

## DEVELOPMENT OF GLASSMAKING AND CHANGES IN ITS DISTRIBUTION IN SLOVAKIA

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### **Abstract:**

*Slovakia is country rich in traditions of glass production. In the past, glassmaking was the typical Slovak craft bounded to special setting in mountain forest area with the sufficiency of wood and water – the most essential location factors of glassmaking in our conditions. In regard to this fact, glassmaking was relatively equally distributed in different regions of Slovakia. The aim of the presented paper is to analyse development of glassmaking and changes in the location of Slovak glass-works and glass industry, to prepare the model of its regionalization based on historical and current distribution of this production and taking into account links with traditional (historical) regions.*

### **Key words:**

*Glassmaking, glass industry, development of glass production, mountain regions, glasswork regions in Slovakia*

## INTRODUCTION

Glassmaking is an old traditional craft well-known since the middle ages. There are still debates about its origin: some sources provide the information that pioneers of glassmaking are Chinese, others mention Egyptians and Phoenicians but also Indians and Jews. The most probable claiming is that glass was invented at the same time in different places of the world.

Glass industry is a brunch of industry focused on production of glass and glass products. According to the current classification (NACE<sup>5</sup>), glassmaking fall under the *Manufacture of other non-metallic mineral products* with the following sub-branches: Manufacture of glass and glass products, Manufacture of flat glass, Shaping and processing of flat glass, Manufacture of hollow glass, Manufacture of glass fibres, Manufacture and processing of other glass, including technical glassware.

Slovakia is country rich in traditions of glass production. In the past, glassmaking was the typical Slovak craft bounded to special setting in mountain forest area with the sufficiency of wood and water – the most essential location factors

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<sup>5</sup> NACE = Nomenclature statistique des activités économiques dans la Communauté européenne

of glassmaking in our conditions. In regard to this fact, glassmaking was relatively equally deployed in different regions of Slovakia. Its character, spatial arrangement and origin have been markedly transformed since the era of industrialization (from about 1950s), and this was the sign of the qualitatively new phase of the glassmaking development in Slovakia.

The topic of glass industry was not underestimated in Slovak literature. So far, we can find monographs and articles in journals written mainly by historians – historiographers (Hetteš 1958a, b, Krnáč 1963, Frický 1964, 1966, 1970, Gasper 1969, Žilák 2002, 2011, Žilák, Hlodák 2012, Zrebený 1981a,b), ethnographers (Pišútová 1968, Bakošová, Pišútová 1979), archaeologists (Staššíková-Štukovská 2001 and others) and local experts (Černý 1967, Číž 1970) who were concerned with the history of glass, its local and regional importance and documentation of its development. Until now, the most complex and highest-quality work about glassmaking is monograph of Vondruška (2002)<sup>6</sup>.

The objects of historical and historiographical works (Bárta 1935, 1955, Borsos 1963, Beňo a kol. 2002, Pišútová, Kišac 1993, Tkáč 1964) were mainly glassmaking localities (Gápel, Huta, Látky, Nemecká Huta, Utekáč, Poltár, Zlatníky, surrounding of Bardejov, Kružlovská Huta, Lednické Rovne, Muránska Huta, central Pohronie and others) respectively towns and also micro-regions or historical counties (Lednické Rovne, Nemšová, Poltár, Uhrovec, Horné Srnie, Teplička nad Váhom, Malužiná, Sihla, Dominion of Muráň, Zvolen district, Horehronie, Nová Baňa and surrounding, Bratislava, Nitra and Trenčín county and others). So far “only” a comprehensive atlas works of the Czechoslovak and purely Slovak proveniences (Atlas československých dějin by Purš et al. 1965, Atlas SSR 1980 by Spišiak, Atlas krajiny Slovenska, 2002 by Mládek, Mišík) have provided historical and current spatial distribution of glassmaking using the cartographic outputs. The issue of glassmaking and glass industry was mentioned only marginally in the geographic sources. Within the study of industrial production in Slovakia, Hromádka (1943) mentions glassmaking and defines 2 areas of its concentration – central Považie and Veporské rudohorie<sup>7</sup>. Slovak industry, its spatial localization, classification and regional standardization were the subject of study of well-known Slovak geographer Mládek (1990) in the 1970s -1980s. As we can read in the Popjaková (2001), the glassmaking as an important part of classification by branch was in the former times in the Šariš region at the mezzo-regional level. The development of glass industry from 1989 to the present, as well as its production focus and spatial distribution have been described by Dubcová et al.

<sup>6</sup> *Unfortunately this work does not include Slovak context and (carto)graphic representation within the elaborated phase of Czechoslovak glassmaking. Czech practice, tradition and concrete experts, who were sent out to Slovakia, had an important place in Slovak glassmaking, and Slovak enterprises were subjects to Czech management in a certain time. Also glass raw materials and customer-supplier relationships (including import - export) between the Czechia and Slovakia played a significant role (even today).*

<sup>7</sup> *J. Hromádka pointed out that in Middle Ages the glassmaking was connected to mining. After the creation of Czechoslovak republic in 1918, many Slovak firms ceased to exist in consequence of Czech competition. He considered glassmaking to be problematic due to the lack of quality glass raw materials and fuels.*

(2008). At least in the last two decades, the glassmaking issue has been discussed at geography departments in the form of bachelor (Baroniková 2012) and diploma theses (Šomšák 1995, Baroniková 2014). They gathered significant database of glassmaking, which was instrumental while writing the presented article.

Our article has an ambition to fulfil the gap in the (historical) geographical research of the one of the traditional branches in industry, which has had features of industry with its own characteristic development. The development was moving from the phase dependent on natural resources and human potential of the mountain area to the phase of concentrated form based partially on tradition and taking into account current trends in the concentration of production and the globalization tendencies. The purpose of the presented paper is to analyse development and changes in the location of Slovak glass industry, to prepare the model of its regionalization based on historical and current location of this production and taking into account links with traditional (historical) regions.

## 1 THE PRODUCTION OF GLASS AND ITS REQUIREMENTS

The glass is the oldest synthetic material in the human history. As such, it does not exist in the natural conditions. Its production is dated to the ancient times (Bronze Age – 3000 BC). The beads found in Egypt are the oldest glassware that has been ever found in a global context. The glass came into the existence probably accidentally while metallurgy and metallurgical process of the production and processing of metals, respectively as a by-product of ceramic production (Vondruška 2002). There are several theories about the geographical origin of glassmaking (Mesopotamia, Egypt, India, Phoenicia – spreading to Europe – as well as to middle Europe and thus to Slovakia. The local Celtic population had already known the glass production).

For its development and competitiveness, glassmaking – like other branches of industry – needs certain complex of conditions and requirements for production. They include in particular: 1. *Capital* (domestic, foreign), 2. *Raw materials, semiproducts* (glass sand<sup>8</sup>, water, soda, potash, limestone – dolomite, feldspar, red lead, hypoboric acid and zinc white, glass cullet) and *energy* (wood, coal, gas, electricity), 3. *Workforce* (appropriate gender, age and education - qualification), 4. *Basic means and technology* (land, buildings and structures, machinery, instruments and equipment, transport equipment, technologic processes etc.), 5. *Innovation* (education, science, research and development), 6. *Tradition* – *genius loci* (experience and skills, social status, ethno-cultural aspects), 7. *Management and Marketing* (advantageous production and distribution relationships, social tactics). Within the production and distribution relationships, there are important *input* (from the forest management, relevant

<sup>8</sup> *Glass sand, as an important raw material for glass industry in Slovakia, has occurred locally, while their stocks have become almost depleted. Nowadays, Slovak glassmaking depends on imported glass sand from Czech Republic. In Slovakia, there were not favourable conditions for creation the higher quality glass sands. The most important are flying sands on Zahorie Lowland (Šajdikove Humence, Malacky, Plavecký Mikuláš, Pernek, Lozorno), originated in the oldest Quaternary in the area about 600 km<sup>2</sup>. These glass sands have a higher content of ferrum, therefore they are suitable only for melting of the green and brown hollow glassware and for the production of vacuum bottles (Kovaničová, Čechovská 2005).*

branches of industry – mining, engineering, chemical et al.) and *output* (manufacture of transport equipment, chemical industry, pharmaceutical and cosmetic industry, food processing industry, building, cellulose and paper industry or trade). A continuity of network industries and technical (environmental) infrastructure is needed.

Glass production on its own includes *production of flat glass, hollow glass, and glass fibres, technical and other glass*. Nevertheless, all groups and modes of production have a significant impact on the environment. The environmental impact of glassmaking affects not only air (glass ash, fly ash from smelters) and waters (sewerage water from technologic processes) but also soil through the solid waste and waste dumps (cullet with lead addition, slag from furnace lining, waste from the demolition of furnace, etc.). Environmental positive impact of glassmaking is utilization of glass cullet within the collection of secondary raw materials. Their addition to the base accelerates melting, saves energy and primary raw materials, thus creates a huge ecological potential.

The basic simplexes of glassmaking are individual glass factories that generally consist of production shops with melting furnaces and annealing ovens, glass cutting shop and glass refinery, auxiliary workshops, raw material storages, stores of material and forms, warehouses and glass packhouses and office blocks.

From a global perspective, it is important to note that the nature of glassmaking production has not changed significantly over the last centuries; however it have been always a secret in its details and specifics that every master have had to strictly keep hidden. Glass mastery was inherited and it was the largest generation heritage (Vondruška 2002).

Glass factories gave impetus to the localization of the related economic activities and thus diversify employment in the regions. Such activities and income opportunities were coal trade – charcoal burning, glazieri, “sklinkárstvo” – a doorstep selling, a carrier’s trade or a variety of other activities to art, respectively naive painting on glass.

Today’s glass factories (and not just in Slovakia) differ in line of production (handmade, machine, combined) and in product types (hollow glass decorated differently, specialization in hollow glassware, illuminating glassware, etc.).

Dwellings of glassworkers were in the past situated near the glass-works. Glass production and own localization of glass factories, they were the pioneer activities of colonization (settlements, villages) in several locations in mountainous areas of Slovakia, e.g. Doľany – Sklená Huta alias Glashutten, Horné Slnie - Svätá Sidónia, Valaská Belá – Gápel, Malé Borové (homestead called hŕby - piles), Detvianska Huta, Sklené (the oldest example from Slovakia), Lesnícka glass-work (Huta) founded by Hussites, Livovská Huta, etc.

The tradition of glassmaking has left its sign not only in geographical naming (names of places - Sklené Teplice, Sklené, Vígľašská Huta, Stebnická Huta, Šiba, land area naming Hutisko, Peciská, Uhlisko), but also in surnames of inhabitants – Sklenár, Sklenárik, which represented also the ethnic origin of the person (Czech or German surnames) – Glaser, Gasper, Brno, Deutschmann.



## **2 DISTRIBUTION OF GLASSMAKING FROM ITS FOUNDING TILL THE 1950s**

Slovakia belongs to countries with a greatly developed glassmaking tradition, especially in the past. Its development and deployment can be determined by number of periods, which are characterized by topography (mineral and natural resources), availability of work force, market possibilities and the level of technology. Those characteristics determined the character and the composition of manufacture, the everyday and long term life of inhabitants and the environmental impact on the land. These periods highly correspond with the development of Czech and even European glassmaking:

- beginning of glassmaking period
- Middle Ages and modern period
- Industrial revolution and capitalism period (17<sup>th</sup> century – 1946-1948)
- industrial period (1950s – 1970)
- return of market mechanism period (after 1989)

### **BEGINNING OF GLASS-MAKING PERIOD**

Like most of European countries, Slovakia gains its knowledge about glass-making from Mediterranean (mostly thanks to Roman Empire) and also thanks to Celts. In Slovakia, there were found many archaeological artefacts related to glass-making. They serve as a proof of importing glass from abroad and also show us the first attempts of our own glassmaking. Our archaeological community is doing historical glassmaking research very intensively and archaeologist like I. Turnovec, P. Jelínek, T. Štefaničová, M. Čurný, D. Staššiková-Štukovská share their discoveries during the special international conferences.

The oldest artefacts are from 8<sup>th</sup> - 6<sup>th</sup> century BC from Smolenice, the youngest are from the beginning of 20<sup>th</sup> century from already extinct glass-work in Rudno nad Hronom. In present day, the research is focused on forfeit glass furnace in Plavecký Mikuláš (P. Wittgrüber- L. Hrehorová).

From Slavic era, there were found homemade glass beads and necklaces. The major glassmaking proof is glass furnace found in Nitra (remains of cupola glass furnaces with pieces of raw glass) and Devínska Kobyla (Bratislava).

Mentioned assortment was made during the Moravia Magna era (8<sup>th</sup> - 11<sup>th</sup> century). The hollow glass was found in findings from 14<sup>th</sup> century. More remains were found from the 15-17<sup>th</sup> century. We can mention bottles with the twisted bottle neck – kurtlofts, goblets, glasses with sticks, medical glass, etc.

Archaeological researches related to history era bring knowledge about recent glassmaking that is not mentioned in written scriptum.

### **MIDDLE AGES AND MODERN PERIOD**

During Middle Ages glass-works were founded outside of towns, mainly in woods or at the edge of them. Factors that affected location were mainly a great deal of wood used during the production of potash, which was used to warming the furnace (from 1000 kg of wood was produced 1kg of potash). Wood was also used on making form and tools; availably of water source was also important (for silica grinding and

danger of fire). Development of glassmaking was determined not only by natural resources but also by increasing demand from aristocracy, townsmen and also village people.

Glass-works were often “strolling companies” not only in Slovakia, but almost in the whole Middle Europe. They were founded on the land belonging to aristocracy or church, which were limited by the amount of woods in their vicinity, so they were mostly only short-termed.

Slovak ancestors were mostly from Czech, Bavarian part of Šumava or Silesia. Glass and its production were spread through the country in 14<sup>th</sup> century thanks to reign of Anjou. They invited glassmakers from Italy – Naples and also imported many glass products from Venice (Krnáč 1963, Žilák 2012).

Creation of first glass-works in Slovakia is related to German immigration, internal colonization of country and expansion of mining industry. Archive and iconographic materials are proofs that Slovak glass-works produced painted church windows in 14<sup>th</sup> and 15<sup>th</sup> century. They were producing also hollow glass, mainly crossbills and flasks for mining practice and alchemists. Among the others, they made glass jars mainly cylindrical and conic goblets, confirming the German influence on glassmaking.

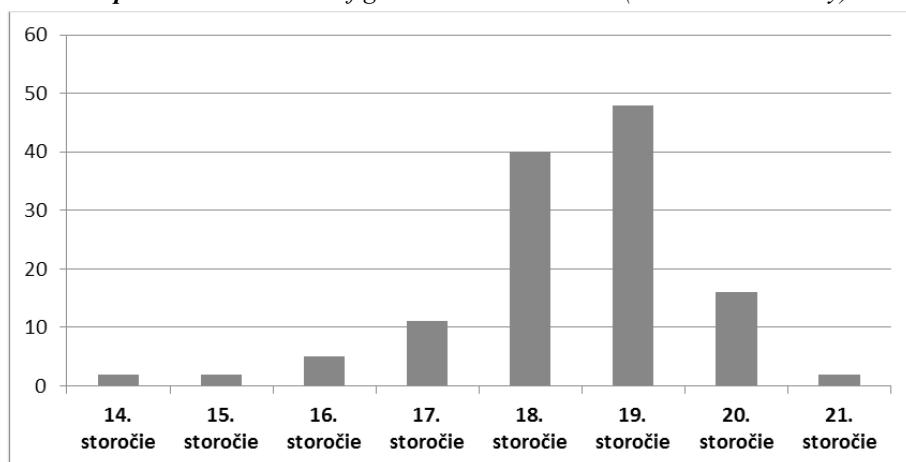
The oldest written reference to the Slovak glass-work was found in written text in Sklené Teplice (around 1350); the second one was founded in Sklenô (1360) – today Sklené pri Handlovej – Biely potok. Those two and later founded Middle Age glass-works in Lesnica (Huta), which was founded by Hussites in 1431-1433 and was successor of glass work belonging to the monks from Červený Kláštor, and also glass-works in Bardejovská Nová Ves from 1463, were related to mining industry, in which the glass was used for testing, but also as everyday tool for rich families. Glassmakers from Italy were invited also by Matej Korvín. In this era, many aristocrats, church and rich people started to found their own factories thanks to sufficiency of woods in Slovakia (Vondruška 2002).

In the latest era (after 1500, Renaissance era), in connection to an overgrowth of small-scale production (in Europe at all) to typical manufactory, the glassmaking was developing and innovating (larger furnaces in glass-works) and thus glass-works were able to remain longer at one place. The contribution of glassmaking was also a development of transport, which could employ additional labour power. Workers in glass-works and other auxiliary employees had built their houses around glass-works. New settlements were built, their population grew and required the adequate facilities (roads, services) or agricultural background as an additional livelihood for family. The isolation of glass-works has grown into lively economic units – municipalities. During the 16<sup>th</sup> century, it was observed the formation of two glass-works – in Lučatin (1564) in Zvolen seat and Medzev (1595) in Abov seat. In the 16<sup>th</sup> and 17<sup>th</sup> century, glass production was expanding in Slovakia; maps of glassmaking shows 15 glass-works.

When comparing with the Western Europe, manufactory phase in the development of glass industry in Slovakia was applied later. In the 17<sup>th</sup> century, especially starting after the second third, 6 glass-works was established in different parts of Slovakia (*Nová Baňa – Stará Huta and Obyce - 1630, Stebnická Huta –*

1641, *Muránska Huta* - 1663, *Dolány* – 1670, *Víglaš* – 1688). There are records that glass factory in *Stará Huta* produced high-class glass. The most of glass products (laboratory and flat – window glass) took *Štiavnica* pantry and they were exported to neighbouring countries. By reason of the irresolvable problems (mainly the lack of quality wood) it was moved to *Sihla* in *Brezno* forests. After more than 130 years it ceased to exist in the 1762. The remains of original glass house are still remaining the glassmaking of this area – picture. The oldest known hollow glass product dating back to 1636 – well-preserved goblet of thin milk glass with an email painting, mentioned above was produced in the glass-work in *Stebnická Huta*. At the present time, the goblet with other exhibits (vases, candlestick, and also glass of various times) is located on deposit of the *Šariš Museum* in *Bardejov*.

**Graph 1:** Establishment of glass-works in Slovakia (14th – 21th century)



The greatest development and increase of glass-works was recorded in the 17<sup>th</sup> – 18<sup>th</sup> centuries (see graph 1). This was due to the sufficiency of capital, demand for glass products, improving production technology and accumulated experience of generations. In the first half of the 17<sup>th</sup> century, 7 glass-works were founded (*Stupava* and *Kurima* – 1707, *Zvolenská Slatina*, *Huty*, *Utekáč*, *Zliechov* – *Gápel*, *Šarbov*), 20 of them were founded in the second half of the 17<sup>th</sup> century (*Detva*, *Sihla*, *Tekovské Nemce*, *Divín*, *Adamovce*, *Bašovce*, *Beňadiková*, *Bešeňová*, *Drahovce*, *Dubové*, *Fačkov*, *Zvolen*, *Gaboľtov*, *Bardejov*, *Horné Strháre*, *Vyšná Boca*, *Kokava nad Rimavicou*, *Horné Srnie* – *Sidonka*, *Livovská Huta* and *Kľak*) – see map 1. The well-known “Lexicon” of *Korabinsky* recorded 21 glass-works in Slovakia in 1786. Unexpectedly, most of them were located in the *Liptov Region* (*Beňadiková*, *Bešeňová*, *Malužiná* and *Vyšná Boca*).

In the 18<sup>th</sup> century, another 12 glass-works were established, but their exact period of activity is not known. They were located in *Víglašská Huta* – *Kalinka*, *Baldovce*, *Budiš*, *Bystrá*, *Dobroč*, *Dubová*, *Dudince*, *Kociha*, *Kremnica*, *Richvald*, *Rimavské Brezovo* and *Slatina nad Bebravou*.

In the second half on 18<sup>th</sup> century, the production of flat glass stimulated the development of glazery – doorstep selling<sup>9</sup> and crafts, even the development of images painted on glass, which is used by lower-quality sheet glass (19<sup>th</sup> century).

Old tradition of glassmaking was carried on with the glazery. Firstly, it was an additional job for men in the villages, later it became a full time job of inhabitants from *Muránska Huta, Huty, Kamienka, Litmanová, Veľké and Malé Borové, Zuberec, Habovka, Chlebnice*, etc. Typical glazing villages have been in a surrounding of a glass-works in Gápel (*Valaská Belá* - until the end of capitalism, *Zliechov, Čičmany, Čavoj, Temeš, Mojtn*). Peddlers with glass and glazing windows (oknári) travelled throughout the Kingdom of Hungary, but also the Austrian part of the monarchy, Poland, Russia and the Balkan countries. In 1922, more than 400 people were working as glaziers (besides the peddlers). After the liberation, building companies and national companies took over the function of glaziers.

At this time, glassmakers were *a unique community of people* connected by work processes and standards that were specific for this job. Job performances, as well as rest days have been linked to many specific customs manifestations. The specific characteristics of glassmakers life have been reflected in apparel, housing, social life and philosophy of life (Pišútová 1968).

The development of glassmaking continued in the first half of 19<sup>th</sup> century, when 22 glass-works were established (*Hriňová, Čaradice, Jedľové Kostoľany, Podkriváň – Dolná and Horná Bzová, Zlatníky – Stará Huta, Čabradský Vrbovok, Látky, Malý Lipník, Slánska Huta, Skýcov, Sabinov, Šibská Huta, Veľké Uherce, Zlatno, Žitná – Radiša, Drženice, Katarínska Huta, Chochoľná – Veľčice, Malužiná, Zlatníky – Kulháň, Nová Lehota*) and proceeded in the second half of 19<sup>th</sup> cent. by foundation of next 15 glass factories (*Horný Tisovník – Balážove, Sliač, Mníšek nad Popradom, Vlko, Rudno nad Hronom, Horný Tisovník – Blískavica, Kremlište, Lednické Rovne, Málinec – Hámor I., Hervartov* and others).

## Industrial revolution and capitalist entrepreneurship

<sup>9</sup> **Glazery**, connected to distribution and installing imported glass into the window and furniture, was formed as a craft in the medieval towns in the 15<sup>th</sup> -16<sup>th</sup> centuries (related to the beginnings of glassmaking in our country). Until then, in the architecture of the higher social classes, windows were glazed by small glass disks (called bow window) connected together into a lead frame. Glaziers put the glass into cabinets or even they produced mirrors. The oldest known glazing trade is from Kremnica (1579), well known glazing trades of the 17<sup>th</sup> century are from Banská Štiavnica (the oldest status from 1622), Bratislava, Modra, Gelnica and Košice. In early 19<sup>th</sup> century, glaziers worked in all towns and townlets in Slovakia. The patron of glaziers was St. Serapion. Peddlers with glass - oknári, provided glazing windows in the villages.

**Peddling a small hollow glass** (sklenkárstvo) was popular in and around glass-works in central and eastern Slovakia. Glaziers distributed goods to surrounding villages and towns - smaller species of drinking glass wrapped in a straw, in backpack on their back, or in baskets on the head. This method of trading was as popular as glazery and peddling a flat glass. Peddling a small hollow glass ceased to exist in the second half of 19<sup>th</sup> century by the gradual liquidation of small glass-works and a new way of transport by wagons and a large rail.

This period (the second half of the 19<sup>th</sup> century till 1945) is already the beginning of capitalist relations of production, which was progressively replaced by feudal relations. This period ends after the World War II. It is characterised by social, economic and technological changes that led to eliminating the number of glass factories in the area. While in the first half of the 19<sup>th</sup> century more than 30 glass factories were in service, at the end of the focused period only 5, respectively 6 were still working (Encyclopaedia of Slovakia 1980).

Wide social usage of glass in the 18<sup>th</sup> and 19<sup>th</sup> century stimulated demand of simple and functional glass products. In the line with flat glass and more complex decorated hollow glass, also blown hollow glass was produced – carafes, bottles, “muchár” - glass jar to catch the flies, eggs, glass paperweight or decorated rustic figurines. Some kinds of glass products kept the morphology of products made from blown glass in the late middle ages. The glassmaking became very close to folk fine arts with glass paintings for instance (from 19<sup>th</sup> century).

Traditional production technology was typical for many Slovak glass factories even at the beginning of the 20<sup>th</sup> century. Low technical and technological level of production was limited due to several factors that blocked its development, but mainly for competitiveness towards the highly developed glassmaking in Czech Republic.

After the World War I, the glassmaking in Slovakia found itself in a big crisis. As a result of low competitiveness, Slovak glass-works had then started to be closed one after another. The consequences of world economic crisis emerged and after the formation of the first Czechoslovak Republic (1918) even the competitiveness of Czech glass-works grew up – while comparing Slovak and Czech glass-works, Slovak found themselves at a disadvantage – for example big distance not only between Slovak glass-works and the sources of raw material that was imported from Germany or from the north of Czech Republic, but also from sale markets, which had disproportionately increased the transport costs (Slovak glass-works urged for the costs reduction) and it was subsequently reflected in the price of Slovak glass. The glass production of Czechoslovakia dropped deeply down during the post-war situation – to 48,6%, the unemployment rate had been raising rapidly from 1930, and it had reached its peak in 1933 with 33 664 unemployed workers. In 1937 the situation in glassmaking got slightly better – foreign and even national sale had grown (Krňáč 1963).

In 1930, there were 11 glass factories in Slovakia; however till the 1940s only 6 of them survived, namely glass factories in *Katarínska Huta*, *Zlatno*, *Utekáč*, *Málinec*, *Nemšová* and *Lednické Rovne*. After Slovak nationalization during 1946-1948, these factories became the basis for enterprises. They are characterized in the following chapter (except Trnava, where the enterprise was created a bit later).

After 1930 the glass factories in Hronské Rudno, Gápel, Teplička nad Váhom, Kokava nad Rimavicou were closed. Only the factories in Katarínska Huta, Zlatno, Utekáč, Málinec, Nemšová, Lednické Rovne and Kružľovská Huta (closed in 1950) were able to survive till the 1940s. On their basis were established companies in the 1950s: Slovenské závody technického skla – Bratislava, Spojené sklárne Lednické Rovné, Stredoslovenské sklárne in Poltár.

Data of the existence of glass factories are unfortunately completely unknown. We can often deduce them from the written archival sources; although the date of

origin so does the end of their activity is not known respectively it is not exact. From the previously published data follow that the longest time (concerning the time of opening and closing the glass-work) of running of glass-work was in Lesnica – Huta in Zamagurie, in Bardejov - Bardejovská Nová Ves, Nová Baňa or in Obyce, Utekáč and Stebnická Huta (over 200 years). For over 100 years, according to the mentioned data, glass-work was the livelihood for the population in 11 villages – localities (Zliechov – Gápel, Katarínska Huta, Zlatno, Sihla, Málinec, Horné Srnie, Divín, Kokava nad Rimavicou, Stará Huta, Hriňová and Čaradice).

After the World War II, we can find only torso from the Slovak glass factories.

The oldest, respectively longest running glass-work in Slovakia was in *Zlatno* (Poltár district) until recently (r. 2003), which was established in 1836. In this former local part of the Gemer, in Český Brezov, a glass-work was built in 1836 on the initiative of Juraj Zahn. It was specialized on stemware. Remarkable results reached chemist and glass inventor Dr. Lev Pantoček (irised and opalized glass, glass medals) by managing of J.Zahn. At the end of the 19<sup>th</sup> century, the factory had 3 melting furnaces; in 1891 employed 257 workers (including 28 women and 52 children) in 1911 had 350 employees (60 women). The glass factory building from 1863 is well-preserved up to this day.

Deeply rooted glass tradition is also reflected in the daily life of the rural population and in folklore. Job performances, as well as rest days have been linked to many specific customs manifestations until recently. Glassmaking thus left the major ethnographic features in the regions.

Glass-works have in each of the mentioned locations its history or presence. During the time, they had different line ranges and different levels of products, various regional relations and different impacts on the surrounding landscape; either typical mountain landscape in the past, or urban in the present situation. They also left their individual genius loci and its persistence beyond the horizon of its own existence. Due to the limited range of our paper, we are planning to pay attention to this issue in the future.

## **GLASS-WORKS IN HORNÝ ŠARIŠ REGION AS AN EXAMPLE OF THE HISTORICAL LOCATION OF GLASSMAKING IN MOUNTAIN REGIONS OF SLOVAKIA**

The glassmaking had a great importance (nationwide according to the current districts) among the all historical regions of glass production in Slovakia (map). However, the greatest importance had *Upper Šariš glass region*, including mountain area of Čergov, Busov, Ondavská vrchovina geomorphological units and trenched upon Spišsko-šarišské medzihorie.

Several factors influenced development of glass industry in this mountain region; namely geographic location and character of the natural environment, ownership and socio-economic prerequisites (cheap labour and limited employment opportunities in peripheral regions). From the all of the glassmaking regions in Slovakia, the Upper Šariš glass region and Middle Slovakia glass region of mining towns were ones of the most important until the 18<sup>th</sup> century. It is shown by the fact that in these regions was the highest number of glass-works,

volume of production was high and they were producing high-quality products. (Gasper 1969).

Bardejov, an important trade and craft centre of Upper Šariš with a strategic location on the trade route leading along river Topľa valley situated at the junction of Balkan-Baltic corridor, had an important role in the formation of glass-works. During the period of its greatest development (in the 15<sup>th</sup> century), modern techniques in the craft spread from there and thanks to privileges of a free royal city, the intensive trade movement was focused in Bardejov. In addition to the most widespread production of linen and cloth in the 15<sup>th</sup> century, glass-work is also mentioned due to its production of luxury glass and according to Gasper (1969) the glass-work existed in the period 1473-1873. Although glassmaking had not reached such importance as other types of crafts, establishing a glass-works was moved to the wider hinterland town. Bardejov was the major consumers of produced glass from the nearby glass-works.

In the 17<sup>th</sup> century, the main feudal owners: Forgach (Hertník Estate) and Rákóczi (Makovica Estate) had a significant role in the development of mountainous areas of the Upper Šariš. They established sawmills, paper-mills and other small manufactures (shingle production, burning coal, etc.) based on the use of rich wood resources. Mentioned owners of estates and their successors founded, respectively rented a piece of land in order to build glass-works – e.g. on the Makovica Estate were established glass-works in Bardejovská Nová Ves (1618), Stebnícka Huta (1641), and there are rumours that both glass-works were related by pulling down wood after the complete-tree utilization of local supplies (Frický 1966); at Hertník Estate in Livov and Livovská Huta, where also pulled down wood and in the middle of 19<sup>th</sup> century it was one of the largest area in the Upper Šariš region.

With the expansion of consumption of glass in the lower middle class of population in the 17<sup>th</sup> century also glass production had increased, especially in areas with plenty of wood. Extensive beech and maple vegetation provided wood that was used particularly for heating the furnace in the glass-works and the acquisition of potash. The sand was mined from rivers, but also cobblestones containing quartz grains were often collected. After then, they were crushed and purified. Moreover, other natural resources were important; the upper parts of watercourses provided not only supply water but also mechanical energy to running the crazing-mill while crushing silica materials. Available resources of limestone and dolomites, necessary in the production process of glass were used. Other raw materials and additives (including high-class glass sands) were imported from more distant regions of Slovakia or from abroad. Glass-works significantly exceeded the production of other products based on the wood. Relatively high demand contributed to keep production in small mountain glass-works.

The oldest glass-work with the longest running period was in *Stebnícka Huta*. Its origins date to the 17<sup>th</sup> century although the exact year of the establishment nor its founder is not known. According to some historians (Frický 1966), glass-work had been running here since 1618, later (in 1641) had been restored and it is likely that it disappeared in the early 1850s. From the Stebnícka Huta glass-work, built on the Makovica Estate have been preserved the most products in the sacred objects – Frický (1966) states four-legged candle chandelier from the church in Nižný Svidník, for instance.

The others glass-works were located in the administrative area of today's villages Kurima, Gaboltov, Bardejovská Nová Ves, Dubová.

Glass-works in Upper Šariš region were intensively built respectively renovated especially in the 18<sup>th</sup> and 19<sup>th</sup> centuries. The era of their existence still had been conditioned by the sufficiency of wood – after the wood run out, glass-work moved elsewhere.

The first mention about glass factory in *Livovská Huta* dates back to 1970. The founder and landlord was Forgach family. Its origin is probably related to the existence of a glass factory in the administrative area of Livov (1683), where the wood was pulled down along the Topľa valley to Livovská Huta in the several stages. Frický (1996) points out the glass -factories were the most important in the region because of their equipment (including glass-cutting shop, which had only 3 Slovak glass factories in the middle 19<sup>th</sup> century), glass mastery of workers coming from Czech, German and Silesian glass-works, which was reflected in the quality and diversity of products (flat glass and hollow glass, cut glass for urban customers, bottles for filling of mineral water from springs in Bardejov Spa, Cigeľka and Lipovce) and management of its landlords (e.g. development of glass factory in 1875-1895 during the lease of Gejza Kuchynka, whose family systematically run a business in glassmaking and was tied up with other glassmaking sites in Slovakia). Raw materials of the highest quality glass were imported to glass factories from Spiš, Silesia and Galicia. Besides the increasing competition of glass factories with modern equipment, at the turn of the 19<sup>th</sup> and 20<sup>th</sup> centuries, the unfavourable transport position away from the railway lines (until 1893, the nearest railway station had been in Prešov, after then the route between Prešov and Bardejov was put into operation) was one of the main factor that caused the extinction of glass factory (1903 or 1906). It significantly increased transport costs of raw materials and export of finished products. After the closing of the glass factory, the part of workers and masters was transferred to a glass factory in Kružlovská Huta.

According to Frický (1964), the middle of the 19<sup>th</sup> century, when glass factories in Stebnická Huta, Livovská Huta, Šibská Huta and Bardejov were running, is the period of the greatest expansion of glass production in the Upper Šariš region. In the 19<sup>th</sup> century, above the village Kríže, in the cadastral of Šiba and Hervartov was known existence of glass factories. The first mention about the glass-work in *Šibská Huta* in the cadastral territory of Šiba neighbouring with the cadastral territory of Kríže, dates back to 1823. At the beginning of the 1870s glass factory in *Hervartovská Huta* (about 2.5 km from the village Kríže) was established. The exact year of establishment is not known, but it is dated to 1870-1873. Glass factory thus migrated in the valley of river Slatvinec and could be the follower (successor) of Šibská Huta glass-work. From 1895 until its closing in 1912, it was tenanted by Hervartov Glass Company. This glass-work confirms the fact that not only the glass factory itself was moving, but also the workers – glassmakers from the Spiš and Šibská Huta came to Hervartovská Huta. After the closing of glass factory, they moved southward to the youngest glass factory in Upper Šariš region, to Kružlovská Huta. Despite the relatively well-equipped glass factory (including glass-cutting), access to transport nodes and routes was a serious problem of glass-factory – therefore the raw materials and finished products rode



in carriage; the raw materials were imported from the Czech Republic and Poland and the finished product were exported to Uzhgorod, Mukachevo, also to Poland and nearby cities Prešov, Košice – and it negatively affected the overall profits from production.

In the early 20<sup>th</sup> century (1903), the last glass factory in Upper Šariš region in *Kružlovská Huta* named as Marienthál or Máriadolina was established. It differs from the previous sites with its location – it was not located in the mountains, but on the alluvial plain at the mouth of river Slatvinec flowing into Topľa, near the road linking Bardejov and Poprad, about 12 km from Bardejov (railway station). It was located in a fabric of former ironwork, which have been renovated and extended, until its disestablishment in 1950. Moving the glass factory was no longer necessary, since the gas was used as a fuel. In the years 1920-1923, the production was stopped due to decline in purchasing power, lack of raw material, difficulties in transporting of raw materials and finished products, as well as expensive maintenance of glass factories. Since 1924, glass production was restored, whereby the highest growth was recorded in the 1930s, when it employed up to 130 workers. After another period of discontinuation in the 1933-1936, it was established the producing and marketing cooperative, the Máriadolina, which had produced glass during the World War II. Its main production program was centred on the outputs of hollow glass. Glass factory supplied the entire eastern Slovakia even after the end of war. After nationalization, it was joined to Lednické Rovne, but the emigration of skilled glassworkers, low profitability and competition of other Slovak and Czech glass factories caused stoppage of production in 1950 and equipment was moved to Lednické Rovne.

### **3 DEVELOPMENT OF GLASS INDUSTRY IN SLOVAKIA SINCE THE 1950s**

The World War II has significantly influenced development of glass industry in Slovakia. After the war, we can find only torso from the Slovak glass factories in Utekáč, Lednické Rovne, Nemšová, Katarínska Huta, Málinec, Zlatno, Nová Baňa, Kružlovská Huta. The total number of employees in glass industry was circa 2000, moreover the equipment of the glass factories was highly destroyed, and it was characterized by low technical performance, production and economic effectiveness.

During the 1946-1948, there was nationalization in glassmaking. Nationalization brought new progressive phase of glass production. From the 1948 until the middle of the 1980s, the value of its production increased more than 40 times and it was a branch of industry with an increasing rate of production within the industry as a whole (from 0,6% to 0,8%). At the end of the mentioned period, the production had reached almost 1,8 milliard CSK.

The cardinal renovation and development of glass industry in Slovakia became reality in the 1960s while the socialistic industrialization of Slovakia program. At this time, the new glass factories were built up, namely technical glass Bratislava – Dúbravka, glass fibres Trnava, domestic glass Poltár, and others glass factories were modernized and reconstructed, namely hollow glassware in Nemšová, domestic glass in Lednické Rovne, the change of production programme from domestic glass to basalt in Nová Baňa and thermal glass factory in Utekáč.

During the year 1975, Slovakia produced 16548 tons of fibre glass and spun glass, 113 millions of beverage glass and 119 million of conservative hollow glass (Vladár,ed. 1981). At the end of the 1970s, the Slovak glass industry shared for over 13% of national (Czechoslovak Socialist Republic) glass production. About 1/3 of Slovak production was exported (of which approximately  $\frac{1}{4}$  was exported to the then capitalist states). Specific indicators for individual companies are presented in tables 1 and 2:

**Table 1:** The number of glass industry employees in Slovakia in the 1960s and 1970s

Company	Year						
	1960	1965	1967	1970	1975	1978	1979
<b>Spojené sklárne Lednické Rovne</b>	.	1170	.	1442	1552	1689	.
<b>Stredoslovenské sklárne Poltár</b>	.	.	.	.	.	.	1840
<b>Slovenské závody technického skla Bratislava*</b>	.	1717	.	2782	3241	3299	.
<b>Skloplast Trnava</b>	.	.	327	.	1744	.	1924
<b>Skloobal Nemšová</b>	293	598	.	923	1080	1124	.

Source: Vladár, J. ed.. (1981): *Encyklopédia Slovenska V.*, 790 s.

**Table 2:** Trend in production value of glass industry in Slovakia in the 1960s and 1970s (million CSK)

Company	Year						
	1960	1965	1967	1970	1975	1978	1979
<b>Spojené sklárne Lednické Rovne</b>	.	40	.	69	86	103	.
<b>Stredoslovenské sklárne Poltár</b>	.	.	.	.	.	.	134
<b>Slovenské závody technického skla Bratislava*</b>	.	65	.	187	373	454	.
<b>Skloplast Trnava</b>	.	.	5	.	272	.	337
<b>Skloobal Nemšová</b>	17	29	.	110	192	215	.

Source: Vladár, J. ed.. (1981): *Encyklopédia Slovenska V.*, 790 s.

In the 1980s, as a latest time of centrally controlled economy, Slovak glass industry was managed by the Ministry of Industry of the Slovak Republic in Bratislava as a Directorate-General trust of glass company *Tatrasklo* with residency in Trnava. *Tatrasklo* merged 5 *national companies* (in brackets are factories that were part of national companies): *Spojené sklárne Lednické Rovne* (without divisions), *Stredoslovenské sklárne Poltár* (Poltár, Zlatno, Katarínska Huta, Málinec), *Slovenské závody technického skla Bratislava* (Kokava nad Rimavicou, Utekáč, Nová Baňa, Stará Voda – okres Cheb), *Skloplast Trnava* (without divisions) and *Skloobal Nemšová* (without divisions); with The Glass Research and Development Institute in Trenčín. Overall, in these companies and factories worked around 10000 workers and this number had increased circa two times since 1965. Before the privatization, the biggest glass factories were in Bratislava (up to 3500 employees, nearly 500 million CSK gross production), Trnava (up to 1900 employees, over 300

million), Poltár (up to 1900 employees, more than 134 million), Lednické Rovne (up to 1700, over 100 mil.) and Nemsova – up to 1200 employees, more than 200 million. (Vladár, ed. 1981).

At the end of the 1980s, another modernization and development of glass industry began. At this time, glass factories in Trnava, Nemšová, Nová Baňa, Lednické Rovne, Katarínska Huta and Málinec were reconstructed and modernized. Modernization took place also in Bratislava – Dúbravka, Utekáč and Zlatno.

## THE DEVELOPMENT OF GLASS INDUSTRY IN SLOVAKIA FROM 1989 TO THE PRESENT

In the glass industry, as well as in other industries in Slovakia, have occurred significant changes after 1989. The change in ownership structure was one of the most significant changes. State enterprises have undergone a *process of privatization*. In some cases, the process was successful (the foreign investors in many cases helped them), on the contrary in other cases it caused liquidation, respectively end of the business (eg. in Utekáč, Katarínska Huta, Zlatno, etc.). It affected mostly a domestic glass production.

During the transformation period, the *process of restructuring* of production was significant. While in the previous time, the glass (thanks to its excellent attributes) was used mainly for the production of domestic glass and decorative objects, nowadays it is used in building, chemical industry, electrical engineering, textile and other industries. Thanks to the discovery of the unknown attributes of glass and its combination with other materials, new innovation leads to the production of specialized products based on glass (safety glass, insulating materials, complex equipment as part of the technological equipment, etc.).

*The change of location factors* of glass industry was also related to the above mentioned changes. The new main factors are *consumption* (proximity to customers from the automotive industry, building, etc.) and *concentration* connected to agglomeration effects.

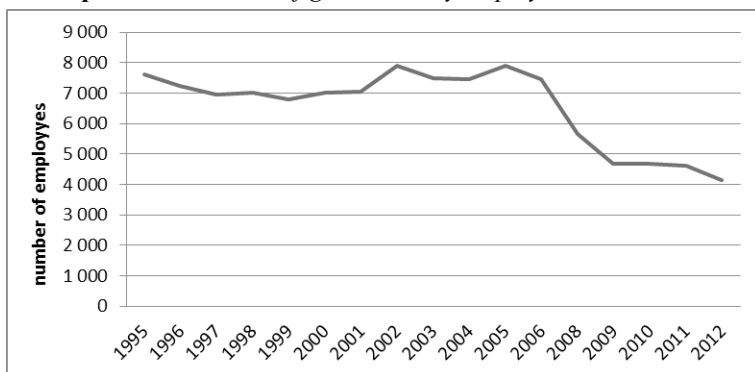
After the year 2000, two major branches have been dominating in the glass industry: *manufacture of technical glass and manufacture of domestic glass*. The two largest companies of technical glass: Skloplast (nowadays Johns Manville) and Vetropack Nemšová benefited from the global plans of foreign investors but the other two leaders of domestic glass Rona Lednické Rovne and Slovglass Poltár were national and they increasingly felt the position of foreign dealers. Unfortunately glass factory in Poltár could not take these problems in one's stride and declare bankrupt.

Unfortunately, glass industry is declining in the long term (graphs 2-4). The crisis was rather a means than a reason to uncover the problems. It is reflected not only in the case of Slovglass Poltár, but also the biggest glass factory in Czech Republic - Bohemia Crystalex Trading met the same fate. Both companies suffered mainly because of the small product and regional focus. The other reason is increased competition from cheap Chinese devices. During the crisis, the market in Slovakia has repurified and nowadays, there are four major glass companies.

The number of employees in glass industry in Slovakia was more or less stable at that time. From 1995 to 2006, we have recorded only minor fluctuations.

The year 2008 and economic crisis year 2009 were characterized by job-cut in the glass industry. The number of employees drops to 4500 and in the 2012 only 4000 workers were employed in glass industry. This index also proves the evidence that this industry belongs to small branches of industry. It employs only 1,22% of the number of employed workers in industry.

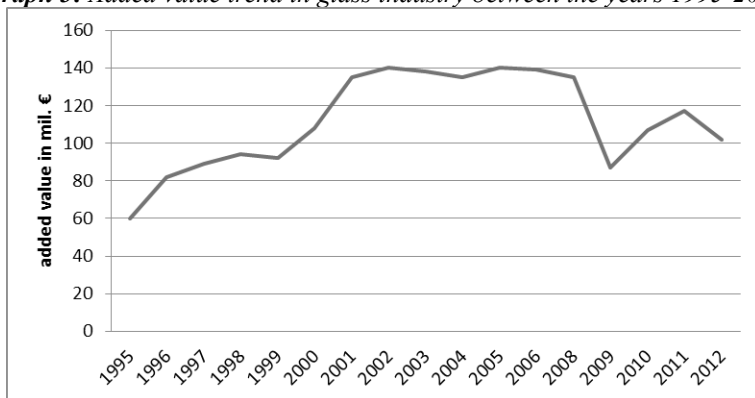
**Graph 2:** *The number of glass industry employees in 1995-2012*



Source: Industry yearbooks 1996-2013, ŠÚ SR

Looking at the economic indicators presented below, we can state that despite the drop in the number of employees until the outbreak of the crisis, the monitored indicators had grown, what can be evaluated positively in terms of increasing labour productivity.

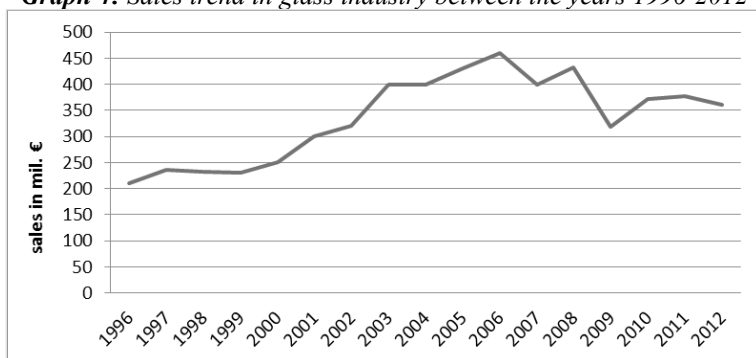
**Graph 3:** *Added value trend in glass industry between the years 1995-2012*



Source: Industry yearbooks 1996-2013, ŠÚ SR

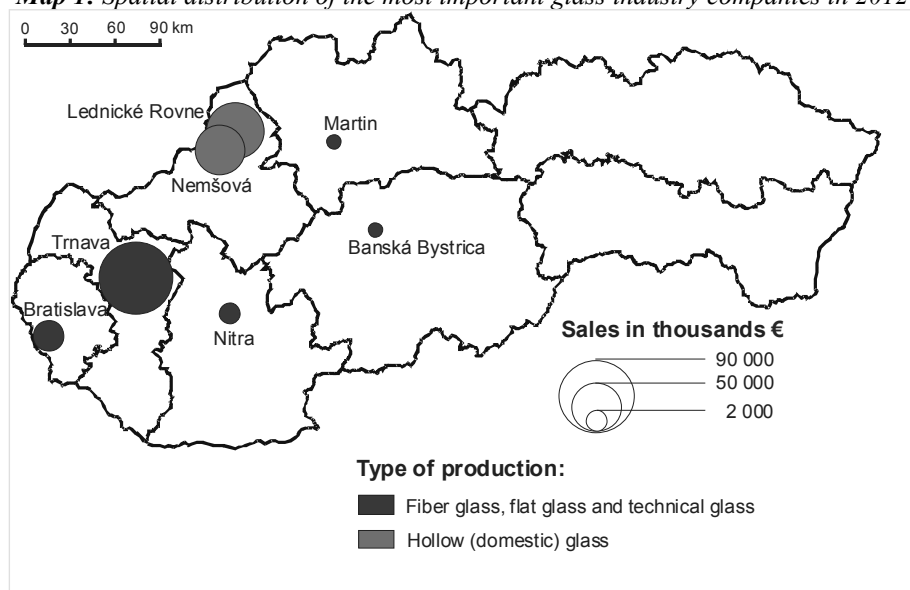
The spatial distribution of the most important glass industry companies in Slovakia is presented in the map 1. In practice, all major glass factories are located on Považie, contrary the traditional areas of glassmaking - especially surrounding of Poltár – have disappeared from the map of glass factories.

**Graph 4:** Sales trend in glass industry between the years 1996-2012



Source: Industry yearbooks 1996-2013, ŠÚ SR

**Map 1:** Spatial distribution of the most important glass industry companies in 2012



Source: TOP TREND priemyslu 2013.

## THE CHARACTERISTICS OF THE MOST IMPORTANT GLASS COMPANIES

As we have mentioned above, studied branch of industry is one of the smallest industries in Slovakia. The industry is essentially powered by five major companies: Johns Manville, Rona, Vetropack, Medical Glass and Saint-Gobain, which proportion in total sales reaches almost 70% (table 3).

*Table 3: Selected indicators of the major glass companies*

Company	Sales thousands of €)	Added value (thousands of €)	EAT (thousands of €)	Number of employees			
				2006	2007	2008	2012
				<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2012</b>
JohnsManville Slovakia, a.s. Trnava	94 015	26 774	-929	1347	1327	1323	900
Rona, a.s., Lednické Rovne	61 222	25 842	694	1461	1414	1400	1279
Vetropack, s.r.o., Nemšová	51 771	16 174	1 150	369	366	369	380
Medical Glass, a.s., Bratislava	24 161	8 744	1 754	.	.	.	n
Saint-GobainGlassolutionsNitrasklo, s.r.o., Nitra	12 690	2 674	-176	.	.	.	114
Izoglobal, s.r.o, Martin	2 257	503	423	.	.	.	n
DoMo-Glass, s.r.o., Banská Bystrica	1 646	637	-17	.	.	.	n
PPC Čab, a. s. Nové Sady*	18508	5805	317	.	313	304	**250.
AGC Tatry, a. s. Stará Ľubovňa*	2798	674	-151	.	n	n	***n
AGC Trenčín, s. r. o. Trenčín**	7861	1957	1	.	80	76	***95
Nitrasklo, a. s. Nitra**	10195	2446	-230	.	.	.	109
Izoglobal, s. r. o. Martin**	1814	307	-275	.	.	.	***33
DoMo-Glass, s. r. o. Banská Bystrica**	1559	669	147	.	.	.	***n
(Slovglass a. s. Poltár)****	6668	423	- 1532	1000	.	.	0
(Ultraglass, a. s. Medzilaborce)	(217)	(6678)	0	.	.	.	(227)

Source: *Trend Top 30.09.2004, 29.09.2005, 28.09. 2006, 27.09.2007, 2.10.2008, 1.10.2009, 30.09.2020, 29.9. 2011, 27.09.2012; 2. Revue priemyslu 2009/9.*

Notes: \* data from 2008, \*\* data from 2010, \*\*\* data from 2009, in brackets are extinct companies and currency conversion from Slovak crowns – year 2003.

**Johns Manville Slovakia a. s.** has continued in 40 years old production tradition of the Skloplast – the original company. In 2001, the US Company Johns Manville became the majority owner of the former Skloplast, a.s. and in 2003 the name of company was changed to Johns Manville Slovakia, a. s. The factory in Trnava is one of the biggest factories. It employs more than 900 employees. The company in Trnava produces mainly fibre glass used in products that can be utilized in the transport industry, building, energetics, infrastructure and the sport branch.

**Rona Lednické Rovne** is the latest major glass producer, in which the tenant in severalty are three Slovak subjects (each of them own 33,3%). The base of offer is beverage glass and dining accessories, thus restaurants and hotels are the primary partners. Even majority of Rona production is exported to foreign countries. Partnership with airlines, which has affirmed its position as world's leader in the drinking glass supply, is essential for the company. Nowadays, it employs nearly 1300 workers.

**Vetropack Nemšová** is part of the Swizz glass packing network of Vetropack Holding AG (60%) and Vetropack Austria Holding AG (40%) that has its own operating companies in other European countries, e.g. in Croatia, in Czech Republic and in Ukraine. Daughter companies are: ŠK LR CRYSTAL, s. r. o., RONA, a. s. Liberec, ZTS-LR NaJUS, s. s. RONA Bratislava, s. r. o., LR COMFORT, a.s., RONA Trading CZ, a. s. Liberec. The company is oriented on the production of packaging glass. The company produces more than 4.5 milliard of glass packaging products per year. Since the arrival to Slovakia, the parent company has invested around 70 million euros and it maintains stable sales and revenues. It is almost a monopoly in Slovakia however about half of the company's production is exported abroad.

**Medical Glass** is the succession company of Bratislava Technické Sklo Company and it is Daughter Company of Italian Stevanato Group. The collapse of the glass industry has little affected the company, whereas key customers are mainly companies from the pharmaceutical environment, for which the company produces glass ampoules, etc. Since 2008, it has significantly increased in sales and in number of employees (an increase of 60 persons).

In the east of Slovakia in Medzilaborce, the successor of the traditional manufacturing of crystal chandeliers is company **Glass LPS**. It processes the raw material of Bohemia Crystal. Up to 90% of its production is exported to Australia, the EU countries, Ukraine and Russia.

#### 4 GLASS REGIONS AND LOCALITIES

In former times, expansion of glassmaking in Slovakia was typical of the mountain areas. On the basis of the historical location of glassmaking (14 cent. - 1989) we can define 13 regions, where the glassmaking was concentrated during the 14<sup>th</sup> – 20<sup>th</sup> century – map 2. The glassmaking has persisted in several localities longer, in other parts shorter. Some of them were oriented on internal market; others were successfully oriented on export.

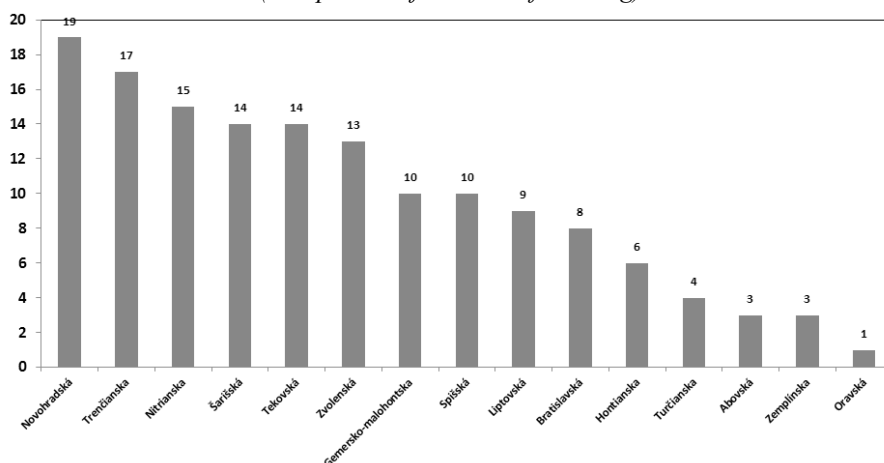
1. **Bratislava-Trnava** (7 localities<sup>10</sup>: Doľany, Píla, Jabloňové, Trnava, Bratislava, Bašovce, Drahovce)
2. **Stredopovažský** (9 localities: Zliechov – Gápeľ, Adamovce, Horné Sfnie, Chocholná – Veľčice, Dubnica nad Váhom, Nová Lehota, Selec, Nemšová, Lednické Rovne)
3. **Hornonitriansky** (7 localities: Handlová – Nová Lehota, Slatina nad Bebravou, Zlatníky – Stará Huta a Kulháň, Žitná – Radiša, Uhrovec, Valaská Belá)
4. **Tekovsko-novobanský** (12 localities: Sklené Teplice, Nová Baňa, Obyce, Tekovské Nemce, Jedľové Kostolany, Čaradice, Skýcov, Veľké Uherce, Veľčice – Huta, Rudno nad Hronom, Kľak, Trnavá Hora - Kľáčany)
5. **Hontiansky** (6 localities: Dudince, Čabradský Vrbovok, Drženice, Bzovík, Hontianske Nemce, Krupina)

<sup>10</sup> Localities are sorted by the (probable) time of origin, respectively by the first or other written evidence (from the oldest until the youngest). The numbers of region and localities (in the brackets) correspond with the map, in case of more time profiles of glass factories existence, we use letter symbols of the map (Example: Region 10, towns 1-12, in the case of town nb.1, there are localities a) (Bardejovská Nová Ves) and b) (Bardejov).

6. **Novohradsko-zvolenský** (17 localities: Stará Huta, Vigľaš, Zvolen, Zvolenská Slatina, Detva, Divín, Horné Strháre, Dobroč, Hriňová - Slanec, Podkriváň – Dolná a Horná Bzová, Látky, Sliač, Horný Tisovník – Balážove a Blískavica, Vigľašská Huta, Detvianska Huta)
7. **Gemersko-malohontský** (21 localities: Muránska Huta, Muránska Lehota, Šumiac, Utekáč, Sihla, Kokava nad Rimavicou, Rimavské Brezovo, Kociha, Zlatno, Cinobaňa – Katarínska Huta, Málinec – Dobrý Potok, Samoterč, Hámor I. a II., Vlčovo a Stupník, Šoltýska, Čierna Lehota, Lom nad Rimavicou, Poltár)
8. **Hornopovažský** (14 localities: Ľubochňa, Huty, Bešeňová, Beňadiková, Fačkov, Vyšná Boca, Tvrdosín, Malužiná, Malé Borové, Hubová, Veľké Borové, Štiavnik, Teplička nad Váhom, Čadca)
9. **Zamagursko** (6 localities: Lesnica, Reľov, Veľká Lesná, Malý Lipník, Sulín, Mníšek nad Popradom)
10. **Spíšký** (3 localities: Baldovce, Dúbrava, Teplička)
11. **Hornošarišský** (13 localities: Bardejov – Bardejovská Nová Ves a Bardejov, Dubová, Stebnícka Huta, Gaboltov, Livovská Huta, Lukov, Kurima, Kružlov – Huta, Hervartov, Šiba – Huta, Šarbov, Sabinov).
12. **Abovský** (4 localities: Medzev, Slanská Huta, Nový Salaš, Košice)
13. **Hornozemplínsky** (2 localities: Stakčín, Medzilaborce)

In the past, when the administrative units in Slovakia (as a part of the Kingdom of Hungary) were called seats and counties, the most of the Slovak glass factories came into the existence. In Slovakia, the deployment of glass factories in seats and counties was as follows – see graph 5.

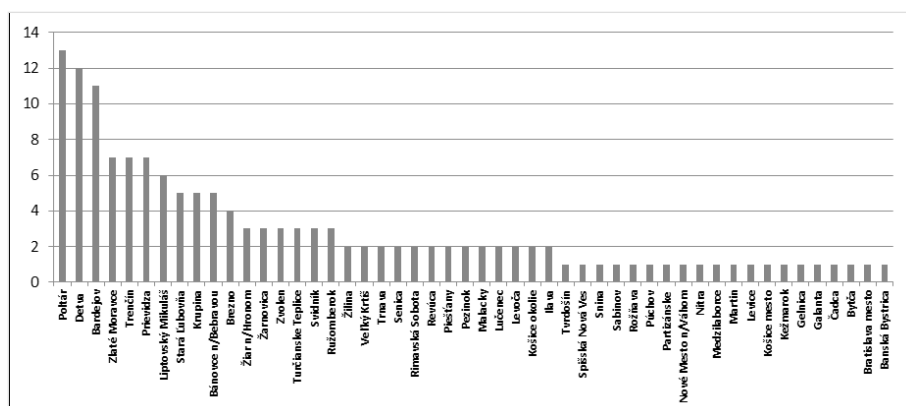
**Graph 5:** *The number of glass factories according to historical seats – counties (irrespective of the time of working)*





As we can see in the graph 5 during the historical period (until the 1950), glass factories were established in the seats – counties with more significant area of higher altitudes and thus timbered area with forests structure pertaining to a given altitudinal zonation. The glass factories were located mainly in the higher altitudes in Novohradská seat – county (19), Trenčianska and Nitrianska County. Šarišská County with 14 glass factories was dominant in the Eastern Slovakia. Only one glass factory (in Tvrdošín) belonged to Oravská County, where in the forest are dominant mainly needle-leaved trees. Glass factories were not located in the dolnozemská Counties, respectively in counties: Komárňanská, Ostrihomská; with the small area of timbers and agricultural oriented areas, where are not suitable conditions for glassmaking because of lack of beechwoods.

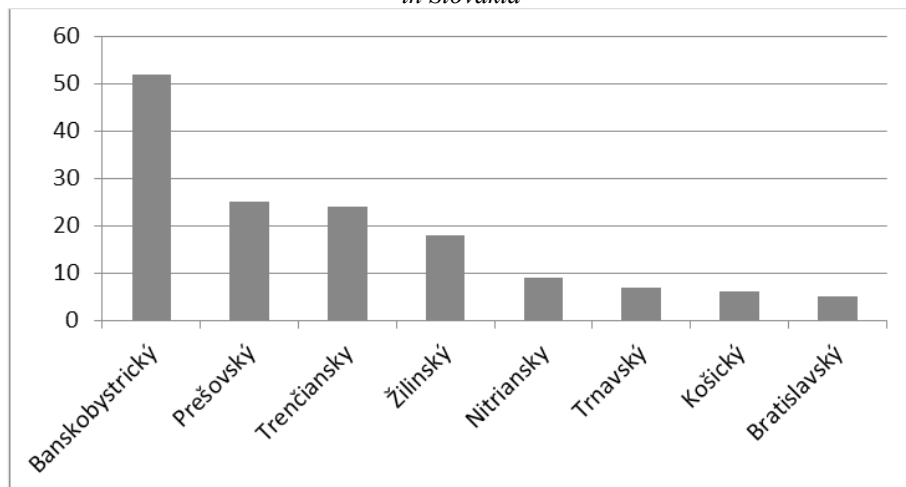
**Graph 6:** *The distribution of historical glass factories according to current districts in Slovakia*



For better spatial vision, we present historic deployment of glass factories according to current districts. Throughout history, the glassmaking was presented in 50 current districts in Slovakia (63% of districts). More than 10 glass factories were located in Poltár (13), Detva (12) a Bardejov (11) districts. More than 5 glass factories were in the next 7 current districts : Zlaté Moravce , Trenčín, Prievidza (7), Liptovský Mikuláš (6) and 5 glass factories were located in Stará Ľubovňa, Krupina and Bánovce nad Bebravou district. During the history, the only one glass factory was in 20 current districts (graph 6).

Cumulating the data of current regions, the situation is the most favourable in Banská Bystrica region (52 glass factories), Prešov region (25) and Trenčín region (24). On the contrary, they are 5 glass factories in Bratislava region, 6 in Košice region and 7 in Nitra region – graph 7.

**Graph 7:** *The distribution of historical glass factories according to current regions in Slovakia*



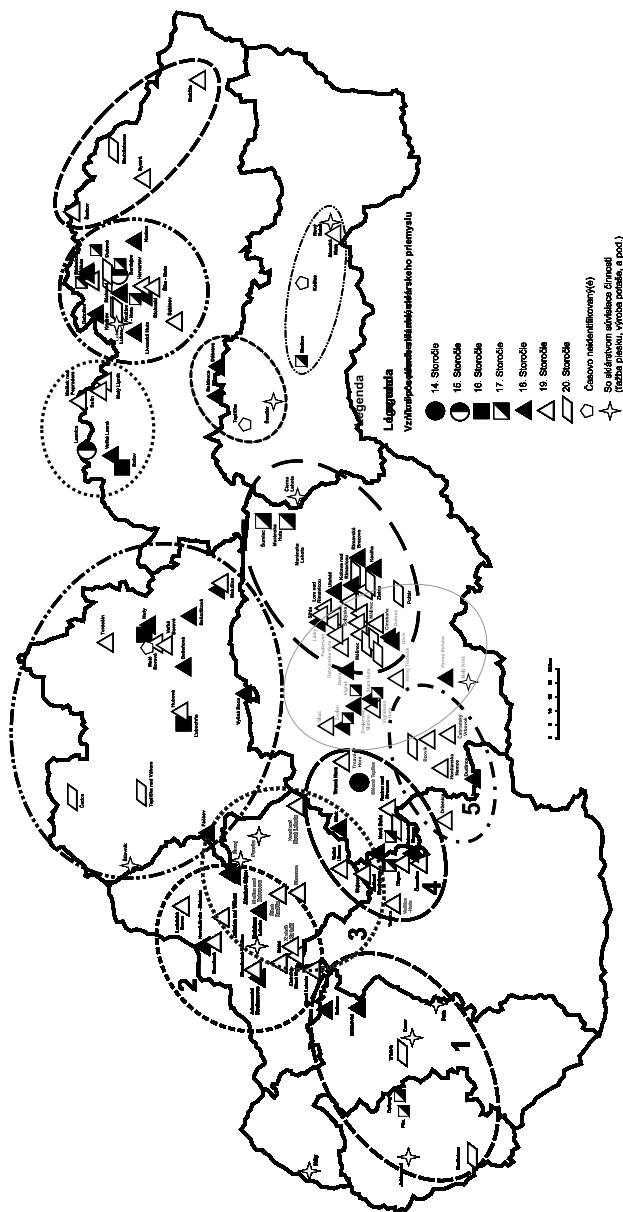
However the glassmaking have not persisted in these regions, in regard to unstoppable development of competitiveness and others location conditions, in these regions are saved many movable and immovable artefacts that are falling into disrepair. As cultural elements, they have a potential for substitution use. In case of revitalization, they can serve the purpose of the original or similar utilization as well as they can be used in cognitive tourism.

## CONCLUSION

Glass industry is one of the traditional industries in Slovakia. However the recent years cannot be considered as favourable for its development. Along with textile, clothing and leather industries, we can assign it to the sectors that have to face the stiff competition, especially from Asian countries. It is due to the fact that mentioned industries constantly require a high proportion of manual labour (mainly in the production of domestic glass).

**Map 2:** Glass regions and localities in Slovakia (14<sup>th</sup> - 20<sup>th</sup> century)

## Sklárske regióny a lokality Slovenska



To survive on the market, it is necessary to modernize production facilities, to introduce the latest production technologies, but it requests a considerable investment. The good news is that many companies (Johns Manville and Ron Lednické Rovne) have announced the modernization of production lines in the next few years. Production restoration in Slovglass Poltár is sounding more promising at that time, because in 2014 the company gained the state donation to its “rebirth”. The products of this company should be able to find a trade outlet in the Middle East, for instance. Determining programs for development and modernization that should have guaranteed the future progress are aimed at:

- the introduction of the most progressive technologies of manufacturing of glass fibres and products of them
- the modernization of production of domestic sodium and potassium glasses and leaded hollow and technical glass
- the modernization of thermal insulating materials
- the saving of energy consumption
- the reduction of import expensiveness of production
- the revitalization of old glass factories by establishing the glass open air museums, ecomuseums, etc.
- the strengthening of sole trader sector and maintaining the traditional manual production and artistic formation of glass.

### Acknowledgement

*The paper is a part of the grant projects: 1. VEGA no. 1/0346/12 „Spatial-politic systems at the beginning of the 21st century and development perspectives“ (Head of the project: prof. RNDr. Robert Ištók, PhD.), 2. VEGA č. 1/1247/12 “Socioeconomically and culturally underexposed rural landscape as a phenomenon of activation in human geography“ (Head of the project: Prof. RNDr. Peter Spišiak, CSc.).*

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