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SOVIET-CZECHOSLOVAK SCIENTIFIC-TECHNICAL COOPERATION IN THE KHRUSHCHEV AND EARLY BREZHNEV ERAS

Abstract: *Economic and scientific-technical cooperation was a popular topic of research for socialist economists and political scientists during the Cold War. Already in the 1950s, a series of studies on the merits of this form of international rapprochement were written up. The outputs of these papers, however, are largely imbued with ideologized reasoning and conclusions. After the fall of the Iron Curtain, historians turned mainly to the study of the negative aspects of intra-bloc cooperation, such as show trials or environmental degradation, and the topic of scientific- technical cooperation became marginalized for decades. The aim of this article is to illustrate the impact, constraints, and evolution of the main currents of scientific-technical cooperation in the Khrushchev and early Brezhnev eras through the case of Czechoslovak-Soviet interaction. Archival sources suggest that it was the period of the 1950s and 1960s that was characterized by a fundamental transformation of the system of cooperation within the Eastern Bloc. The choice of the cooperation partners to be subjected to research is also not random. The Soviet Union and Czechoslovakia were among the countries with the strongest scientific- technical base within the Eastern Bloc, and their R&D activities were to a large extent complementary. The article seeks to propose a new periodization of the development of intra-bloc cooperation, map the main forms and fields of cooperation, and explore its impact on the economy and scientific-technical progress of both cooperation partners. The emphasis is placed on the sectors of heavy industry, nuclear physics, infrastructure, education, chemistry and other areas of science and technology that were of particular importance during the Khrushchev and Brezhnev eras. An additional research task is to determine the extent to which cooperation was implemented because of political and ideological pressures and goals, and to what extent it was a „bottom-up" activity initiated according to the genuine needs of research and manufacturing. Both micro and macro echelons of cooperation are analyzed to ensure the comprehensiveness of the present study. The first category is represented by*

individual scientists, technical staff, manufacturing companies and research institutes. At the macro level, the objectives and roles of the Communist Party of Czechoslovakia, the Communist Party of the Soviet Union, the Council for Mutual Economic Assistance, and the industrial ministries of both countries are examined. To achieve a depth of research, it was necessary to analyze a wide range of primary and secondary sources. In this respect, the fonds of the industrial ministries at the Czech National Archives were studied, supplemented by other primary sources from the Security Services Archive, the United Nations Library & Archives Geneva, and the Škoda Auto Archive. These primary sources were then complemented by the findings of both the communist-era literature, and the post-Velvet Revolution studies which offered a depoliticized critique of selected aspects of intra-bloc cooperation.

Key words: *Czechoslovakia, Soviet Union, economic cooperation, scientific-technical cooperation, Khrushchev era, Brezhnev era, Cold War, Council for Mutual Economic Assistance, Communist Party of Czechoslovakia, Communist Party of the Soviet Union.*

SOVJETSKO-ČEŠKOLOVAČKA NAUČNO-TEHNIČKA SARADNJA U HRUŠČOVOM I RANOM BREŽNJEVOM PERIODU

Apstrakt: *Ekonomska i naučno-tehnička saradnja bila je popularna tema istraživanja među socijalističkim ekonomistima i političkim naučnicima tokom Hladnog rata. Već u 1950-im godinama napisano je nekoliko studija o prednostima ovog oblika međunarodnog približavanja. Međutim, rezultati ovih radova su u velikoj meri prožeti ideologizovanim rasuđivanjima i zaključcima. Nakon pada Željezne zavese, historičari su se uglavnom okrenuli proučavanju negativnih aspekata unutarblokovske saradnje, poput pokaznih procesa ili degradacije životne sredine, dok je tema naučno-tehničke saradnje decenijama postala marginalizovana. Cilj ovog članka je ilustrovati uticaj, ograničenja i evoluciju glavnih tokova naučno-tehničke saradnje u Hruščovom i ranom Brežnjevom periodu kroz slučaj čehoslovačko-sovjetske interakcije. Arhivski izvori sugeriraju da je period 1950-ih i 1960-ih godina bio obilježen fundamentalnom transformacijom sistema saradnje unutar Istočnog bloka. Izbor partnera za saradnju koji će biti predmet istraživanja nije slučajan. Sovjetski Savez i Čehoslovačka bili su među zemljama s najjačom naučno-tehničkom bazom unutar Istočnog bloka, a njihove aktivnosti u istraživanju i razvoju u velikoj mjeri su se dopunjavale. Članak ima za cilj da predloži novu periodizaciju razvoja unutarblokovske saradnje, mapira glavne oblike i oblasti saradnje, i istraži njen uticaj na ekonomiju i naučno-tehnički napredak oba partnera u saradnji. Naglasak je stavljen na sektore teške industrije, nuklearne fizike, infrastrukture, obrazovanja, hemije i druge oblasti nauke i tehnologije koje su bile od posebnog značaja tokom Hruščovog i Brežnjevog perioda. Dodatni*

istraživački zadatak je utvrditi u kojoj mjeri je saradnja bila realizovana zbog političkih i ideoloških pritisaka i ciljeva, a u kojoj mjeri je bila aktivnost „odozdo" pokrenuta prema stvarnim potrebama istraživanja i proizvodnje. Analiziraju se i mikro i makro nivoi saradnje kako bi se osigurala sveobuhvatnost ove studije. Prva kategorija obuhvata pojedinačne naučnike, tehničko osoblje, proizvodne kompanije i istraživačke institute. Na makro nivou ispituju se ciljevi i uloge Komunističke partije Čehoslovačke, Komunističke partije Sovjetskog Saveza, Saveta za uzajamnu ekonomsku pomoć i industrijskih ministarstava obiju zemalja. Da bi se postigla dubina istraživanja, bilo je neophodno analizirati širok spektar primarnih i sekundarnih izvora. U tom smislu, proučeni su fondovi industrijskih ministarstava u Češkom nacionalnom arhivu, dopunjeni drugim primarnim izvorima iz Arhiva bezbjednosnih službi, Arhiva Ujedinjenih nacija u Ženevi i Arhiva Škode Auto. Ovi primarni izvori su zatim dopunjeni nalazima i literature iz komunističkog perioda, kao i studijama nakon Baršunaste revolucije koje su ponudile depolitizovanu kritiku odabranih aspekata unutarblokovske saradnje.

Ključne riječi: *Čehoslovačka, Sovjetski Savez, ekonomska saradnja, naučno-tehnička saradnja, Hruščovo doba, Brežnjevo doba, Hladni rat, Savet za uzajamnu ekonomsku pomoć, Komunistička partija Čehoslovačke, Komunistička partija Sovjetskog Saveza.*

Introduction

Soviet-Czechoslovak scientific-technical cooperation is one of the most popular topics of Eastern European political scientists, economists and other scholars of the communist era. However, despite the relatively detailed analysis of this question provided by Hoffmann, Němec, Dvořák and other academics, there are also uncountable opportunities for historians of the 21st century to contribute to the expansion of our understanding of this aspect of Cold War history.[1] The reason is that the vast majority of literature dealing with Soviet international cooperation is largely imbued with ideologized reasoning and conclusions. This form of distortion of the depicted reality is not limited, as one could expect, to studies of communist-era provenance, but is also identifiable in certain patterns among writers of the 1990s and later periods who were at times partial to everything that emanated from the East (consult e.g. Kaplan and

[1] J. Dvořák, *Československo-sovětská spolupráce v kosmu – Interkosmos*, Lidové nakladatelství, Prague1985; J. Němec, M. Stříbrský, et al, *Československo-sovětská hospodářská spolupráce*. Svět sovětů, Prague 1963; E. Hoffmann, *Comecon: Der gemeinsame Markt in Osteuropa*. C. W. Leske, Opladen 1961.

Borák).[2] Moreover, communist-era studies often focused narrowly on a mere description of the extent of Soviet assistance without providing a critical evaluation of its impact on the development of Czechoslovak science, technology and economy. Another impetus for the analysis of the topic of Soviet-Czechoslovak scientific-technical cooperation is the fact that existing research has only marginally covered a number of its key aspects. In this regard, one may highlight, for example, the hitherto missing detailed analysis of Czechoslovak assistance in the development of the Soviet engineering, the question of cooperation between the two states on the platforms of international organizations, or the branching of the fields and forms of cooperation in revolutionary technical disciplines.

The aim of this paper is not only to contribute to filling some of the above-mentioned historiographical gaps in the context of Soviet-Czechoslovak cooperation, but also to provide a more comprehensive and therefore more objective portrayal of the issue of intra-bloc (i.e. within the Eastern Bloc) cooperation under Khrushchev and Brezhnev. The case study of Soviet-Czechoslovak cooperation is a pragmatic choice in this respect because of the intensity of mutual ties that enabled the implementation of both one-off straightforward projects, as well as highly complex and capital-intensive forms of cooperation. In addition, both Czechoslovakia and the USSR were at the cutting edge in selected scientific disciplines and by sharing experts, know-how, funds and laboratories could achieve significant symbiotic and synergistic outputs of their scientific-research activities.

In the analysis of Soviet-Czechoslovak scientific-technical cooperation, it is appropriate to focus on several key aspects. First of all, it is necessary to characterize the specificity of the mutual ties and to address the causes of their emergence and viability. An analysis of the transformations of Soviet-Czechoslovak scientific-technical cooperation over time will help to achieve these fundamental aims. As the limited pre-consulted archives suggest, the second half of the 1950s in particular proved to be a crucial but so far unappreciated period of the construction of a new model of comprehensive and long-term cooperation between both countries. However, it needs to be recognized that although the subsequent 1960s brought a number of challenges threatening the stability of intra-bloc ties, the crisis associated with the economic recession and the stagnation of the activities of the Council for Mutual Economic Assistance (CMEA) also gave rise to fresh opportunities for the further development of Soviet-Czechoslovak cooperation.

Clarifying the general development line of Soviet-Czechoslovak ties will then enable a more objective analysis of selected fields of scientific-technical cooperation. In this respect, specific attention is due to the sector of heavy

[2] K. Kaplan, *Sovětští poradci v Československu 1949–1956*. ÚSD AV ČR, Prague 1993; M. Borák, *Výzkum perzekuce československých občanů v Sovětském svazu (1918-1956)*. Slezské zemské museum, Opava 2007.

industry that played a vital role in the Czechoslovak economy, especially until the final de-Stalinization in the first half of the 1960s. The turn of the 1950s and 1960s also enjoyed an accelerated development of collaboration in nuclear physics, which soon thereafter found a practical application in the energy sector. In this respect, the aim of the present article is to depoliticize and technicize the numerous studies on these topics published by scholars and historians over the last 75 years. In order to achieve this goal, a wide range of archival materials of Soviet, East German and Czechoslovak provenance were consulted. These sources were supplemented by the archives of East-West organizations such as the UN Economic Commission for Europe, which provided a „Western technical" perspective on the approach of socialist economies to the question of international cooperation.

Coating an alredy steel-like relationship

One of the main aims of the analysis of Soviet-Czechoslovak scientific-technical cooperation is to objectivize the existing narrative and to clarify the role of mutual flows of goods, experts and know-how for the development of socialist science, technology and economy. This task may be more difficult than one might expect, given the strong politicization of the issue and the extent of Soviet authority. As a result of these factors, Czechoslovak primary and secondary sources from the communist era analyzing cooperation with the USSR often seem to have a biased character, since it is clear that, despite considerable Soviet achievements in selected fields, the contribution of its assistance to Czechoslovak economy could not be as unilaterally positive as presented.[3]

In spite of the dubious testimonial value of the sources of communist-era provenance, the decisive influence of the USSR on the development of Czechoslovakia is an undeniable fact. Both communist-era and post-Velvet Revolution scholars agree that the Soviet Union was Czechoslovakia's largest trading partner and, along with East Germany, the main provider of scientific-technical assistance. According to the archives of Czechoslovak industrial ministries, the two economies maintained remarkably strong ties in all strategic sectors, from transport through engineering, energy, mining and metallurgy to arms production.[4] The pivotal role of the USSR is also demonstrated by the activities of Czechoslovak enterprises, which directed the majority of cooperation requirements to the USSR and the German Democratic Republic

[3] National Archives, finding aid 1109, fond 935, inventory no. 125, cartons 79-87, finding aid 1181, fond 957, inventory no. 79, carton 80.

[4] National Archives, finding aid 1188, fond 961, inventory no. 43, carton 28, finding aid 878, fond 1186, inventory no. 221, carton 257, *materiály k československé vědecko-technické spolupráci se SSSR a dalšími socialistickými státy*.

(GDR). Assistance from other socialist countries was not nearly as much in demand.[5]

The individual reasons for the development of such an intensive cooperation between Czechoslovakia and the USSR remain a question to be answered. As Hoffmann and Wilczynski in their studies indicate, the intensity of Soviet-Czechoslovak relations was determined not only by the size and strength of the Soviet economy, but also by Soviet openness to the concept of scientific-technical cooperation, which was into a great extent prompted by the ideological persuasions of the Communist Party of the Soviet Union (CPSU).[6] Soviet assistance was seen as a tool to justify communist ideology and maintain political stability and coherence in the Eastern Bloc. The capacity of the USSR to achieve this aim was then based on the large number of its experts who enjoyed considerable financial support from the Party, especially in selected areas of strategic importance. Secondary data in this regard indicate that spending on R&D in the USSR was equal to 67% of that of all CMEA members combined.[7] Thanks to this significant inflow of capital, the Soviet science often successfully reached a world-class level and therefore could act as the main Czechoslovak partner in intra-bloc scientific-technical cooperation.[8] Wilczynski suggests that another reason for the exceptional intensity of Soviet-Czechoslovak ties may have stemmed from the partially fruitful division of labor. As it turned out, the scientific-technical capacities of the Soviet Union were appropriate for basic research, while those of Czechoslovakia were more suited to applied research.[9] This complementarity proved to be an important prerequisite for the division of R&D tasks, which facilitated the further development of cooperation.

Černý adds that one of the key reasons for the successful intensification of Soviet-Czechoslovak cooperation could be the close personal relationship and shared political-economic visions of Nikita Khrushchev and Antonín Novotný, which led the communist leadership of both countries to advocate similar measures. This was the case of the shared views on the question of intra-bloc economic integration. Thanks to the authority and support of Khrushchev, both the Soviet and Czechoslovak delegations in the CMEA at times successfully promoted their vision, which led to the establishment of standing commissions and their subsequent concentration on the coordination of production and R&D

[5] National Archives, finding aid 837, fond 1149, inventory no. 30, carton 145; J. Wilczynski, *Technology in Comecon: Acceleration of Technological Progress through Economic Planning and the Market*. Palgrave Macmillan, London 1974, 268-270.
[6] J. Wilczynski, *Technology in Comecon: Acceleration of Technological Progress through Economic Planning and the Market*. Palgrave Macmillan, London 1974, 265.
[7] E. Hoffmann, *Comecon: Der gemeinsame Markt in Osteuropa*. C. W. Leske, Opladen 1961, 30-70; see also J. Wilczynski, *Technology in Comecon: Acceleration of Technological Progress through Economic Planning and the Market*. Palgrave Macmillan, London 1974.
[8] A. Uschakow, *Der Rat für gegenseitige Wirtschaftshilfe (COMECON)*. Wissenschaft und Politik, Köln 1962, 149.
[9] J. Wilczynski, *Technology in Comecon: Acceleration of Technological Progress through Economic Planning and the Market*. Palgrave Macmillan, London 1974, 269.

programs.[10] It must be admitted, however, that in the first half of the 1960s the common vision lost its strength and the emerged divergence of approaches between the two governments in many ways turned into a counterproductive phenomenon.

Although Kaplan often treats Soviet-Czechoslovak cooperation as a monolithic entity, it is possible, and probably appropriate, to further periodize it and examine its individual aspects and forms in more detail.[11] The following section seeks to propose a new time line revealing hitherto hidden milestones in the development of Soviet-Czechoslovak scientific-technical collaboration, which shed more light on the dramatic transformations of the Khrushchev and early Brezhnev eras.

The deaths of Klement Gottwald and Joseph Stalin brought fundamental changes to the nature of Soviet-Czechoslovak scientific-technical cooperation. Although the Czechoslovak communist leadership remained Stalinist until the early 1960s, the outside pressures of the Khrushchev Thaw and the stagnating economy forced the administration of Viliam Široký to support a revision of intra-bloc cooperation as early as 1953. One of the major early transformations was a partial equalization of the powers between the Soviet Union and the other socialist states. Malenkov and later Khrushchev abandoned the strictly authoritarian system of direct control, which led to the abolition of the CMEA Bureau and the suppression of the role of Soviet advisors.[12]

However, it needs to be acknowledged that although the system of intra-bloc cooperation was undergoing radical transformations in 1953-1954, specific scientific-technical projects continued in many respects in the spirit of the Stalin era. The inadaptability to the new conditions here partly stemmed from the slow penetration of the transformations into the lower strata of the economy and the existence of cooperation agreements concluded between 1948 and 1953, which were often still in force by the mid-1950s. Projects launched under their auspices could not be easily readapted to the new de-Stalinized conditions.

Further significant transformations in the system of Soviet-Czechoslovak scientific-technical cooperation were observable in 1956, when, as a result of the Hungarian Revolution, the CPSU decided to remove the rest of its politicized advisors. As it turned out, this decision led to a schism between the de-Stalinizing CPSU on the one hand and the ongoingly Stalinist Communist Party of Czechoslovakia (CPC) on the other, as the urgings of Khrushchev to withdraw the advisors from Czechoslovakia met with resistance from the Široký administration. After protracted negotiations between the two sides, the Soviet

[10] O. Černý, *1957 a 1964*. Internet Archive, February 8, 2008, retrieved August 14, 2022, from https://web.archive.org/web/20190306044431/http://www.rozhlas.cz/prezident08/prezidentskevolby/_zprava/427286; K. Kaplan, *Československo v RVHP 1949-1956*. ÚSD AV ČR, Prague 1995, 172-204.

[11] K. Kaplan, *Rada vzájemné hospodářské pomoci a Československo 1957-1967*. Karolinum, Prague 2002.

[12] K. Kaplan, *Československo v RVHP 1949-1956*. ÚSD AV ČR, Prague 1995, 182-203.

leadership finally agreed to allow a limited number of Soviet experts, especially those in the technical and organizational fields, to continue to work in Czechoslovakia.[13] However, it must be acknowledged that their power was significantly reduced. A similar transformation took place on the platform of the CMEA, where the number and authority of Soviet advisors decreased and their responsibilities were gradually assumed by the newly established standing commissions.[14]

The significant curtailment of the powers of the Soviet advisors had far-reaching consequences for the nature of Soviet-Czechoslovak cooperation. The fact that they were no longer politically untouchable forced them to formulate their opinions more carefully and initiate consultations with Czechoslovak experts and officials. This led to the introduction of a new model of Soviet-Czechoslovak cooperation based on mutual respect for each other's needs. This theory is supported by Kaplan, who indicates that permanent Soviet advisors ceased to dictate the general macro-political decisions and began to focus on narrowly defined issues of the organizational and scientific-technical character in the fields of aviation, uranium mining, optics, or engine construction.[15] As archives of the Czechoslovak Ministry of Internal Affairs (*Ministerstvo vnitra*) show, the importance of the permanent advisors continued to decline during 1956 and their role was gradually replaced by experts seconded through the CMEA or the newly established bilateral commissions for scientific-technical cooperation. As a result, by 1957 there were no more permanent advisors active on the level of Czechoslovak ministries.[16]

While many historians approach the development of Soviet-Czechoslovak cooperation as a linear process, archival findings, on the contrary, highlight its undulations, with the period 1956-1957 being one of the peaks of the positive amplitude. This is evidenced by the activities of Czechoslovak industrial ministries, which at that time began to cooperate with Soviet partners on a number of complex projects.[17] These observations are confirmed by the findings of selected Czechoslovak historians, which show that the dynamic development of Soviet-Czechoslovak cooperation at that time was one of the main factors that contributed to overcoming the economic crisis of 1956.[18]

[13] National Archives, fond Rehabilitační komise 1968-1969, sl. A. Čepička, 15.10.1968.
[14] A. Bloed, *The External Relations of the Council for Mutual Economic Assistance*. Martinus Nijhoff Publishers, London 1988, 123-124; see also K. Kaplan, *Rada vzájemné hospodářské pomoci a Československo 1957-1967*. Karolinum, Prague 2002.
[15] K. Kaplan, *Sovětští poradci v Československu 1949-1956*. ÚSD AV ČR, Prague 1993; National Archives, fond 100/24, folder 99, archival unit 1145.
[16] Security Services Archive, fond A 2/1, archival unit 1088; National Archives, fond 02/2, folder 128, archival unit 165; see also K. Kaplan, *Sovětští poradci v Československu 1949-1956*. ÚSD AV ČR, Prague 1993.
[17] National Archives, finding aid 1181, fond 957, inventory no. 79, carton 80, finding aid 878, fond 1186, inventory no. 221, carton 257.
[18] K. Kaplan, *Rada vzájemné hospodářské pomoci a Československo 1957-1967*. Karolinum, Prague 2002, 20-35.

Further evidence of the specificity of the years 1956-1957 is provided by a study of the Czechoslovak Federal Ministry of Foreign Affairs (*Federální ministerstvo zahraničních věcí*), which demonstrates that in 1957 both countries concluded a total of seven long-term framework cooperation agreements. These included conventions on the exchange of goods, on cooperation in the field of veterinary medicine and general health care, on know-how sharing between the Czechoslovak and Soviet academies of sciences, on the construction of infrastructure networks and on the exchange of students.[19] Additional archival findings reveal that these initial agreements laid an important foundation for intensifying the mutual exchange of experts and know-how in the following years. For example, in 1958, the two countries concluded a supplementary agreement specifying the conditions for the exchange of scientists and students. This resulted in a significant increase in the number of Czechoslovak and Soviet experts working in the academic sphere of the partner state. By the end of 1958, some 134 Czechoslovak nuclear physicists had been educated in the USSR and dozens of other experts were provided training in the fields of radiology, chemical industry, energy and arms production.[20]

Furthermore, based on the stimuli offered by the framework agreements of 1956-1957, individual companies and research institutes began to conclude direct bilateral cooperation agreements among themselves. Around 1957, a total of 85 institutes maintained contacts in this way. Their number continued to grow and roughly tripled by the early Brezhnev era.[21] This new form of direct contractual cooperation brought several clear benefits, including integration and de-bureaucratization, which made the realization of individual projects more effective. An example is the Czechoslovak Cotton Research Institute (*Výzkumný ústav bavlnářský*), which, thanks to direct bilateral agreements, was able to increase the number of Soviet engineers assisting with the development of new spinning mills. A total of eighteen Soviet experts, mostly from the All-Union Scientific Research Institute of Light and Textile Machinery (*Vsesoyuznyy nauchno-issledovatel'skiy institut legkogo i tekstil'nogo mashinostroyeniya*), could easily travel between the two countries and transfer scientific literature, equipment and other forms of know-how.[22]

In addition to the emergence of new forms of cooperation, there was also a boom in the fields the cooperation covered. Experts from both countries began to address new challenges brought about by the rapid progress in nuclear energy,

[19] *Československo-sovětské vztahy 1945-1960: dokumenty a materiály*. SPN, Prague 1971.
[20] National Archives, finding aid 1181, fond 957, inventory no. 63, carton 79, inventory no. 30, carton 35, finding aid 1188, fond 961, inventory no. 30, cartons 24-26, inventory no. 43, carton 28.
[21] National Archives, fond 506, inventory no. 1356, archival unit 1-21c, carton 1666, inventory no. 1360, archival unit 1-21h, carton 1667, inventory no. 1600, archival unit 21c39, carton 1815, inventory no. 406, signature 0u1, carton 458.
[22] K. J. Freeze, Unlikely Partners and the Management of Innovation in Communist Europe: A Case Study from the Czechoslovak Textile Machine Industry. *Business and Economic History*, vol. 5, 2007, 1-29.

information technology, consumer electronics, geophysics, astronomy and other scientific disciplines. To facilitate the development of cooperation in these fields, new bilateral and multilateral organizations, commissions and working groups were established, and the Soviet side provided equipment and funding for their operation. One of the strategic sectors that in the second half of the 1950s enjoyed an accelerated development of cooperation was nuclear physics and energy. In 1955, the Nuclear Physics Institute (*Ústav jaderné fyziky*) was founded with Soviet help in Řež near Prague.[23] In the following years, the Soviet side supplied the Institute with reactors and other equipment, provided training to Czechoslovak nuclear scientists and assisted in the design and construction of the first Czechoslovak nuclear power plant. This cooperation was greatly facilitated by the establishment of the Joint Institute for Nuclear Research (JINR) in 1956, which enabled Czechoslovak experts to participate in cutting-edge R&D in nuclear physics.

Although the secondary literature of the communist era, represented by the studies of Moulis, Bačkovský and Melichar, describes the development of Soviet-Czechoslovak cooperation in the following years in a comparatively successful manner, new archival findings indicate that, especially during the outbreak of the Czechoslovak economic crisis around 1962, mutual collaboration went through a period of major stagnation.[24] The cause of this phenomenon was a confluence of several negative developments at once. In the early 1960s, the entire Eastern Bloc was experiencing a political-ideological crisis linked to a lack of vision for the further development of cooperation. In addition, mineral reserves in the USSR began to run thin at that time, leading the Soviet government to increase demands for investment participation in their further extraction. The situation was not helped either by Romania's vetoing of integration proposals in the CMEA nor by the forced suspension of cooperation with China.

A gradual improvement in Soviet-Czechoslovak scientific-technical cooperation came first after 1963. The revival of constructive ties was supported at the time by the conclusion of an agreement on the establishment of a new reformed Czechoslovak-Soviet Commission for Economic and Scientific-Technical Cooperation. Although similar bodies organizing mutual cooperation had existed before, they failed to adapt to the rapidly changing environment of the globalizing market and to fully exploit the cooperation potential offered by the progress of science and technology.[25] The new Czechoslovak-Soviet

[23] National Archives, finding aid 1181, fond 957, inventory no. 79, carton 80, inventory no. 30, carton 35, záznamy o československo-sovětské spolupráci v jaderné energetice; ÚJV: Historie. retrieved August 13, 2022, from https://www.ujv.cz/cs/o-spolecnosti/historie.

[24] V. Moulis, *Vědeckotechnická spolupráce mezi ČSSR a SSSR*. Lidové nakladatelství, Prague 1971; J. Bačkovský, Vztahy československé a sovětské fyziky. *Pokroky matematiky, fyziky a astronomie*, vol. 16, issue 3, 1971, 113-114; E. Melichar, *30 rokov RVHP - výsledky a perspektívy*. Pravda, Bratislava 1978.

[25] *Československo-sovětské vztahy 1961-1971: dokumenty a materiály*. Svoboda, Prague 1975, 57.

Commission met approximately twice a year and its sub-bodies intensively worked on the coordination of R&D tasks and on the elaboration of specific projects for the exchange of know-how. Limited insight into the outputs of this strategic body is provided by Hašková, Štefek, and the archives of Czechoslovak industrial ministries, which reveal that the Commission was able to negotiate and implement large-scale projects shortly after its establishment. This was the case of the construction of a railway line from the USSR to Košice in eastern Slovakia, which was launched in 1964. Thanks to subsequent Soviet supplies of iron ore via this railway, Košice became one of the main centers of steel production in the Eastern Bloc. Similarly, the new Commission was instrumental in the completion of the Druzhba oil pipeline and the launch of the construction of the Brotherhood gas pipeline.[26]

It was also around 1963 that Soviet-Czechoslovak scientific-technical cooperation on the CMEA platform began to develop successfully after a several-year intermission. The initial impetus was the partial overcoming of long-standing disputes with Romania, which resulted in the adoption of the „Basic Principles of the International Division of Labor" at the 15th Session of the Council in 1962. This measure laid an important foundation for a further intensification of specialization and coordination of scientific-technical work.[27] Although the adoption of the Basic Principles did not result in the implementation of a comprehensive pan-CMEA coordination system, it did at least contribute to bringing more integrated forms of cooperation to the forefront of the CMEA agenda. As a result, after 1962 Czechoslovakia and the USSR began to cooperate on the integration of selected economic sectors, which was reflected, for example, in rapid progress in the coordination of energy policies on the platform of the Central Dispatching Board. Similar integration measures were initiated in the fields of organization and education. In this context, the Czechoslovak and Soviet academies of sciences elaborated a reform of the organization of Czechoslovak scientific-research activities according to the Soviet model. Analogously, the new 1966 Treaty on Cultural and Scientific Cooperation led to the reorganization of the Czechoslovak educational system and to the adoption of Soviet curricula.[28]

Although the ideologized literature from the Brezhnev era focused mainly on Soviet assistance to Czechoslovakia, it must be admitted that know-how flowed in both directions. In this regard, the mid-1960s in particular were

[26] L. Hašková, *Ropa teče přes hranice*. NPL, Prague 1963; P. Štefek, Širokorozchodná trať (ŠRT). *Stránky přátel železnic*, retrieved August 13, 2022, from http://spz.logout.cz/trate/srt.html; see also National Archives, fond MZV VA3.

[27] C. T. Saunders (ed), *East and West in the Energy Squeeze: Prospects for Cooperation*. Palgrave Macmillan, London 1980, 313-314; Council for Mutual Economic Assistance: *Basic principles of international socialist division of labor*. Council for Mutual Economic Assistance Secretariat, Moscow 1962.

[28] *Československo-sovětské vztahy 1945-1960: dokumenty a materiály*. SPN, Prague 1971, 338-339; *Československo-sovětské vztahy 1961-1971: dokumenty a materiály*. Svoboda, Prague 1975, 153-155.

characterized by a significant increase in Czechoslovak assistance to the Soviet Union. As Soviet mineral reserves dwindled, the extraction had to move to less accessible parts of Siberia. The challenges of this transformation were not only of a logistical nature, but laid also in the need to adapt the technological methods of extraction and processing to the new conditions of the harsh climate. In this context, the Czechoslovak economy provided both considerable funding as well as scientific-technical assistance to facilitate the necessary transformation of Soviet basic industries.[29] The intensification of Czechoslovak aid in the mid-1960s was also observable in other sectors. This trend was partly facilitated by the progressing inter-bloc *détente*, which enabled the import of Western know-how, its incorporation into Czechoslovak production and its further dissemination to the USSR. An example is the acquired know-how of Western IT companies, which facilitated the development of Czechoslovak measuring equipment that was later installed on Soviet satellites under the Interkosmos program. Similarly, the experience Czechoslovak engineers gained from cooperation within the International Atomic Energy Agency (IAEA) helped improve Soviet-Czechoslovak nuclear power plant construction projects.[30]

These findings suggest that although the early Brezhnev era is often regarded as the climax of Czechoslovak East-West ties, it must be admitted that Soviet-Czechoslovak scientific-technical cooperation also experienced considerable development at that time.

Rich fruits in the Soviet-Czechoslovak orchard of cooperation

Although a number of secondary sources provide a general characterization of many Soviet-Czechoslovak collaborative projects, they usually do not offer a detailed insight into their stakeholders, the causes and consequences of their implementation or their position in the broader context of Cold War history. To fill this historiographical gap, reports, analyses, surveys and other documents from archives of Soviet and Czechoslovak industrial ministries need to be consulted. The hypothesis that is examined in this section is that cooperation in selected areas took on such proportions in the Khrushchev and early Brezhnev eras that it set the course for the development of Czechoslovak science, technology and economy for many years to come. To test

[29] E. Hoffmann, *Comecon: Der gemeinsame Markt in Osteuropa*. C. W. Leske, Opladen 1961; J. Lomíček, Troubles of Socialist Economic Integration: Czechoslovakia and Joint Projects within the CMEA in 1970s and 1980s. *Prague Economic and Social History Papers*, vol. 19, issue 1, 2014, 61-74; National Archives, finding aid 1234, fond 963, inventory no. 294, cartons 210-211.

[30] E. Těšínská, *Počátky mezinárodní spolupráce v oblasti mírového využití atomové energie a účast Československa (MAAE, UNSCEAR, ICRP)*. ÚSD AV ČR, Prague 2006, 43-58; National Archives, finding aid 1181, fond 957, inventory no. 63, carton 79, inventory no. 30, carton 35, finding aid 1188, fond 961, inventory no. 30, cartons 24-26, inventory no. 43, carton 28; United Nations Library & Archives Geneva, E/ECE/SR.7/1-25, ECE annual reports 1948-1952 71; E/ECE/TRANS/SC1/71, E/ECE/TRANS/242, E/ECE/333-344: 1959.

this hypothesis, selected key Soviet-Czechoslovak cooperation projects are studied with the help of primary sources. Particular attention is paid to the flows of experts, goods, capital and know-how between the two partners and their embedment into the broader framework of the economic and scientific-technical history of the Socialist Bloc.

One of the fields of Soviet-Czechoslovak cooperation that experienced a phase of rapid development in the first half of the Khrushchev era was nuclear physics. However, it needs to be acknowledged that the rollout of the cooperation was circumspect, as in 1953-1955 there was in many ways merely a continuation of the projects initiated under Stalin. This was the case of cooperation in nuclear medicine, in the analysis of radioactive materials and in the mining and processing of uranium ores.[31] Czechoslovak archives show that an important milestone in the development of Soviet-Czechoslovak cooperation in nuclear physics was the year 1955, when the USSR pledged to assist in the establishment of independent Czechoslovak nuclear research program. The assistance offered included the preparation of project documentation, the construction of Czechoslovak research institutes and nuclear power plants, the provision of nuclear facilities, the training of Czechoslovak scientific-technical cadres, and the supply of fissile material.[32] The first Soviet experts arrived in Czechoslovakia in 1955 and soon afterwards they began training Czechoslovak scientists and helped build the Nuclear Physics Institute in Řež. The Soviet Union was also responsible for the equipment of the Institute and provided it with a VVR-S reactor and a cyclotron.[33]

However, although secondary literature often ends by listing these basic forms of assistance, archives of the Czechoslovak Ministry of Energy (*Ministerstvo energetiky*) supplemented by Tesařík show that this initial support was followed by a number of other collaborative projects. Some of these were necessary for the development of extensive supporting infrastructure, as in the case of Soviet assistance in the construction of a heavy water treatment facility and in the production of nuclear equipment, others aimed at the professionalization of Czechoslovak nuclear physics.[34] As it turned out, one of the pivotal fields of Soviet assistance in this respect was education, since it enabled the formation of the first generation of independently operating and

[31] National Archives, finding aid 835, fond 936, inventory no. 40, carton 5; D. Jančík, Vývoz československého uranu do Sovětského svazu v letech 1946-1959. *Acta Oeconomia Pragensia*, vol. 15, issue 7, 2007, 199-201; K. Kaplan, V. Pacl, *Tajný prostor Jáchymov*. ACTYS, České Budějovice 1993; J. Bačkovský, Vztahy československé a sovětské fyziky. *Pokroky matematiky, fyziky a astronomie*, vol. 16, issue 3, 1971, 113-114.

[32] National Archives, finding aid 1181, fond 957, inventory no. 30, carton 35, *materiály k československo-sovětským projektům v jaderné energetice*.

[33] National Archives, finding aid 1188, fond 961, inventory no. 29, carton 24, finding aid 1181, fond 957, inventory no. 30, carton 35; see also J. Folta, I. Janovský (eds), *Technická zařízení vědy v druhé polovině 20. století*. Společnost pro dějiny věd a techniky, Prague 2006.

[34] National Archives, finding aid 1188, fond 961, inventory no. 29, carton 24, finding aid 1181, fond 957, inventory no. 30, carton 35.

highly competent Czechoslovak nuclear physicists. Soviet support in education and training was provided both in Soviet enterprises and institutes and directly in Czechoslovakia by visiting Soviet experts. Within the former, training was delivered to the technical staff of the Czechoslovak Nuclear Research Institute at similar institutes in Moscow and Leningrad. In 1955 alone, a total of 118 Czechoslovak experts were seconded to the USSR in this respect.[35] Educational assistance was also provided to the teaching and administrative staff of the newly founded Faculty of Technical and Nuclear Physics (*Fakulta technické a jaderné fyziky*) at the Charles University, whose major task was to prepare the first batch of nuclear physicists able to conduct their own research.[36] To this end, training was also offered in many associated fields such as radiochemistry, nuclear engineering, and radioisotope utilization.[37]

The development of Soviet-Czechoslovak cooperation in nuclear physics continued in the second half of the 1950s. In 1956, the Joint Institute for Nuclear Research (JINR) was established in the Soviet Dubna. Czechoslovakia was not only one of its 11 founders, but also one of its most active members participating in a number of its research projects.[38] The USSR played a pivotal role in the development of cooperation on the JINR platform, as it initiated and organized the establishment of the Institute, as well as provided a substantial financial, technical and personnel support for its activities. The amount of Soviet financial backing was equal to about 50% of the total expenses of the JINR, which placed a disproportionate burden on the Soviet economy.[39] Thanks to this funding mechanism, the Czechoslovak science could carry out cutting-edge research projects that would have been unfeasible in the domestic environment due to their prohibitive costs.

Another clear advantage of the JINR was its ability to organize an almost pan-socialist network pooling top experts and know-how. This gave physicists from the Czechoslovak Academy of Sciences (CAS), the Faculty of Technical and Nuclear Physics, the Faculty of Mathematics and Physics (*Matematicko-fyzikální fakulta*) of Charles University and other entities a unique opportunity to

[35] National Archives, finding aid 1188, fond 961, inventory no. 29, carton 24, finding aid 1181, fond 957, inventory no. 30, carton 35; J. Folta, I. Janovský (eds), *Technická zařízení vědy v druhé polovině 20. století*. Společnost pro dějiny věd a techniky, Prague 2006.

[36] B. Tesařík, Sto let od narození českého fyzika Václava Petržílky. *Matematika–fyzika–informatika: časopis pro výuku na základních a středních školách*, vol. 14, issue 8, 2005.

[37] Státní úřad pro jadernou bezpečnost: Historie a předchůdci SÚJB. retrieved August 13, 2022, from https://www.sujb.cz/o-sujb/15-let-sujb/historie-a-predchudci-sujb.

[38] Ministerstvo školství, mládeže a tělovýchovy: SÚJV - Spojený ústav jaderných výzkumů. retrieved August 13, 2022, from https://www.msmt.cz/vyzkum-a-vyvoj-2/sujv-spojeny-ustav-jadernych-vyzkumu; E. Těšínská, *Československá jaderná a částicová fyzika: Mezi SÚJV a CERN. Pamětnická ohlédnutí za českou a slovenskou spoluprací se Spojeným ústavem jaderných výzkumů Dubna (SJÚV) a Evropskou organizací pro jaderný výzkum (CERN)*. ÚSD AV ČR, Prague 2019.

[39] *Agreement on the Establishment of a Joint Institute for Nuclear Research*, TASS report, July 11, 1958.

establish critical connections.[40] This was also the case of the Czech Technical University (*České vysoké učení technické*), which was through JINR able to cooperate with Soviet scientists from the Kapitza Institute for Physical Problems (*Institut fizicheskikh problem im. P. L. Kapitsy*) in Moscow. Thanks to Soviet provision of training, equipment and ancillary infrastructure, a revolutionary laboratory of circular microtrons was established in Prague in the framework of this cooperation.[41] A number of prominent Czechoslovak scientists, including Miroslav Vognar, Ivan Úlehla, Čestmír Šimáně and Václav Petržílka, are associated with Soviet-Czechoslovak cooperation on the JINR platform.[42] Among them it was Vognar and Šimáně who, after receiving their education and training in Dubna, returned to Czechoslovakia to assist in the establishment of the microtron laboratory. Similarly, after gaining experience in the JINR, Petržílka became Dean of the newly established Faculty of Technical and Nuclear Physics at Charles University.[43]

The key role of Soviet assistance on the JINR platform in the development of Czechoslovak nuclear physics is documented by memoirs and reflections of some of the personally involved experts. For instance, the nuclear physicist František Lehar claimed that the contribution of the USSR to Czechoslovak science through the JINR was immeasurable, as the Institute was able to break free from the influence of political ideology. According to Lehar, scientists were selected to work in Dubna on the basis of their experience and knowledge, regardless of their political affiliation.[44] Úlehla supports the conclusions of Lehar and adds that, thanks to Soviet assistance, JINR offered a unique platform for pooling the scientific-technical capacities of the Eastern Bloc, which helped to solve highly complex challenges of twentieth-century science.[45]

In addition to Soviet assistance through the JINR platform, cooperation continued to be developed on a direct bilateral basis. Czechoslovak journal *Pokroky matematiky, fyziky a astronomie* (Advances in Mathematics, Physics and Astronomy) points to the fact that the bilateral division of labor with the USSR in the field of physics was well developed in the Khrushchev era. This

[40] I. Úlehla, Dvacetpět let spolupráce matematicko-fyzikální fakulty UK se Spojeným ústavem jaderných výzkumů v Dubně. *Pokroky matematiky, fyziky a astronomie*, vol. 26, issue 6, 1981, 302.
[41] M. Vognar, Historie výstavby pražské laboratoře mikrotronu, kruhových mikrotronů MT 22 a BMT 25 a jejich provozu (podrobná zpráva), in J. Folta, I. Janovský (eds), *Technická zařízení vědy v druhé polovině 20. století*. Společnost pro dějiny věd a techniky, Prague 2006, 171-253.
[42] Joint Institute for Nuclear Research: Czech Republic. retrieved August 13, 2022, from http://www.jinr.ru/posts/map_maps/czech-republic/.
[43] M. Králová, Václav Petržílka. *Techmania Science Center*, retrieved August 13, 2022, from https://edu.techmania.cz/cs/encyklopedie/vedec/1281/petrzilka; B. Tesařík, Sto let od narození českého fyzika Václava Petržílky. *Matematika–fyzika–informatika: časopis pro výuku na základních a středních školách*, vol. 14, issue 8, 2005.
[44] F. Lehar, *O zlaté kleci a jiné vzpomínky*. Akropolis, Prague 2003, 10-11.
[45] I. Úlehla, Dvacetpět let spolupráce matematicko-fyzikální fakulty UK se Spojeným ústavem jaderných výzkumů v Dubně. *Pokroky matematiky, fyziky a astronomie*, vol. 26, issue 6, 1981, 303.

form of cooperation seemed to be beneficial for both cooperating parties, as it was often initiated mutually on the basis of a de-politicized and equal relationship. One of the pioneers of the division of labor in physics was the Soviet scientist Abraham Ioffe, who initiated the conclusion of a long-term agreement on the division of R&D tasks in thermoelectricity.[46] Soviet bilateral assistance was throughout the second half of the 1950s also initiated in formerly marginalized areas of nuclear science, such as nuclear biology and medicine. In 1957, the USSR provided training to sixteen Czechoslovak experts in these fields. In addition, the Soviet economy boosted its supplies of nuclear equipment and material for the reformed Prague Institute for the Research, Production and Utilization of Radioisotopes (*Ústav pro výzkum, výrobu a využití radioizotopů*) and for the Nuclear Research Institute in Řež.[47]

The gradual scientific-technical progress and the strengthening of the practical use of nuclear physics stimulated the development of Soviet-Czechoslovak cooperation also in the early Brezhnev era. Czechoslovak physicists continued to be among the most active members of the JINR, which enabled them to direct intra-bloc nuclear research to meet the needs of Czechoslovak science and economy. Active in this respect remained Václav Petržílka, Čestmír Šimáně and other scientists who, after assisting with the establishment of domestic Czechoslovak nuclear disciplines, repeatedly returned to Dubna to work with Soviet colleagues on proton collisions, bubble chamber phenomena, and other experiments. In 1964, a new tripartite project of Czechoslovak, Polish and Soviet scientists was launched on electronic experiments on the synchrofasotron in Dubna.[48] The successful development of Soviet-Czechoslovak collaboration in nuclear physics was followed by the intensification of mutual cooperation in related fields, including energy.

In the Khrushchev era, Soviet-Czechoslovak cooperation in the field of energy proved of strategic importance for the development of the Czechoslovak power network. This was due to several critical factors. Foremost, the projects of Soviet-Czechoslovak cooperation in energy from the turn of the Stalin and Khrushchev eras were exceptionally large in scope. As their detailed analysis reveals, they covered the modernization of the hydro and thermal energy network, the construction of new power plants, the reorganization of the energy sector and the launch of a large-scale project to link the Czechoslovak power system to those of other CMEA economies.[49] It is clear from these findings that

[46] J. Bačkovský, Vztahy československé a sovětské fyziky. *Pokroky matematiky, fyziky a astronomie*, vol. 16, issue 3, 1971, 113-114.
[47] J. Zahálka, Šedesát let Ústavu pro výzkum, výrobu a využití radioisotopů. *Radioisotopy*, vol. 20, issue 6, 1979, 921-929; *70 let Ústavu pro výzkum, výrobu a využití radioisotopů*. ÚVVVR, Prague 1989, 18; National Archives, finding aid 1181, fond 957, inventory no. 30, carton 35.
[48] Cern: International Relations: Czech Republic. retrieved August 13, 2022, from https://international-relations.web.cern.ch/stakeholder-relations/states/czech-republic.
[49] M. Galetka, Vznik a vývoj přenosové soustavy elektrické energie. *tzbinfo*, January 4, 2016, retrieved August 13, 2022, from https://energetika.tzb-info.cz/elektroenergetika/13645-vznik-a-

the foundations for the dynamic development of Soviet-Czechoslovak cooperation in the energy sector observable since the second half of the 1950s were laid at the dawn of the Khrushchev era. A number of incentives for the dynamic development of Soviet-Czechoslovak cooperation in energy were identified by experts from the Vienna-based Institute for Comparative Economic Studies, who found that one of the major reasons for Czechoslovak pro-Soviet course in the power sector was the reliability of Soviet energy supplies at favorable prices.[50] Moreover, an important impetus seemed to be the establishment of the CMEA Permanent Commission on Electric Power in 1956, which helped to develop new forms of cooperation, including multilateral division of R&D tasks and the construction of the joint CMEA grid.[51]

One of the main driving forces behind the development of Soviet-Czechoslovak cooperation in the energy sector in the second half of the 1950s turned out to be scientific-research institutes. Since the Soviet energy institutes such as the Soviet All-Union Thermal Engineering Research Institute (*Vsesoyuznyy teplotekhnicheskiy nauchno-issledovatel'skiy institut*) or the Moscow State Academy of Public Utilities and Construction (*Moskovskaya gosudarstvennaya akademiya kommunal'nogo khozyaystva i stroitel'stva*) were perceived by their Czechoslovak counterparts as authorities capable of directing the development of the entire socialist energy sector, they were requested to provide studies, directives, statutes and standards that the Czechoslovak authorities willingly adopted as guidelines for the further development of the national power system.[52]

In addition to the adoption of the Soviet energy system, Soviet assistance in specific Czechoslovak energy projects was also being expanded at the time. One of the main projects of Soviet-Czechoslovak cooperation in the second half of the 1950s was the preparation for the construction of the first Czechoslovak nuclear power plant. This cooperation began in 1955 with the establishment of the Government Committee for Research and Peaceful Use of Nuclear Energy (*Vládní výbor pro výzkum a mírové využití atomové energie*) and the Faculty of Technical and Nuclear Physics at Charles University, one of whose main tasks was to train future nuclear power plant employees.[53] In 1957, work began on the first unit of the plant. As nuclear energy was still in its infancy at that time, experts from both countries cooperated on the development of individual

vyvoj-prenosove-soustavy-elektricke-energie; C. T. Saunders (ed), *East and West in the Energy Squeeze: Prospects for Cooperation*. Palgrave Macmillan, London 1980, 313

[50] C. T. Saunders (ed), *East and West in the Energy Squeeze: Prospects for Cooperation*. Palgrave Macmillan, London 1980, 100.

[51] *Ibidem*, 319.

[52] National Archives, finding aid 1181, fond 957, inventory no. 63, carton 79, inventory no. 30, carton 35, finding aid 1188, fond 961, inventory no. 30, cartons 24-26, materiály k československé spolupráci ve stálých komisích RVHP, see also inventory no. 43, carton 28.

[53] Státní úřad pro jadernou bezpečnost: Historie a předchůdci SÚJB. retrieved August 13, 2022, from https://www.sujb.cz/o-sujb/15-let-sujb/historie-a-predchudci-sujb.

components for nuclear power stations, which included the joint design of a gas-cooled heavy-water reactor that allowed the use of Czechoslovak uranium.[54]

The extent of mutual cooperation in the development of nuclear power plants can be documented by the number of Soviet and Czechoslovak entities that participated in these large-scale projects. Significant assistance in the planning and construction of the first Czechoslovak nuclear power plant was provided by the Soviet Academy of Sciences, the LOTEP (*Leningradskoye otdeleniye Vsesoyuznogo gosudarstvennogo proyektnogo instituta Teploelektroproyekt*, Leningrad Branch of the All-Union State Design Institute Teploelektroproekt), the Central Boiler and Turbine Institute (*Tsentral'nyy kotloturbinnyy institut*), and a number of other R&D and production enterprises. On the Czechoslovak side, experts from Energoprojekt, ZVIL (*Závody V. I. Lenina*, V. I. Lenin Works), ČKD Stalingrad, ČKD Dukla, Královopolská Engineering and other enterprises and institutes joined.[55] Representatives of these entities organized an intensive cooperation not merely through mutual visits, symposia and other conventional forms, but also through more integrative channels, including the division of research tasks. Archival findings indicate that this cooperation was cost-effective for the Czechoslovak economy, as its research expenses covered only about 30% of the total costs.[56]

Although the Soviet-Czechoslovak cooperation in the energy sector was to a large extent focused on the development of nuclear power, the two countries established close cooperation also in other subfields of power generation, among which coal energy in particular stood out. At the turn of the 1950s and 1960s, the Soviet All-Union Power Engineering Institute (*Vsesoyuznyy energeticheskiy institut*) assisted with testing of scuttles and valves for the Tisová II coal-fired power plant. Soviet experts also delivered complete construction projects for the Czechoslovak Počerady and Tušimice power stations and assisted in the production of blocks for the Ledvice coal-fired power plant. In addition, the USSR was the main supplier of different technical innovations that contributed to the modernization and increased power output of a number of older power plants.[57]

In 1959, on Soviet initiative, a new project known as the Unified Energy System „Mir" was launched to further integrate the electrical transmission grids of the individual CMEA members. In this regard, the High Voltage Direct Current Power Transmission Research Institute (*Nauchno-issledovatel'skiy institut po peredache elektroenergii postoyannym tokom vysokogo napryazheniya*) in Leningrad and the Czechoslovak Energy Institute (*Energetický ústav*) cooperated on the analysis of the influence of water pollution

[54] *Ibidem*.
[55] D. Dobak, M. Mončekova, et al, *50 rokov jadrových elektrární na Slovensku*. Jadrová a vyraďovacia spoločnosť, Enel Slovenské elektrárne, 2007, 36-46.
[56] National Archives, finding aid 1181, fond 957, inventory no. 63, carton 79, inventory no. 30, carton 35, finding aid 1188, fond 961, inventory no. 30, cartons 24-26, inventory no. 43, carton 28.
[57] *Československo-sovětské vztahy 1961-1971: dokumenty a materiály*. Svoboda, Prague 1975, 46.

on the durability of various electrical insulators. Close cooperation in R&D with Soviet partners was initiated also by other Czechoslovak energy institutes and enterprises including Energotrust and Energovod.[58] In addition to these purely bilateral forms of cooperation, both partners also sought to address the development of the pan-CMEA grid in a multilateral way. In this regard, intensive cooperation was developed within the CMEA Permanent Commission on Electric Power. At the end of the 1950s, thanks to the proactive approach of the Czechoslovak and Soviet delegations, this body achieved a multilateral division of tasks in the development and construction of the unified energy system.[59]

Although secondary literature often describes Soviet-Czechoslovak cooperation in the energy sector as something consistent and linear, the Czechoslovak archives uncover a number of its evolutionary phases.[60] One of the key milestones separating two major stages of cooperation was the completion of the first phase of the Mir system in the early 1960s. As it turned out, the progressing integration of energy networks started to force CMEA members to approach energy issues in a joint cooperative spirit. This was facilitated by the establishment of the Central Dispatching Organization in 1962 with its headquarters in Prague, whose task was to manage the development and maintenance of the network. As it later turned out, it was the close multilateral collaboration on its platform that enabled the full benefits of a unified network to be realized. This included a significant reduction in the required power reserves, the suppression of system overloads and the avoidance of power outages. At this point it must be admitted that the integration of the power grid would not have been possible without significant assistance from the USSR, whose experts helped install the 400 kV lines and transformers and provided a wide range of standards and technical drawings.[61] As a result, by 1972 a total of 22 electric transmission lines had been put into operation, connecting the GDR, Bulgaria, Hungary, Poland, Czechoslovakia, Romania and the USSR.[62]

The early Brezhnev era was also characterized by a new wave of strengthening Soviet-Czechoslovak cooperation in nuclear energy. At the time,

[58] International Atomic Energy Agency: *Performance Analysis of WWER-440/230 Nuclear Power Plants*. IAEA, Vienna 1997, 17-19; National Archives, finding aid 1181, fond 957, inventory no. 63, carton 79, inventory no. 30, carton 35, finding aid 1188, fond 961, inventory no. 30, cartons 24-26.

[59] National Archives, finding aid 1181, fond 957, inventory no. 63, carton 79, inventory no. 30, carton 35, inventory no. 79, carton 80, finding aid 1188, fond 961, inventory no. 30, cartons 24-26, inventory no. 43, cartons 28-29.

[60] K. Kolovrat, F. Homola, et al, *Ekonomika energetických soustav*. SNTL, Prague 1965.

[61] National Archives, finding aid 1181, fond 957, inventory no. 63, carton 79, finding aid 1188, fond 961, inventory no. 30, cartons 24-26, 35, inventory no. 43, cartons 28-29, inventory no. 79, carton 80; M. Galetka, Vznik a vývoj přenosové soustavy elektrické energie. *tzbinfo*, January 4, 2016, retrieved August 13, 2022, from https://energetika.tzb-info.cz/elektroenergetika/13645-vznik-a-vyvoj-prenosove-soustavy-elektricke-energie.

[62] C. T. Saunders (ed), *East and West in the Energy Squeeze: Prospects for Cooperation*. Palgrave Macmillan, London 1980, 82.

both countries started to collaborate on highly complex challenges, including the development of power reactors.[63] In addition, cooperation on the construction of the first Czechoslovak nuclear power plant Jaslovské Bohunice was intensified. This was made possible by a new agreement concluded in 1966 that led to increased Soviet supplies of power equipment and enhanced assistance in research into more efficient fuel cells and fast neutron reactors.[64]

These findings demonstrate that Soviet scientific-technical assistance in the field of energy was of a considerable scope and had a far-reaching positive effect on the development of Czechoslovak science and economy.[65] It led to the elaboration of the project of the first Czechoslovak nuclear power plant, to the construction and modernization of thermal power stations, to the professionalization of Czechoslovak engineers, and to the construction of a new transmission network. In addition, a wide range of Czechoslovak enterprises, schools and research institutes received Soviet technical drawings, equipment, training, expertise and other forms of know-how.

One of the main areas of Soviet-Czechoslovak cooperation in the Cold War period turned out to be infrastructure. The reason for this was that for the communist leadership, the development of intra-bloc transport network was a tool for further integration as well as economic and political stability. At the beginning of the Khrushchev era, various projects initiated under Stalin were completed, which included an extensive restructuring of the Czechoslovak transport system along the Soviet lines, with the main emphasis on the railway network.[66] However, Czechoslovak-Soviet cooperation in infrastructure in the mid-1950s was not limited to the adoption of the Soviet model, since both economies also gradually developed a sophisticated exchange of scientific-technical know-how and other complex forms of cooperation. For instance, in the automotive sector, the Czechoslovak Automobilové závody, národní podnik, (AZNP) developed intensive cooperation with Soviet car manufacturers such as ZIL (*Zavod imeni Likhachyova*, Likhachov Plant) and GAZ (*Gorkovsky avtomobilny zavod*, Gorky Automobile Plant) as well as with Soviet scientific-research institutes, including the NAMI (*Nauchno-issledovatel'skiy avtomobil'nyy i avtomotornyy institut*, Scientific-Research Automobile and

[63] Státní úřad pro jadernou bezpečnost: Historie a předchůdci SÚJB. retrieved August 13, 2022, from https://www.sujb.cz/o-sujb/15-let-sujb/historie-a-predchudci-sujb.
[64] *Československo-sovětské vztahy 1961-1971: dokumenty a materiály*. Svoboda, Prague 1975, 190.
[65] V. Wagner, Co to je mikrotron a k čemu se hodí aneb vzpomínka na nestora české jaderné fyziky Čestmíra Šimáně. Ústav jaderné fyziky AV ČR, August 3, 2012, retrieved August 13, 2022, from http://hp.ujf.cas.cz/~wagner/popclan/historie_fyziky/Simane_mikrotron.htm; Čestmír Šimáně: Můj život mezi atomy. *CzechIndustry*, retrieved August 13, 2022, from https://www.casopisczechindustry.cz/products/cestmir-simane-muj-zivot-mezi-atomy/.
[66] Řízení letového provozu, s.p: Historie. retrieved July 16, 2016, from http://www.rlp.cz/spolecnost/profil/Stranky/historie.aspx; National Archives, finding aid 1253/01, fond 1035, inventory no. 248-254, archival unit 12889-18865, carton 65, archival unit 24653-27099, carton 71.

Engine Institute).[67] Mutual cooperation focused mainly on the development and testing of new Škoda models.[68] At the same time, collaboration in the automotive industry often took multilateral forms. For example, a trilateral cooperation between the USSR, Czechoslovakia and Hungary started on the construction of Ikarus buses and a division of labor took place between the Soviet KAMAZ (*Kamskiy avtomobilny zavod*, Kama Automobile Plant) and BelAZ (*Belaruski autamabilny zavod*, Belarusian Automobile Plant) on the one hand and the Tatra truck producer on the other.[69]

The Czechoslovak economy was also interested in the prospects of cooperation with the Soviet aviation industry. A point of particular interest for Czechoslovak engineers became the development and production of jet engines, the construction of which had a long history among Soviet enterprises. However, the exchange of know-how and blueprints could also be observed in the field of aircraft testing and air traffic control.[70] In the second half of the 1950s, the cooperation began to take on more intensive forms and started focusing on the development of Czechoslovakia's own production of high-end aircraft.[71] As a result, Czechoslovak Aero Vodochody and Avia did not merely manufacture the Soviet MiG and Ilyushin aircraft under license, but in 1959 successfully designed and produced the first Czechoslovak jet aircraft, the Aero L-29 Dolphin.[72]

At the same time, Soviet-Czechoslovak cooperation in rail transport was intensifying as the network could not keep up with the onslaught of the rapidly growing international trade. Mutual exchange of know-how and technology focused on dieselization, electrification, mechanization, automation, the introduction of variable gauge cars, the designing of railway tracks and the improvement of railway management. Emphasis was also placed on the construction of large-scale infrastructure systems that were to be the launch pad for further economic growth. In 1963, a bilateral agreement on Soviet assistance with the construction of a broad-gauge line from Uzhhorod (Ukraine) to Košice (today's Slovakia) was signed and the Common Pool of Freight Cars was

[67] Škoda Auto Archive, fond AZNP, cartons 148, 157.
[68] *Ibidem*.
[69] P. Pavlínek, *A Successful Transformation? Restructuring of the Czechoslovak Automobile Industry*. Physica Verlag, Heidelberg 2008, 46-47.
[70] J. Horník, J. Pruša, Historie, regulace a právo v letecké dopravě, role letecké dopravy v globálním světě. *Flying Revue*, July 24, 2018, from https://www.flying-revue.cz/svet-letecke-dopravy-2#:~:text=Opravdovou%20%C3%A9ru%20proudov%C3%BDch%20letadel%20v,)%20a%20Douglas%20DC%2D8.
[71] National Archives, finding aid 1286/01, fond 862, inventory no. 466, archival unit 4827-5494, carton 128.
[72] Avia Av-14. *Vojenský historický ústav*. retrieved August 13, 2022, from http://www.vhu.cz/exhibit/avia-av-14/; TÝC, P: 50 let od vzletu Avie Il-14. *Letectví a kosmonautika*, vol. 82, issue 9, 2006, 30-31; Historická letka republiky Československé: MIG 19S / AERO S 105. retrieved August 13, 2022, from http://www.historicflight.cz/vyroba/aktualni/mig-19s-aero-s-105/; Z. Hurt, P. Kučera, et al, *Ilustrovaná historie letectví*. Naše vojsko, Prague 1992.

established.[73] As it later turned out, Soviet assistance was not limited to the provision of manpower, machinery and expertise for the construction of the Uzhorod-Košice section, but the Soviet economy also helped modernize the entire Czechoslovak railway network and its experts provided training to Czechoslovak train drivers and technical staff.[74]

As findings from the Czech National Archives reveal, the Brezhnev era was also characterized by the strengthening of cooperation in new fields of infrastructure. In 1966, the two countries concluded a treaty on Soviet assistance in the construction of Czechoslovak motorways and the Prague metro. In this context, the USSR supplied prefabricated materials, experts, project documentation and specialized machinery, and provided training to Czechoslovak technicians and train drivers.[75] Last but not least, it is necessary to mention the previously discussed projects for the construction of energy infrastructure, including the joint electricity transmission network Mir as well as the Druzhba and Brotherhood pipelines.[76] Soviet contribution laid in the provision of funding and heavy equipment, in the designing of these networks and in the supply of standards and technical drawings.[77]

Summary

As this article has illustrated, the Soviet Union and its approach to international scientific-technical cooperation with other Eastern Bloc states remains a largely misunderstood phenomenon of contemporary history. The topic of international cooperation and its benefits was one of the main pillars of communist propagandist literature, and its deep-rooted politicization became reflected even in the studies of the post-Soviet period. The aim of this article was to uproot the subject from the clutches of post-Cold War trauma and to replant it in a more hard-data soil watered by new primary sources from the provenance of

[73] K. J. Kansky, Regional Transport Development and Policies in Czechoslovakia since 1945, in B. Mieczkowski (ed), *East European Transport Regions and Modes*. Martinus Nijhoff Publishers, The Hague 1980, 148; International Atomic Energy Agency: *Performance Analysis of WWER-440/230 Nuclear Power Plants*. IAEA, Vienna 1997, 17-19; National Archives, finding aid 1181, fond 957, inventory no. 63, carton 79, inventory no. 30, carton 35, finding aid 1188, fond 961, inventory no. 30, cartons 24-26.

[74] National Archives, fond 506, inventory no. 1356, archival unit 1-21c, carton 1666, fond 506, inventory no. 1600, archival unit 21c39, carton 1815, fond 506, inventory no. 1360, archival unit 1-21h, carton 1667, fond 506, inventory no. 406, signature 0u1, carton 458.

[75] National Archives, finding aid 837, fond 1149, inventory no. 30, carton 145.

[76] V. Průcha, *Hospodářské a sociální dějiny Československa 1918-1992: 2. díl. Období 1945-1992*. Doplněk, Brno 2009; M. Ernst, *Czechoslovakia and International Economic Cooperation*. Orbis, Prague 1987.

[77] L. Hašková, *Ropa teče přes hranice*. NPL, Prague 1963; T. Mikšovský, Český systém ropovodů je jedinečným technologickým dílem. *PETROLmedia*, March 16, 2016, retrieved August 13, 2022, from https://www.petrol.cz/aktuality/cesky-system-ropovodu-je-jedinecnym-technologickym-dilem-6993; see also National Archives, fond MZV VA3.

Czechoslovak, Soviet and Swiss archives. Thanks to newly consulted archival records from industrial ministries, manufacturing and foreign trade enterprises as well as research institutes, the present article unveiled new forms, development phases and projects of Soviet-Czechoslovak cooperation. Mutual contacts between the two economies were of a considerable scale and the Soviet Union turned out to be a key source of know-how, expertise, technical drawings, R&D infrastructure and financial support for Czechoslovak scientific-technical progress.

The early post-1953 era was marked by large-scale projects in the field of heavy industry, which in many cases traced their origins back to the Stalin era. However, the period of Khrushchev's leadership was not merely in the spirit of outdated Stalinist patterns of cooperation, and with the gradual de-Stalinization, the second half of the 1950s in particular proved to be a period marked by the strengthening of revolutionary forms of Soviet-Czechoslovak scientific-technical cooperation. A fresh approach to mutual projects was developed in the fields of education, medicine, and nuclear physics, and the two scientific stalwarts of the Eastern Bloc began to include other CMEA partners to seek solutions to pressing research challenges. Trilateral and other multilateral forms of cooperation were developed mainly with the participation of East Germany and Poland, with occasional inclusion of Hungary and other countries.

After a certain period of stagnation in the development of Soviet-Czechoslovak cooperation in the early 1960s, the early Brezhnev era was again characterized by the expansion of constructive and increasingly complex projects. Nuclear physics continued to be nurtured at the Joint Institute for Nuclear Research, the power grid was rapidly constructed with the assistance of the Soviet All-Union State Design Institute Teploelektroproekt, and the automotive industry flourished in cooperation between the Soviet Central Scientific Research Automobile and Automotive Engines Institute and the Czechoslovak Automobile Works, National Enterprise. In addition, the Soviet Union proved to be a strategic partner in the construction of highways, oil pipelines and metro lines, as well as in the advancement of computer technology and space research. Projects of Czechoslovak-Soviet cooperation in the Khrushchev and Brezhnev eras could be counted in thousands and it was therefore impossible to include all of them in the content of this article. Nevertheless, it can be safely concluded that mutual cooperation had a major and in many cases positive impact on the development of the Czechoslovak scientific-technical base, notwithstanding the many adverse effects of the Soviet supremacy.

Zaključak

Kao što je ovaj članak prikazao, Sovjetski Savez i njegov pristup međunarodnoj naučno-tehničkoj saradnji s drugim državama Istočnog bloka ostaje uglavnom nerazumljen fenomen savremene historije. Tema međunarodne saradnje i njenih benefita bila je jedan od glavnih stubova komunističke propagandne literature, a njena duboko ukorijenjena politizacija odrazila se čak i u studijama post-sovjetskog perioda. Cilj ovog članka bio je da oslobodi temu iz kandži posthladnoratne traume i da je ponovno smjesti u plodnija tla koja su zalivena novim primarnim izvorima iz arhiva Čehoslovačke, Sovjetskog Saveza i Švicarske. Zahvaljujući novim arhivskim podacima iz industrijskih ministarstava, preduzeća za proizvodnju i vanjsku trgovinu, kao i istraživačkih instituta, ovaj članak otkriva nove oblike, faze razvoja i projekte sovjetsko-čeho-slovačke saradnje. Uzajamni kontakti između dviju ekonomija bili su značajnog obima, a Sovjetski Savez se pokazao kao ključni izvor znanja, stručnosti, tehničkih crteža, R&D infrastrukture i finansijske podrške za čeho-slovački naučno-tehnički napredak.

Rano post-1953. razdoblje obilježeno je velikim projektima u oblasti teške industrije, koji su u mnogim slučajevima vučeni još iz Staljinove ere. Ipak, period vođstva Hruščova nije bio isključivo u duhu zastarjelih staljinističkih obrazaca saradnje, a s postepenom de-staljinizacijom, druga polovina 1950-ih posebno se pokazala kao period jačanja revolucionarnih oblika sovjetsko-čeho-slovačke naučno-tehničke saradnje. Razvijen je novi pristup zajedničkim projektima u oblastima obrazovanja, medicine i nuklearne fizike, a dva naučna oslonca Istočnog bloka počela su uključivati i druge partnere CMEA kako bi tražila rješenja za hitne istraživačke izazove. Trilateralni i drugi multilateralni oblici saradnje razvijeni su uglavnom uz učešće Istočne Njemačke i Poljske, uz povremeno uključivanje Mađarske i drugih zemalja.

Nakon određenog perioda stagnacije u razvoju sovjetsko-čeho-slovačke saradnje početkom 1960-ih, rano Brežnjevovo razdoblje ponovo je obilježeno širenjem konstruktivnih i sve složenijih projekata. Nuklearna fizika nastavljena je u Zajedničkom institutu za nuklearna istraživanja, elektroenergetska mreža brzo je izgrađena uz pomoć Sovjetskog Saveza i sveučilišnog državnog projektantskog instituta Teploelektroproekt, a automobilska industrija cvjetala je u saradnji između Sovjetskog centralnog naučno-istraživačkog instituta za automobile i motore i Čeho-slovačke automobilske tvornice, Nacionalnog preduzeća. Pored toga, Sovjetski Savez se pokazao kao strateški partner u izgradnji autoputeva, naftovoda i metro linija, kao i u napredovanju kompjuterske tehnologije i svemirskih istraživanja. Projekti čeho-slovačko-sovjetske saradnje u Hruščovljevoj i Brežnjevoj eri mogli su se brojati u hiljadama, pa je stoga bilo nemoguće uključiti sve njih u sadržaj ovog članka. Ipak, može se sa sigurnošću zaključiti da je uzajamna saradnja imala veliki, a u mnogim slučajevima pozitivan uticaj na razvoj čeho-slovačke naučno-tehničke osnove, uprkos mnogim negativnim efektima sovjetske supremacije.

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