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SALT MINING IN GALICIA (1867 – 1900)

Abstract. *The purpose of the article is a generalized study of rock and table salt mining in Galicia during the Austro-Hungarian period. To achieve this goal, general historical approaches to statistical interpretation of events and phenomena, mathematical methods of modelling have been used. The Research Methodology is based on the principles of historicism, objectivity, the use of historical comparative, historical systemic, analytical synthetic, biographical, statistical methods, as well as the methods of personalization and source studies, the archival analysis of documents. The scientific novelty consists in a complex analysis of salt mining in some administrative territorial formations of Austria. The Conclusions. The development of salt deposits in Galicia along the north-eastern edge of the Carpathians had continued since the Middle Ages, but reached its prosperity during the Austro-Hungarian Empire. During the second half of the XIXth century the main producers of salt were the saltworks in Bolekhiv, Bochnia, Wieliczka, Deliatyn, Dolyna, Drohobych, Kosiv, Lacko, Lanchyn, Stebnyk and Kachytsia. In 1868 – 1880 the saltworks of Galicia, with the exception of Wieliczka (36 – 63 thousand tons) and Bochnia (15 – 20 thousand tons), produced an average of 4 – 7,5 thousand*

tons of salt per year. During the last quarter of the XIXth century 9 – 13 kg of salt was produced per 1 inhabitant, which was twice more than the natural needs of a human being for his consumption. About 50,000 tons of salt were used per year in Galicia. In addition, less than 23 thousand tons were used for livestock. The saltworks in Wieliczka and Bochnia were the largest salt producers. Wieliczka produced more salt than all other saltworks in Galicia (maximum in 1872 – more than 75,8 thousand tons). At the beginning of the 1870-ies there was the maximum of salt production, except for Lacko and Stebnyk, where there was a gradual increase in production during 25 years. During the years of 1868 – 1892, the saltworks of Galicia produced the following amount of salt (tons) per year: Bolekhiv – 5877; Bohnia – 14521; Wieliczka – 42697; Deliatyn – 4047; Dolyna – 4934; Drohobych – 4834; Kalush – 3832; Kosiv – 4329; Lacko – 6240; Lanchyn – 4032; Stebnyk – 6734. Two saltworks in Western Galicia (Bochnia, Wieliczka) produced 57% of all Galician salt production during 25 years, while nine saltworks in Eastern Galicia produced only 43%. The introduction of a salt monopoly in Austria-Hungary reduced its value and revenues to the Galician budget. If in 1832 salt exports brought in revenue of 1,4 million zol., during the 1890-ies – only 0,1 million zol. more. In 1892 the value of Galician salt was: rock salt – 4,5 million, table salt – 4 million zol. rynskykh. During the period of 1868 – 1892, almost 3 million tons of salt were produced in Galicia with a total value of 2,4 million zol. rynskykh. The average price was 0,8 zol. per 1 kg of a ready-made product. The share of Galicia in the salt industry of Austria-Hungary was 44% by volume and 43,5% – by value of products. The fact is striking, first of all, that the total monetary price of all salt products had been significantly underestimated since 1872, when its monetary price of all salt products amounted to more than 12 million zol. rynskykh, while in 1892 – it did not reach even 8 million. This price was caused by the Austro-Hungarian agreement of June 7, 1868, when the sale price of salt was lowered by 0,5 zol. rynskykh per 1 ton. In total, during 1868 – 1892 Galicia produced 2,997 million tons of salt (annually – 1,2 million tons) of all varieties worth 237 million zol. rynskykh or 9,5 million per year. Expenditures for the same period amounted to 22,6 or annually – 1 million zol. rynskykh. In general, the salt industry of Galicia was highly profitable – the income amounted to more than 210 million zol. rynskykh (8,5 million zlotys. rynskykh – per year).

Key words: salt, mine, brine, salt springs.

ВИДОБУВАННЯ СОЛІ У ГАЛИЧИНІ (1867 – 1900)

Анотація. Метою роботи є узагальнене дослідження видобування кам'яної та кухонної солей у Галичині Австро-Угорського періоду. Для досягнення мети використано загальноісторичні підходи статистичної інтерпретації подій і явищ, математичні методи моделювання. **Методологія дослідження** ґрунтується на принципах історизму, об'єктивності, застосуванні історико-порівняльного, історико-системного, аналітико-синтетичного, біографічного, статистичного методів, а також методів персоналізації та джерелознавства й архівного аналізу документів. **Наукова новизна** полягає у комплексному аналізі видобування солей в окремих адміністративно-територіальних утвореннях Австрії. **Висновки.** Розробка соляних покладів у Галичині уздовж північно-східного краю Карпат тривала з середньовіччя, але розквіту досягла у часи Австро-Угорщини. У другій половині XIX ст. основними виробниками солі були солеварні у Болахові, Бохні, Велічці, Десятині, Долині, Дрогобичі, Косові, Лацьку, Ланчині, Стебнику та Качиці. У 1868 – 1880 рр. солеварні Галичини, за винятком Велічки (36–63 тис. т) і Бохні (15–20 тис. т), продукували в середньому від 4–7,5 тис. т солі щорічно. На 1 мешканця в останній чверті XIX ст. вироблялося 9–13 кг солі, що удвічі перевищувало природні потреби людини на її споживання. Щорічно у Галичині споживалося близько 50 тис. т солі. Крім того, менше 23 тис. т використовувалося тваринництві. Найбільшими виробниками солі були солеварні у Велічці та Бохні. У Велічці продукувалося солі більше, ніж на всіх інших солеварнях Галичини разом узятих (максимум у 1872 р. – понад 75,8 тис. т). На початок 1870-х рр. припало максимальне видобування солі, окрім Лацько та Стебника, де впродовж 25 років відбувався поступовий ріст випуску продукції. Упродовж 1868 – 1892 рр. солеварні Галичини щорічно продукували (т): Болахів – 5877; Бохня – 14521; Велічка – 42697; Десятин – 4047; Долина – 4934; Дрогобич – 4834; Калущ – 3832; Косів – 4329; Лацько – 6240; Ланчин – 4032; Стебник – 6734. Дві солеварні Західної Галичини (Bohnia, Wieliczka) впродовж 25 років випустили 57 % всієї продукції солі Галичини, тоді як дев'ять

солеварень Східної Галичини – лише 43 %. Запровадження в Австро-Угорщині монополії на сіль, зменшило її вартість та надходження до бюджету Галичини. Якщо 1832 р. експорт солі приніс дохід у 1,4 млн. зол., до у 1890-х рр. – лише на 0,1 млн зол. більше. У 1892 р. вартість галицької солі сягала: кам'яної – 4,5 млн., кухонної – 4 млн зол. ринських. За період 1868 – 1892 рр. у Галичині виготовлено майже 3 млн т солі загальною вартістю 2,4 млн зол. ринських. Пересічно ціна складала 0,8 зол за 1 кг готової продукції. Питома вага Галичини у соляній промисловості Австро-Угорщини складала 44 % за об'ємом та 43,5 % – за вартістю продукції. Вважає насамперед суттєво занижена загальна грошова вартість всієї продукції солі, починаючи від 1872 р., коли грошова вартість всієї продукції солі становила понад 12 млн зол. ринських, в той час як у 1892 р. – не доходила навіть до 8 млн. Це було викликано австро-угорською угодою від 7 червня 1868 р., коли ціни продажу солі занижено на 0,5 зол. ринських за 1 т. Загалом, Галичина впродовж 1868 – 1892 рр. виробила 2,997 млн. т солі (щорічно – 1,2 млн т) всіх сортів на суму 237 млн зол. ринських або 9,5 млн на рік. Видатки за цей же період становили 22,6 або щорічно – 1 млн зол. ринських. Загалом, соляна промисловість Галичини була високоприбутковою – чистий дохід склав понад 210 млн зол. ринських (8,5 млн зол. ринських – на рік).

Ключові слова: сіль, шахта, ропа, соляні джерела.

The Problem Statement. Galician salt industry dates back several centuries. Nowadays, there is almost no complete economic history of rock salt and brine mining, their processing and production of table salt. The article focuses on a comprehensive analysis of salt production in Galicia during the Austro-Hungarian Empire, i.e., from 1867 till the beginning of World War I. This comprehensive analysis has been done for the first time.

The source base of the research consists of statistical yearbooks, manuals and reference books [“Handbuch des Lemberger Statthaltereigebietes in Galizien für das Jahr” (1862), “Rocznik Statystyki Galicyi” (1887), “Rocznik statystyki przemyslu i handlu krajowego” (1888), “Polska gospodarcza” (1932), “Przemysl i handel” (1929), “Szematyzm Królestwa Galicyi i Lodomeryi” (1877)], which provide the information on the geological conditions of salt deposits, construction and operation of salt mines and springs, statistics of mining, processing and production of ready-made products by saltworks. Distribution areas of table and potassium salt, technological and regional features of salt production, general features of the economy of salt production were covered in the monographs by M. von Kelb (1876), F. Buyak (1910), J. Semiradsky (1922), V. Klapchuk (2013). Some materials of salt production from the territories bordering on Galicia were given in the article by S. Orlyk and V. Orlyk (2019).

The purpose of the article is a comprehensive study of salt production in Galicia. To achieve this goal, general historical approaches to the statistical interpretation of the events and phenomena, mathematical methods of modelling have been used.

The Statement of the Basic Material. The development of rock salt and brine deposits has been going on since the Middle Ages. Salt production in Galicia reached its apogee during the Austro-Hungarian Empire. At that time the general management of salt mining and production was carried out by the Department of saltworks of the National financial directorate in Lviv, which was subordinated to the Ministry of Finance (Szajnocha W., 1899, pp. 111–114).

In the XXth century salt production at saltworks of Western Galicia was carried out in Wieliczka and Bochnia.

Rock salt in Wieliczka and Bochnia was mined by vertical mines at depths of 80 to 400 m, for which a column and a chamber building were built. Manual drills were used for drilling wells, and combined blasting operations with compressed gunpowder cartridges were used for digging tunnels and blasting mining material and rock.

The salt from the mines was delivered to Wieliczka and Bochnia by horses, at other saltworks – by workers, and later by – steam engines. For transportation, movement of

people in mine, lifting of water and brine, and, at last, for mine ventilation there were used horizontal workings and mine columns, which were lined with wood, rarely – with stone. The wood was best suited for the salt mine, as it was eventually impregnated with salt, which made it fireproof and resistant to all influences. In Bochnia and Wieliczka the special insurance of chambers and clearing recesses created the so-called box fastening, which consisted of several transversely superimposed and respectively connected wooden beams. The box fastening was used to catch the mining layer. The above-mentioned boxes were filled with waste rock and soaked in salt water, which made them fire-resistant and durable. In Wieliczka, where all mine excavations significantly exceeded 1,5 million m³, box fasteners played an exceptional role in preventing the collapse of underground chambers and thus protecting the lives and property of the inhabitants of the ancient mining town of Wieliczka.

Filling purificatory saltface with empty rock had been considered since 1830, but due to various difficulties no results were achieved. At the turn of the centuries, the necessary work was carried out at the functioning salt mines and the work was done on filling in the old cavities. To avoid blockage of these cavities the embedded material was made of clay and sand. This material was brought to salt mines and by a cable car on specially made wells it was lowered into the mine and delivered to the cavities. In Wieliczka salt mines there were three transport, at the same time drainage, mine columns: named after Emperor Franz Joseph I, Empress Elizabeth and Emperor Joseph II; two descents into the mine: named after Crown Prince Rudolf and Emperor Franz; three ventilation mines: named after God's Will, Lois and Gursko.

The depth of the above-mentioned mines was: Emperor Franz Joseph I – 197 m; Empress Elizabeth – 298 m; Emperor Joseph II – 302 m; Crown Prince Rudolf – 204 m; Emperor Franz – 63 m; God's Will – 148 m; Lois – 141 m; Gursko – 183 m.

There were five salt mines in Bochnia: Floris, Sutoris, Regis, Campi and Trinitatis, the first three of which were used as ventilation and entrance, Campi mine – as a mine lifting column and the latter – as ventilation and elevator. The depth of the mines was: Floris – 275 m; Sutoris – 294 m; Regis – 70 m; Campi – 413 m; Trinitatis – 216 m (Szajnocha W., 1899, pp. 111–114).

Salt industries provided certain social and living conditions for their employees. Thus, at the turn of the centuries, the construction of houses for workers started, first of all in Wieliczka – 22 houses for 72 families and in Bochnia – 8 houses for 32 families. At some salt-producing enterprises there were consumer societies, in Wieliczka water supply system was built. There were also bathrooms and rooms with heating for workers. On the positive side, it should be noted the activities of various funds in the pension fund, such as: “Bruderladen”, “Stiftungsfond”, “Heiliger Geist Spitalsfond”, “Grubenbefahrungsfond” and the others.

Wieliczka was the largest saltwork in Galicia (in terms of production and market value, advanced technologies, etc.). From a geological point of view, the salt deposits in Wieliczka contained all three kinds of salt: rock, green and bronze (brown, gold). The first two types were used for food, the third one – for industrial purposes. The rock salt was the purest and contained up to 98,7% of sodium chloride. Deposits of these three types of salt were located alternately with a total thickness of layers up to 200 m (in some places up to 364 m) in a strip up to 3 km. In general, at the end of the 1860-ies, salt reserves in the suburbs of Wieliczka were estimated (in million tons): rock salt – 87,8; green salt – 18,4; bronze salt – 3,8 (Szajnocha W., 1899, p. 60).

The salt area near Bochnia was 3,7 km long with a width of 100 m and salt thickness of 200 m in the East and 400 m – in the West. Total salt deposits were estimated at 3 million tons there. However, it should be noted that the thickness of numerous salt layers was insignificant

and in some areas it reached 3 m only. Further to the East salt deposits were widely developed near Dobromyl, which was caused by specific geological conditions of the territory. From Nyzhankovychi and Dobromyl, i.e., between the San and the Dniester, there was a wide strip of salt mines and former and operating saltworks: Guysko, Kosmanytsia, Aksmanytsia and Soltse near Nyzhankovychi; Lacko, Guchko and Tarnava near Dobromyl; Khyriv, Stariava and Bereziv near Khyriv; Stara Sil and Shumyne near Stara Sil; Bachyne near Stare Misto (Клапчук В.М., 2013, с. 234).

Lacko saltwork was the only functioning saltworks in the region, which processed natural brine. It was located 2 km from Dobromyl. The layers of raw material reached 9 – 14 m and contained up to 24,2% of table salt. In addition, the composition of the raw material included small amounts of calcium sulfate (0,492%), magnesium chloride (0,1%), calcium carbonate (0,09%) and magnesium sulfate (0,07%) (Szajnocha W., 1899, p. 64).

To the East of Lacko there was the saltwork in Stebnyk, which belonged to the next salt formation between the Dniester and Stryi rivers and included salt deposits in the following villages: Koblo Stare, Blazhiv, Sprynka, Chereshava, Lukavytsia and Vykoty near Sambir; Stupnytsia and Silets near Dubliany; Uroch, Nahuyevychi, Yasyenytsia Solna, Popeli, Banya Kotovska, Volianka, Tustanovychi, Uniatychi, Truskavets, Modrych, Kolpets, Solets and Stanelia near Drohobych; Ulychne near Stryi.

There were two saltworks in this region – in Drohobych and Stebnyk, the first of which produced table salt from natural salt solutions; in the second deposit there was salt of different composition, origin and aggregate composition. A two-meter layer of crystalline salt was located in Stebnyk at the depth of 46 m. From the depth of 51 m the second saline layer began, consisting of two layers – the upper (45 m thick), which was separated by a meter layer of sandstone from the lower layer – 18 m thick. Deeper from 113 m there was the third layer – a six-meter layer of green salt, and even deeper, from a depth of 122 m – the fourth layer, which was 97 m thick. Thus, the salt deposits in Stebnyk were 168 m, which exceeded the reserves of the world-famous Wieliczka (Klapchuk, 2013, pp. 241–242).

Near Morshyn, between the Stryi and the Limnytsia rivers, there were a number of salt deposits: near Morshyn – in Zhulyn, Lukavytsya Verkhnya, Ninov Verkhnyi and Dovhy; near Bolekhiv – Lysovychi, Voloske Selo, Tysiv, Turya Velyka, Bolekhiv, Trostianets, Solukiv and Sloboda; near Dolyna – Rakhynia, Turya, Novychka and Kadobna; near Rozhniatov – Rakhiv, Krekhovychi, Strutyn Verkhniy, Tsinyava, Rypne; Zahirne near Kalush.

At that time there were saltworks in Bolekhiv, Dolyna and Kalush. They can be attributed to a single group of salt, because their composition is similar and even annual production was more or less the same. During the last third of the XIXth century in Bolekhiv and Dolyna 5 – 7 thousand tons of salt were produced annually. In Kalush significant changes and increase in annual production were observed, especially during 1869 – 1876. After the fire of 1872, which destroyed the main building of the brewery, new technologies were introduced in Dolyna saltworks and since then it had been one of the best in Galicia. In Dolyna salt raw material (27% of pure salt) was mined at Barbara mine from the depth of 64 m.

In Kalush salt was represented by sylvin and kainite. This saltworks was first mentioned during the second half of the XVth century, and since 1809 it had been expanded and enlarged. The territory of the mines, pierced by numerous surface quarries, hindered the recovery of salt at the end of the XIXth century. However, although the recovery slowed down the volume of production, the saltworks had been constantly increasing its annual production since 1877 and in 1892 reached 4,76 tons of a ready-made product.

To the East of Kalush, between the Limnytsia and Bystrytsia Nadvirnianska rivers, there were a number of villages with well-known salt deposits: near Kalush – Adamivka, Novytsia, Uhryniv Seredniy and Staryi, Petranka; near Nebylov – Krasna; near Bohorodchan – Rosilna, Maidan, Lesivka and Khlibivka; near Solotvyno – Solotvyno, Dzvyniach, Zhuraky, Starunya; near Nadvirna – Markov, Maniava, Krychka, Hvizd, Babche, Molotkiv and Bytkiv. Between these villages, the rich deposits of potassium and magnesium salt in Rosilna, as well as the deposits of ozokerite in Dzvyniach and Starun, deserve special attention. The saltworks in Rosilna was one of the most productive in Galicia during the first half of the XIXth century, producing more than 3,000 tons of salt (during 1841 – 1851 – 3,4 – 3,5 thousand tons) (Klapchuk, 2013, pp. 242–243).

Between the Bystrytsia Nadvirnyanska and the Prut rivers, the deposits of raw salt were located in Nadvirna and Pnivya near Nadvirna; Deliatyn, Horysha, Shevelivtsi and Loeva near Deliatyn; Lanchyn, Krasniy, Sadzhavtsi and Ivanivtsi near Lanchyn; Otyniya and Oprashyna near Otyniya; Kamianka Mala near Kolomyia. Deliatyn deposit with the thickness of saline rocks up to 2000 m was considered the most powerful; raw salt could be mined from the depth of 16 – 20 m (Szajnocha W., 1899, p. 69). In Lanchyn the raw salt was mined from the depth of 53 m.

To the east of the Prut to the outskirts of Galicia there were numerous outcrops on the surface of saline rocks and raw materials: Zarichchya and Oslava near Deliatyn; Pechenizhyn, Molodiatyn, Markivka and Runhura near Pechenizhyn; Kniazhdvir and Sopiv in the outskirts of Kolomyia; Yabluniv, Maly and Velykyi Kliuchevy, Myshyn, Stopchativ, Ivanivka, Liucha, Bereziv Vyzhnyi, Banya Berezivska, Liuchky and Tekucha near Yablunov; Kosiv, Staryi Kosiv, Pistyn, Utoropy, Monastyrskie near Kosiv; Kosmach and Akreshory near Kosmach; Kutly.

Saltworks in Deliatyn, Kachytsia, Kosiv and Lanchyn functioned in Hutsul region. Until the middle of the XIXth century, in Kosiv and Deliatyn only government saltworks produced salt on a fairly large scale (up to 7,000 tons per year). However, three times more expensive salt was sold to peasants by speculators. For several days or even weeks, the locals were in long queues with their carts near the saltworks. This situation caused a general dissatisfaction because salt deposits were discovered in many other places but for the unknown reasons the deposits were forbidden to be used. In some period of time the saltworks in Utoropy and Lanchyn were restored. Large reserves of salt springs were discovered in the outskirts of Kosmach, Pistyn and Zhabye. But their use was insignificant. The restriction on the use of salt springs is confirmed by the fact that in 1810 in Eastern Galicia salt was mined at 20 of the 500 existing deposits, in 1860 – at eight deposits, and in 1875 – at nine deposits (Klapchuk, 2013, p. 252).

During the second half of the XIXth century the main salt producers were the saltworks in Deliatyn, Kachytsia, Kosiv and Lanchyn in Hutsul region. The biggest problem was at the saltworks in Deliatyn, where during 20 years the output fluctuated within 4 thousand tons or 60%, which was incomprehensible, because this saltworks was considered one of the best in terms of technology and production culture in Eastern Galicia. In general, Hutsul saltworks produced from 3 to 6 thousand tons of salt annually or up to 15 thousand tons totally. Taking into consideration the fact that in 1880 the population was about 157 thousand people, about 100 kg of salt was produced per one inhabitant. With an annual salt requirement of 3 – 3,5 kg per capita, it becomes clear that the rest of the salt was exported to other regions of Austria-Hungary or abroad.

Deliatyn saltworks did not function during 1841 – 1866. During 1871 – 1873 5,2 – 6,4 thousand tons of salt were produced there, but for unknown reasons since it had reduced production in 2 or 3 times (during 1886 – 1888 2,3 – 2,5 thousand tons of salt were produced).

According to M. von Kelb, Deliatyn gave “the richest tributaries of natural raw salt” (Kelb von M., 1876, pp. 149–156). At the same time, huge deposits of salt (up to 2000 m) were close to the surface there. That is why, its insignificant annual production was difficult to be understood. Since at the main mines – Francisco Carol and Elizabeth, raw salt was easily mined from the depth of 16 and 20 m with the volume of 18 – 22 thousand tons. In Lanchyn, salt deposits were smaller, and the saltworks, which had existed since the second half of the XVIIIth century, was completely rebuilt during 1874 – 1876. The saltworks used the natural raw salt of the main mine from the depth of 53 m. At both saltworks 80 and 60 workers worked for 12 hours daily, earning 600 – 800 zol. per year (CSHAUL, f. 146, d. 7, c. 726, pp. 18–19, 72–73). In 1862 “Franz-Josef-Salina functioned in Deliatyn and “Salineamt” functioned in Lanchyn under the leadership of Josef Haas. (Handbuch, 1862, pp. 203–205). M. von Kelb wrote about significant deposits of salt near Deliatyn (Kelb von M., 1876, pp. 135–156). 116 m³ and 106 m³ of brine, respectively, were extracted from Francis Charles mine and Elizabeth mine per day. In 1877 well-educated workers were employed at these saltworks (Szematyzm, 1877, p. 163).

838 m³ of beech, 3657 m³ of birch, alder and fir, 60 m³ of alder and aspen were used for salt boiling in Deliatyn saltworks; in Lanchyn – 106 m³ of oak, 524 m³ of beech, 6186 m³ of birch, alder and fir, 1646 m³ of alder and aspen (Rocznik statystyki, 1888, pp. 83 – 84; Klapchuk, 2013, p. 253). In 1897 the cost of a kilogram of salt was 1,5 kreutzer, and the selling price – 9 kreutzers (Gromadskyj golos, 1897, p. 10). Technical information on the activities of saltworks in Deliatyn and Lanchyn are given in Table 1 (Die Salinen Österreich, 1900, pp. 126–319).

Table 1

**Technical Information on the Activities of Saltworks
in Deliatyn and Lanchyn (compiled by the author)**

Information	Deliatyn	Lanchyn
Amount of Mines	2	1
Depth of Mines	16; 18	54
Pipelines for Raw Materials, m	Pipelines for Raw Materials	Pipelines for Raw Materials
Amount of Reservoirs for Raw Materials	4	2
Volume of Reservoirs, m ³	380,8	190,0
Amount of Furnaces for Salt Boiling	8	4
Warehouses Amount for Salt Storage	6	6
Length of Water Supply System, m	580	–
Duration of Salt Boiling, h	42,5	29
Costs for Salt Boiling:		
– raw materials, g kg	183219	148649
– firewood, m ³ ;	12378	9575
– metal, t;	2,9	2,4
– fireproof brick, pieces;	456	274
– ordinary brick, pieces.	4300	3420
Production of Salt per Worker, Working Day (12 hours), kg	12773	11251
Amount of Raw Materials per 1 ton of Salt, l	31359	32742
Average Salt Production per m ³ of Firewood, kg	472	474,2
Mining Raw Materials per Year, g kg	182489	148600
Amount of Workers	168	114
Salary Fund, krons	71168	53048

It should be noted that the saltworks was destroyed during World War I and did not resume its activities in Deliatyn.

Kosiv production (3 – 5 thousand tons) was equal to the production of salt in Kalush. Since 1869, in Kosiv rock salt mining had started. The rock salt was for export to Russia mainly (Szajnocha W., 1899, pp. 71–72).

According to Lviv Property Directorate, during 1869 – 1878, an average of more than 500 tons of rock salt were mined in Kosiv annually (Szajnocha W., 1899, p. 71; Кляпчук В.М., 2013, p. 263).

In 1910 the saltworks in Lanchyn used only natural brine to produce salt, and the saltworks in Deliatyn and Kosiv used rich stocks of brine with the salt content of 25 – 60%, located in 22 underground barns. Of these barns, only 14 were used with a total volume of 61 thousand tons (Bujak Fr., pp. 73–74). In 1923, in Deliatyn the salt deposits were discovered at the depth of 2000 m; the layer thickness – 16 – 20 m (18 – 22 thousand tons each); an annual output could reach 5 – 6 thousand tons (Siemiradzki J., p. 150). In 1913 the salt mining was 4460 and 1451 tons at saltworks in Lanchyn and Kosiv (Polska gospodarcza, 1932, p. 279; Przemysł i handel, 1929, p. 955; SAIFR, f. 58, d. 1, c. 74, p. 4; SAIFR, f. 58, d. 1, c. 81, p. 14).

In some period of time, Kosiv rock salt mine began to use brine as a result of frequent landslides over mine shafts beneath all territory of Kosiv in the form of underground streets. Underground work caused subsidence and landslides of the surrounding mountains, which led to the formation of a small pond, which gradually expanded. The rock salt mining was stopped in 1870, but before World War I, when crystalline salt was discovered in one of the mines, the government allocated funds for the construction of a mechanical mill for its grinding (Пелипейко І., 1995). Salt mining was carried out until 1915, when water from the pond reached the mine. Later on it was pumped and evaporated in a brewery equipped with three iron boilers with a total area of 195 m² (Monografia powiatu kosowkiego, 1930, pp. 25–26).

In addition to the production of salt (mainly table and partly – rock salt), also there was also practiced the use of saline solution as a medicinal substance, for which the administration of the saltworks built a salt bath with several cabins, which could be used by workers and guests (Monografia powiatu kosowkiego, 1930, p. 26). With the permission of the Directorate excursions were organized to the dungeons at the depth of 300 m. A certain fee was paid for excursions (Gąsiorowski, H., 1933, p. 259).

In Kachytsia the only saltworks operated in eastern Galicia, but no statistics or information on the chemical composition of the local salt was found (Klapchuk, 2013, p. 264).

Economic Data of Saltworks Activity in Galicia. During the second half of the XIXth century the main salt producers were the saltworks in Bolekhiv, Bochnia, Wieliczka, Deliatyn, Dolyna, Drohobych, Kosiv, Lacko, Lanchyn and Stebnyk (table 2; picture 1–2).

In accordance with the amount of salt produced (table salt), the undisputed leader was the saltworks in Stebnyk, which produced from 5,5 to 7,6 thousand tons of salt during this period annually. The saltworks in Wieliczka (28,8 – 75,9 thousand, t) and Bochnia (9,1 – 20,1 thousand, t) were the leaders among the saltworks, which produced rock salt. In general, saltworks in Galicia produced an average of 4 to 9 thousand tons of salt per year or more than 102 thousand tons in total. In 1880 more than 13 kg of salt was produced per capita, in 1890 – 9,3 kg. With an annual salt need per capita of 7,3 kg, 480,220 quintals of salt were used in Galicia. 227619 quintals of salt were used for livestock needs.

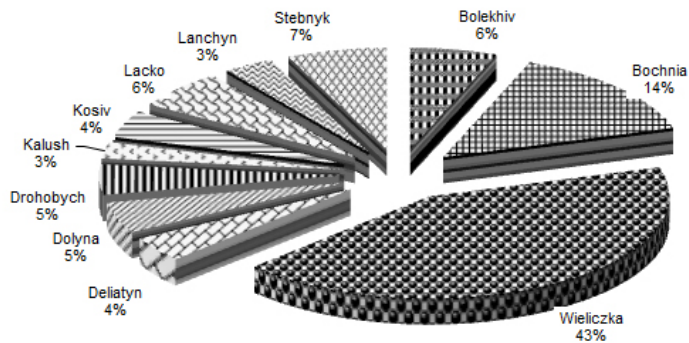
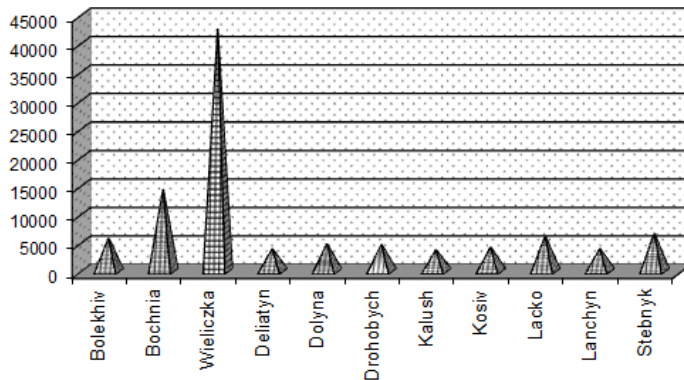
Thus, in 1890, 707839 quintals of salt were used by the Galicians as a food item and for feeding cattle (Szajnocha W., 1899, p. 108). The output of salt in the same year was 897907 quintals, which means that only 190 thousand quintals of salt were exported (Klapchuk, 2013, p. 269).

Table 2

Production of Table Salt at Saltworks in Galicia during 1868 – 1892 (compiled by the author)

Saltworks	1868–1892, totally	Average Year Production Output
Bolekhiv	146935	5877
Bochnia	363038	14522
Wieliczka	1067430	42697
Deliatyn	101190	4048
Dolyna	123353	4924
Drohobych	120852	4834
Kalush	65146	3832
Kosiv	108220	4329
Lacko	156000	6240
Lanchyn	84671	4032
Stebnyk	168352	6734

The Reference: Szajnocha W., 1899, p. 56 – 57.

**Picture 1. Salt Mining (t) at Main Saltworks (1868 – 1892)****Picture 2. Average Year Production Output in Galicia (1868–1892)**

The largest salt producers were the saltworks in Wieliczka and Bochnia. In Wieliczka there was produced more salt than at all other saltworks in Galicia (maximum in 1872 – more than 75,8 thousand tons). At the beginning of the 1870-ies there was a maximum of salt production, except for Lacko and Stebnyk, where there was a gradual increase in production during 25 years. The biggest problem was at the saltworks in Deliatyn, where the output jumped within 4,000 tons or 60% during 20 years. It is not clear what caused this situation, as this saltworks was considered one of the best in terms of technology and production culture in Eastern Galicia.

Two saltworks in Western Galicia produced 57% of all Galician salt production during 25 years, while nine saltworks in Eastern Galicia – an average of 4 – 7% each or 43% – totally.

During the Polish-Lithuanian Commonwealth, despite very primitive technical methods of mining and boiling, salt was an indisputable and great wealth of the whole region and population. Since the invasion of Galicia by Austria and the introduction of the salt monopoly, salt became exclusively the government's treasure, the subject of a tax value only, and was of no importance to the region and its population. In 20 years after the invasion of Galicia, 1,5 million zol. rynskykh were received for Galician salt. In 1832 the sale of salt abroad gave the income of 1,386 million zol. In 1891 the value of Galician salt sold abroad reached only 6 – 7 thousand zol. rynskykh (Klapchuk, 2013, p. 270).

To interpret this financial situation, we analyzed all aspects of salt production (a total cost of salt production, cost of production, selling price, total income, sales of all kinds of salt, domestic consumption, exports). The total cost of rock salt production, in parallel with the amount of its mining, was the highest in Wieliczka (239 – 4403 thousand zol. rynskykh per year). In 25 years the total cost of rock salt was 75 653 thousand zol. rynskykh or 3026 thousand zol. rynskykh per year. The value of Bochnia salt products was twice lower (858 – 1932 thousand zol. per year): in 25 years – 34 271 thousand zol. rynskykh or 1371 thousand zol. rynskykh per year. The lowest production amount led to the lowest profits at the saltworks in Kosiv. During 1868 – 1892, 250,8 thousand zol. rynskykh were received there of income, which amounted to 10 thousand zol. rynskykh per year.

During 1868 – 1892, among the saltworks where brine was mined, the largest revenues were received in Stebnyk – 15 million zol. rynskykh; Lacko – 14; Bolekhiv – 13,3.

Totally, during 25 years Galicia produced 2 997 million tons of salt (1,2 million tons per year) of all kinds at the price of 237 million zol. rynskykh or 9,5 million per year (Szajnocha W., 1899, pp. 54–55).

It is striking, first of all, that the total monetary cost of all salt products had been significantly underestimated since 1872, when the price of all salt products was more than 12 million zol. rynskykh, while in 1892 – the price did not reach even 8 million. Such a decline makes us think about prices that normalized the monetary value of all products. From the end of the XVIIIth century the monopoly sale prices of salt changed many times. Since 1868, the monopoly sale prices were usually based on the Austro-Hungarian agreement of June 7, 1868 and the laws of the Austrian monarchy and the orders of the Austrian Ministry of Finance. The above-mentioned agreement reduced the sale prices of salt for Austria by almost 5 zol. rynskykh per quintal. The above-mentioned agreement abolished the sale of salt for livestock needs.

Beginning in 1868, the selling prices of salt did not change radically in Austria. The prices changed after the introduction of the metric system (1875). The sale prices of salt of 1881 are given in Table 3.

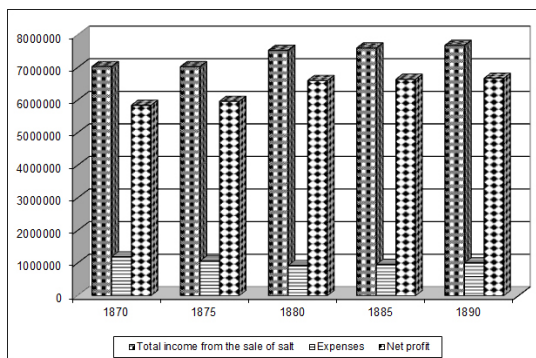
Table 3

Sale Prices of Salt in Galicia in 1881 (compiled by the author)

Producer	Kind of Salt	Price for 1 quintal, zol. rynskykh	
		For the country	For Russia
Wieliczka and Bochnia	Crystalline	17,25	–
	Mine Salt , in Lumbs (over 14 kg)	10,00	–
	Mine Salt, in Lumbs (less than 14 kg over 14 kg)	9,65	–
	Mine Salt, Ground, in Mound	10,00	–
	Green Salt, in Lumbs, (over 14 kg)	8,90	–
	Green Salt, in Lumbs, (less than 14 kg)	8,55	–
	Green Salt, Ground, in Mound	8,90	–
	Brown Salt, in Lumbs	8,50	–
	Brown Salt, Ground, in Mound	8,50	–
	Factory Salt, Grade 1	50	–
	Factory Salt, Grade 2	40	–
	Factory Salt, Grade 3	30	–
	Factory, Denatured Soda	0,94–1,04	–
	Mine Salt, in Lumbs	–	82
	Green	–	72
Wieliczka	Crystalline, Ground, Crumbs	–	65
Saltworks of Eastern Galicia	In Furnaces	9,0	–
	Grey	8,4	–
	In Mound	1,34	–
Kosiv	Rock Salt (0,5% less)	–	3,13
	Table Salt (1 % less)	–	1,79

The Reference: Rutowski T., 1887, p. 15; Szajnocha W., 1899, p. 81.

To calculate the net income from the Galician salt mines, the data on the cost of products and sales, i.e., a real income from the sale of manufactured salt, are also required. The statistical yearbooks of the last quarter of the XIXth century were used for the calculation. (Picture 3).



Picture 3. Financial Balance of Salt Mining in Galicia
(Compiled by the author; the reference: Szajnocha W., 1899, pp. 82–83).

The diagram illustrates the following data: from 1870 to 1880 the cost of salt production decreased due to reduced production of table salt during that period. Only since 1885 the cost of production increased with the production of salt simultaneously.

Totally, during 1868 – 1892, 2,997 million tons of salt were produced (annually – 1,2 million tons) of all grades at the cost of 237 million zol. rynskykh or 9,5 million per year in Galicia (Szajnocha W., 1899, pp. 54–55).

The expenditures for the same period amounted to 22,6 or 1 million zol. rynskykh per year. In general, the salt industry of Galicia was highly profitable – a net income amounted to more than 210 million zol. rynskykh (8,5 million zol. rynskykh – per year).

Due to the amount of salt production and its value, Galicia occupied a dominant position in the Austro-Hungarian Empire, producing 44% of all salt production of the monarchy.

The Conclusions. The development of salt deposits in Galicia along the north-eastern edge of the Carpathians had continued since the Middle Ages, but reached its prosperity in the Austro-Hungarian Empire. During the second half of the XIXth century the main salt producers were the saltworks in Bolekhiv, Bochnia, Wieliczka, Deliatyn, Dolyna, Drohobych, Kosiv, Lacko, Lanchyn, Stebnyk and Kachytsia.

In 1868 – 1880, the saltworks of Galicia, with the exception of Wieliczka (36 – 63 thousand tons) and Bochnia (15 – 20 thousand tons), produced an average of 4 – 7,5 thousand tons of salt per year. During the last quarter of the XIXth century 9 – 13 kg of salt were produced per 1 inhabitant, which exceeded twice the natural needs of a human being for his consumption. About 50,000 tons of salt were used in Galicia per year. In addition, less than 23 thousand tons were used for livestock.

The largest salt producers were the saltworks in Wieliczka and Bochnia. In Wieliczka there was produced more salt than at all other saltworks in Galicia (maximum in 1872 – more than 75,8 thousand tons). At the beginning of the 1870-ies there was the maximum of salt production, except for Lacko and Stebnyk, where there was a gradual increase in production during 25 years.

During 1868 – 1892, the saltworks of Galicia produced the following amount of salt (t) per year: in Bolekhiv – 5877; Bohnia – 14521; Wieliczka – 42697; Deliatyn – 4047; Dolyna – 4934; Drohobych – 4834; Kalush – 3832; Kosiv – 4329; Lacko – 6240; Lanchyn – 4032; Stebnyk – 6734.

The two saltworks in Western Galicia (Bochnia, Wieliczka) produced 57% of all Galician salt production during 25 years, while nine saltworks in Eastern Galicia produced only 43%.

The introduction of the salt monopoly in the Austro-Hungarian reduced its cost and incomes to the Galician budget. If in 1832 salt exports brought in revenue of 1,4 million zol. rynskykh, during the 1890-ies the income was only 0,1 million zol. rynskykh more. In 1892 the cost of Galician salt reached the following sum of money: rock salt – 4,5 million, table salt – 4 million zol. rynskykh.

During the period of 1868 – 1892, almost 3 million tons of salt were produced in Galicia with a total cost of 2,4 million zol. rynskykh. The average price was 0,8 zol. rynskykh per 1 kg of a ready-made product. The share of Galicia in the salt industry of the Austro-Hungarian Empire was 44% of amount and 43,5% of the production cost. It is striking, first of all, that the total monetary value of all salt products had been significantly underestimated since 1872, when its monetary value of all salt products amounted to more than 12 million zol. rynskykh, while in 1892 – it did not reach even 8 million. This was caused by the Austro-Hungarian agreement of June 7, 1868, when the sale price of salt was lowered by 0,5 zol. rynskykh per 1 t.

In general, during 1868 – 1892 Galicia produced 2,997 million tons of salt (annually – 1,2 million tons) of all varieties worth 237 million zol. rynskykh or 9,5 million per year (Szajnocha W., 1899, p. 54–55).

The expenditures for the same period amounted to 22,6 or annually – 1 million zol. rynskykh. In general, the salt industry of Galicia was highly profitable – the net income amounted to more than 210 million zol. rynskykh (8,5 million zol. rynskykh – per year).

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