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GEODETIC EXPORT ACTIVITIES: ASPECTS OF DEVELOPMENT

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Introduction

It is possible to distinguish three phases of export activity undertaken so far by Polish geodesists.

The first phase covers the period 1969–1973, comprising mostly Geodetic State Enterprise (PPG) activity performing pioneer services in the GDR, Czechoslovakia, Greece and Libya.

In the second phase, covering the years 1973–1982, these services were provided by the Union of Geodetic and Cartographic Enterprises GEOKART. This period was marked by dynamic growth and several large contracts were accomplished concerning the establishment of geodetic control, as well as topographic and basic mapping, utilizing up-to-date technologies developed in Poland and employing teams of Polish specialists (in total more than 1,100 persons were employed outside Poland in this period).

In the third phase, since 1982, crucial changes have taken place in these activities. Initially resulting from stagnation during the period of martial law and later caused by the political and economic transformation which started in 1989. Exports coordinated by the GEOKART Union and delivered by state-owned enterprises were taken over by various commercial entities and individual specialists within the framework of the free market of goods and services. Enterprise for Geodetic and Cartographic Export GEOKART was the direct successor of export activities of the previous Union.

This paper is concerned with the second stage and provides an introduction to the following papers in this issue, written by authors with a deep knowledge of these projects gained from their professional position and achievements at that time. In his paper *Polish export in the area of geodesy and cartography,* Jerzy Wysocki M.Sc. Eng., director general of GEOKART Union and later of GEOKART Enterprise, presents an outline of the history of this area, writing as a coordinator of works carried out and a witness of many of the events (Wysocki,

[1] He participated as a scientific consultant for the export activities of PPG, GEOKART Union and GEOKART Enterprise carried out in Iraq, Iran, Kuwait, Libya, Syria, Afghanistan, Nigeria and other countries.

2009). The third paper *The map of Baghdad* contains a description of a little known contract and its products, providing an example of export work carried out. This paper is written by Jan Kulka M.Sc. Eng., contract manager, and Jan Bienek M.Sc. Eng., chief technology expert for the contract (Bienek and Kulka, 2009).

Conditions for growth

The growth, which occurred in the second stage, should be recognized as deserving attention. Of particular interest are the following five factors, together favouring such rapid growth of geodesy and cartography export projects at that time.

Centralized organizational structure of geodesy and cartography

The GEOKART Union was established in 1973 with a centralized structure responsible to the Head Office of Geodesy and Cartography (GUGiK) (Figure). It included

- The State Geodetic Enterprise (PPG);
- The State Photogrammetric Enterprise (PPF);
- A network of district geodetic and cartographic enterprises (OPGK) located in larger cities all over the country;
- The Information Technology Centre of Geodesy and Cartography (CIGiK) as a research and development centre established in 1974.

Within this structure PPG and PPF were later integrated with the Warsaw Region Surveying Enterprise (WOPM) and a new large enterprise was created: the State Geodetic and Cartographic Enterprise (PPGK).

The cooperating units in the framework of GUGiK were the Institute of Geodesy and Cartography (IGiK) and the State Enterprise of Cartographic Publications (PPWK).

This structure, criticized for other reasons, undoubtedly focused the ways and means necessary for delivering large export orders that exceeded the capabilities of a single enterprise. Foreign trade enterprises, such as POLSERVICE or BUDIMEX, were intermediaries in contacts with foreign customers, which in some cases made contract management more difficult.

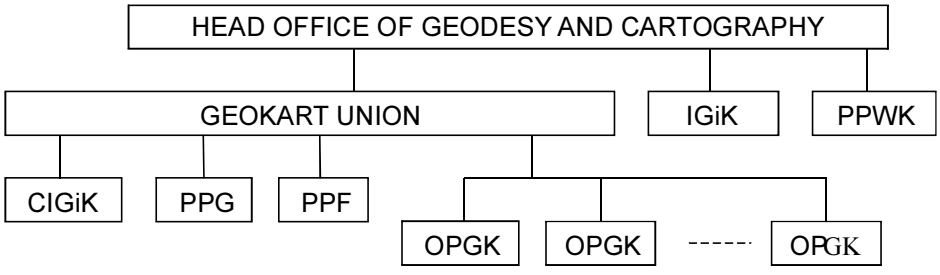

Figure. The structure of GEOKART Union in 1974

Production and scientific potential

The resources GEOKART Union had at its disposal provided distinctive production potential on a global scale, particularly with regard to the number of highly qualified and specialist employees. This potential was supplemented by scientific staff from CIGiK, IGiK and higher education institutions, including Warsaw University of Technology, who were not only involved in the design and execution of the export projects but also their acquisition.

Competitiveness in foreign markets

The GEOKART Union was an organization which was able to compete in foreign markets due to its structure and existing production and scientific potential, offering products and services of the highest quality with short delivery times. The relatively low salaries of Polish specialists combined with high exchange rates of the US dollar into the Polish currency allowed successful competition on price. We should emphasize that the modern technologies and equipment required for this work were, fortunately, not subject to embargo.

Attractiveness of work on export contracts

Secondment to work on an export contract brought Polish residents a number of benefits. For example, because salaries for work abroad were paid in US Dollars, with an advantageous exchange rate to the Polish currency. In addition, foreign trips brought the opportunity to see the charm of different natural environments, to get away from dull every day life and to see other parts of the world. For many, this was simply an opportunity to get a passport and to travel outside the *iron curtain*, whilst at the same time improving their financial situation on return to Poland.

Advantages of Polish specialists

Polish specialists assigned to these export projects – surveyors, photogrammetrists, cartographers, IT and electronics specialists and representatives of other professions – were distinguished not only by good education and professional experience, but also by other valuable characteristics beneficial in sometimes primitive working conditions in deserts, mountains, marshes or slums of big cities. These qualities included resourcefulness, entrepreneurship, professional ambition and the ability to adjust to an existing situation. These were particularly important during poor communications, unrest and when directly threatened by warfare or guerilla activities.

Leaders at various organizational levels, persons with initiative who were not afraid to take decisions despite considerable risk of failure, played an important role in the development of export activities.

In the Peoples' Republic of Poland such activities connected with mass travel abroad required political protection. Deputy minister Czesław Przewoźnik Ph.D, president of GUGiK and an enlightened technocrat, assured such protection and undoubtedly contributed to the development of Polish geodesy and cartography.

Effects

Measurable effects, expressed in terms of financial results, were very positive for the Polish organizations involved in exporting geodetic and cartographic services. The effects were also significant for the specialists traveling to work outside Poland. However, the Iraqi war caused Poland to incur financial losses due to the loss of equipment, means of transport and the ability to complete contracts (Wysocki, 2009). In addition, individual specialists incurred losses, sometimes painful, or even tragic. There were suicides, fatal accidents and illnesses, and extended separation had adverse effects on family relations.

Unmeasurable positive effects included:

- strengthening of Polish contacts with the countries benefiting from geodetic and cartographic work and creating a favourable atmosphere for further cooperation;
- enabling scientific and technical progress for Polish organizations in order to execute the contracts abroad;
- transfer of modern technologies to and from foreign customers.

➲ An example of positive effects

An example of the positive effects is the use of information technology for the establishment of an astronomical-geodetic network and mapping in Iraq, together with the establishment and running of a computer centre furnished with Polish software in Baghdad. According to the contract (Gaździcki and Kwiatkowski, 1977), to establish this network, two state of the art NOVA 840 computers were purchased in the United States. One of them, installed in CIGiK made it possible to:

- develop software systems to adjust large geodetic networks and aerotriangulation, meeting the Iraqi needs;
- conduct training of Iraqi personnel in CIGiK.

The second computer was installed in the Geodesy Computer Centre (GCC) newly established in Baghdad and was used for processing measurement data, final adjustment of geodetic network and for production of topographic maps covering an area of 170 000km$_{2}$. Later, the GCC supported production of base maps with an inventory of underground installations in Baghdad.

The specialists from CIGiK ran the GCC while training Iraqi personnel.

The ceremonial opening of the GCC, the first computer centre in Baghdad, took place on 17 July 1976. On that occasion, the representative of Iraqi authorities, director Fuad El-Hakim, wrote in the guest book of the contract: *Let the Center serve further development of cooperation between the two countries and let it serve further progress.* This wish was fulfilled. The computer equipment purchased and software developed at that time made it possible not only to fulfill the contract but was also successfully used in both countries for many years.

This example is known to the author of this paper as he had the privilege to be in charge of the project in CIGiK and GCC and the work performed by a team of a dozen or so high class specialists, including geodesists Janina Deryło-Stępniak Ph.D.., Witold Gedymin Ph.D. and Tadeusz Welker M.Sc. Eng.; photogrammetrist Ewa Musiał M.Sc. Eng. and electronic engineer Robert Podgórski M.Sc. Eng. This work, and particularly the adjustment of so large an astronomical-geodetic network by the least squares method, was performed using technologies designed by the team to ensure a proper scientific level of results and, at the same time, effective exploitation of the architecture and facilities of the computer equipment. The results obtained were distinguished by the I Degree Prize in the Master of Technology Competition, Warsaw, 1977 and by II Degree National Prize (Wysocki, 2009).

The atmosphere of positive and friendly cooperation was created at that time by the coordinators and other persons working for this large contract, with whom the author was in touch: Jerzy Wysocki M.Sc. Eng. and Tomasz Rybicki M.Sc. Eng. (GEOKART Union), Tadeusz Dzikiewicz M.Sc. Eng.and Marian Szymański M.Sc. Eng. (PPG) and the specialists of the contract Ryszard Pażus M.Sc. Eng. for geodesy and Andrzej Rymarowicz M.Sc. Eng. for photogrammetry.

Timely execution of the all this pioneer work provided one of the victories achieved during that *invasion* of Polish surveyors of Iraq.

Conclusion

A few dozen years ago, a generation of surveyors and cartographers demonstrated initiative and the ability for collective action and achieved significant success in the export of geoinformation services and products. This resulted from the skill to adjust to the conditions of a centrally managed economy and to make use of its imperfections in such a way that they became stimulators of progress.

We hope that, in a few dozen years time, similar opinions will be expressed about the initiative, common actions and successes of the present generation benefiting from the free market economy and democratic freedom in Poland.

Will earnings-motivated trips to more affluent countries in search of work exploiting professional qualifications satisfy the ambitions of the present generation?

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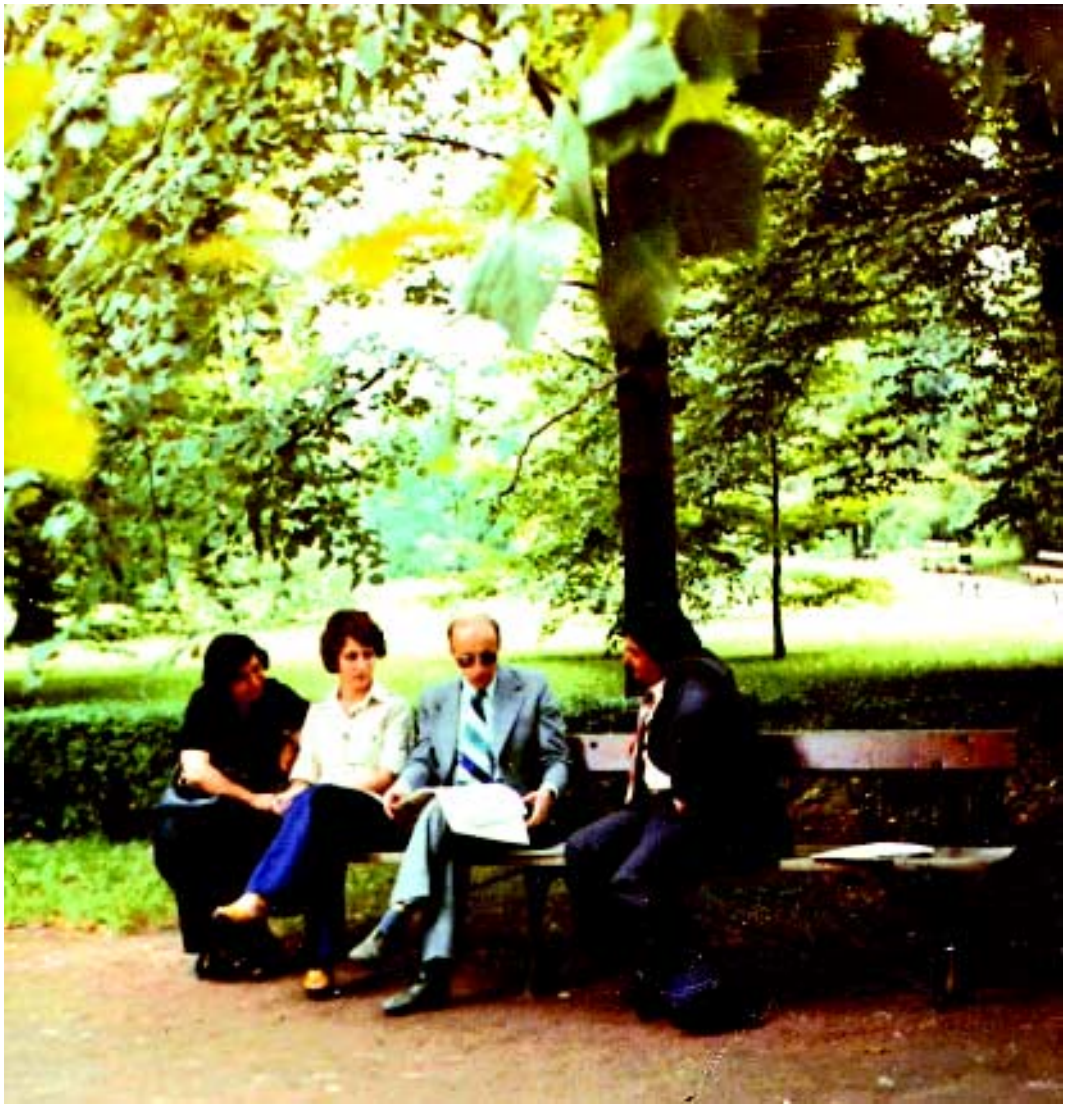
Fot. 1. W górzystym Kurdystanie. Obok samochodu stoją (od lewej strony): dyrektor naukowy CIGiK prof. dr hab. Jerzy Gaździcki, zastępca dyrektora PPGK mgr inż. Henryk Kwiatkowski, kierownik kontraktu na założenie SAG Iraku, największego kontraktu GEOKART-u, mgr inż. Tadeusz Dzikiewicz. Zdjęcie ze zbioru autora, 1977

Fot. 2. Posiłek w czasie odwiedzin grupy pomiarowej: od prawej strony wiceminister, prezes GUGiK dr inż. Czesław Przewoźnik, kierownik kontraktu mgr inż. Tadeusz Dzikiewicz i dyrektor ZPGiK GEOKART mgr inż. Jerzy Wysocki. Zdjęcie ze zbioru Tadeusza Dzikiewicza, 1978



Fot. 3. Szkolenie personelu irackiego odbywało się nawet w Łazienkach. Zdjęcie ze zbioru autora, 1976

Fot. 4. Praca przy komputerze NOVA 840 w Geodesy Computer Centre (od lewej strony): dr inż. Witold Gedymin i mgr inż. Andrzej Kopcewicz. Zdjęcie ze zbioru autora, 1977

Fot. 5. Po uzyskaniu nagrody I stopnia w konkursie Mistrz Techniki. Od lewej strony: mgr inż. Roman Jankowski, dr inż. Janina Deryło-Stępniak, prof. dr hab. Jerzy Gaździcki, mgr inż. Ewa Musiał. Zdjęcie ze zbioru autora, 1977