

# Knowledge Exchange between Poland and Vietnam in Mining and Geology – the Status Quo and Future Development

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**Abstract.** From the beginning of the 21<sup>st</sup> century, knowledge exchange between Poland and Vietnam in mining and geology has been focusing in technology, education and training. Since years, Polish academic and commercial partners have been developing a close collaboration with Vietnam National Coal – Mineral Industries Holding Corporation Limited. Major outcomes of the collaboration are installations and operation of mining equipments and machines in Vietnamese mining companies, and excellent training programs for graduate and post graduate students and mining staff for both countries, etc. From aspects of knowledge management in globalization, the article highlights the outstanding outcomes of knowledge exchanges between the two countries, outlines cultural and economic challenges for the exchange and proposes some improvement in the future. **Key words** – knowledge exchange, mining knowledge, Polish – Vietnamese corporation.

## 1 Introduction

The collaboration of Poland and Vietnam has been being developed since 1950s. Since then, Poland has received thousand researchers and students from Vietnam for research and educational programs. During the time 1960–1980s, scientific collaboration was mainly at state levels. To date, this partnership has been promoted at different levels of institutes, universities and organizations, and private activities. In the 21<sup>st</sup> century, knowledge exchange in mining and geology has been significantly changed by the engagement of Polish companies with mining companies in Vietnam, and internship programs of Polish students in geology and mining disciplines in Vietnam universities and institutes. Publications are increasing in the last ten years in many scientific journals and conferences. Education programs for a new generation of qualified scientist with master and doctorate degrees are launched by different organizations. A revision of achievements and look back to its disadvantages is supportive for overcoming the obstacles of a better knowledge exchange in the future between the two countries.

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## 2 The status quo of knowledge exchange in mining and geology – collaboration of Poland and Vietnam in the 21<sup>st</sup> century

### 2.1 Mining and geology knowledge exchange

New knowledge is created from mutual conversion of tacit knowledge and explicit knowledge in the individual or organization [1]. Tacit knowledge is rooted in action, procedure, routines, commitment, ideals, values and emotions. Tacit knowledge can be accessible through consciousness if it leans towards the explicit side of the continuum. On the contrary, explicit knowledge has a universal character supporting the capacity to act across contexts, for example drawings and writing, etc.

Mining and geology knowledge are specific knowledge, being accumulated from the development of the mining industry, and transferred from countries to countries and organizations to organizations. Mining and geology knowledge are not the truth or the belief of this industry, but also mental models, methods and skills, and especially know-how as well.

**Table 1.** Activities of mining knowledge exchange between Poland and Vietnam since 2010

No.	Activities	Year	Outcomes
<b>From Poland</b>			
1	International conference Pol-Viet (1)	2014	International conference with results of research between Poland and Vietnam, attracted more than 100 scientists from education organizations and research institutes from both countries. 40 presentations in geology and mining, and other related fields were on schedule of the conference. An outstanding outcome of the conference is an overall review of education and scientific research from University of Sciences and Technology AGH Krakow and Vietnamese education organizations and research institutes.
2	Conference on Polish mining equipment and machinery – modern technology, creative solutions	2014	Organized by the Polish Commerce Chamber in cooperation with Vietnamese Association of Mining Sciences and Technology, the conference attracted participants of senior staff of the Chamber and professors of AGH Krakow as well as representatives of 14 leading mining companies in Poland. Coming from Vietnam is representatives of Vietnam National Coal – Minerals Industries Holding Corporation Limited (Vinacomin), Quang Ninh (the largest mining area in Vietnam) and other representative from mining and machinery subsidiaries under Vinacomin, and leaders of mining universities and research institutes.
3	Conference on “Stimulation of export on selected market”	2015	In frame of a commercial promotion program by Polish Ministry of Commerce and Industry, mining companies from Vietnam visited some outstanding mining and machinery companies for further cooperation in supplying modern equipment and technology for deeper mining in Vietnam.
4	Sending students and staff to Vietnam for studying and internship	2010 – 2017	Host organizations are Vietnamese research institutes and universities in mining and geology. After finishing studying and internship, either they came back to Poland or staying in Vietnam. They play an important role in the development of the mining and geology industries in Vietnam and the cooperation of the two countries.

**Table 1. cont.**

No.	Activities	Year	Outcomes
<b>From Vietnam</b>			
1	International conference Viet – Pol (2)	2015	The conference brought excellent opportunities for Vietnamese scientists, especially the junior ones in fields of geology, geomatics and mapping, geophysics, mining and electro-mechanics.
2	International conference Viet – Pol (3)	2016	The conference is integrated in the conference on Earth sciences and sustainable geo-resources development ESASGD 2016 in frame of activities for the 50 <sup>th</sup> anniversary of Hanoi University of Mining and Geology (HUMG). Participants of the conference came from many countries such as Poland, France, Germany, Russian, China, Laos, Thailand, Myanmar, Japan, India and USA. 391 papers are on themes of 8 different sessions of mining, petroleum, geology, geodesy, education and training, economic and administration in mining industry, mining electric and mechanic engineering, and mining automation etc.
3	Institute of Mining Sciences and Technology (Vinacomin)	2016	Corporation with Carboautomatyka Company in knowledge transfer in mining machinery production, mud management technology, and coal quality management.
4	Institute of Mining Sciences and Technology (Vinacomin)	2016	Corporation with Polish mining companies in knowledge transfer regarding methane gas control, automatic warning system, mining machinery components production, etc.
5	Sending junior engineers and staff to universities in Poland	2010 – 2017	Hundreds of students and staff from universities, research institutes, state officers and mining companies have been sent to Poland during this time. Vinacomin strengthens the cooperation with Polish universities to send post graduate students for further studying. Those who come back to Vietnam can obtain the knowledge and develop it at work, as well as be a bridge for the mutual relationship of the two counties

The specific knowledge is stored in various kinds of documents such as books, videos, audio, pictures and paintings and etc. Besides, mining and geology knowledge is also experiences of individuals, which is very difficult to express in documents but can be shared over time. In this article, mining and geology knowledge are mentioned in activities of collaboration programs such as education and training, scientific conferences, equipment installation and knowledge transfer, etc.

From these activities, it can be seen that knowledge exchange between Poland and Vietnam are mainly in research and technology transfer. Short courses and visiting lecturers/professors in universities and internship in mining companies are absent from knowledge exchange of the two countries. Without courses and lectures, knowledge cannot be multiplied or distributed, meanwhile, without practice, experiences and skills cannot be accumulated and knowledge cannot be upgraded or innovated.

**2.2 Obstacle of knowledge exchange in mining and geology**

Being known as one of the most important producers in Europe of coal (hard coal and lignite) and copper, Poland is also a reliable country for mining education to Vietnamese

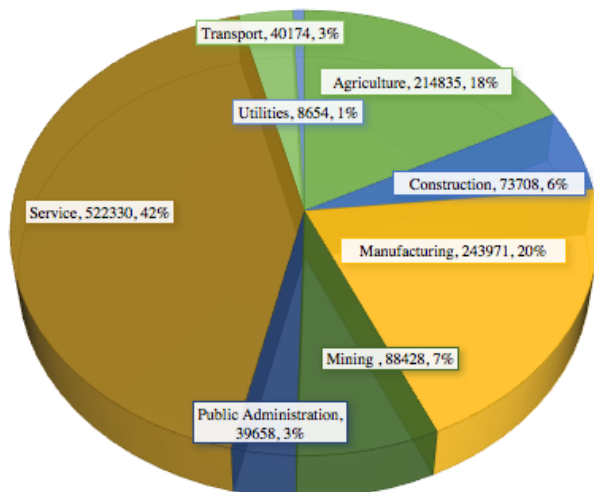
government and mining companies for decades. However, there are some obstacles for the knowledge exchange in mining and geology as of the differences between the two countries. Besides of technological conditions, which are difficult to overcome due to aspects of geology, mines and mining conditions, social – economic challenges and cultural challenges are worth being mentioned.

### 2.2.1 Socio-economic challenges

According to reports of World Bank in 2016, Poland has a population of about 38 million and Gross National Income per capita of nearly US\$ 12,400. With this number, Poland has the largest economy in Central Europe [2]. Poland has achieved a development success milestone, moving from middle-income to high-income status in record time. Labor market conditions continued to improve in 2016, as employment increased and unemployment reached record lows (5.5% in the fourth quarter of 2016). In 2017, GDP of Poland is expected to increase, and driven by domestic demand [3]. Due to the relatively low potential of replacing coal with other energy sources, current forecasts show coal retaining its major role in the Polish energy mix for upcoming years [4]. In 2016, Poland Gross Domestic Product (GDP) reached 469.509 billion USD [5], two times larger than Vietnam's number of 202.616 billion USD [6].

With a population of more than 92 million [6], Vietnam is now one of the most dynamic emerging countries in East Asia region [7]. Mining still plays an important part in GDP of the country, taking about 7% in national annual GDP [8].

However, the two countries and their mining industries were deeply impacted by the economic downturns in recent years. The mining industries had to downsize to prevent from losses due to domestic and international markets difficulties, therefore, numbers of workers in mining sector, and consequently, those of student enrolment in mining universities have been being reduced [9, 10]. Trimming investment on education and training, heavier workloads and new job roles with higher working intensity, etc. are impact factors on knowledge transfer and its effects [11, 12]. Resigned and retired workers and staff without a contingency create a big loss of knowledge and experiences in mining and geology.



**Fig. 1.** Contribution of sectors in GDP of Vietnam 2016 (billion VND) (Source: Data from [8])

The economic gap between the two countries reflects also the investment gap of mining and geology, mining and geology education and research.

### 2.2.2 Cultural challenges

Although Vietnam and Poland has been building their mutual friendship since the middle of the 20<sup>th</sup> century, their mutual understand of languages, cultures and religions is still insufficient.

Languages seem to be the biggest challenges of the knowledge exchange, as the two countries are both non-English speaking countries and their native languages are not taught in education systems. Either using a third languages or interpreters/translators is an obstacle of knowledge exchange.

Other cultural differences come from cultural aspects, such as the way of presenting ideas, concept of punctuality, dealing with problems, ego and concept of individualism and collectivism, manners and behaviors [13] and safety competence [14]. These aspects impact on the collaboration, however, the impact can be improved by returning experts as these experts are bringing to their home countries not only new knowledge, experiences and skills but also new network and understanding of cultural aspects [14].

Besides of those differences, mining and geology have their own culture, which are quite common all around the world, such as: significant features of a dangerous, tough and monotone job, staff and workers come from typical faculty in typical universities and they are normally inspired in working in companies by their kinship and ancestors, from whom they get invisible influences and experiences, the proud of teamwork, solidarity and consensus, typical celebration and festivals, etc. [15]. This kind of culture can also be a barrier for people in adapting new knowledge, as they can create undernet with specific knowledge of particular groups (in an organization). Knowledge, therefore, can be easily exchanged in each group, but not easy in different groups.

Mutual trust between the two sides of knowledge exchange is also a significant issue, as knowledge sharers might not be sure that knowledge recipients understand and use knowledge appropriately, or knowledge recipients do not rely on the accuracy of knowledge [16]. This issue becomes more crucial when languages challenges cannot be resolved.

## 3 Perspective of knowledge exchange and further collaboration



**Fig. 2.** Staff of Vinacomin received their master degrees of ventilation from AGH Krakow in July 2017. Two of them will be chosen for doctoral program (Source: Vinacomin)

Being one of the biggest employers of Vietnam industry, Vinacomin aims to send staff to Poland, studying ventilation and safety management in master and doctoral degrees, to meet

the requirement of going deeper and further underground in upcoming years. But Vinacomin is not just only one partner of knowledge exchange. There are other education and research institutes in Vietnam that can promote their activities with Poland. Besides of middle-term and long-term plans such as education in universities, as mentioned in the previous part, knowledge exchange in mining and geology between Poland and Vietnam can be broadened in numbers of exchange students and school staff, and developed in organizing short courses and small symposia. These academic activities cannot only be supportive for knowledge exchange but also can reduce the gap of culture between the two countries. Collaboration can be developed further under the technical supports of mining and geology schools such as Krakow AGH and Wroclaw from Poland, Hanoi University of Mining and Geology, Hanoi University of National Resources and Environment and other universities in from Vietnam, and financial supports from the two government as well as other organizations and programs such as Erasmus+. Members of Society of Mining Professors and other associations from Poland and Vietnam are also the bridges for the collaboration, because they can connect their networking for an expansion and an effect knowledge exchange. Funding should be found for guest lecturers and retired professors from Poland to come to Vietnam, giving lectures in a short course of 2–3 weeks, and junior lecturers from Vietnam to come to Poland for experiences exchange. In recent years these activities are developed in a program of AGH Krakow and Hanoi University of Mining and Geology. However, there is still a big demand from other mining and geology schools.

## 4 Conclusions

Advances in technology and management are two drivers for knowledge exchange, and further, knowledge management of organizations and countries. Sharing knowledge is not a loss of knowledge but a multiplication. Exchange of knowledge in mining and geology is an important aspect for the sustainable development of the mining industry in the forthcoming years. From perspective of a forerunner mining country, Poland can share the rich experiences to emerging mining counties like Vietnam. On the other hand, Poland can gain new experiences in mining and geology, filling gaps in research from emerging mining countries and supporting to investment and commerce. From perspective of an emerging mining country, knowledge exchange helps Vietnam to quickly obtain and control new technology, meeting the demand of production expansion in mining and geology, safely and effectively. Understanding of challenges in economy and culture in knowledge exchange in a specific sector of mining and geology, Poland and Vietnam can benefit from the collaboration in the upcoming years.

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