Business Clusters: How To Better Support Problematic Regions In Slovakia

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Abstract. Changes in business strategies, changes in investment, organizational arrangements, production programs, and access to innovation processes were primarily influenced by nature and change in the demand-side of the market mechanism in business history. However, there were many exceptions based on the radical innovations of companies such as Eastman Kodak, Nokia, Apple, Walt Disney, Universal Music, Mozilla, etc. Technologies often play an important role in radical innovations. Radical innovations (especially platforms) have played an important role in the economic and social development of regions and countries since the 17th century and the First industrial revolution. However, incremental innovations often bring cumulative gains to the effectiveness of business activities, and thus better support for the socio-economic aspects of a given region or economy. However, according to the findings, support for innovation and networking of firms for joint open innovation is often lacking in solving crisis situations of troubled businesses or in developing less economically successful regions. The outputs of this research include several statistical information and scientific findings based on the questionnaires evaluated, as well as a description of selected shortcomings and recommendations in the area of strategic and innovative management of problem firms based on an expert study. Quantitative and qualitative research was carried out in the two most problematic regions of the Slovak Republic, in Banská Bystrica and Košice regions in 2017-2019. In both regions, 500 problem companies (250:250) were analysed, which had at least two negative economic outcomes in the last three years and were forced to lay off employees.

Keywords: Problem companies; Innovation; Innovation management; Business alliances; Clusters

1. Introduction

Even though globalization of trade was already in the 17th century, with globalization and rationalization of business activities, „slimming“ of organizational structures, respectively with the „expansion“ of flexible organizational structures, technologies, and processes, we can only fully meet after the 1980s. Although the concept of lean industrial production was introduced already in the 1950s in connection with the post-war restructuring of the Japanese economy. As early as this period, international business was becoming increasingly controlled. However, the effects of the IMF and WTO made it easier to set up subsidiaries abroad (WTO, 2019). As the global business develops, international financial and capital flows have been also expanding (Šikula, 2016). At the same time, a number of international companies were growing to penetrate foreign markets through acquisitions of domestic companies, Joint Ventures (JV), or mergers. In the 1980s, acquisitions, JVs, or mergers created an increasing share on the global FDI, more than FDI based on „greenfield“ business. The so-called *FDI Property search strategy* has been developing since that time.

The global search for resources, new markets, or the search for greater efficiency, or more profitable assets abroad, have been expanding fully after 1990 (Nayyar, 2015). This period can be called "A modern era of global business". This era has been largely supported by the strong development of ICT, manufacturing technologies and logistics networks, but also by a significant change in the global demand, driven by the growth of the social standard of living/quality of life, especially in advanced economies. Higher quality of life is also associated with greater demands on assortment, availability, quality of goods and services. So-called "*The new style of global corporations*", namely the building of home firms or strategic alliances in foreign countries based on local suppliers, traditions and culture, the production of specific products, or the provision of specific services for a given region, has been increasingly used since this period.

What should be maximized is not a local market share, but a global corporation's share on the global market. Equally, maximizing profit and increasing the market value of a business are assessed globally against the parent company. The geographic location of the business becomes less important than the *economic location*, respectively, entering the global value network. At the same time, local investment, infrastructure, legislation, intellectual property protection (IPP), quality of education and quality of the workforce, overall employment, local technology levels, government subsidies, tax holidays, etc. are particularly important for business investment placement. In many emerging countries, foreign corporations have been building their factories and affiliates, employing people, especially cheap labor forces, supporting local suppliers and their innovativeness, but often exporting most of their production, including local

profits. Important becomes the so-called quality of the home environment, towards creating the most suitable conditions for flexible strategic business connections in a particular area.

2. New Global Business Trend - Building Strategic Business Alliances

In global business, a new trend of success is emerging, based on the quality, speed of innovation and the specialization of global corporations depending on local market requirements. However, innovation activity is increasingly dependent not only on the quality of inventions and know-how of the company, but also on the ability to effectively use foreign capital, information, or personnel resources. The rotation of financial instruments for systemic support of innovation processes and their own competitiveness are also becoming important tools of successful companies. That is why successful integration into strategic alliances is becoming one of the critical success factors. In particular, local and specialized firms (so-called Focal firms) prefer to create alliances before acquisitions and mergers (Yang et al., 2011) and prefer to acquire assets that are related to their own business activities. The perceived legal inadequacy of innovation is negatively related to customer interests, while perceived non-functioning competition is positively associated with customer participation, especially with regard to domestic strategic connections. (Wang et al., 2019) However, in a global economy, global companies are also increasingly rivaling local firms that are able to engage in strategic alliances, whether at the level of joint research, development, integration of logistics, manufacturing and marketing processes, these can be called so-called business ecosystems (Mohelská & Pitra, 2015). The success of these ecosystems depends largely on how individual strategic alliance members work together and pursue a common strategy. These alliances are also very flexible and are constantly reviewing and adjusting their portfolios and are largely open to continually refining their A/P structure (Rong et al., 2015).

According to research, the motives for setting up cluster business alliances, which will be further characterized more precisely, as well as their organizational structures - can be very individual. On the basis of our surveys, companies enter into alliances repeatedly with companies with whom they have already worked together and have built common trust that reduces the cost of setting up and functioning of the alliance and also leads to greater individual company performance in alliances. On the other hand, it is also confirmed in the long term that the overall synergic effect of repeated partnerships is lower, especially in a climate of high business uncertainty (Goerzen, 2007 and 2018). Strategic alliances can be free contract partnerships where each member has a role in the alliance. Depending on this task, it contributes with some resources to achieving the overall objectives of the strategic alliance, but it does fulfill its specific tasks too. Or the nature of a capital treaty partnership, where each member puts a fixed capital in advance to carry out the common tasks of the alliance. This second form of partnership is more widespread in economically advanced regions and economies. (Silipo, 2008)

In the area of R&D, we can distinguish between three types of basic cooperation:

a) Cartel-based cooperation - enterprises choose R&D activities to maximize common profits.

b) Joint Venture cooperation - enterprises try to achieve maximum individual profits, but R&D results are shared.

c) JV Cartel Cooperation - businesses maximize collective profit, R&D results are shared again.

Cooperation usually balances the initial differences of companies, balances costs, synergizes investments, marketing capacities, and market knowledge, can change market concentration, but also redistribute profits. Therefore, it is also risky. For this reason, and as far as the ethical aspects of cooperation are concerned, there are different institutions in the world that regulate cooperative relationships between companies in research, e.g. there is a so-called The National Co-operative Research and Production Act . In Slovakia, the relevant Ministry of Education, Science, Research and Sport creates and coordinates conditions for cooperation in science and research, also with regards to international organizations operating in Slovakia. At the same time, it participates in shaping legislation and conditions to motivate the business sector to promote joint research and development, etc.

For successful companies, collaboration in R&D is appropriate, especially for comparable companies (Atallah, 2016), mainly by size, legal form, financial indicators, market share, goodwill, etc. For problem firms, it is recommended to build alliances with successful and innovative companies. Therefore, building business and innovation clusters in less developed regions is appropriate if successful companies are also involved in these clusters. On the other hand, many troubled companies indicate that foreign companies often hamper the competitiveness of domestic firms. There is, therefore, a need for adequate legislation in terms of both market protection and selective support for domestic producers.

In concentration-based alliances, a new business entity is usually created. Although businesses in the alliance retain their legal character, at the same time they deposit or regularly deposit fixed capital, and their overall activities and especially strategic activities are often managed from the center (Majtán, 2014). In practice, there are many specific groupings with different capital connections from different sectors based on the internal organization of the alliance, which often changes. Overall, the main role of high-end business clusters is not so much the competition to improve the current market share or the current maximum profit, but the rivalry for the future possible use of the opportunities that the global development brings.

Global corporations and industry-leading specialist companies are committed to making their business a reality for the future. They strive to place their affiliates in purpose-oriented prospective business or innovation alliances such as the most famous clusters, besides Silicon Valley, for example DaeDeok Valley (ICT, semiconductors, environmental technologies),

Sangam Digital Media City (ICT, media), Boston's Route 128 (software, telecommunications, medical technologies and financial services), Gwanggyo Techno Valley nano- and biotechnology), Sophia Antipolis, Antibes (IT & Pharmaceuticals), Seattle Aircraft Cluster, Yongin R&D Cluster (ICT, Networking Technology), Kista Science City, Stockholm (ICT Club), or Milan Fashion Cluster, etc. Since successful knowledge clusters strongly support research, development and business activities, they also contribute to the development of the economy. Especially if the overall research, innovation and other knowledge-based capacities of the economy are also proportionate to its economic results, even dynamically (Bianchini & Pellegrino, 2019; Bottazzi & Peri, 2007).

For example, perhaps the most pronounced region is the Silicon Valley (SV), which includes about 1,500 square miles, has about 3.1 million miles population and provides 1.6 million workplaces. Starting from128,308 USD per capita in the annual gross domestic product (GDP), residents in California's technology zone have produced more than almost every region on the planet. (Silicon Valley, 2019). For another example of promoting regional development, Techno Science Park (San Marino) is a new regional development model that uses innovation as an engine to increase the regional competitiveness. It also includes the regions surrounding the Republic of San Marino, in particular, Rimini and Pesaro-Urbino. TSP integrates the needs of businesses and technology training centers to ensure continuous and progressive growth of the business market primarily based on innovation. The park's incubator is the first concrete initiative to promote the conception, launch and competitive development of new businesses in the area. (Emiliaromagnastartup, 2019) With the services offered, the incubator is a safe space where entrepreneurs can accelerate their competitive growth, focus solely on business growth, immediately contact companies that can help with their development and have significant savings in initial costs, etc.

3. Selected key aspects of clustering business and problem companies

The history of business clustering is not long. The term Business Cluster, Industrial Cluster, or Competitive Cluster was first used by Michael Porter in 1990 in the book named Competitive Advantage of Nations, although Englishman Alfred Marshall, or originally Czech economist Joseph Schumpeter, mentioned the benefits of strategic concentration of companies already in the early 20th century. The importance for the region and the country where the business cluster is being built was first described in Paul Krugman's book Geography and Trade in 1991. Since this year, many government institutions and industry organizations have taken over this business concept as one of the major resources of national, regional and local development. The first comprehensive study on building and functioning of clusters originated in the Barcelona Competitiveness Institute and is called the „Cluster Initiative Greenbook“ (Ketels et al., 2003). The book presents data on business in 250 clusters around the world. It describes and analyzes in details the functioning of clusters, such as the way of setting up, setting goals, the course of setting up, the key elements of functioning and the success of clusters, while offering so-called

„Cluster Innovation Performance Model“ (CIPM) that is used to analyze and evaluate the functioning of clusters. This model is based on 4 key components - the social, political, economic environment is the first part of the cluster's success, followed by the purpose and main goal of the cluster, the building process and later real cluster performance. Based on this publication, another study was developed in 2005, which includes activity data of 1,400 clusters from around the world and forms the basis for the creation of a cluster organization. Another more recent study: „Cluster Initiative Greenbook 2.“ was published in 2013. The analysis was based on data from 356 cluster organizations in 50 countries worldwide, especially in OECD countries. Data were collected through a Global Cluster Initiative Survey (GCIS). Respondents were mainly cluster managers. According to this study: the most common sectors targeted by cluster initiatives are IT, food, automotive, green technology, health, and energy. On average, cluster firms have 4 employees (compared to 2 in 2005). Most initiatives have more cluster firms. 73% of CIs have formal membership (64% in 2005). There is an average number of members within these institutions: 80. 41% of CIs have been initiated primarily as a response to a public call or political program and as much as a private sector initiative. The remaining 18% had a more complex background. (Lindqvist et al., 2013)

In practice, a business park, strategic innovation alliance, science-research park, technology park, innovation center and so on - are often used as a synonym of the cluster. Cluster Initiative Greenbook, OECD, UNIDO, and the European Commission define clusters approximately the same. On the basis of the different cluster definitions, we can say that a cluster is predominantly a grouping of geographically-concentrated contracted companies (e.g. research institutions, university teams, suppliers, customers, manufacturers, customers, service companies, financial, training, and legal institutions and other support organizations) in a specific field, or in a small number of related fields. These firms in a cluster alliance can co-operate with each other but also compete, can do business on a cooperative or concentration basis. The main role of clusters is to gain a synergistic effect from a grouping of companies, both regionally, sectorally and globally. Therefore, clustering is intended to help increase profitability and overall efficiency among cluster firms and to have a positive impact on innovation and competitiveness, creating/disseminating knowledge and information, economic growth and long-term business dynamics which are especially important for problem companies in less developed regions. A problem company itself may have much more difficult conditions to improve its position than a firm operating in a strategic alliance.

Clustering concept further pushes networking of companies as it can include all forms of transfer and exchange of information and know-how, capital, IP and capacity sharing, etc. (Keeble & Wilkinson, 2017) Clusters can include a group of interdependent industries, institutions, and other players important to competition. For example, they include suppliers of specialized inputs, such as materials, parts, machines, or providers of specialized infrastructure and services. A cluster should create a more favorable environment and conditions for its business than outside the cluster, which is especially important for troubled businesses. Clusters

are interconnected with different small companies/start-ups, which is particularly important for underdeveloped regions. Clusters can also be partners of larger companies where the problem firm itself would not be successful. Clusters are often expanding down to sales channels and customers and to the side of manufacturers of complementary products and companies in industries related in terms of capabilities, technologies, or common inputs. Clusters should also include supportive government institutions, media agencies, tax and accounting services, insurance companies, or business associations that provide specialized services, training, information, finance, infrastructure, joint research, or technical support.

The main specificities of the cluster organization are:

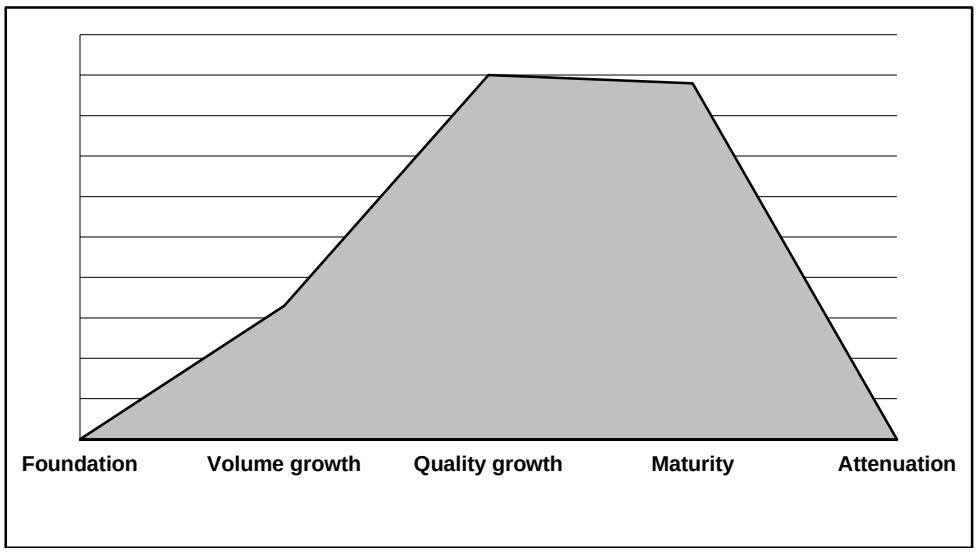
- The geographic concentration of companies, institutions, teams, all of which may not be directly located in one cluster location, but are strategically contractually (financially, materially) related to it.
- Creation of a regio-international alliance or a micro-mezzo alliance, depending on the main goal, size, legal form and arrangement of the cluster.
- A flexible organizational, capital and legal structure that varies depending on the needs of stakeholders (participating entities), resp. Cluster Life Cycle.
- The specific purpose of the establishment and the common goal/strategy/culture of the cluster, mostly for so-called core (basic) businesses in a cluster.
- The technological affinity of cluster activities, again especially for so-called core cluster firms, but the cluster usually also changes its business portfolio.
- Higher demands on the performance of an individual company, its effectiveness, as well as social relations, caused by direct contact with cooperating or competing companies.
- A high proportion of intangible capital, mainly S&T know-how, as the main capital to ensure cluster synergy by sharing/expanding.
- Mutual specialization, competition, and complementarity of companies in the cluster alliance (coopetition).
- Specific support for start-up companies, etc.

The specialization of companies in clusters may not be a major factor in their success. The above-mentioned Silicon Valley has grown to become the world's leading knowledge-based business cluster by focusing primarily on leading semiconductor and venture capital firms, while for example, Oulu Techno Park in Finland has become successful by focusing on 5 major areas: IT, media, BT (business technology), environment and people's quality of life. At a time when the Korean economic structure is also being reorganized towards knowledge-based industries, each of the Korean clusters being built must be geared towards promoting Korean competitiveness by focusing on the latest technical, technological and economic trends in its

area. Cluster policy in Korea is being promoted at the national level, notably in the cluster program for industrial complexes. The goal of this policy is to improve previous industrial complexes from simple physical agglomerations of companies and factories to innovative clusters by improving R&D performance and networking. The best candidates for creating clusters in Korea are telecommunications companies, semiconductor manufacturing, especially for IT, Internet software, interactive media, and so on. (Yangmi, 2014) This is a positive example also for smaller emerging economies and problem regions mainly based on foreign investors.

Clusters affect the way companies collaborate, organize and compete, but clusters and their associated benefits rarely spontaneously go into direct expansion. It is argued that clusters typically develop in line with their life cycle, which includes an evolutionary sequence of steps involving private and public actors, and where one or more cluster intermediaries coordinate and support these processes. (Ingstrup & Damgaard, 2011) The results of the cluster, as well as the enterprise, are also largely conditioned by its life cycle (illustration *Figure 1*). This life cycle (LC) often follows the familiar S-curve, although it may have many interruptions. Problem firms are usually at the bottom of the curve, not only in terms of financial results but also in terms of investment, innovation, production results, technology, human capital support, corporate culture, etc. There may be some distance between effective innovations and positive business results. Usually, only a small number of innovations and patents are commercially successful. Cluster collaboration can facilitate these innovations, spread risks, and drive positive business development within the LC. The concentration of a larger number of problematic companies, without successful companies, can have a negative impact on cluster development and economy. In the model case, it is first to establish a cluster, in the form of concluding contracts with companies, creating cluster management, defining strategy, forming an organizational structure, preparing a business program, respectively. The focus of research, the provision of services to businesses, the conclusion of contracts, etc. Typically, creating a cluster is a short-term process that takes up to a few months.

Figure 1: Model development of cluster life cycle



Source: [own scheme]

The second stage of cluster development is the so-called quantitative (volume growth) cluster development phase. This stage is about expanding the entities in the cluster alliance, expanding the business portfolio, adding new activities to the cluster, etc. Cluster science and research usually do not yet achieve the desired efficiency and results. Therefore, companies often imitate already offered products or services in order to minimize costs and risk of failure. Especially problem companies do this. According to the study, usually, a strategy of trial and error research is used by many companies. If the innovative product/process is technically/technologically demanding, the research is mainly done by engineers and accompanied by a number of problems and errors as well as high material costs that may be the end point for troubled businesses unless they cooperate in the cluster. The quantitative phase is usually ended by a significant increase in quality indicators.

The third phase of cluster development is the so-called qualitative phase. This phase is accompanied by a decrease in the cost of R&D and respectively, by an increase of overall cluster efficiency. These effects usually also bring new benefits for companies in the cluster, especially when it comes to improving their reputation and market positions. Material and transaction costs usually also fall. Also, the organizational structure of the cluster is changing towards leaner activities, numerous and multilateral innovation processes, patents, technological processes are changing, marketing is more optimized, markets are changing, cluster value is

growing. Especially these clusters need to be searched by troubled companies. However, it is often impossible in problem regions where these companies operate. For example, in China, Taiwan, and Japan, there are predominantly clusters whose so-called the quantitative phase of cluster expansion is only now, after several years, replaced by qualitative expansion through the growth of quality of innovative solutions and the growth of know-how. However, it should be recalled that in the environment of developed Asian countries, if a certain innovation is created, e.g. in the form of new product design, many companies will offer a similar design to the market within a few days. Therefore, it is rather a continuous innovation process and innovation must also be accompanied by flexible and efficient marketing and adequate IP protection. At the same time, many Asian clusters produce multiple innovations, but only a minority of them are commercially successful (only 20% of them in JPN). At this stage of cluster development, many previously troubled companies are able to innovate more, produce better quality products, and perform more targeted marketing, etc.

The subsequent phase is either the further longer-term positive development of the cluster results, which means some cluster maturity. Furthermore, the quantitative growth of the cluster may follow again, depending on the market development in a certain attenuation of the innovation process, or, on the contrary, a significant decline in all activities, a decrease in the cluster's economic results, which may lead to its disappearance, decline or restructuring cluster activities. (Hervas-Oliver & Albors-Garrigos, 2014; Suire-Vicente, 2014) This type of cluster is highly risky for all businesses, not just for troubled businesses. An example is the Detroit automotive cluster. Such a cycle is just a model example of how cluster activities may look like. In practice, clusters have their individual development and, according to research, predominantly thrive, because the geographic concentration of cluster firms usually contributes to reducing the overall costs associated with their activities, which is particularly beneficial for troubled businesses. However, other cluster benefits will be more precisely specified.

3.1 Which clusters are suitable for problem businesses?

According to the survey, there is no suitable cluster organization for troubled businesses and often there are different project organizational structures that best fit the cluster focus. However, we can talk about two basic types of clusters based on the level of knowledge used:

• *Research-driven clusters* - oriented towards research, innovation, and high-tech, are typically tied to universities and local research and innovation centers, such as Gwanggyo Techno Valley (research and development in the field of nano- and biotechnology), are much more demanding on quality and the use of intangible capital. (Liu et al., 2018) For troubled companies, it may be more difficult to enter this type of cluster unless they have their own research and development.

• *Business clusters* - aimed at supporting, developing and innovating entrepreneurship in a particular business field or region, such as the Automobile Cluster in Trnava, which associates several automotive suppliers. The intangible capital is predominantly in the form of production-sales know-how. This type of cluster may be more appropriate for troubled companies, as it usually provides more comprehensive services, including training, funding, IP protection, commercialization of own products, etc. Problematic companies can also do research in this cluster alongside other business activities including running joint testing facilities.

Other clustering methods include:

Porter's clustering:

• *Production clusters* (they have 3 kinds of main benefits for troubled companies: economies of scale, lower transport costs and better use of labor), e.g. automotive (VW, Wolfsburg), medical, high-tech, chemical, aeronautical or electrotechnical clusters, etc. are mostly transaction-oriented.

• *Service (non-industrial) clusters* (for problematic companies, they are advantageous for reasons of market proximity, better use of foreign know-how, or improvement of company image), e.g. tourist clusters in Australia, SW-consulting clusters, health clusters, or in the form of venture capital provisions, these are more relationship-oriented.

• *Geographical distribution* - international, national, regional, regional, localized usually close to large cities, or good transport infrastructure (rail, highway, airport). Especially regionally oriented clusters are missing in problem regions of the SR, according to this research.

• *Sectoral distribution* - e.g. Dubai Media City or Aston, Birmingham (optical cables), chemical products, biotechnology, ICT, quality, wholesaler, retail, military industry (NASA), tourism industry (Orlando), entertainment industry (Lyon, Paris).

• *Divided by the horizontal level of industry* - links between companies in one industry, the main benefit for problem businesses is for better purchasing prices, and risk diversification in joint research and development, improved marketing and sales.

• *Distribution by production chain* - shopping, manufacturing, sales, usually close to larger manufacturing plants, or larger sales centers.

• *Distribution by technology taxonomy* - supply dominant firms, information networks, research clusters, logistical clusters. Often, the biggest problems have smallest businesses in troubled regions, but these businesses have also the greatest difficulty in getting to the more favorable business conditions provided by the cluster.

• *Distribution by lateral link in the industry* - which brings together companies from different fields and sectors that complementing each other e.g. in the automotive industry (construction, IT, security). (Rodríguez-Pose & Hardy, 2014) These are particularly necessary for the sectoral focus of problem regions in Slovakia.

• *Distribution by capital connection* - based on said concentration or cooperation, in the form of JSc, Ltd., cooperative companies, civic association, self employment etc. (Skokan, 2007).

• *Life-cycle distribution* - foundation, volume growth, quality growth, maturity, attenuation (Otsuka & Sugihara, 2019).

• *Other breakdown* - by size, by number of entities, by strategy and organizational structure, by degree of use of knowledge, etc., depending what is most suitable for a problem company.

3.2 Cluster foundation and functioning, advantages and disadvantages for problem companies

The processes of preparing, setting up and effectively managing strategic alliances in the form of clusters are very often individual, and each region or sector organization predominantly choose its own methodology. Clusters should influence the business, knowledge and innovation level of the region, but also be a certain catalyst of efficiency in the problem environment. It is not a rule, but they often improve local employment, popularity and economic growth of the region. Innovation and production processes and expansion of cluster knowledge, especially S&T know-how, are largely conditioned by the local innovation, education and economic level of the environment, the potential for innovation transfer, and the cluster itself. Problem firms should check these factors in advance, along with other conditions before entering the cluster. Much of the success of business analysis before establishing a cluster also depends on the quality of the information and on the evaluation of local and regional institutions. A good local business environment also as to the future use of know-how directs foreign investment flows. One of positive examples is Boston's Route 128 (software, telecommunications, media, and financial services). Boston is also considered so-called „The world of ideas“, which is needed for the innovation processes of companies. Maybe because while the city accounts for only 10% of the country's total population, it accounts for 34% of total state participation in 35 universities. A similar situation exists in Sillicon Valley, which is home to around 40 Fortune 1000 businesses (Ashton, 2016).

Key factors in the success of a cluster-based strategic alliance may include:

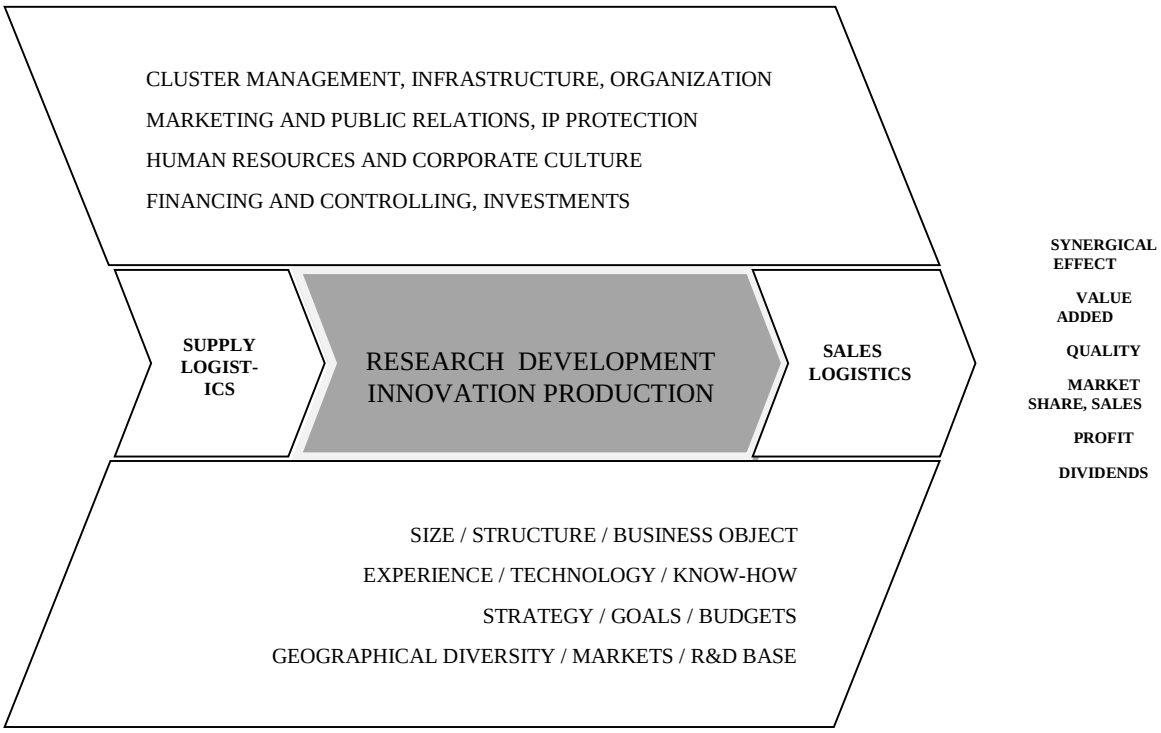
- The appropriately chosen capital structure according to the number of founders, the subject of activity, the area of activity, respectively a planned cluster strategy,
- Alternative preparation of a long-term business plan for cluster development, a real budget prepared,
- A detailed mid-term business plan, including an appropriate innovation strategy,
- Systemic support of the government, region, industry, and local society,
- Adequate and stable state legislation and fiscal policy,
- Good infrastructure, logistics and communication links,

- The proximity of markets and sufficient customers´ demand in the area (note especially for locally oriented clusters),
- Participation of successful companies in the strategic alliance,
- Strong business and innovation base and focus on continuous performance improvement,
- The existence of a high-quality knowledge base, including universities or vocational schools,
- High quality of partnerships/relationships, high working culture and functional working ties inside the cluster but also outwards,
- Good access to financial, marketing, insurance, and advisory services,
- Good management, controlling and cluster development,
- Adequate protection of intellectual property, etc.

Government support at the national and regional level for cluster creation is often crucial. Kista Science City , a knowledge cluster in Sweden and Yokoska Research Park in Japan have become world-leading in wireless technology, mainly thanks to government support at the national and local level. Cluster creation can thus become the dominant component of national economic programs for development of both advanced and emerging economies in the world. However, the effectiveness of this development to the great extent depends on the understanding of the process of cluster creation and development (Moon, 2018). However, it is necessary to separate public-private organizations from purely private and public organizations at different levels. For example, the United Nations Department of Commerce and Industry (DTI), OECD, UNIDO or the EC are building their own strategic alliances within a single sector, such as biotechnology, nanotechnology, ICT, steel, etc. Many private companies provide companies with minimal business premises and basic infrastructure and call them business or technology parks. More specific cluster projects or organizations are groupings consisting of public-private organizations such as companies, government agencies, and universities. Universities can thus get better information about the requirements of companies for their students. At the same time, it is possible to present the current knowledge or requirements of practice at universities as well as other types of schools. It is also possible to implement joint projects and apply new discoveries more quickly or to apply current inventions in practice.

Other factors that can influence the positive results of clusters are adequate accounting and tax benefits, but also, for example, the organization of international scientific and business conferences, venture capital support, region reputation, etc. The synergy of these factors is also important. In terms of problem regions, the state or international organizations should have adequate targeted support for clusters. Contracts with companies must be based on the win-win principle. Unreliable and long-term unsuccessful companies cannot be supported in a cluster. Based on the well-known Porter and Wirth value chains, it is possible to determine the cluster value chain (*Figure 2*), which transforms inputs into outputs for maximum synergy. According to the cluster's core activities, which are broken down according to its specialization, and on the basis of these key clustering factors, its value chain can also be outlined.

Figure 2: Model cluster value chain



Source: [own scheme]

Many of the top clusters create a business incubator environment within the cluster due to the high competitive intensity on the market. Some companies effectively enter the cluster because of the better conditions of the incubator. In terms of cluster efficiency, it is necessary to define the conditions for establishing such the incubator appropriately, especially as regards start-ups or troubled companies. The cluster synergistic effects of such clustering can then be compared to those of a specialized business/research incubator. If successful corporations operate within the cluster, there is a presumption that there will be greater pressures on the effectiveness of the activities of the whole cluster, and so-called problem firms will be forced to reduce the cost of scale. But, there is also a risk that these successful companies will take over market shares from less successful local businesses. Here too, adequate legislation restricting monopolies is needed, but also targeted support for domestic problem firms. The relative impact of the incubator on cluster efficiency may be due to the intrinsic efficiency of particular firms, but also to long-term market factors (demand, prices, and quality of competition, etc.) that predominantly influence whether the company is actually using the cluster. However, it is confirmed that companies that grow up in such business networks are

also accelerating in new and challenging industries, and what is interesting, are striving for the same efficiency, profitability, and innovation activity after leaving the cluster (Chesbrough et al., 2018) So the initial support of these firms can return to the region, whether in the form of innovative products, employment support or tax payments.

Michael Porter argues that clusters have the potential to affect troubled businesses in these ways: through increasing the productivity of companies inside the cluster, supporting innovation and attracting new businesses to the cluster, which is also suitable for start-ups and troubled businesses. (Moon, 2018) Overall, clusters lead to improving the competitiveness of troubled businesses for the following reasons:

- Improve productivity by allowing companies a better access to specialized inputs of materials and production components, as well as more skilled workforce, information and specialized know-how at lower transaction costs.
- Increase innovation/absorption capacities of problem firms by speeding up acquisition, improvement, and use of information and knowledge. Competitive pressures inside clusters are intensifying the research and innovation activities of the companies as well as the transfer of their results.
- Encourage the emergence of new businesses and industries by new spin-offs, technology, and indigenous industries through lower entry and exit barriers, while new profitable industries are emerging as well, and the market mechanism can also form new flexible organizational connections (Otsuka & Sugihara, 2019).
- They enable better planning and preparation of problem firms and industries for the future, thanks to better knowledge of the business environment by successful companies in a particular region or industry (Pavelková et al., 2017). They allow smaller companies to better implement more complex innovation programs in cooperation with larger companies.
- Provide economies of scale and savings from new opportunities, as well as lower operating costs, lower logistics costs, better recruiting and training employees, or introducing innovations (Otsuka & Sugihara, 2019), and thus better efficiency resulting from business clustering and from joint support and service activities within clusters.
- Increase local competition intensity, thus providing better competitiveness for businesses and regions.
- The cluster's goodwill also improves the reputation of the cluster's companies.
- Encourage regions and governments to invest in infrastructure, education, innovation and the development of regions and states.
- Improve the constraints of troubled companies (availability of resources, know-how, and information) and increase their effective specialization, but the role and competence of mainly smaller firms in the cluster alliance is important too, as there is a significant

relationship between alliance competence and innovative performance, innovation performance and economic results of the company (Lee & Hsieh, 2008).

- Speed up business transactions and the expansion of new products, know-how and technologies.
- Diversify of risks arised from new investments, new market entries, and possibly of new products introduction.
- Improve a market power, competitiveness through strategic links, attracting new customers, eventually, local benefits, etc. (Ketels, 2017)
- Increase an availability of financial resources for problem companies, under more favorable conditions, a rotation of financial instruments, better use of venture capital, etc.

Each cluster may not succeed. According to our research, the reasons for cluster failure may be in particular: poor cluster formation (an unspecified vision, business plan and goals), a lack of innovation strategy, an inappropriate capital structure, inappropriate management and an organizational structure, insufficient infrastructure, budget overruns, high co-ordination costs, a lack of R&D time, poor accounting and a lack of business regulation, including IP protection, cluster services, a business and government disinterest or no brand presented externally.

An important problem remains what should be the main output of a cluster and how to measure its success? An important synergistic effect for problematic companies is the improvement of their good name, the growth of individual company profits, the value added (VA), or the growth of quality. One solution to how to measure the overall performance of a cluster and its merits is to use a simplified model (Illustration *Equation 1*), which also takes into account the effect of past investments:

$$\mathbf{TEt = [E_{t-1} + Et(Ex) + Et(In)] * RF} \quad (1)$$

In which:

TEt – Total cluster efficiency at time t,

Et–1 – Cluster efficiency and added value over the last year of cluster life,

Et (Ex) – Current cluster efficiency based on external success factors at time t (e.g. tax rates and accounting regulations, average region profitability, GDP per capita, labor costs, unemployment rate, input prices, interest rates, marketing costs, infrastructure, patent and license prices), etc.

Et (In) – Current cluster efficiency based on internal factors at time t (cluster size, organizational structure, internal efficiency, cluster costs, equity costs, labor productivity, cluster strategy and culture, investor and partner claims, etc.)

RF – This risk factor includes a likelihood of cluster success and various impact indicators on business results, e.g. variability of key market indicators, variability of global economic impacts, variability of domestic macro environment, variability of sales and costs of the problem company, incorrect assessment of own assets and capital, risk of insolvency, low valuation of own know-how, corporate immaturity and smallness, poor corporate culture and other market risks.

Source: [own formula]

Cluster's overall efficiency include then not only the current cluster performance, but also the past and expected results, more comprehensive success indicators, high-quality intra-organizational accounting, and optimum costs and structure. Cluster output should also be in the creation and expansion of so-called tacit knowledge (TK). Although, according to research, so-called local cluster spillovers are often overestimated as driving forces for the development of regional innovation activity (Öhman & Simonsen, 2018). Local dissemination of knowledge also includes local quality of human capital, educational infrastructure of the region, respectively willingness to acquire new knowledge. However, most of the knowledge is produced locally, respectively by regional clusters, where personal collaboration of research and innovation teams is a prerequisite (Guisti et al., 2019; Jirasek, 2007). Clusters that do not associate local businesses and their activities are mainly linked just through ICT are associated with lower TK production. This may be due to the lower mutual trust of such teams in sharing real know-how or providing information. However, clusters based solely on large international capital may attract a lot of small investments over time, whether through new so-called core companies or even logistic, financial, personnel and other companies. However, without an effective combination of scientific and innovation capacities, or even marketing know-how, they tend to have short duration (Bhaumik et al., 2019).

The problem is mainly to find out and measure the effect of TK resulting from the cluster's research and innovation activity, which could be the subject of further analyses of cluster organizations. Known Error Correction Mechanism Method used to assess the overall dynamics of the innovation process, is not enough to measure this knowledge according to our experience. TK is the most important in basic research or in the early stages of the innovation process, especially if production and technological standards are not yet in place. But, this knowledge and its effect is easier to measure in applied research where incremental innovations are concerned. If the main output of the cluster is know-how that can be intended for transfer, and the financial output may be the selling price. However, it is confirmed that often when selling know-how there occur some suboptimal steps towards the spread of intellectual property that leads to additional costs (Kroeze et al., 2017). In particular, there is a need for sufficient legislation and effective legal infrastructure, especially for problem firms.

4. Results of innovative and networking processes analysis of problematic companies in Slovakia

The outputs of this research include several statistical information and scientific findings based on the questionnaires evaluated, as well as a description of selected shortcomings and recommendations in the area of strategic and innovative management of problem firms based on the expert study. Quantitative and qualitative research was carried out in the two most problematic regions of the Slovak Republic, in Banská Bystrica (BB) and Košice (KK) regions in 2017-2019. In both regions, 500 problem companies (250: 250) were analyzed, which had at least two negative economic outcomes in the last three years and were forced to lay off employees. The research was first conducted in the form of questionnaires, and then, following expert consultations, some problem areas in selected industrial enterprises were discussed.

Regarding business rivalry, more than 25% of companies reported unfair business practices and competition frauds, while the worse situation was in the KK (Košice) region. However, more than 30% of companies have introduced some cooperation as a precondition for open innovation cooperation, including in the area of business alliances, clusters or other S&T cooperation. While companies consider cooperation to be mostly standard, especially in the BB (Banská Bystrica) region, but they consider it weaker in the KK-region. For these troubled companies, there is no much competition in Slovakia but in the EU markets. Especially for larger businesses. In terms of innovation processes, companies are particularly reporting the issue of protecting domestic products and services at the national level, but especially within the EU. In particular, companies in the KK-region demand more support. However, enforcement requires considerable effort and investment in innovation and various forms of cooperation with foreign firms, which is often underestimated. More than 50% of these companies reported weaker support from financial institutions, including in innovation activities and cluster building. In particular, companies in the BB-region would like to shorten the process of acquiring business loans. In particular, larger firms in the KK-region would welcome more favorable terms of providing these loans.

More than 30% of companies reported standard cooperation opportunities in the regions in question in business and innovation clusters, but weaker in terms of collaboration with academia. Companies also complain about the problem of insufficient professional and practical knowledge of school leavers. Especially the problem is that companies cooperate very little with academia and within research and business parks in both regions. When it comes to collaboration between companies, troubled companies collaborate mainly in the field of marketing and innovation protection. When it comes to collaborating in S&T, the better situation is in larger companies, with more SMEs and startups calling for this support. More than 20% of these troubled companies reported a strong impact of technological progress on their business. While technological advances in the BB-region are mainly in new opportunities for business growth. In the KK-region, this usually does not affect business. In terms of

introducing innovations to the market, companies usually do not respond flexibly. The situation is worse in the KK-region. Companies in the BB-region usually follow innovation trends through own suppliers. In the KK-region, companies cooperate more with external firms or through their own employees. However, almost all the firms surveyed said there were no rewards in the company for employee innovation. This can also be a significant reason for the lack of innovation and business performance of troubled businesses.

In terms of long-term planning and foresight, companies usually state that there are an informal innovation culture and an unsystematic approach to business innovation planning, including networking, which can be considered another major risk in the context of this research. The worse situation is in the BB-region. More than 50% of companies report linking innovation to specific business orders. Technological forecasting processes were applied only in the minimum number of larger enterprises (TR ≥ 500 000 EUR). About a third of small businesses have no innovation strategy but have an innovation plan, often just as part of their business plan. With regards to market research, mapping of innovation trends and forms of cooperation in R&D, these problematic firms perform random surveys as needed, which is also a significant risk factor. Innovative system-based radar processes have not been identified in both regions. In smaller firms, a business owner is usually involved in innovation planning, and innovation planning is often very simplified, and the plan depends mainly on the economic outcome and the owners' requirements. In larger companies, business management and R&D management are responsible for innovation planning and joint research. Roadmapping processes are practically not realized even in larger companies. Often, the processes of planning for innovation and joint research are left to the parent company. A subsidiary will only receive an innovation plan as a prescription, which may cause some aversion. Innovation planning in larger companies is largely based on technological innovations and product innovations.

Chaining innovations, an open innovation strategy, and related synergic effects are usually underestimated by problem firms. There are also some business concerns before entering the cluster in both regions. The objectives of innovation planning usually depend on the requirements of the parent company, economic results, and management requirements. Technological trends and competitive developments are often underestimated. The innovation plan is being implemented for about one year in about 30% of small businesses. The link between risk management and innovation management processes is often not identified in strategic planning. Innovation planning is usually single-variant. The innovation strategy is often only a formal document and is not linked to specific innovation processes. A company that does not have an innovation strategy often focuses its resources on long-term inefficient capacities, on low-flexibility technologies and on the organization of production that does not allow for synergic effects of innovation. Conversely, a clear innovation strategy can bring preventive capacities for flexible production, employee motivation for innovation, some synergies, also in terms of S&T cooperation in strategic alliances.

Often, a problematic company manages its activities based on current orders, which is often handled by the owner or manager of the company. Instead of conceptual strategic management, management deals with the company's daily problems. According to surveys, only about 10% of companies are also focusing on innovation management. But, in terms of education activities, employees are trained as needed in more than 40% of businesses. Innovations are usually funded from profits in more than 73% of businesses, followed by bank loans and owner deposits. Smaller companies report and 1-5% share on profit that goes to innovation and a company often does not innovate in the case of loss, which often exacerbates the negative business situation. In particular, the growth in small business outcomes and the improvement of the reputation and market share of larger businesses are mostly influencing innovation. Most companies consider it a significant obstacle to promoting innovation - a low customer interest in changing products and services, i.e. lower market pressures in these problem regions. However, many businesses are not able to take advantage of the EU markets. While, customers are more in demand for new products faster, especially in the BB-region. In the BB-region, product innovation is more closely linked to personnel changes and in-service training. In the KK-region, there can be found more synergies into the business system. The more advanced industry and business, the more it focuses on process innovation, a product delivery with services, or new market segments. The problem is also the impossibility of joining the innovation park, which is also lacking in the regions. Smaller companies usually lack funding for both innovation and a cluster entry. Foreign investors in these troubled regions often have monopolies, which improves the unemployment rate but can weaken domestic firms. Employees are usually involved in innovations inside the company, but this is not their job duty compared to many top companies. Many businesses also state that employees are usually not interested in innovation. There are also many unjustified concerns about the misuse of corporate intellectual property in business alliances. However, companies often underestimate the protection of their intellectual property. (*Table 1*)

Table 1: Results of evaluation of selected aspects of innovations and network processes in 500 problematic enterprises in Slovakia

		BB-region, small firms (TR<500 000 Eur)	**BB-region, larger companies (TR>500 000 Eur)**	**KK-region small firms (TR<500 000 Eur)**	**KK-region, larger companies (TR>500 000 Eur)**
		%	**%**	**%**	**%**
Business type	Ltd.	73,3	100	50	66,7
Industry	Engineering and automotive industry	26,7	5	25	66,7
	Building and Construction	40	8	37,5	9
	Rubber and plastic products manufacturing	3	100	6	8

Type of production	Piece production	50	-	50	66,7
	Serial production	21,4	100	12,5	33,3
Kind of assortment	wide within 1 industry	26,7	100	62,5	66,7
Type of organizational structure	simple functional OS	40	100	50	66,7
Layoffs in the last 5 years	Yes	33,3	5	62,5	66,7
Business cooperation	standard	53,3	90	37,5	33,3
Main competition	EU businesses	13,3	92	50	66,7
Required quality of products and services	High	73,3	100	75	100
Impact of technological progress	strong - new opportunities for a company	26,7	95	12	8
	strong - does not affect business	20	5	50	66,7
Frequency of market research	Irregular, random	40	97	50	33,3
Responsibility for innovation	Business owner	73,3	6	50	33,3
	Company management	46,7	50	25	66,7
Missing innovation support within the EU	Better conditions for doing business within the EU	100	6	7	98
	Better protection of domestic products and services	3	95	50	97
Missing innovation support within the Slovak Republic	Greater protection for domestic products and services	50	5	99	98
Lack of innovation support from financial institutions	Shortening the process of acquiring business loans	50	97	99	8
Cooperation with academic environment	School graduates do not have sufficient theoretical knowledge	3	98	50	4
	School graduates do not have sufficient practical experience	95	5	97	4
As regards to cooperation in research and business	Company cooperates in marketing	50	95	6	20

parks:	Company cooperate in protection on innovation	40	3	40	10
How does the company follow innovative market trends?	Usually, company monitors innovation trends through suppliers	45	90	3	4
	Company cooperates on innovations with an external firm	5	7	55	8
	Employees track individually opportunities for innovation	2	5	15	95
How are innovations planned in the company?	Innovation plan depends on specific business orders	50	100	5	100
How are employees motivated to innovate?	There are no rewards for innovations in a company	95	92	85	98
How are product innovations linked in the company?	Product innovations usually also involve personnel changes and in-service training	95	97	5	3
	Product innovations are implemented without other changes in an enterprise	2	1	45	90

Source: [own scheme]

5. Conclusions

„It takes all the running you can do to keep in the same place. If you want to get somewhere else, you must run at least twice as fast as that.“ (Lewis Carroll)

Based on the results of this analysis, it can be stated that among the most problematic companies are mainly micro-enterprises with up to 10 employees (mainly in the form of Ltd.), primarily active in construction, engineering, automotive, rubber, and plastic industries. In terms of the need to lay off employees, the worse situation was in the KK-region, where more than 60% of these companies had to lay off employees for economic reasons in the last 5 years. In the BB-region it was only about 33% of the problem firms. More than 30% of companies report standard cooperation opportunities in these regions as to the business and innovation clusters, but weaker in terms of collaboration with academia. A significant lack of competitiveness is that only about 10% of companies are also focusing on innovation management. Often, the process of planning for innovation and joint research is left to the parent company, which may not have comprehensive information about its branch's regional environment. A subsidiary will only receive an innovation plan as a prescription, which may also trigger some aversion. Often the problematic company manages its innovation activities

based on current orders, which is often handled by the owner or manager of the company. Instead of conceptual management of innovation, management deals with the company's daily problems. Innovations are usually funded from profits in more than 73% of troubled businesses, followed by bank loans and owner deposits. However, problem firms report only 1-5% of the profit share that goes to innovation. In the case of loss, a company does not innovate. Most companies consider as a significant obstacle to promoting an innovation - a low customer interest in changing products and services, i.e. lower market pressures in these problem regions. Most of the larger problem firms report as their main market - the EU market where there are high competition and the need for the higher level production innovation. More than 30% of companies have introduced some cooperation as a precondition for open innovation cooperation, including in the area of business alliances, clusters or other S&T cooperation. While the companies consider cooperation to be standard in the BB-region, they consider it weaker in the KK-region. In terms of innovation processes, companies are particularly reporting the issue of protecting domestic products and services at the national level, but especially within the EU, etc.

If we look at global economic challenges, a cluster-based strategic grouping of businesses would be a trend, but certainly not an answer to addressing business problems in less developed regions. However, it is confirmed that clusters have a positive impact on regional development, employment, and economic growth. Companies do not enter clusters just to find a cheaper economic environment, but because clusters focus on knowledge, skills, and resources spillovers to support their economic results. Clusters provide businesses with better access to a skilled workforce, better outsourcing capabilities, and better opportunities to exploit their innovation potential, including internationally. The relationship between innovative entrepreneurship and clustering of enterprises can be defined by many types of research by their positive impact on the cluster value chain and regional/sectoral economic development (Gereffi & Lee, 2016). Although business pooling processes often redistribute drivers and factors that affect the local competitiveness of smaller firms or regions, these processes are important for the ability of smaller states, such as the SR to develop new manufacturing disciplines/programs and improve their competitiveness. Of course, the success does not only depend on the openness of companies or countries to develop joint research or business activities but is very closely linked to the quality and efficiency of these connections between local firms and successful global corporations.

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