



## BalkanMed E-Business Pages

# Good Practices Guide on Clusters and Technology Transfers- North Macedonia

GAUSS Institute - Foundation for New  
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***Good Practices from  
Existing Clusters and  
Technological Transfers  
in the Republic of North  
Macedonia***

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## Cluster overview

### Definition of cluster

For theory and empirical knowledge today it is not disputable that for every economy, and especially for a small and open developing economy, the foreign trade and the external economic sector as a whole are extremely important for the economic development of the country. Republic of North Macedonia also has special reasons with an acute interest and attention to address the situation and the results of this plan. Even, it is objectively forced its strategy for long-term development and based its current economic policy on strategy for export expansion. Let's list the most important reasons for this determination.

With the dissolution of the former Yugoslavia and the independence of the R. North Macedonia, the internal market has narrowed from over 20 million to 2 million people. Consequently, all indications of industrial, agrarian, infrastructure and other production and service economic capacities, built according to the potential of the former Yugoslav market, are today faced with the problem of placing a large part of their production. The current North Macedonia market is unable to absorb the products of metallurgy, metalworking, chemical, construction, textile, leather, tobacco and other industries. This is the case with the supply of our important plant and animal products (garden, industrial crops, orchard, vineyard, lamb and sheepskin, etc.) and their products (cigarettes, wine, juices, etc.).

Without exporting a significant part of this production, the use of the available capacities would be reduced to a suboptimal and unreliable level, ie their survival would not have an economic justification, which ultimately would lead to destruction and a definite loss of invested capital and to catastrophic disindustrialisation. In fact, the small domestic market does not give grounds for any other option, except for export-oriented development and breakthrough in European and other international trade flows (Acemoglu, D., Zilibotti, F., 2011, p. 102). Developed international trade and other economic relations make it possible to achieve an economy of the scope, to make quicker adjustment of production to demand and achieve integration in the developed markets. For all these reasons, for most of the existing economy, its revitalization, technical-technological modernization, restructuring and training for competitive export of European and other external markets - is a solution without an alternative. The main and main assumption for the dynamics and a significant increase in exports is the dynamics and the increase in production.

The most direct way to realize this goal in the industrial sector is the revitalization, modernization and adjustment of the previously mentioned seven groups of products that form the corpus of North Macedonia industrial exports. Among them, the group of existing industrial capacities for the production of machines, devices, appliances, transportation means and significant potential for accelerated development through technical and technological innovation and modernization, as well as with the development of new products. There is also a realistic outlook

for the chemical industry to increase the production of medical, pharmaceutical and cosmetic products preparations (Al-Ghailani, H.H., Moor, W.C., 2015, p. 65).

Special attention deserves the expansion of production and export of electrical materials - conductors, cables, electric motors etc., then metal parts and accessories, as well as the non-metal industry, given the diverse and rich natural resources. For most traditional industrial branches: textile, leather, wood, construction, food, etc., there is a solid raw material base and already built significant capacities. These branches are FX-active exporters, with opportunities for increasing the export, under the conditions to provide certain -relatively modest investment investments and more efficient organization of exports. These branches except this, they also have a well-known specific meaning, in conditions of the current high unemployment in our country: they are expressive labor-intensive activities. However, a particular problem in the industrial sector is production and export of basic capacities of non-ferrous metals, where according to all estimates the solution can be found only with proprietary and technological engagement of foreign strategic partners and with the appropriate takeover by the state of the burden of their cumulative obligations. The agrocomplex export structure is characterized by the predominance of three to four groups products: tobacco and processing; wine and other drink; fruit and vegetables and lamb and sheep meat. Moreover, these groups of products achieve positive balance in the trade with abroad, while the total external the turnover of the agrocomplex has negative negative value: the value of the import is higher than exports.

## Cluster development

The increase in exports of agrocomplex products and gradually reducing and eliminating the deficit in the trade with abroad of this sector can be achieved, as well as in the industry, in the first order by increasing the primary production and production of processing capacities of agricultural and livestock products. According to the analyzes in part from this study dedicated to the issues of the agrarian sector, the expansion of export opportunities would should be achieved through the measures of the investment and the current one agrarian and foreign trade policy aimed at promoting the production and export of tobacco; orchards; viticulture and important horticultural crops. Measures would also be justified to increase the production of individual industrial crops and other products that would reduce or

substitute the imports of some plant and animal products. The successful accomplishment of these goals could lead to the reduction and elimination of the deficit in the foreign trade of agricultural products from the agrocomplex until 2019 and until an enviable surplus by 2020. Place the current imbalance of the secondary 60 in 2019, a surplus of around 30 would be realized millions of dollars, and in 2020 the surplus could reach a densely higher level. In other words, a significant positive result would be achieved turnaround: from the net importer,

the agrocomplex could become a net exporter. Let's repeat again, the basic condition for such positive achievements are to be accepted in agrarian development and current politics a firm commitment to actively support the magnification programs the production and improvement of the export structure of these products. The concrete measures in the plan that are discussed in the study (Scenario II) would not derogate the course of liberalization into the agrarian sector nor would they come to a collision with the WTO norms and the EU. It has remained strictly on the line of contemporary internationally recognized and allowed activities in the foreign trade sector. However, in the absence of such policies and measures and staying on inertial and spontaneous processes, structural shifts would have been lingering and balance between the import and export of agrocomplex products would remain negative not only until 2019, but also by 2020 (Walz, U., 2016). Taking into account the existing production capacities and potentials in the industrial and agrarian sector, assuming that the development and the foreign trade policy are definitely determined for the implementation of active support for export-oriented production. Moreover, the fact that our economy is already emerging from a long recession and from the unfavorable external environment is a favorable circumstance is the open process for the promotion of status and relations with the WTO and the EU. Moreover, taking into account the exceptional an impetus from the effects of the Stability Pact for the Region, it seems economically viable and realistic to expect a more stable and more intensive growth of exports. According to estimates in our material, in such conditions an export growth rate of around 7% could be achieved, annually until 2019 and an increase in the volume of exports of goods and services from the current around 40% to about 50% of the BP, and in 2020 and up to 2/3 of GDP, which would catch up with more successful developing countries and those in transition. At the same time, the deficit of current transactions on the balance of payments could be reduced from 8.2% in 2018 to 6.7% in relation to GDP in 2019 (Vidal, J.-P.. 2019, p. 74).

A special chance and a challenge for the production dynamics and an increase in exports is the rebuilding and construction of Kosovo and Serbia, at the same time with the regional dimension of investment investments for the advancement of the economies of the countries of Southeast Europe, and in within the framework of the Stability Pact. It will undoubtedly give a wide impetus for increased placement of primary agricultural products, products from the food and tobacco industry, stoves, building materials, textile and chemical products, electrical materials and especially intensification of transport and construction services, etc.

It would be a serious omission, this expected extraordinary incentive for the export of goods and services and the production of industrial and agricultural sector that is created in the post-Kosovar period, to be used only as a transient conjuncture episode and not to be valorized for establishing future relations on a more permanent basis with the partners from the neighborhood and wider, with participants from other countries involved in the activities for reconstruction and development of the countries of the Region. The Republic of North Macedonia, as a small and economical development and prosperity, undoubtedly sees in openness towards the world and its goal of integration in international economic flows. Starting from the current situation and the available material and human

resources, the expected structural and dynamic changes in the economy, it is estimated that in the next period will come gradually to a turnaround in the export flows, that is, up to their expansion and dynamism (Acs, Z.J., 2014). The higher profitability of certain activities and the ability to exchange products with the world of competitive basis will be the main barometer for capital allocation from one in another branch-exporting company. Globally observed, the exporting producer of goods in the next period will certainly be the industry, but the export of services and on-land products should also be noted. Within the export of industrial products, significant structural changes are expected in the direction of increase of the participation of industrial branches that achieve greater finalization of finished products and higher income. This primarily refers to industrial products from the complex of equipment and durable consumables, chemistry and processing of agricultural products.

The traditional sectors will also have a significant place in the export of the complexes of leather, textiles and basic metals, although their participation in the total industrial exports will relatively decrease in the upcoming one period. North Macedonia, and in the period up to 2020, technological gap will fall behind the general level of technological equipment of the most important trading partners - members of the EU. However, as a result of the restructuring of the economy and the entry of foreign expertise and knowledge, it is expected that in the structure of exports after the economic purposes of the products will a decrease in the share of raw materials and intermediate goods, at the expense of the growth of products with a higher degree of technology and finalization. On the import side, however, an increase is expected the import of equipment that is necessary for raising the level of technological processing of data, as well as for realization of the planned investment dynamics and economic growth.

In the regional direction of exports, a significant increase will be achieved in exports in the developed Western countries, especially in the countries of the European Union. Exports to neighboring countries will also be intensified, as well as cooperation with regional partners, while with countries with which there is a high deficit in the trade of goods and services, and free trade agreements have been signed (for example, Slovenia), there will be an attempt to achieve a more balanced exchange. Structurally observed, in the period until 2003, as well as expected, a faster increase in the export of services from the increase in the export of goods is due to the following reasons: a) the global tendency of increasing the role of the service sector, especially in the emerging economies and b) the end of the war in the region will "Pull" the activation of the North Macedonia transport and construction capacities, and will enable the realization of higher inflows from the financial services and tourism. Due to its small critical mass and scarce resources, North Macedonia needs a clear strategy for export support in order to reach the established goals within a certain period of time. The only strategy that can be accepted under such conditions, a vis-à-vis developed economies, is a "development tracking strategy", which means monitoring the development of world trends and appropriate response through providing high technical, technological and market specific analysis, taking into account the existing comparative advantages and interests. Carriers within such a defined development of the export sector is the realization of the "Strategy for marketing profitable

production", that is, targeting the production of goods with a high degree of added value per product, which should contribute for the specialization and the absorption of much of the existing and the new industrial facilities from R. North Macedonia on world markets.

Accordingly, the state's activities in support of exports can be divided into five areas (Weddle, R.L., et al 2016):

1. Improvement of the general economic conditions;
2. Reduction of unit labor costs, including tax obligations and contributions;
3. Reducing the cost of capital;
4. Adequate gender exchange rate;
5. Improving infrastructure.

Export performance in the past period was determined and limited by the limitation of export markets, inadequate technological capacity in production, and the low level of productivity, the result of high production costs and the exchange rate policy, which conditions its appreciation. This produced significant reallocation of resources from export to domestic production and service sectors and thus additionally affected the stagnation of exports. The activities of the state in that period were aimed at ensuring macroeconomic stability, finding alternative markets for exporting and institutionalizing economic exchanges, primarily through the signing of free trade agreements and economic cooperation agreements for the protection of investments and agreements for the avoidance of double taxation. In short, the focus was on improving general conditions, and not on measures of direct stimulation.

The new condition and conditions imposed the adoption of an approach that in the basis should be built on the interest in restructuring the production into higher processing phases, the vertical linkage of the existing and the new primary production with the activities and branches of the final sector (subcontracting) and increased profitability.

The role of the state towards direct export support to achieve these goals through legal solutions is limited. Although the new Customs Law supports exporters, incorporating the duty to return customs under certain conditions, it is limited by the "origin of goods" rule set out in Protocol 2 to the EU-Treaty. The space where the state can the measures for financial support of exports in the existing capacities, but also providing incentive measures for supporting the establishment and development of new production export capacities, in the sectors that are defined in advance in the export strategy.

Such a policy is that export stimulation, so that it can fall under the criteria of the WTO agreement, must primarily be limited to certain branches, on the basis of objective criteria and conditions and with limited action. Within these limitations, the state having in mind the structure of the export capacities and the priority directions of development during the intervention should be limited to the following general and selective export incentives:

General export incentives include (WEF, 2011):

1. Exemption from paying income tax for a period of 5 years starting from the date of commencement of production for companies that will be given pioneering status.
2. Exemption from paying income tax in the amount of the costs for capital investments (in equipment, spare parts and technology), realized within a period of up to five years the date of the decision to grant the support.
3. Exemption from income tax for investments in research and development.
4. Complete exemption from customs duties on imports of raw materials, equipment and spare parts.

Selective export incentives include (Acemoglu, D., 2012):

1. Exemption of profit tax companies, reinvested earnings in capital expenditures for expansion the production capacity, modernization and diversification in related products. Exemption is given additionally of normal exemptions.
2. Provision of favorable international loans and their placement through MBDP and commercial banks, as a priority established lists of strategic branches and sectors in the economy, financing of the export cycle and modernization of the capacities.
3. Grants (grants) by the State of export credits at a level that is lower than what they have to pay for engagement of funds (if they make loans to foreign markets) or payment of all business costs which would occur to exporters or financial institutions in the provision of loans, as well as to those who are used in the provision of material values in the field of export credits.
4. Guarantees on export credits or insurance programs, insurance or guaranteeing programs targeted against increasing costs for export products or programs to protect against the change in exchange rates, according to the level of premiums that are insufficient to cover long-term operating costs and losses from such programs.
5. Fees or reliefs provided by the State or the import agencies of import or domestic products or conditional goods used in the production of export goods, on conditions that are more acceptable than commodity commissions that are designed for the domestic market.

Stimulating the invertebrates. North Macedonia should at the same time be a covered the overcoming of existing infrastructure (before cb telecommunications) barriers, information barriers and the problem of underdeveloped financial institutions.

Additional measures to encourage exports can be predict (Shan, J. and Sun, F., 2018):

- channeling the funds received from the privatization of enterprises and lending to the acquisition of profitable export companies,
- Encouraging additional capitalization of the enterprise by issuing additional shares,

- Encouraging franchising and leasing in these enterprises and establishing a consortium for marketing and export in these companies,
- co-financing of participation in fairs in North Macedonia companies in abroad and co-financing the costs of marketing activities of companies.

In doing so, the number of exporters should always be kept in mind enterprises, the danger that is present due to subjectivity in decision-making, and the most important factor: disturbed market relations that can directly impact on the realization of the factors of production. For these reasons it is necessary to ensure full transparency of the decisions and measures and to ensure equity of the entities in the supporting branch.

For R. North Macedonia, in the analysis of the need for export support, the application of customs and non-customs duties is of particular importance barriers and the perception of the subtle forms of non-tariff restrictions, applied by the countries in which our exports are primarily realized. In doing so, it is relevant to see two elements: species and concentration by sectors. The low level of customs barriers to our main trading partners (in the EU and the neighboring countries markets) has been replaced by a high degree of extra-customs barriers (anti-dumping, special duties, mandatory domestic component, cumulative origin, etc.) which are largely concentrated in several extremely important sectors of North Macedonia exports (agriculture, iron and steel products, chemical industry and textile industry). Although imports of products from these sectors in those markets is small and generally less than 1%, they participate in North Macedonia exports in the amount of about 60 percent. Parallel and common is the use, in accordance with WTO and GATT regulations, of measures and forms for the protection of health and safety, the protection of the environment, labeling and packaging of products, automatic licenses, attests, product quality certificates, anti-dumping procedures, etc. The first activity of the state is to set up a system of organization to state and private institutions, bodies or agencies that would have an assignment to collect, process and exchange data and to provide exporters with expertise on technical aspects of NT and its financing (see section V). In parallel and in continuity, the state needs to facilitate the appearance of foreign markets and achieve a larger export effect to create conditions, that is, to encourage the adoption of the technical regulation and standards in the production of goods (covered by the Law on Standardization, "Official Gazette" No. 23/95), or so-called. ISO 9001 standard.

A very important factor for the implementation of the foreign trade policy is the development of an institutional network (more specifically covered in section V) and activities aimed at concluding new trade and economic agreements, which would include inclusion in the cumulative rule on the origin of goods. They must integrate the issues of:

1. From the run-off of double taxation.
2. Elimination of restrictions on international trade through the harmonization of legislation.

## Types, number and analysis of clusters registered in North Macedonia, incl. of their structure

Gathering business substances into affiliations, systems, gatherings, and chambers is available in North Macedonia for quite a while. These kinds of affiliations frequently are done based on closeness of business territories or closeness of the business the business elements are associated with. Tragically, these methods for association don't have the structure and the usefulness of the present groups. Without precedent for North Macedonia, groups are shaped in 2002 under the USAID North Macedonia Competitiveness Project (MCA). Amid this Project the initial five bunches have been made (Veugelers, R., Cassiman, B., 2014):

- Cluster for sheep meat and cheddar
- Cluster for the travel industry
- Cluster for IT
- Cluster for wine
- Cluster for material.

While the Project was operational these groups were bolstered in their advancement and development in different ways. The Project's point was to help in raising the aggressiveness of North Macedonia organizations through helping the groups in their advancement and accomplishing manageability. After the Project finished a portion of the groups wound up inert and quit working, while a portion of the bunches continued creating and developing.

Amid 2007 and 2008 a few additional groups have been made in North Macedonia (Aitken, B. J., 2017):

- Cluster for wood industry
- Cluster for car industry
- Cluster for handling products of the soil
- Cluster for style and plan
- Cluster for rural motorization
- **Cluster for lamb and sheep cheese.** In this cluster, about 70 industry representatives gathered to work together to improve the production and marketing process for a successful breakthrough and direct sales of lamb and cheese in supermarkets across the EU and the United States. The idea was to win the ethnic markets, that is, the diaspora supply markets. After the completion of the MCA project, the cluster practically failed to continue the activities. This cluster was the first cluster that was supported by the USAID Competitiveness Project of North Macedonia. The goal of the cheese and lamb cluster was to strengthen the

position of North Macedonia as a producer of fresh lamb and sheep cheese on the world market by promoting products, implementing quality standards and applying acquired marketing and sales techniques. At the end of 2003, North Macedonia dairies made their first export, sending a trial shipment with North Macedoniacheese to the United States. Thus, from the minimal revenues from export of dairy products in 2003, the export of cheese to foreign markets in 2006 amounted to 1.1 mil. US dollars. USAID's support through the Competitiveness Project helped cluster members connect with potential buyers by participating in global trade fairs as a major prerequisite for placing their products on the international markets. Also, USAID has helped sheep breeders to improve their earnings through direct sales of lambs on the Greek market and other buyers. Thanks to the initial support of USAID, two sheep breeders' cooperatives were established, one in western, another in eastern North Macedonia, and managers were also hired to support them, who together with the representatives of cooperatives and sheep breeders, held trainings to promote their cooperation and to build common capacities.

- **Tourism cluster.** The tourism cluster in 2003, with the support of USAID, conducted a market research based on which it developed a strategy for attracting "healthy, rich, experienced" tourists interested in natural-adventurous or cultural-historical tourism. In 2004, 15 tour operators from the United States, the United Kingdom, the continental part of Europe and Turkey were invited to North Macedonia to get acquainted with the country's beauties and the best that it can offer to their citizens, with the greatest emphasis on natural beauties and adventurous perceptions.

As a result of these visits, immediately afterwards, North Macedonia was included in the tourist offer of 9 of these tour operators. USAID together with the cluster of tourism actively participated in the development and creation of the tours: evaluating the hotels, preparing unforgettable experiences, tourist attractions, museums, mosques, churches, old markets, archaeological sites, etc. The cooperation of the cluster with the Dutch Chamber of Commerce, however, was returned by the Dutch tourists to North Macedonia, as well as the charter flights from the Netherlands to Ohrid. As a result, the number of Dutch tourists by the end of 2005 increased by 400%, reaching 20,000 Dutch tourists. In 2005, the members of the tourism cluster and USAID participated in the creation of today the well-known tourism portal - [www.exploringNorthMacedonia.com](http://www.exploringNorthMacedonia.com)- Information Technology Cluster. The cluster was designed to work on the promotion of North Macedonia as a market for subcontracts for software development, based on the availability of staff and the relatively low labor cost. This cluster is proving to be very dynamic and can serve as an example of successful external intervention when it is complemented by a vision and a desire for success in cluster leadership. One of the more successful clusters in the region, and of course, most successful in us.79

- **Foundation Tikvesh wine road.** And this cluster continued to develop successfully after the completion of the project with which it was founded. His mission is to improve the quality of North Macedonia wines and promote the export of packaged wines at a higher price, organize marketing campaigns and promote our wines. The cluster consists of wine cellars, wine growers' associations,

research institutes, suppliers of wine production equipment and donor organizations.

The production of North Macedonia quality wine dates from ancient times, and today it is recognized and recognized in the world. However, it is little known that until 2003 in North Macedonia, cheaper bottling wines were produced, which were mainly exported to the market in Germany. Through USAID's support for quality improvement and marketing in order to increase sales of high quality wines intended for the European market, North Macedonia wineries invested \$ 9m in new plants and equipment, as well as engaging experienced oenologists. The USAID project aimed to strengthen cooperation between growers and wineries in the direction of improving the quality of the grapes. USAID also used US viticulture, oenology, marketing and promotion experts to help winemakers meet the conditions for placing and selling North Macedonia bottled wine in bottles.

As a result of this cooperation and education, the wineries received an international certificate of quality of the wines they produce, winning medals in international competitions such as "International Wine Challenge" in Bordeaux, "Mundus Vini" in Germany and "International Wine Challenge" in London. In 2005, North Macedonia was first presented in a report on the countries of the 77th edition of Harpers Wine and Spirit Directory, listed as one of the 29 countries producing quality wine next to France, Australia, the South African Republic, New Zealand, Italy, Spain, the United States and Argentina.

- **Cloth for textiles.** It was originally made up of 30 members of the North Macedonia Textile Association, in order to organize it to help with the departure of the Ion system, introducing flexibility of production, restoring local fabric production, developing own North Macedonia designs and brands, as well as attracting foreign direct investments . The cluster became independent from the MCA project in 2004. Thus, TTA-CT is formed, which today has 70 active members, who pay membership fees in the association from which they receive various types of services and support. The cluster has a horizontal and vertical structure, cooperates with universities and foreign cluster associations. In 2005, USAID helped North Macedonia textile companies to perform together for the first time in one of the most prestigious and competitive markets in the world - the Milan fair. With the help of USAID, cluster textile clerks began to update their promotional materials and produce catalogs for their presentation in prestigious fashion weeks in London and Paris.

As a result of the participation in the fairs in Milan, Copenhagen and SIMM in Madrid, five cluster companies signed contracts totaling nearly \$ 5.4m in 2005 with well-known brands: Versace, Mossino, Cruzia, Valentino, Heisberg, Henes and Moritz and Zara. Cluster companies have invested in new factories and equipment, which by 2006 amounted to \$ 3m and created 250 new jobs.

In the frames of the project, the National Council for Entrepreneurship and Competitiveness (NECC) was established, whose goal was to unite the various economic organizations and associations and to establish a platform for dialogue between the representatives of the private sector and the relevant representatives of the Government institutions, whose task is to provide conditions for the

establishment and development of clusters and the overall competitiveness of domestic companies.

During the project, from 2002 to 2006, USAID collaborated with more than 180 companies from five clusters and played a direct role in creating revenue from exports in the amount of 15.4 million US dollars, most of which were by selling new products and / or new geographic markets where North Macedonia companies have not sold their products at all. In addition, USAID has supported co-investments in the amount of at least \$ 12.5m in improving their production capacities, sales, marketing and product quality. Today, 12 years later, these figures have been multiplied a lot.

- **Cluster of Information Technologies.** With the support of USAID, North Macedonia ITC companies have penetrated into new markets and gained significant recognition on the world market. None of the North Macedonia IT companies alone lacked the capacity to undertake a larger project. However, if a consortium is formed in which each company would present itself with its strongest capabilities, as well as complementarity with other cluster members, then their negotiating position in front of foreign buyers would be greater. From this, two consortia - North Macedonia IT and ITSM Group were formed, representing a great achievement in the ITC cluster. Within this framework, more than 80 meetings with potential clients in Vienna, Zurich and London were organized for "Business - with - Business" telemarketing. In the same direction, through the support of USAID, the Association MASIT strengthened its ability to serve its members and represent the industry in North Macedonia in relation to government institutions and abroad in front of related associations. Thus, MASIT became members of the "World IT Services Associate - WITSA". In terms of the total estimated value of the sale of new softwares and the digital media industry in the United States and Western Europe in 2005 was \$ 1 million, while today this value has been multiplied. The upward development of the IT cluster, in which significant support is provided by USAID, was confirmed in the OECD study, which was transferred to the renowned magazine "The Economist", North Macedonia was listed as one of the five fastest growing markets IT and business services in the world.

- **Wood industry cluster** - counts over 100 wood and furniture processors. Most small and medium-sized enterprises in the wood industry can not respond to market challenges due to poor technical and technological equipment, and the cluster is expected to help address these issues and promote furniture exports.

- **Fruit and vegetable processing cluster** - operates in an industry that is 90 percent export-oriented and the effects of cluster work should directly increase competitiveness, adding value to processed vegetables and fruits exported to foreign markets. The objective of the cluster is to help identify our products according to their geographical origin, as a specific North Macedonia brand.

Established in 2002, the North Macedonia Association of Processors' fundamental design is the further advancement of the foods grown from the ground handling industry so as to build the development and intensity of the North Macedonia economy. Its primary exercises center around (Aghion, P., Howitt, P., 2018):

- Increasing the intensity of the North Macedonia foods grown from the ground handling division;
- Strengthening the capability of MAP individuals to enter outside business sectors;
- Informing individuals about market patterns, innovative and legitimate issues;
- Coordinating business appointments and joint introductions at exchange fairs;
- Lobbying towards securing the interests of the handling business;
- Establishing business interchanges with outside organizations and foundations;
- Strengthening the participation with ranchers and rancher affiliations; and
- Establishing participation with private and open foundations, the business network and universal undertakings dynamic in North Macedonia.

- **Fashion design cluster.** It is located in Skopje, unites the fashion designers from North Macedonia in the preparation of their collections and in the performance on foreign markets. It is generally estimated that it is a very dynamic and attractive cluster, whose potentials, although relatively small, are estimated to be extremely large. The objectives of the cluster are spreading the awareness of the value of fashion, affirmation of the North Macedonia fashion, the spread of fashion culture, introduction of technological innovations and modern design education.

- **Cluster for agricultural mechanization** is located in the region of Pelagonija and is composed of small and medium enterprises producers of this kind of equipment. The cluster cooperates with the Technical Faculty at the University of Bitola, has great potential and is still expected to develop.

- **Cluster for automotive industry.** This is the latest cluster, registered in November 2008, has great potential, but its effects will have yet to be expected. The cluster uses financial and logistical support from GTZ for its establishment.

Regarding the assessment of the degree of maturity of the existing clusters, there is a certain disproportion in development. First-way are the established clusters, such as the cluster of IT, the cluster of textiles, the cluster of wine. In the second line are the clusters in the initial development, such as the cluster for wood, the cluster for food, the cluster of fashion, the cluster of agricultural mechanization and the cluster of the automotive industry. At the lowest level and practically do not act, clusters of lamb and cheese and tourism, as shown in Table 1.

**Table 1. Cluster Development Level**

<b>Cluster</b>	<b>Development Level</b>
<b>Lamb and sheep cheese</b>	<b>Zero level</b>
<b>Tourism</b>	<b>Zero level</b>
<b>Information Technology</b>	<b>Established</b>
<b>Wine - Tikvesh wine road</b>	<b>Established</b>
<b>Textile</b>	<b>Established</b>
<b>Wood industry</b>	<b>Initial growth</b>
<b>Processing of fruits and vegetables</b>	<b>Initial growth</b>
<b>Fashion design</b>	<b>Initial growth</b>
<b>Connection mechanics</b>	<b>Initial growth</b>
<b>Automotive industry</b>	<b>Initial growth</b>

Source: World Bank database

Spontaneous clusters that deserve support are seen in ecotourism, in the production of healthy food, in transport and logistics, in spa tourism, in the metalworking sector, in construction, and the potential for cluster network formation in the Southeastern Europe region is seen.

**Table 2. North Macedonia clusters**



Source: North Macedonia Business Chamber

## Tools and Mechanisms for supporting Cluster Organizations in North Macedonia and for the implementation of Technology Transfer

When talking about the development of clusters, the question of the new challenges in the world economy, such as the creation of the only global market in response to the globalization process, a focus on research and development activities and the commercialization of innovation, as well as continuous transformation in all segments of the economy. The world is increasingly being based on specialization. A single, global market is created. The foundation of development and diversity of regions is becoming a new type of competitiveness of the global economy, and regions become the main drivers of competitiveness in the global market. The determinants of the competitiveness of the regions are: quality and mobility of the workforce, basic and business infrastructure, entrepreneurial climate, positive and stimulating environment for innovation and cluster development, efficiency of public institutions, preservation of the

environment and the like. Building non-knowledge-based regions and a solid partnership between the public and private sectors require an integrated innovation platform that is based on the promotion and support for cluster formation. Key challenges for the North Macedonia economy in the coming years will be (Vincenti, W.G., 2014):

- maintaining macroeconomic stability and reducing the external trade deficit;
- Strengthening the competitiveness of the planning regions by means of sectoral specialization and branding of the regions;
- increasing productivity and focus on high value added sectors: information and communication technologies (ICT), pharmaceutical industry, renewable energy sources, automotive industry, etc.;
- proactive attitude towards foreign direct investment and targeted investment in export-oriented sectors;
- increase in exports;
- harmonization of the costs of production of the economy with the conditions of the common EU market in order to increase competitiveness (duties, taxes, contributions, operating costs);
- development of economic sectors based on new technologies and new value-added products;
- Restructuring of industrial sectors;
- Modernization of the obsolete production technology in certain sectors in order to raise the overall technological level of the economy;
- development and raising entrepreneurial / fiscal capacities in the regions / municipalities;
- adaptation of labor legislation to the conditions for increasing the competitiveness of the economy;
- Strengthening entrepreneurial education at all levels of the education system.

So far, the importance of cluster development policies in the Republic of North Macedonia has been recognized in the following strategic documents:

- Industrial policy of the Republic of North Macedonia 2009-2020,
- Innovation Strategy 2012-2020,
- Strategy for Entrepreneurial Education of the Republic of North Macedonia 2014-2020, and
- Regional innovation strategies of the eight planning regions in the Republic of North Macedonia, 2016.

Clusters as an organizational form of cooperation in the Republic of North Macedonia started their activities in 2002 with the USAID project

- North Macedonia competing activities, where the establishment of the first five clusters was supported: sheep cheese and lamb cluster; tourism cluster; wine

cluster; an IT cluster and cluster for textiles. By mid 2016, about 30 clusters are institutionalized in different areas, with the "bottom-up" approach being an essential feature of the development of the cluster concept in North Macedonia.

The development of clustering policies in R North Macedonia is part of a proactive industrial policy aimed at increasing the competitiveness of the North Macedonia economy. The implementation of the cluster program in the Republic of North Macedonia consisted of three phases. In the first phase, identification of potential clusters was necessary, the second defined the clustering policy, and the third assumed the implementation of cluster policies in practice. Based on the identified clusters, the original concept undertaken by the state was to promote the development of those clusters that were of strategic importance to the state, in terms of number of companies, employee participation, existing advantages and market share in North Macedonia and foreign markets.

When creating programs to support cluster associations, the Ministry of Economy is based on the three fundamental principles that are defined and practiced within the European Union (Wei, L., 2015):

- cluster programs must be integrated in a broader context for growth and innovation policy and contain appropriate framework conditions;
- funding must be based on top performance and dynamism, and it is necessary, and
- a clear distribution of roles - with precisely defined responsibilities of institutions and cluster associations.

Innovation is an interactive process between the private sector, public and private researchers and other innovative actors. The concept of cluster policy is aimed at strengthening public-private partnerships in the direction of encouraging the growth of technological sectors and traditional industries.

The Ministry of Economy supports the activities of cluster associations through programs, on an annual basis, since 2009.

The support of cluster associations is realized by applying projects that are aimed at:

- linking clusters with universities through jointly created projects;
- development of innovation and development of branded products;
- support for sector export promotion clusters,
- organizing thematic fairs and
- developing quality standards and adapting to the requirements of EU markets.

In the period 2009-2016, the Ministry of Economy of the Republic of North Macedonia supported 58 project initiatives in the amount of 10.484.970,00 denars.

There is no specific model for the formation and operation of clusters - everyone is a story about themselves. It's like playing a soccer team - you have to cooperate. The advantages given by the location, being together, working together, performing together, sharing the costs together, having joint training, interacting in

a number of common areas - all of which benefit. Clustering is a long story. The record of the activities in the cluster and their activity is of particular importance - it is realized through defined indicators for measuring the progress of the clusters.

In the development of clusters there are different approaches to certain countries, certain industries, that is, there is no single generally accepted model.

Clusters are a unique form of organization, networking of a social base, a change in corporate culture. Successful clustering and science and research should be put into the function of the industry and motivated to work for it.

Improving cluster policy management is expected to strengthen the efficiency and sustainability of the coordination and cooperation of all relevant clusters. The cluster development strategy in the Republic of North Macedonia includes a series of different measures that are coordinated across the management system. Good governance ensures the successful implementation of all measures of the Strategy and it supports their connection and compliance (Wheelwright, P.E., 2016).

Improving cluster management involves region specialization, mapping of cluster initiatives, establishing a central registry for clusters in which data for clusters are collected, as well as mapping of institutions, cluster organizations and other cluster participants, including the analysis of their interrelationships. The result of the mapping is the production of a comprehensive database from which the repeat targets and measures for the Cluster Development Strategy can be implemented.

Improving the management will in particular reflect the strengthening of the cluster coordination structure in North Macedonia. Accordingly, in the Strategy is proposed to establish various coordinating bodies with clear tasks and responsibilities. The Coordinative Composition was comprised of the National Cluster Coordination Body, as the highest body to oversee and oversee the overall cluster policy, as well as the National Platform as an open forum for the exchange of thoughts, networking and creation of new approaches, chosen by the Ministry of Economy.

Strong competition from foreign companies, as well as the numerous changes in the North Macedonia economy, demand a growing need for new forms of work, as you clustered. Clusters in the Republic of North Macedonia can primarily be used to increase competitiveness and exports. In this direction, the proposal for the establishment of the National Cluster Center.

The goal of the National Cluster Center (NCC) is to find a strategic partner for each cluster of the region and the EU, so that North Macedonia clusters will position themselves as clusters in the EU and will push towards achieving long-term competitiveness and sustainability of the global scene.

The basis for the management of the North Macedonia cluster policy will be to evaluate and monitor the work of all the institutions that contribute to the support and development of clusters, as well as the evaluation of the work of the clusters themselves. Evaluation of the relevant institutions will provide the necessary information for making decisions. Making the decisions will be easier and with the establishment of a unique system for tracking cluster activities.

Therefore, a particularly important goal of the Cluster Development Strategy is to create a framework for tracking and evaluating clusters and cluster organizations and their impact on regional and national level.

In that way, we expect that North Macedonia's cluster policy will be tackled with the cluster policy makers of the EU and will define appropriate measures for active participation in EU programs.

### *Clustering mapping*

Mapping of clusters will be carried out within the framework of the goal of improving the management of the North Macedonia cluster policy. The objective of mapping clusters is to give an overview of the existing clusters and their interrelations as a basis for defining appropriate future activities within the Cluster Development Strategy. Mapping is expected to include all institutions in the country that are already providing or can support the development of clusters.

### *National Coordination of Clusters*

The development of clusters and clusters support effectively will be coordinated by the Cluster Development Strategy. Due to the complex nature of the clusters, the composition of cluster coordination has to include different degrees and institutions in the "higher-level management structure". Within this management structure, each partner will have clearly defined tasks and responsibilities, defined by written instructions. For this purpose, the National Clusters Coordination Body will be established.

### *Specialization in the regions and the development of a regional cluster map*

Each of the planned regions in the Republic of North Macedonia has specific territorial capital, which differs from others and which represents the basis for their development and attracting investments. The Cluster Development Policy must give them helping the region's regions to use their territorial capital and in this way to increase their competitiveness in relation to other regions. Public consultations within the Sixth Progress Report on Economic and Social Cohesion in the European Union bring a conclusion that territorial cohesion enhances economic and social cohesion. Consensus on all public policies in the European Union is that everybody should take into account the territorial impact of individual measures and interventions by focusing on the necessary reforms and activities, as in the next 10 years, a community based on importance, ecology, social and sustainable development, investment in research, development and innovation. The concept of territorial cohesion is recognized in the Lisbon Treaty and in the EU-2020 Strategy Paper. Territorial diversity is an essential development potential of the EU, with the need to increase the coordination of national sectoral policies and territorial

cohesion policies, in order to achieve the synergy of the various programs. In the Republic of North Macedonia, this is achieved by assisting the coordinated approach of the policy for balanced regional development, which will combine the approach for development of the "top" and "Far from" and which will achieve balance between convergence and the strengthening of regional competitiveness, will lead to an acceleration of the rate of increase in GDP, an increase in regional competitiveness and their capabilities to match the European and global market, growth in export and employment rates and ensuring an adequate standard of living and quality of life in the planned regions. In this way, at the same time, successful integration of the North Macedonia economy into the European Union will be facilitated and the institutional and administrative capacity of the planned regions for the use of the EU funds will be strengthened (Acemoglu, D., 2012).

The experience of the European Union shows that the best instrument for achieving specialization in the regions is the establishment of regional clusters for sectors that have the potential to be competitive on the global market. Regional clusters are located on geographical areas that encompass a logical economic and spatial entity and emphasize the totality of the comparative advantages that the cluster must exploit. The development of regional clusters enables the networking of the public, private and scientific-research sectors ("Triple Helix"), which leads to an increase in regional competitiveness.

### *Informing and promoting the Cluster Development Policy*

In the cluster policy cluster policy, it is necessary to provide comprehensive information to all stakeholders, as well as to promote regional development policies, as this is a prerequisite for effectiveness and optimism. For this purpose together with the Cluster Development Strategy in the Republic of North Macedonia, a Communication Strategy for Cluster Development Policies and the Communication Action Plan should be developed.

The communication strategy with the help of a detailed action plan will lead the process of communication during the implementation of the Cluster Development Strategy in the Republic of North Macedonia. Considering that the Strategy is being developed for the period 2018-2025, the Communication Strategy is planned to be developed for the same period, while the Action Plan will be adopted in accordance with the Action Plan for Cluster Development.

The ultimate objective of the Communication Strategy is to make the information available, raise awareness and understanding of the importance of implementing clustered development policies in the Republic of North Macedonia, and to enable target groups to understand the objectives and function of the Strategy for Development on clusters.

In order to achieve the objectives of the Communication Strategy, the action plans for the implementation of the communication strategy will develop measures that will contribute to fulfill the following specific goals (Wolff, E.N., 2011):

1st goal: Informing the public about the role of the Cluster Development Strategy in raising the competitiveness of the North Macedonia economy;

2. Objective: Informing participants and potential beneficiaries at national, regional and local level of the opportunities available to finance cluster development;

3. Objective: Ensuring continued transparency in the implementation of the Cluster Development Strategy in the Republic of North Macedonia

Goal 4. Adjustment of all communication activities implemented by the partner institutions covered by the Cluster Development Strategy in the Republic of North Macedonia.

The Ministry of Economy as the carrier of cluster development policies in the Republic of North Macedonia is responsible for the development and implementation of the Communication Strategy and the Communication Action Plan.

### *Cluster tracking and evaluation*

The implementation of the Cluster Development Strategy is based on the regular monitoring and evaluation of the implementation of the activities of the strategy, which allows obtaining the necessary information for continuing or adjusting the goals and measures of the Strategy of the level of policy and management. In particular, those measures by which cluster organizations receive public funds will be assessed in relation to the fulfillment of objectives, results and performances. Evaluation will also serve as a learning tool for all persons and institutions involved in the implementation of cluster policies.

### *Cooperation is a cluster of politicians in the EU*

The Republic of North Macedonia cooperates with the holders of cluster politics in the EU. As the continuation of the cooperation, the Cluster Development Strategy has the aim of strengthening and deepening the relations with the cluster policy makers in the EU. In particular, those institutions that implement the Cluster Development Strategy will be supported in order to become the powerful partners of the European cluster community and actively contribute to the shaping of new cluster policies at the European level. The support of these institutions can take the form of technical assistance (consultation) or financial support, saving needs. Close cooperation with the cluster policy of the EU also means active participation in the relevant EU programs and the exchange of experiences with cluster politics in other countries (World Bank, 2018).

## Technological transfers implemented in North Macedonia

The challenge for most developing countries lies in the advancement of the process through which science and innovation would lead to innovation, and thus to a visible economic result. Innovation to bring the wheel of economic development requires knowledge to move effectively among the actors of the national economy. Innovation is a process that implies the existence of a complex network of interactions between economic actors. Economic actors, however, act in a specific cultural and social milieu, which simultaneously is in a backlash of influence with the organizational and institutional infrastructure.

In order to find out if the model of triple helix can be implemented in RM, it is necessary to carry out an analysis in relation to all four dimensions of the model.

First of all, it is necessary to answer the following question: Are there conditions for internal transformations in each of the three helices (the so-called first dimension of the triple helix)? Accordingly, an answer should be given to the question of whether universities are exclusively dealing with research and teaching, or endeavoring to capitalize on the created knowledge. Furthermore, it should be determined whether there are conditions for creating lateral links between private sector firms by forming strategic alliances. It also needs to be seen whether the government is ready to take on the role of investor.

The World Economic Forum (WEF) 2011-2012 Global Economic Competitiveness Report (WEF), disappointing, places the RM on the level of economic development in the second, from a total of three stages to economic development, t. n. phase of economy driven by efficiency. The third, and at the same time the most developed phase of economic development according to the WEF, is the innovation-driven phase. RM occupies 79th place out of 142 countries in the overall global index of competitiveness, and in terms of the innovation index it lags even more where it occupies 105th place<sup>20</sup>. Within the Western Balkans, only Bosnia and Herzegovina is ranked lower. The indicators of private sector participation in R & D, as well as the indicator of the level of government procurement of high tech products are defeating (Acharya, R.C., Keller, W., 2017).

The Global Competitiveness Index developed by the WEF consists of twelve pillars that are based on three basic components of the competitiveness of an economy: (i) basic preconditions, (ii) efficiency catalysts, and (iii) innovation and sophistication factors. Table 3 presents selected pillars of the Global Competitiveness Index that indicate the level of technological and general innovative development of the Republic of North Macedonia. All the indicators in Table 3 (except for those relating to patents) were obtained through a survey conducted among company managers (CEOs). The respondents are required for each indicator to rank the performance of countries on a scale from 1 to 7. The basic hypothesis on which the global index is based and built<sup>20</sup> RM and in the Global Competitiveness Report 2010-2011, WEF took the 79th place, but from a total of 139 countries (WEF, 2010-2011). Regarding

the index of innovation, the Republic of North Macedonia in the previous report is ranked 97th.

The competitiveness of the SEF lies in the knowledge that each economic system has its own specifics, and for this reason it is not possible for a country, which, like the Republic of North Macedonia, is still in the phase of an economy driven by efficiency to implement public policies that will promote measures of sophisticated technological development. On the other hand, in order for a developing country to switch to the third stage of economic development, it is necessary to develop a long-term strategy for attracting technologies with type-B content (Acemoglu, D., et al 2011).

All this is possible only if there is a systemic approach and essential co-operation between the main factors of the triple helix model, i.e. between the private sector, universities and the government. The data from the survey conducted in the framework of the research for this book point to the fact that there are no such essential links in the Republic of North Macedonia. According to the survey results, only 20% of the respondents, as representatives of relatively high technology companies in the Republic of North Macedonia, say that their company has established cooperation with university institutions in the field of technology transfer (Questionnaire "Transfer of Technologies in the Republic of North Macedonia", question number 6; Appendix 1 and Appendix 2). It is even more daunting that 100% of those 20% of the respondents reported cooperating with a foreign, rather than a domestic university in the process of technology transfer. This statistics is indicative of the lack of essential links between domestic universities and the private sector in the process of technology transfer.

To the question number 7 of the survey regarding the situation of transfer of own developed technology to another entity, 100% of the respondents answered that they transferred the technology to a firm (80% said that the transfer was performed on a foreign one, and 20% responded that the transfer was carried out by a domestic firm), and not at a university. These results further reinforce the conclusion that there is no substantial cooperation between the private sector and the universities in the Republic of North Macedonia. The answers to question number 8 of the survey point to the fact that the university community in the Republic of North Macedonia does not transfer its own developed technologies to the private sector companies. Namely, 100% of the respondents answered that the technology was transferred from a foreign company. Also, the data obtained regarding the cooperation between the private sector and the public institutions in the field of technology transfer speak about the unenviable situation in this sphere. In the moment, research and development participates with a minimum 0.2% of the total GDP of Republic of North Macedonia, a record number of respondents (100%, taking into consideration that those who chose the third option offered in response also responded positively) responded positively, which in turn leads to a conclusive conclusion that the state does not allocate most of the budget of the Republic of North Macedonia for R & D conducted by the private sector, and it does not appear in the role of investor in the process of transfer of technologies, as well as in the process of innovation in general (Acharya, R.C., Keller, W., 2017).

The analysis of the data obtained from the World Bank Institute database, KAM confirms the statistics of WEF in view of the (non) existence of essential links and communication between the three helices in the Republic of North Macedonia. According to the Global Competitiveness Index (GIC), the Republic of North Macedonia takes 92nd place out of a total of 142 places in relation to the cooperation of universities and the private sector in activities targeting I & R, and according to the CAM in the same category is ranked 3.36 out of possible 7. In terms of ability for technological absorption at company level, the statistics are again defeating. The ability of appropriate private sector absorption of technologies is an essential factor for successful collaboration between universities, the private sector and the government in the process of technology transfer. In this regard, the GIC places the Republic of North Macedonia at 121 place out of possible 142, and CAM puts it at the position of 0.24 out of possible 7. It is surprising that in terms of the availability of entrepreneurial capital, the Republic of North Macedonia does not score as low as in terms of other technological-innovative factors. Regarding this indicator, the GIK places the Republic of North Macedonia at the 65th place out of a possible 142, and KAM puts it in position 5.28 of the possible 7.

This situation (if all this is analysed in the context of the overall position of the Republic of North Macedonia in terms of technological innovation factors, and above all, in view of the underdeveloped capability of the private sector for technological absorption and competitiveness) leads to an indirect conclusion about the inability of the private sector to seize the opportunities offered in the form of entrepreneurial capital. This in turn leads to the conclusion that the firms and universities that operate in the sector of the R & D on the territory of the Republic of North Macedonia are not sufficiently informed and connected with the informal financial sector that offers opportunities for financing in the form of entrepreneurial capital. On the other hand, one should not forget that entrepreneurial capital does not play a major role in financing the initial stages of technological research. The most important financial instruments in the pre-initial, ie. The initial stage of a technology transfer project is business angels and finances derived from public authorities, usually in the form of subsidies or project financing. In Europe, unlike the United States, business angel networks are fragmented and weak (Acs, Z.J.et al, 2014). All of this points to an alternative conclusion that even if they have unrestricted access to entrepreneurial capital, North Macedonia firms can not use it because entrepreneurial investors will not be interested in injecting investments in the early stages of the development of a technological project that has an inherently high rate of risk.

Regarding the competitive advantage, the private sector of the Republic of North Macedonia according to the GIK is 125th out of a possible 142. In the previous chapters, it was pointed out that the intensity of the triple helix model consists precisely of the potential for achieving technological competitive advantage on a global scale. In the Republic of North Macedonia, this competitive advantage is almost non-existent. Another factor that confirms the unseen position of the Republic of North Macedonia in terms of the possibilities for successful implementation of the triple helix model is the level of cluster development, i.e. the ability to exploit the agglomeration economies and the effect of Silicon Valley.

From this aspect, the GIK ranks the Republic of North Macedonia on the unenthused 101th place out of a total of 142.

The analysis of the data on gross fixed capital formation (GDP) according to various indicators (private sector participation, government participation, participation in universities, participation in different scientific domains) conducted at a comparable level (countries from the region: Albania, Bosnia and Herzegovina, Serbia, Croatia and Slovenia, and two developed countries that have developed a system of transfer of technologies and innovations: Germany and South Korea) only confirms and at the same time complements the previously conducted analysis based on GIC and CAM. If you look at statistics related to the public consumption of R & D, expressed as a percentage of GDP, it will be noted that the Republic of North Macedonia in this regard is just ahead of Bosnia and Herzegovina and Albania, which still have extremely low levels in terms of this indicator of technological development.

It is not surprising that the percentage of BPIR in GDP declined in the Republic of North Macedonia over time (in 1996 BPIR was 0.4%, in 2009 it was reduced to only 0.2% of GDP). Positive trend in terms of increase of percentage share in BPIR is recorded by the private sector, although this statistics points to the weak technological development of the North Macedonia private sector compared to the technological development of the private sector from other countries. For example, in Germany and South Korea, the private sector's private sector share in BPIR is significantly larger than the percentage of government participation in BPIR. Such an allocation is characteristic of technologically developed countries, in which the private sector has high rates of technological absorption and diffusion ability. In contrast, the situation in developing countries is completely reversed, i.e. the government occupies the largest percentage share in BPIR at the expense of universities and the private sector. For example, in the Republic of North Macedonia, the percentage of government's participation in the BPIR in 1997 was 47%, in 2008 to be reduced by 7% and amounted to 40%. This reduction of government activities in this domain is due to the increase of the percentage participation of the North Macedonia private sector in BPIR (Aghion, P., Howitt, P., 2018). The percentage participation of the universities in the Republic of North Macedonia is experiencing a downward trend, a fact that is initiated by the decline in the percentage share of GDP in GDP. All these data lead to the concluding conclusion that the first dimension of the triple helix model is unattainable in the given constellation of relations between the three helices in the Republic of North Macedonia. Once the first dimension is unfeasible, any analysis of the other three dimensions, which by their nature are more advanced, will not bear fruit, i.e. will be based more on speculation, and less on valid scientific assumptions that could be easily tested. The system of transfer of technologies and innovations in the Republic of North Macedonia is inefficient not only because of the lack of cooperation between the three main factors of the triple helix model (government - universities - private sector), but also because of the lack of essential communication between the governmental institutions that have competencies in the area of technological development. Partly this is due to the way of financing the activities of these institutions. The Ministry of Education and Science is a government institution that has the greatest competencies in the field of

technological development financing. However, the financial resources with which the MES are disadvantaged are limited. For example, in 2010, MES was awarded eighty-five million denars for R & D purposes, and this amount in 2011 dropped to just sixty-five million denars. Financial support refers to all activities of the MES in the field of R & D and technological development in general, and above all the domestic and international technical university cooperation, provision of equipment, financing travel for conferences, mobility of young researchers, scholarships and research projects. The MES financed two types of projects: (i) Scientific focusing on the needs of research institutions; and (ii) Developments focusing on strengthening links and co-operation between research institutions and the private sector. On the other hand, the Ministry of Economy supports activities related to R & D, investment, competitiveness and innovation of the private sector. There are no budget funds set aside for the FDI Strategy whose implementation is in the field of competencies of the MoE.

The annual budget of SME / Competitiveness reaches 6 million denars. In 2009 and 2010, no financial support was provided from the Budget of the Republic of North Macedonia for Industrial Policy. In 2011, only eleven million denars were allocated for activities covering innovation and cluster development.

In North Macedonia, a small number of public policies openly promote the transfer of technologies and innovative activities. Frequently, public policies aimed at transferring technologies include financial incentives, such as the release of research institutions from customs duties and partly from Value Added Tax (VAT) when importing scientific equipment, as well as tax incentives for technological industrial development zones (TIDZ). Public procurement of innovative goods and services is limited.

Given the lack of substantial cooperation between the universities and the private sector in the Republic of North Macedonia in conditions of rudimentary development of the technological capability of the private sector, as well as in conditions of unclear provisions of the Law on Industrial Property regarding the acquisition of patent rights inventions derived from research financed by the public authorities require changes, in particular in the regulation that regulates these relationships. Undoubtedly, only the adoption of a Bayh-Dole regulation in the current constellation of relations in the Republic of North Macedonia would not change anything, since the implementation of this type of regulation requires the existence of certain preconditions, and above all the existence of a developed private sector that would possess the technological ability to absorb and commercialize the technologies that the universities would create, and the existence of efficient technology transfer offices that would have the role of a mediator in the system of collaboration between universities and private sector (Aitken, B. J., 2019). The *de lege ferenda* regulation should focus primarily on standardizing and fostering co-operation between the private and public sectors. It is necessary to provide transparent and clear provisions on the manner and criteria for public funding of I & R implemented by both public research institutions and the private sector. Transparency and objectivity in the implementation of public policies are a basic precondition for creating legal security, which, on the other hand, acts in the long run, stimulating the development of creativity and

innovation. Furthermore, the fact that there is no functional university transfer office in the Republic of North Macedonia speaks also of the lack of systemic cooperation between universities and the private sector in the field of technology transfer. The Government of the Republic of North Macedonia should undertake public policy measures aimed at encouraging the establishment of university offices for the transfer of technologies, especially at technical faculties whose research and technological innovations are typically subject to faster commercialization. In this regard, a change in the vague provisions of the Law on Encouraging and Assisting Technological Development (2011) is needed, in particular those relating to the conditions for the establishment of technology transfer centers. The law provides for the establishment of different types of entities that would constitute the technological infrastructure in the Republic of North Macedonia. The manner of regulation of this sphere is rigid and obsolete, and on the other hand, it is insufficiently clear with regard to the basic characteristics of the technological entities in the Republic of North Macedonia. For example, it is not clear which was the intention of the legislator to standardize only four types of technological entities in the Republic of North Macedonia in a situation where there is overlapping of functions between the so-called. technology transfer centers, science and technology parks and innovation centers. On the one hand, the new draft Law on Innovation Activity provides for the abolition of the provisions of the Law on Encouraging and Assisting Technological Development. On the other hand, the new Law does not introduce significant improvements regarding the standardization of the technological entities in the Republic of North Macedonia. On the contrary, the trend of overlapping of functions continues, which creates legal uncertainty (World Bank, 2018).

Since technological growth involves a holistic approach, it is necessary to adopt appropriate legislation in the field of patent protection of biotechnological inventions, and especially in the domain of protection of biotechnological research tools. In order to avoid divergent jurisprudence that would arise as a result of the application of the obscure and contradictory provisions of the Law on Industrial Property (2009) which provide for the extensive right to free use of patented inventions in certain cases, it is necessary to amend the Law and replacing these obscure and contradictory provisions with specific and specific exceptions to patent protection that will be in line with the *acquis communautaire* of the European Union in the field of biotech intellectual property. While further research is needed, it is possible to assume the existence of a correlation between the construction of appropriate regulation to support research in the natural sciences (and above all, in biotechnology) and stopping, i.e. slowing down the high rate of brain drain in this sphere in the Republic of North Macedonia.

In a modern society based on knowledge, information and knowledge that are available without any limitations, they encourage the development of education and scientific research. Because of all of this, the Government of the Republic of North Macedonia needs to undertake public policies aimed at promoting the concept of open access. First of all, it is necessary to adopt a legal solution that would include a requirement for compulsory publication, digitization and archiving of all research financed by the public budget in accordance with the principles of free and open access (with obligatory respect for copyright). In this

way, the transparency and efficiency of spending of budget funds for R & D in the private and public sector will be promoted.

The development gap between developed and developing countries can be most graphically described through the development gap that existed between Homo sapiens and Homo neanderthalensis in the past. The basic factor that influenced the disappearance of Neanderthals, as a special curve in the development of hominids, lies in the fact that modern people possessed technology, and Neanderthals do not. Neanderthals did not want to take risks and were not inclined to conquer new spaces, unless they were forced by nature. Their mind was not fantasy, critical, and creative. By contrast, modern people took risks by conquering unknown territories, they knew how to dream, and most importantly, they quickly found the way to realizing their dreams. If this archaic, evolutionary story is transmitted in the modern world, modern people are embodied in the developed countries, which have the primacy in technological development. They possess all the necessary resources to take over the world in the same way that modern people drowned Neanderthals. They own the technology that, together with the critical and fantasy mind, is *conditio sine qua non* for the preservation of the sight. Unfortunately, developing countries are metaphorically similar to Neanderthals. They have a weak institutional infrastructure and poor human capital, leading to a lack of creativity and a fantasy mind. In most cases, the geographical position of these countries further exacerbates their technological inferiority (Wheelwright, P.E., 2016).

The agenda of public policies in the area of innovation and development of technologies in the Republic of North Macedonia is filled with resolving of burning development problems: solving the weak economic structure, low level of productivity, poor performance of the education system, high level of indebtedness, high level of unemployment, lack of recognition of the role of the private sector in the process of innovation, the lack of feedback communication between the private, public sector and universities, and the lack of motivation, commitment and trust if social values .

According to many indicators of the OECD's Investment Reform Index 2010, the Republic of North Macedonia ranked first among the countries of the Western Balkans. However, despite the positive reforms in the field of education and in the field of vocational qualification and further qualification, the Government of the Republic of North Macedonia is faced with a number of problems, primarily in the area of existence of a deficit of certain kinds of vocations, which in turn generates a gap between the supply and demand of certain types of skills. The loss of certain types of professions in the form of an outflow of mind is particularly pronounced in the Republic of North Macedonia. The high rate of brain drain generates distortions in the market of highly skilled workforce in the Republic of North Macedonia. The private sector often emphasizes the need for a workforce that will have practical and technical skills. The lack of a highly qualified workforce affects both micro and macro levels. All this leads to the conclusion that the state faces high rates of brain drain, primarily in the sphere of natural and technical and technological sciences. The education system is obsolete and not adapted to the needs of the labor market. Reforms are needed, especially in the sphere of secondary vocational

education, in order to profile and educate as many professional staff as possible within the three-year vocational secondary education. The Government of the Republic of North Macedonia should take measures to establish a network of the intellectual diaspora according to the principle of brain circulation. Through the establishment of this network, scientists who have already left their home country will be able to participate in collaborative projects with local scientists, without leaving the state in which they have already established itself as scientists. Of course, one should not forget the fact that a large number of young educated people do not return to their country of origin and because of inadequate business practices of employers in terms of recruitment and selection, nepotism and lack of transparency in universities and public administration (Wei, L., 2015).

Another bitter problem in the field of human resources development is the fact that although formal mechanisms, i.e. paper mechanisms for consultative processes among all the actors of the triple helix model exist in the Republic of North Macedonia, in practice communication between the government institutions and between government institutions, universities and the private sector is bad, fragmented and ad hoc. Because of all this, the Government of the Republic of North Macedonia should implement a holistic, inclusive approach to education, science, technological development and innovations as soon as possible. In this sense, it is necessary to establish essential, not only formal institutional ties. Also, throughout this process, the Government of the Republic of North Macedonia should be established as a partner of the other two actors in the model of triple helix - universities and the private sector. It seems that in the current constellation of relations, the Government is the primary actor who is the carrier of the primacy and "absorbs" and at the same time controls the sectors of higher education, science and the private sector. From this aspect, it would be particularly important to use the EU IPA funds for the development of human resources in the Republic of North Macedonia. Namely, within the framework of the Multi-annual Operational Program for Human Resources Development of the Republic of North Macedonia 2007-2013, prepared by the Ministry of Education and Science and the Ministry of Labor and Social Policy, several priority axes of development in this sphere are emphasized, while technological development and innovations are one from them. In addition, the Program itself provides for the allocation of funds from IPA funds for the development of cooperation between the three stakeholders in the triple helix model, as well as for scholarships for doctoral studies and research that would be applied in the private sector (Weddle, R. et al, 2016).

The government should take urgent measures to increase investment in education. Among other things, the Republic of North Macedonia has poor results compared to other Southeast European countries regarding the development of a system of continuous education and training. These measures should be taken as more quickly if the long gestation periods of human capital are taken into account, the possibility of increasing the demand for skilled labor at the global level, as well as the possibility of vulnerability to a policy of cheap labor that does not produce added social value in the long run and can only have harmed the national economy. At the same time, the Government should consider changing the tertiary

education system, which is obsolete, inefficient (a large number of professors are inactive in the sphere of research and development) and inconsistent with the needs of the labor market. Of course, public policy measures should move in the direction of rationalizing the number and location of universities, and not for the purpose of opening dispersed studies at state universities in every city in the Republic of North Macedonia.

Given the lack of substantial cooperation between the universities and the private sector in the Republic of North Macedonia in conditions of rudimentary development of the technological capability of the private sector, as well as in conditions of unclear provisions of the Law on Industrial Property (2009) regarding the acquisition of patent rights inventions derived from research financed by the public authorities require changes, in particular in the regulation that regulates these relationships. Undoubtedly, only Bayh-Dole regulation in the current constellation of relations in the Republic of North Macedonia would not change anything, since the implementation of this type of regulation requires the existence of certain preconditions, and above all the existence of a developed private sector that would possess the technological ability to absorb and commercialize the technologies that the universities would create, and the existence of efficient technology transfer offices to play the role of a mediator in the system of collaboration between universities and the private sector. The *de lege ferenda* regulation should focus primarily on standardizing and fostering co-operation between the private and public sectors. It is necessary to prescribe transparent and clear provisions on the manner and criteria for public funding of I & R implemented by both public research institutions and the private sector. In doing so, it is necessary to standardize and strictly define cases when the public authority will finance projects, and when the whole institutions. Also, public policies in the field of technology transfer should focus on attracting business angels, as an alternative source of funding to the initial stages of a technology transfer project (Walz, U., 2016).

The free access to information networks, scientific publications and other databases is the basic tool for development and upgrading in a modern, globalized knowledge society. This is particularly important for a developing country, such as the Republic of North Macedonia, because in most cases neither the private sector nor scientists and public sector researchers are prepared nor have the means to allow a seamless approach to expensive databases which are protected by intellectual property rights. In this sense,

the information and knowledge available without any restrictions encourage the development of education and research work. In order to encourage and promote the concept of open access, the Government of the Republic of North Macedonia can adopt a public policy that will set requirements for publication and archiving of all publicly funded research according to the principles of free and open access (with obligatory respect for copyright rights). The government should encourage the digitization process of books and magazines that are no longer protected by copyright. In this way, the Government would implement the principle of the so-called. "Information Commons". The free access to information networks, scientific publications and other databases implies promoting and supporting the principle

of free / open source software in the functioning of not only private sector entities, but also in the functioning of the government and universities.

Reduced human capital market in the Republic of North Macedonia, and high levels of brain drain affect the level of technological readiness of the private sector. According to all the parameters of the WEF and the World Bank, the North Macedonia private sector invests little in the R & D, has poorly developed power for technological absorption, and is not at all competitive on the global technology market. This is also confirmed by the statistics regarding the payments made and the receipt of license fees in the Republic of North Macedonia. Low levels of human capital, as well as the poor ability for technological absorption, on the other hand, contribute to the entry of FDI which are by their very nature low technological and can not generate technological and economic growth. From this aspect, the government often faces the solution of the following complex issues: How could foreign research laboratories attract as high value-added activities? Are the effects of FDI always positive? How to reduce the negative effects of FDI? Should domestic firms be encouraged to take on innovative activities abroad, rather than at home? What are the basic mechanisms for encouraging the transfer of technologies from multinational corporations to domestic companies? A simulated answer to these questions does not exist. However, it should be considered the knowledge that foreign firms operating on the territory of the Republic of North Macedonia generally have weak links with local firms. They mostly use foreign suppliers and have foreign customers. This is a consequence of the technological rudimentation of the North Macedonia private sector (Veugelers, R., Cassiman, B., 2014). Accordingly, the FDI so far can not generate quality transfer of technologies and knowledge in the local North Macedonia economy, without creating additional conditions for technological development.

One of the possible strategies in terms of attracting modern technologies in the local economy is a public policy aimed at attracting outsourcing to highly sophisticated R & D. When formulating a public policy in this sphere, the North Macedonia government should ask the following question: Will the establishment of highly sophisticated research centers entail technological discontinuity in the local economy and will create some kind of technological enclaves or these centers will represent a nucleus of diffusion and assimilation of modern technologies in the local economy. The answer to this question is multifaceted, complex and depends on the geographical position of the country, from the historical circumstances, from the available human capital, but most of all depends on the degree of development of the institutional and legal framework (in this context, the legal framework that regulates trade secrets and contracts for the prohibition of competition and non-disclosure).

## Conclusion

From the analysis of the impact of the volume and the type of trade on the technological development of the Republic of North Macedonia so far, the conclusion is that the public policies aimed at supporting open trade are important for the Republic of North Macedonia, especially in terms of attracting modern technologies. However, openness is not enough. In order to achieve continuous technological development it is necessary to meet certain additional conditions, such as building sustainable absorption capacities, as well as creating the ability to adopt technology developed abroad. These two conditions are closely linked to the existence of talented human capital, as well as by investing in intensive industries with research and development.

In order to improve the technological competitiveness of the private sector in the Republic of North Macedonia it is necessary to undertake a series of regulatory reforms in terms of improving the legal and institutional environment associated with the transfer of technologies. Above all, it is necessary to increase the level of transparency of the work of the governmental institutions that have competencies in the domain of implementation and monitoring of the public policy for technological development. They also need more coordination, as well as the establishment of genuine, rather than apparent, collaborative mechanisms with private sector representatives. The comprehensive analysis of all aspects of the impact of the transfer of technologies as a factor of the economic development of the Republic of North Macedonia leads to the problem of the problem. Namely, each analysis begins and ends with the problem of human capital. Its existence or non-existence is the basic reason for technological development or underdevelopment, both of the private as well as of the public and of the university sector. Without the existence and continuous creation of critical and innovative minds, the Republic of North Macedonia will remain in the circle of countries that are underdeveloped, both materially and in a spiritual sense. Because of this, in order to get out of the vicious circle of technological underdevelopment, it will be necessary to invest unreservedly in the future, in the offspring, in the development of their entrepreneurial abilities, in the development of their literacy, and above all in the development of their critical mind.

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