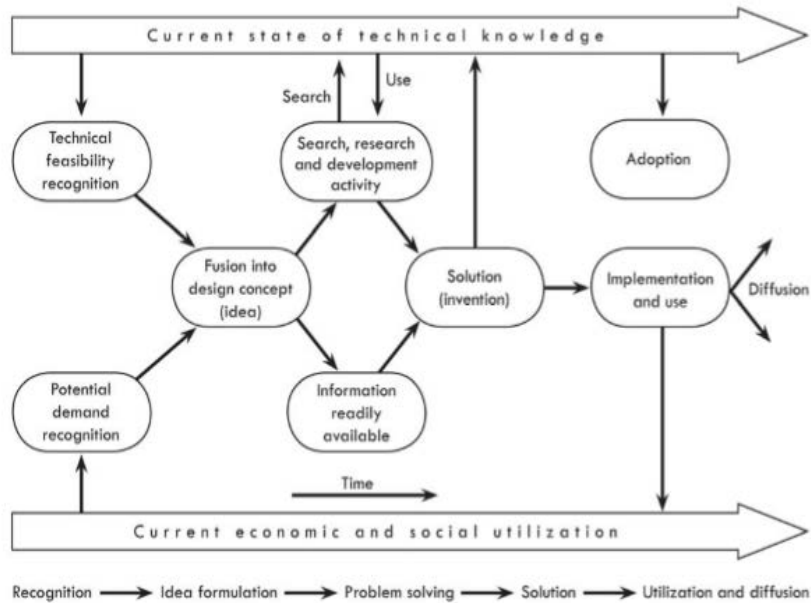


Figure 3 The Myers and Marquis Coupling Model from 1969 (Source Godin, 2013 [25])

Rothwell and Zegveld explain the innovation process as a complex network of communication paths inside an organization as well as outside of it, connecting the different inter organization functions and the company with the broad scientific and technological environment and the market. In this 3rd generation of innovation models we notice a change of approach towards knowledge and awareness for current technical knowledge throughout all of the innovation activities.

4. Models of innovation systems and networking as pre determinants of clustering

The *fourth generation of innovation models* is enriched by multiple feedback loops and interaction between stages, putting an emphasis on the validation of the knowledge gained in the innovation process [26]. This generation of innovation models are the replacement of the linear models with a model that truly reflects the complex innovation process [27]. These models are also functionally integrated innovation models. They achieved integrating the suppliers, customers and partners in the development process, and companies were focused on creating links and strategic alliances with other organizations [28]. Below on Figure 4 is the *Chain-Linked Model* developed by Rosenberg and Kline (1986) which is a fourth generation innovation model on a company level. On an economy level, in this generation of innovation models we have the *System models* which argue that firms that do not have the resources to develop innovation in-house can benefit from establishing relationships with a network of other firms and organizations [29].

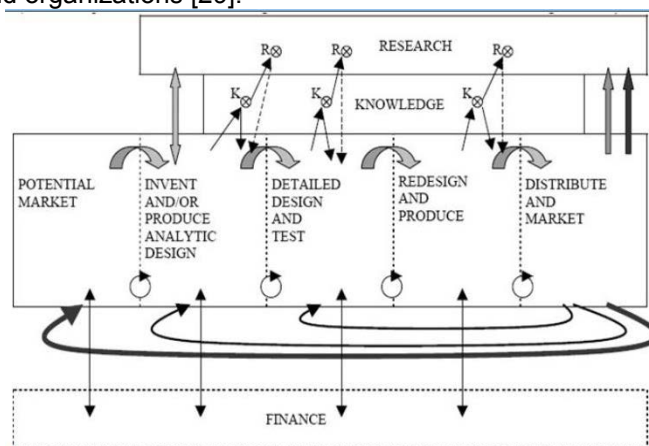


Figure 4 The Chain-Linked Model of Innovation (Rosenberg and Kline, 1986)

The importance of networking and clustering is starting to become a crucial element for the success of innovation. This transfers onto the *fifth generation of innovation models* which was developed in times when the information systems became the next big thing especially in expediting communication within the company's network and process automation [29]. Rothwell's *SIN (Systems Integration and Networking)* model on a company level which is a fifth generation model incorporates the higher integration inside companies as well as with the outside entities such as suppliers, consumers, universities and authorities [30]. This is also a time where there have been many R&D cost cut downs, so companies had to network to fulfill their innovative ideas [31]. We can notice integration of the different activities within the innovation process, but they also appear simultaneously with overlapping functions and feedback. There is a strong focus on improvement of the efficiency in the knowledge transfer (Figure 5).

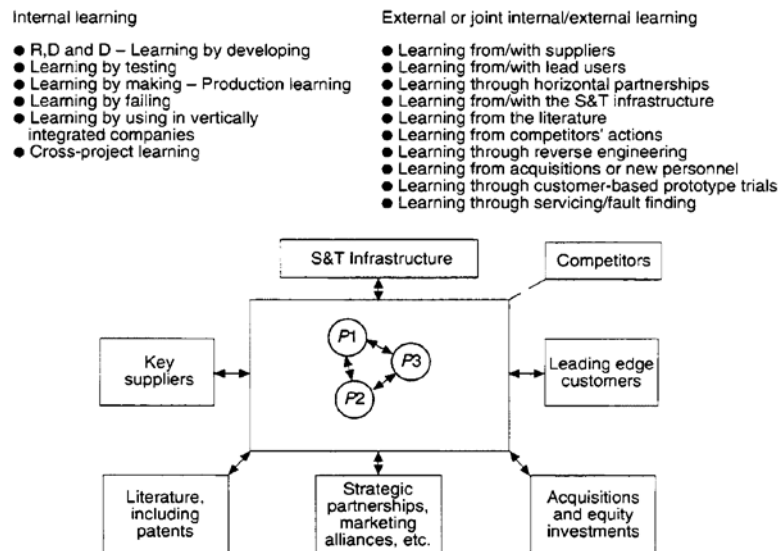


Figure 5 Fifth generation of innovation model (Source: Rothwell, 1992 [32])

Marinova and Phillimore put *evolutionary models* of innovation in this fifth generation of innovation models as an overall economy models. These evolutionary models “analyse the behaviour of big number of firms in the context of the environment which is more or less common to all firms” [33].

The sixth generation of innovation models has two models in the literature: *The Open Innovation Model* (according to Kotsemir and Meissner & Chesbrough) and the *Innovation milieu* (according to Marinova and Phillimore). The open innovation models have been implemented by large companies, and some SME's as well, primarily for market related motives such as meeting customer demands and keeping up with competitors, where the biggest challenges lie in organizational and cultural issues as a consequence from dealing with increased external contacts [34]. This model promotes networking (Figure 6) and is created and introduced by Chesbrough [35]. It also promotes using outside knowledge, such as suppliers, competition, entrepreneurs, scientists etc. [36]. The whole idea of the open innovation concept is that R&D is being done by outside partners which reduces or transfers the costs for R&D, and also that ideas can occur while developing a new product/service which can change the course of the process. In order to generate more ideas this model uses outside sources such as universities, research centers, suppliers, competition, government bodies and consumers [37], and promotes transparency as a key for a successful innovation.

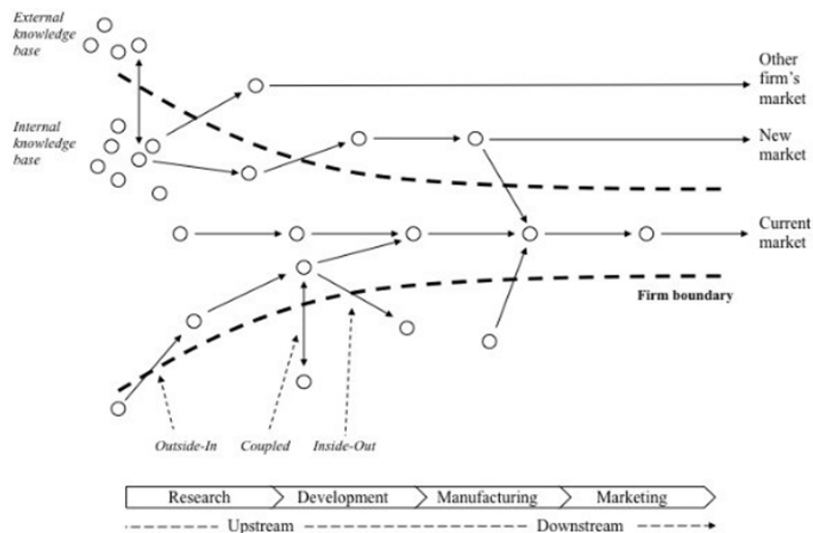


Figure 6 The Open Innovation Model (Chesbrough, 2014)

According to Shefer and Fenkel, there are two major groups of variables that are likely to affect the rate of innovation of firms: internal (such as size, age, ownership type, location, type of industry to which the firm belongs and the extent of R&D activities taking place in the firm) and external (such as the rate of local innovation, the degree of cooperation and collaboration among the firms and the degree of economies of localization and agglomeration – these create the local innovation milieu) [38]. The innovation milieu models are “focused on separate firm locations within regions” [39]. Innovation in clusters comes from the territorial organization and is a combination of a cumulative general creative know-how. One element of cluster initiatives is trust that “proved to be a complex but important element of the social capital engagement in cluster initiatives” [40] [41]. Actually, the ease of contact and trust between partners is a major feature of a successful innovation milieu environment just because they reduce uncertainty in development of new technologies and prove to be a source of exchange of tacit knowledge [42]. The local innovative milieu is considered as a “cost reducing agent/factor that diminishes uncertainty, increases production efficiencies and enhances the innovative capability of firms [43] [44]. According to Nicolov and Badulescu, innovation seems to be a localized phenomenon with an intrinsically territorial point of view, which is dependent on the specific location of resources linked to certain places and impossible to replicate elsewhere [45].

5. Discussion and conclusion

Innovation networks are networks comprised of all of the actors involved in the innovation process and the ties or relationships that connect them [46]. There are many elements to consider when planning a networking and clustering initiative like distance, industry type, size of companies, type of ownership, R&D activities, rate of innovation etc. It has been found that there were clusters located nearby universities, that have enormous innovation capacity but show disappointing results, according to the predetermined internal and external variables that affect the rate of innovation of firms, because the faculty staff was focused on teaching instead of research [47]. For companies to become more innovative, they need to be ready for a change and to have set up mechanisms that will support the process. This can be expedited through clustering. As a beginning of the new innovation model we can say that generating ideas is the most important part, as well as planning a reliable and safe funneling and distribution of the same ideas. Clusters can encourage all involved sides to share knowledge and ideas, which will help smaller companies thrive and larger companies use some fresh new ideas that do not come only from their employees. The next stage should be the selection stage, where companies can determine whether their ideas have the potential for realization or not with four mandatory components: marketing, legal, economical and developmental component, which can be used as controlling elements in order to determine whether a company should proceed with the next stage or not. The selection process of innovative ideas should be done by strict criteria and very carefully, and the model should be able to recognize whether the time is right to introduce a certain innovation on the market. Being a part of a cluster should make it easier for these stages to be finalized, and this will result with a larger innovative activity, collaboration, transparency of the innovation process and quicker learning experience. Next stages of the innovation process are

planning and realization, diffusion and marketing, and of course the feedback (because the feedback loops were lacking in the first and second generation of innovation models, and customer's feedback is an essential element of innovation), which should be considered as a part of every stage of the innovation process. Clusters enable companies to easily adapt to a networking environment, handle interaction, know the competition and easily identify new sources of ideas. Therefore, findings show that in order to increase the innovative activity of a region, networking and clustering are the main things to consider especially by putting the focus on knowledge gain and on maintaining the knowledge level of the companies that are involved. The clusters should be knowledge oriented and focused on creating a continuous and active learning culture. Clusters can achieve more innovation activity by using a semi formalized innovation model that will be based on the open innovation model and will put a specific focus on generating ideas, selection of the ideas and their realization. Choosing the right stakeholders is crucial, but also transforming them could be an option, because it would be beneficial for both the cluster and the entity.

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