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Message from the ESASGD 2016 Chairman

Dear **Colleagues and Friends**,

We welcome you to the 2016 International Conferences on Earth Sciences and Sustainable Geo-Resources Development (ESASGD 2016) that is held on November 12 - 14, 2016 at the Hanoi University of Mining and Geology (HUMG), Hanoi, Vietnam. The ESASGD 2016 is organized on occasion of the 50th Anniversary of the Hanoi University of Mining and Geology and will be an excellent opportunity to share experiences, stimulate research activities, and enhance international cooperation in the fields of mining, earth sciences, and related fields for sustainable development. On the other hand, the ESASGD 2016 provides an important playground for presenting the state-of-art developments in the scientific research and applications in the fields of mining and earth sciences.

In this event, we would like to express our gratitude to the committee members and reviewers of the conference for their hard work. We also thank the keynote speakers for sharing their insights with us. Finally, the conference would not be possible without the excellent papers contributed by authors who play an important role in the success of the ESASGD 2016. We would like to thank all for your presence in the event.

We hope that this conference will further stimulate research activities and cooperation in the fields of earth sciences and sustainable geo-resources development. We also feel honored and privileged to serve the best recent developments in the fields of the ESASGD 2016 to you through this exciting event.

Sincerely,

Assoc. Prof. Dr. Le Hai An

Chairman of the ESASGS 2016

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International Conference on Economic Management in Mineral Activities (EMMA)

Challenges of an effective international knowledge transfer from the perspective of Southeast Asian Mining Schools

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Abstract

Excellent education is the key precondition for individual wealth, economic prosperity and environmental protection. In the mining industry, global knowledge transfer helps to secure a productive and sustainable development especially in emerging countries, like those in ASEAN countries. End of 2015 all ASEAN countries have established the ASEAN Economic Community (AEC). AEC is planned to be a huge open market based on a free flow of goods and services, capital, investments and labor. With a GDP of US\$ 2.6 trillion and a growing population with already more than 622 million people the AEC was the seventh largest economy in the world and the third largest in Asia.

The AEC is an emerging mining region with a lot of potential. But, the competencies to mine effectively and sustainably have to be improved. Reforms in the national academic systems and a better collaboration between the universities to improve the student mobility, credit transfers, quality assurance and research clusters are necessities to close gaps in mining education and to avoid brain-drain. To reach these goals, ASEAN mining schools have established a common platform called AUN/SEED network. The network is the basis to secure an effective knowledge transfer between these emerging mining countries. To realize the vision of SOMP to foster collaboration and innovation in research, teaching and learning practices based on effective networking the AUN/SEED network is the ideal partner in the AEC.

To effectively develop and support the mining engineering education in these mining schools it is a necessity to understand and handle the challenges of an effective international knowledge transfers. Currently, some of these challenges are technological development gaps, disparities in economic growth, large labor deficits or surpluses and big differences in languages, cultures and religions.

Keywords: mining education; mining network; knowledge transfer.

1. Mining education and mining knowledge transfer in Southeast Asia

The Association of Southeast Asian Nations (ASEAN) today is made up by ten member states in Southeast Asia: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam. Aims and purposes of ASEAN include to accelerate the economic growth, social progress and cultural development in the region through joint endeavors in the spirit of equality and partnership to strengthen the foundation for a prosperous and peaceful community of the nations in the region, and to promote active collaboration and mutual assistance on matters of common interest in the economic, social, cultural, technical, scientific and administrative fields.

By the end of 2015 all ASEAN countries have established the ASEAN Economic Community (AEC), planning to be a huge open market in Asia and in the world. The development of the community cannot be successful without the contribution of the emerging mining industry, not only in field of mining but also in subsidiaries or related industries and its ability to create numerous new jobs.

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The mining markets in ASEAN can be considered established ones with Indonesia, Malaysia, Philippines and Thailand and emerging ones including Cambodia, Laos, Myanmar and Viet Nam.

Table 1. Southeast Asia – Mining sector industry values (USDbn)

Countries	2014e	2015e	2016f	2017f	2018f	2019f	2020f
Laos	0.80	0.80	0.80	0.80	0.90	1.00	1.10
Thailand	10.29	8.61	7.68	7.17	7.12	7.07	7.04
Cambodia	0.16	0.19	0.22	0.25	0.28	0.31	0.34
Viet Nam	16.90	15.50	15.00	15.20	16.50	17.80	19.20
Myanmar	5.63	6.52	7.70	9.50	11.97	14.99	17.55

(e/f= estimate/forecast. Source: National sources, BMI research: Southeast Asia Mining Report, Executive Summary, 2016)

1.1. Mining education

Mining education in ASEAN is having gaps among countries owing to economic- politic conditions, technical problems and differences in culture, belief and languages. To maintain the sustainable development of the mining industries, mining schools need to improve themselves, adapt new technology and training methods from other countries through knowledge transfer. It is also important for them to establish networks, not only in ASEAN but other international networks. In upcoming years, parallel with the development of the AEC, mining schools need to reform their national academic systems, and to improve collaborations among universities and mining industry. These renovations support increasing student mobility, credit transfers, quality assurance and research clusters. Furthermore, not only gaps in mining education can be narrowed but also brain-drain is avoidable.

To reach these goals, ASEAN mining schools have established a common platform called AUN/SEED network. The initiative of this network came from ASEAN University Network in 2001. Projects started in 2003 with main support from the Japanese Government through Japan International Cooperation Agency (JICA), member institutions and member governments. The network of AUN/SEED-Net is composed of 26 Member Institutions from 10 ASEAN countries selected from leading institutions in engineering in respective countries. Each year these institutions organize international conferences on geological and geo-resources engineering, mining, materials and petroleum engineering, and earth resources technology. These conferences are good opportunities for academic staff and students as well as industries to update new technology and exchange experiences. These conferences can be considered the most prestige and famous conferences in mining education in ASEAN.

1.2. Mining knowledge transfer

Knowledge transfer is becoming more and more important in a globalized world. Knowledge is transferred in ASEAN mining schools not only by organizing conferences under the framework of AUN/SEED Net but also from guest lecturers from ASEAN and other areas. Since 2002 there have been guest lecturers from Australia, Germany and other countries come to this area, moderating short training courses and strengthening the collaboration among universities by other long-term projects. Knowledge transfer is becoming more important in the globalization since the last decades.

With the engagement of the Society of Mining Professors (SOMP) and initiatives from its Capacity Building Committee, SOMP is fostering collaboration and innovation in research, teaching and learning practices in ASEAN. Within the last 3 years there have been three regional meetings of ASEAN mining schools and SOMP members. In these meetings, knowledge transfer has been a significant topic. However, as it has been mainly from developed mining countries to developing ones, it is necessary to seek for appropriate solutions to improve the effectiveness of knowledge transfer. One of the solutions can be considered “Empowerment Teaching”, which is mostly based on a “western perspective” from forerunning mining countries. However, western perspective in teaching also creates barriers to the effective transfer in terms of languages, cultures and religions.

2. Challenges of knowledge transfer in ASEAN mining schools

Since years SOMP Capacity Building Committee members are seeking for solutions to make this knowledge transfer more effective. To find out suggests for academic of developing mining countries to adapt better results and overcome barriers of international knowledge transfer, a workshop under the frame work of the last SOMP regional meeting in SEA was organized in collaboration with the task force on sustainability and mining of the World Federation of Engineering Organizations. Participants of the workshop were members of the AUN/SEED net who joined the SOMP regional meeting and other participants from different countries. In total, there were about 50 participants from 16 countries who are representatives of over 30 mining schools (25 in ASEAN) and the mining industry.



Fig. 1. Agenda of the workshop on developments in mining education in ASEAN session

There are 4 main challenges in international knowledge transfer, including:

- Technological development gaps between developed and developing mining countries (technological challenges);
 - Disparities in economic standard and growth (business challenges);
 - Cultural (including religious and languages) differences (cultural challenges); and
 - Implementation challenges.
- Main outcomes of the workshop are described as follows:

2.1. Technological challenges

The participants provided some information about technological gaps:

- Technological gaps come from differences between mining companies and mining universities: the lack of support from mining companies to universities regarding mining technology, finance, experience, infrastructure, mining software, blast design, etc., the disadvantages of universities in developing research, training centers and mining software, etc.
- Assessment is an important driver for educational practice and change. There is still an assessment gap in how changes in curricula and new skill demands are implemented in education; school do not always make necessary adjustment in assessment practices because of these changes. Simple applications of information technology that allow non-disruptive peer observation, offer considerable promise in giving teachers timely feedback they can use

- Professional development: all challenges are originated from the lack of adequate, ongoing professional development for mining teachers or lecturers who are required to integrate new mining technologies into their classrooms yet who are unprepared or unable to understand new technologies
- Collaboration between the mining universities in ASEAN countries is lacking active encompassing teaching and joint research projects.

2.2. Business and market challenges

Economic growth in ASEAN is different from country to country. Therefore, market challenges are not alike in ASEAN mining schools. However, there are some most common business and market challenges, such as:

- Finding funds for knowledge transfer: sponsoring for research projects, organizing workshops, seminars and lectures, and exchanging teaching staff and students
- Exchange of teaching staff is less expensive than large scale student exchange, as sometime refund is just at minimum requirement for compensation of travel expense
- Protecting universities from issues regarding intellectual property rights, visa problems, tax problems and working permit
- Demanding of common teaching materials, such as: software packages, movie clips, data set (case studies), best practice examples in variety of problems, laboratory equipment and instrumentation.

2.3. Cultural, religious and languages challenges

Most participants were interested in cultural challenges of the international knowledge transfer; thus, various ideas and information are mentioned. Here are some highlighted ideas:

- The exist of barrier in social activity, attitude and belief such as food and drinks, farming, punctuality and rehabilitation shows that early education is helpful to people, to respect to each other, no matter what the people's role (owners, workers, academic) or religion is
- More women are joining the mining field; it is important to understand them and to let them involve widely
- English skills should be enhanced to understand different accents, so that the online library, e-learning and blended courses can work well
- Lack of media tools to avoid misunderstanding in countries' culture and religion
- Communication is a big challenge, and should be enhanced to understand each other better
- Communication style is also a significant impact of training style
- Understanding the demand of land use, new jobs and rehabilitation of indigenous people due to conflict between the future local consumption and mineral development for international market
- Open-minded and tolerance are two requisite characters during the transfer.

2.4. Implementation challenges

Implementation challenges are described in different ways.

- Due to securities problems, there are areas that the government might not want to change or do not allow civilian to see
- Funding is an important issue in implementation phase of the transfer in most ASEAN mining schools
- Technology implementation faces with many issues due to shortage of infrastructure and legislative differences
- As students come from different ASEAN countries with different languages systems, religions and cultures, difficulties of implementation phases come from languages (English skills and accents), students levels and learning styles
- Shortage of time is an obstacle for guest professors to give lectures in host university in ASEAN
- Accessing mining journal is difficult in some schools. It is complicated or unable to access mining journals in some schools due to financial and technical problems
- The engagement of new members, especially young staff in faculty to knowledge transfer is not insufficient
- Lack of qualified young members leads to the blank in sending young staff for internship and research abroad to gain new experiences and knowledge to give further at home country
- Consequently, it is difficult to find appropriated local assistants for guest professors.

3. Overcoming challenges in knowledge transfer

From the outcomes of the workshop, many lessons can be figured out to overcome challenges in knowledge transfer. Normally quality of lectures or transfer are mentioned but by subjective thinking of lecturers. It is necessary to collect the ideas from the students to improve quality of lectures. Universities in Southeast Asia also welcome ‘coming back’ professors, the one that have background of the host country/host university/mining industry and come usually to lecture and consult with updated information. Whenever they come back they can follow up with learners after a time of training and practicing.

Maintaining and developing train-the-trainer programs cannot be separated from knowledge transfer. As mentioned in “Brain circulation concept” (J. Kretschmann and N. Nguyen, 2013), train-the-trainer programs can be effective just only when trainers become connection of knowledge transfer by coming back to his country, exchanging initiatives, information and experiences with other people and improve the theory under circumstance of each country in ASEAN. “PhD on the Move” and Mentoring program are kinds of train-the-trainer programs that should be promoted. Inspired from program “School on the Move” of AUN/SEED-NET[†], “PhD on the Move” can be understood that PhD Students do their research in different universities, giving lectures, and exchanging experiences etc. in different countries. There they can be also connection of knowledge transfer, having background of different countries and understanding as well as overcoming themselves obstacles of culture and knowledge transfer.

Mentoring program is a new program offered by the Members Development Committee of SOMP, attracting the attention of participants in the SOMP regional meeting in Bangkok. The aim of the program is to connect SOMP members based on research and/or teaching interests. The program was kicked-off during 2015/2016 with mentor-mentee pairs being designated and put into contact by this Committee. The special emphasis of the program is on pairing PhD students and fresh faculty with established SOMP members. More opportunities are offered to students in emerging countries and knowledge transfer can be less expensive with training online, E-learning, and blended courses, etc.

Finally, to develop the ASEAN Mining Education Network initiative in the future, database of professors is supportive. This network can be considered a small SOMP in ASEAN, providing opportunities for professors and students in mining schools, strengthening international collaboration and opening international labor market in ACE in forthcoming years.

4. What should SOMP do

As a SOMP regional meeting is affirmed to be specifically meaningful, it was stated to be organized in ASEAN every two years. Other members of SOMP are welcome, besides the professors of the Capacity Building Committee. Visiting-Professors-Programs/(retired) professors should be promoted in countries like Myanmar and Viet Nam. The Mentoring program of SOMP should be evaluated and improved with specific aspects for the effective development of the program in ASEAN.

For a better collaboration among mining universities (not only in ASEAN) database of professors is a requirement. SOMP can develop online teaching, and tool box for developing countries. Mining schools in ASEAN appreciate support from retired professors of SOMP who come lecturing and the help of SOMP in providing textbooks and case studies.

In upcoming regional meetings, especially in Southeast Asia, “PhD on the Move” should be placed in the agenda to discuss about further steps and to build a concrete program.

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[†]“School on the Move” is the basis for the international internship program set for a 3rd year undergraduate students to further extend the cooperation in terms of practical education. 20 master students from Japan will be sent to Kyushu University and Waseda University in Japan and universities in ASEAN countries including Chulalongkorn University (Thailand), Institute of Technology Bandung (Indonesia), Gadjah Mada University (Indonesia), University of the Philippines, University Sains Malaysia, Hochiminh City University of Technology (Viet Nam) and Institute of Technology of Cambodia. Students will earn credits through participation in the introductory subjects at the cooperative universities for about half year which comprised of one month short-stay education program and maximum three months for long-stay research.

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International Conference on Economic Management in Mineral Activities (EMMA)

Empowerment teaching: A 7-Phase Model to secure an effective international Knowledge Transfer in Applied Sciences

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Abstract

International knowledge transfer is the basis to reaching scientific excellence all around the world. But: How can we transfer our knowledge effectively from country A to country B? What are the prerequisites especially in applied sciences like engineering? Having given numerous lectures in ASEAN countries during the last years the authors are convinced that participatory training methods can be an ideal answer to this question. The main aim is to empower the learner to meet the challenges of the future in theory and in practice. Participatory training methods enable the learner to develop skills, knowledge, and attitudes. They are very useful to overcome cultural barriers between the lecturer and their students. This can create a win-win situation for both sides. The authors have developed a 7-phase model based on their practical teaching experiences which can be applied to secure the effectiveness of knowledge transfer to ASEAN countries and beyond.

Keywords: knowledge transfer, participatory training methods, 7-phase model

1. International excellence through knowledge transfer

Around the world, an excellent education is believed to be the key precondition for individual wealth, economic prosperity, and environmental protection. Therefore, our world should be in excellent shape since ninety percent of all scientists who have ever lived are living today; the largest number of scientists in a generation of all time. But how can we apply a successful international knowledge transfer as knowledge is created in such an immense amount? As today knowledge is mostly published through the internet and high-ranked journals in a one-way street of knowledge transfer. But one-way communication alone is not enough to secure long-lasting effects on science, society and, politics.

In emerging countries, the potential of highly motivated young academics is diminished by a lack of ability to apply this knowledge. Therefore, it is essential to implement capacity building measures to promote and accelerate the transfer of knowledge and technologies from developed countries to emerging countries. Expertise from abroad can bring knowledge and motivation to these countries, but the focus must be the building and development of local academic expertise. A key element to this merging process is the cooperation between universities from different countries. On a face-to-face level the scientific community can try to motivate and enhance the capacities of the highly qualified academic talents in the emerging countries. By exchanging the acquired knowledge and transferring personal expertise of senior researchers and highly experienced executives from developed countries, knowledge will be accessible and easy to process for future researchers, managers and leaders in emerging countries.

The international cooperation of universities is a key element in this transition process as future decision-makers are educated at these institutions. If the foundations of an effective knowledge transfer and values in education and research are not taught to the students the primary goal of generating, improving and applying

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knowledge world-wide cannot be achieved. Therefore, universities are obliged to exchange knowledge across the international scientific community and to establish a suitable world-wide infrastructure for an effective and efficient knowledge transfer.

2. Participatory teaching methods for knowledge transfer

In conventional lectures the teacher defines what is to be taught and the methods to be used. This approach of lectures is traditionally based on the idea that the lecturer knows everything, while the students know nothing (deficit orientation). The lecturer defines the set of what students need to learn and how these learning needs can be met. Students do not have any active roles during this process. The lecturer becomes the central point, around whom the entire process revolves. In applied science, this method cannot be regarded as state-of-the-art. The success of communication (teaching) depends on the listener not on the speaker. Because of this effective teaching requires a change of the lecturer's role from being a mere sender of knowledge (teacher) to a coach, then to a motivator, and finally, to a mentor. Participatory training methods are based on an empowerment-orientated approach. They promote learner-centered development through training and learning. Participatory training methods help learners by enabling them to develop skills, knowledge and attitudes individually and to share perceptions so that they can actively contribute to renewal and improvement. They aim to increase the potential of the learner (potential orientation).

Active application of participatory teaching methods also implies a change of perspective for the lecturer as the seats are arranged in a semi-circle or circle to create a closer contact between participants and the lecturer. Regarding training materials, diverse tools and other materials such as white board, moderator box and contents, sheets of AO paper (flipcharts), notebooks, projector and screen, etc. can be used. Beside of this lecturer should use materials such as photos from incidence in practice or/and video clips to visualize the theoretical inputs. This will help students – even those with poor English knowledge – to remember the detailed information, more than only listening to the trainers, or reading documents or books. Additionally, posters, related statistical data, and charts can contribute to a better understanding.

If participatory training methods are applied during the training programs the lecturer can motivate and mentor the learners' initiative roles in learning, and encourage them to contribute more at work; such as finding out disadvantages and how to improve the situation themselves. Learners should understand that the details can be seen in work place by the directly involved staff, not by the management board. Participatory training methods promote learner-centered development through training and learning. Therefore, the training should be multi-sectoral, interactive and focused on group work. Participatory training is learner-centered as it recognizes, evaluates and seeks to build on the existing knowledge of the learners.

7-Phase Model for an effective international knowledge transfer

During multiple training courses in Asia the authors have developed a 7-phase model for an effective international knowledge transfer from developed countries to emerging countries with an emphasis on the education in the mining sector.

2.1. Start-up phase

At the beginning of the first seminar it is important to establish a common basis. The lecturer has to explain the framework and the rules they expect to be followed in the course of the lecture. But they should be open for cultural characteristics and can redefine these rules in cooperation with the students. Most importantly, knowledge cannot be transferred when teacher and student do not speak the same language. English has to be defined as the classroom language! Not Thai, Myanmar or Lao etc. A strict application of this rule has to be enforced in order to keep everyone on the same knowledge level.

After formal aspects of the training course have been defined by the lecturer, the participants should be asked to introduce themselves, sharing briefly their experiences and expectations of the content of the lecture. The aim of this first short introductions sequence is to overcome students' hesitancy to speak. To make students talk is a first step to empowerment. The lecturer and the students get to know each other and facilitate the knowledge transfer by creating a friendly and cooperative atmosphere. Especially in ASEAN countries the cultural characteristics must be acknowledged. Here, it is important to overcome the hesitancy of mentioning the ego (I – myself) as a performance of politeness and the reluctant of showing the individual and preference of the group. Due to the high respect for older people and lecturers it will always be a challenge for the lecturer to implement participatory training methods, which emphasize individuality and flat hierarchies. A side effect of the short introduction by the students is that the lecturer familiarizes themselves with the names of the participants. This is especially challenging when dealing with names from completely unfamiliar cultural contexts. But to generate a friendly learning atmosphere this task should to be completed by the lecturer as soon as possible.

During the whole training course, it is imperative to welcome questions as this gives the students the chance to participate and actively contribute to the learning success of their students.

2.2. Warm-up phase

After the introduction, it is necessary to quickly break the ice between lecturer and students!

At first the “big picture” of the lecture should be explained in simple comprehensive language as the lecturer cannot assess the languages skills of his class at this point of the course. If possible the building of an emotional bond based on trust and sympathy should start right now. The warm-up phase must be regarded as a core element of the 7-phase model as communication has a social dimension and is therefore the result of the interactive behavior between the lecturer and the learners (based on their culture and experiences). In the process of an active knowledge transfer two levels of teaching are present. On the content level the objective information is emitted but on the process and relationship level sympathies, emotions, expectations and fears are transferred in the way people speak to each other. Communicative relationships – like the ones between lecturer and student – are influenced predominantly by feelings and only to a much lesser extent by rationality.

Lecturers and students should understand each other on the content level and on the relationship level. That is why during this phase the lecturer should evaluate potential barriers like shyness, restraint and poor language skills to further adapt the course. In this process the role of the lecturer as a team leader with their social competences and emotional and social intelligence is crucial for the success of his lecture. The lecturer should try to enforce the students’ willingness and abilities. Above all the lecturer should promote positive thinking and avoid negative comments (No shame, no blame!). Though a main aim of the lecturer should be to motivate the students to talk and listen – it is their task to be the best listener in class. Student’s acknowledgments of the learning progress should be given and contributions in classroom should be valued. In this way students, will feel optimistic about their abilities to learn, enhance creativity and decision-making skills which keep the intrinsic motivation high and leads to a better learning effort.

2.3. Learning and experiencing phase

Phase 3 initiates the learning and experiencing process of the students and enables the learner to develop their potentials, skills, knowledge and attitudes. The teaching methods must be outlined and explained to the students comprehensively. Time should be given to the students as they probably do not know the new teaching methods that will be applied during the course. The course must be designed by distributing learning in intervals, there must be enough time for discussions and repetitions. For the long-term learning effect, it is essential that the students can make their own experiences by guessing, trying, and speculating on new ideas and techniques. While transferring knowledge, and applying this new method of teaching the trainer must constantly encourage the students to actively use the English language.

In the theoretical inputs sessions, participants should share their own ideas and experiences. When learners get used to speaking out loud, they gain self-confidence to contribute more. The lecturer leads by setting the framework and planning the learning process. He acts as a moderator when the students provide their own ideas, knowledge and techniques. He helps the learners to understand the content of the lectures leading Q&A sections and discussions.

Theoretical input sessions should be systematic, scientific, updated, and realistic. The systemization of knowledge and techniques helps participants better obtain new knowledge and skills. The scientific features are illustrated by up-to-date achievements, can become persuasive evidence to the students. Students are free to contribute to the achievement of the group and ask questions to get a better understanding of the practical relevance of the theoretical input. The lecturer should play the role of a motivator and a mentor when facilitating and supporting participants' knowledge development. Participants can exchange experiences, share reactions and observations, reflect upon implications and consequences, and discuss theoretical input with responsible people in practice. Subsequently students can develop practical and conceptual understanding.

The main goal during this phase should be that the students are eager to come to class and learn as they have been inspired by the transmitted new ideas and learning processes. Due to the possibility to contribute to class in a two-way-learning-process (which increased their acting competence) a trust and belief in their competencies is enhanced more and more which contributes to an increasing self-efficacy and self-esteem.

2.4. Practical phase

In general, people remember about:

- 10% of what they read
- 20% of what they hear

- 30% of what they see, but
- 50% of what they see and hear
- 80% of what they say or write
- 90% of what they compile and execute themselves

The aim of the practical phase is to learn with all senses. Learning is often not done with the head alone, but with the hands (touching), the heart (emotions), the skin (heat, coldness) and sometimes with the whole body (very strenuous work). Therefore, it is important that theoretical input sessions are accompanied by field trips, practical sessions or discussions with people in practice. In applied sciences knowledge, should not be generated and transferred in small academic circles, but should be used to improve the outside world. Therefore, the theoretical input must be transferred into life to make the world a better place by realizing improvements. Applied science is based on every day's challenges everybody must face everywhere around the world, big challenges like climate change, deforestation or conserving the global fresh water supply; as well as other smaller problems like implementing safe working conditions in underground coal mines. Therefore, a sustainable understanding should be transferred to the students that every challenge is important and every question should be addressed. Teaching applied science should make the students able and willing to use their knowledge in practice for improvements.

The practical phase must imprint the fact that mining is an applied science. To achieve this, students must be given space to realize self-effectiveness and competence. The lecturer must foster acting competence in practice. He should encourage teamwork and demand students' contribution by actively asking questions, sharing experiences and observations, reflect implications and consequences and leading the discussion with people in industry such as active miners. To sum this up the students must test themselves to become future researchers, decision-makers and team players. Sometimes best cases or role models can be adapted and implemented. But, applied science in the real world usually does not carry out one-size-fits-all-solutions. To solve the challenges of a real case and apply suitable solutions should be the focus of this phase. That is why the lecturer should set the goals and rules, give orientation and lead the learning process! Most importantly they have to create a positive learning atmosphere with the aspiration in mind – yes, we apply! The learners should be aware they are not learning for their exam primarily, but for their future lives.

2.5. Wellness phase

As the courses have been designed as block seminars with additional field trips it enhances the learning process of the students tremendously when the lecturer designs a friendly and creative atmosphere outside the classroom as well. Planned distraction like trips to cultural heritage sites or more touristic places will first shape the group cohesion and support the creation of a student network, which is especially important as the students in the courses often come from different countries and universities. These extracurricular activities will help to overcome cultural barriers between the lecturer and the students themselves. Enjoying free time transports joined positive experiences into the classroom. The aim is that the lecturer creates “happy moments” (and hundreds of photos by the learners) to show the learners that lecturers can be good company. The learners sometimes will remember these happy moments for the rest of their lives.

2.6. Exam phase

A lecturer has to actively let his students apply their knowledge during this phase that will summarize the learning efforts of the students. During the exam, the lecturer has to be the mentor and coach who encourages the students to transfer their knowledge learned by the participatory teaching methods back to the audience in form of the audit committee. By creating a positive and challenging atmosphere the lecturer should guide the student through the exam. It is imperative to be fair and avoid surprises by asking questions out of the transferred knowledge curricula. Handwritten papers might be allowed to support the student in the exam. It must be made clear beforehand that the number of personal notes should be kept to a manageable limit.

The lecture's evaluation is the reflection of the participants. They can express their opinion about the seminar and the lecturer request students to give qualified feedback anonymously and voluntarily to the lecturer and enable them to improve their teaching abilities themselves.

2.7. Final phase

After the exams are completed the final phase concludes the course. The importance of this phase should not be underestimated as it will have a long-lasting impact on the students. As they have hopefully all passed the exams, it is the final and most important task for the lecturer to encourage the students to be proud of themselves. In order to strengthen the emotional bond and build a trustful and long-lasting future relationship the class and staff of the institution which supported the course could jointly celebrate the end of the course, for example during

a dinner. A handwritten invitation is a very polite way to say “Thank you” for the time shared and the knowledge that was transferred. This will close the whole course in an appropriate way. It will probably be done by the students intuitive but the lecturer should not forget to take photos to value the time they shared with their students.

3. Conclusion

Potential orientated participatory teaching methods can improve the effectiveness of an international knowledge transfer. The following equation summarizes the authors’ vision of such a transfer:

$$a + 2h = c$$

a = I am (a valuable person, lovely, nice, competent, unique characteristic, individual, somebody special, human)

h = I have (knowledge, aims, competencies) I have (friends, a team who will help, people who like me)

c = I can (apply my knowledge, solve problems, bear burden, meet challenges, undertake responsibilities, ...)

When implementing this equation by using participatory teaching methods lecturers will realize the tremendous learning effort of their students as the biggest advantages of this method compared with the classical "top-down teaching." If international lecturers insist on playing the center role in the class/seminar room, transfer of knowledge might be possible, but it is not very effective and denies cultural barriers that might exist. Lecturers should therefore give the participants the initiative in learning, sharing and applying their knowledge playing the roles of the coach, motivator and mentor. If lecturers want to teach successfully all over the world, they need excellent language skills, high motivation, humanity, respect, excellent time management, huge emotional engagement and a great passion to their profession. Participatory teaching methods applied effectively can overcome cultural barriers and create win-win situations for both, lecturers and students. This experience will enrich their lives and bring them joy and happiness!

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Management training in Viet Nam Coal-Mineral Industries Holding Corporation Limited to 2020 and vision to 2030

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Abstract

Viet Nam Coal-Mineral Industries Holding Corporation Limited is a leading group that has an important role in National Energy Development Strategy. Human resource development in general and especially managers is a vital tool to improve the operation efficiency in Viet Nam Coal-Mineral Industries Holding Corporation Limited (hereafter called Vinacomin). In order to improve the quality of managers, the corporation has applied a lot of methods such as “Recruitment-Promotion-Training” or “Recruitment-Training-Promotion” or “Training- Recruitment-Promotion”.

Keywords: training, management, Vinacomin

1. Introduction

Human resource is the most important factor of social production force that determines the power of each nation. For each company, human resource is considered as “endogenous” resource that rules socio-economic development process and its overwhelming strength is “unlimited” or “infinite” if training and using is suitable. In the trend of international economic integration with many fluctuations, the victory will belong to nations and companies with high quality human resources.

Human resource development in general and especially managers is a vital tool to improve the operation efficiency in Viet Nam companies as well as in Vinacomin.

Vinacomin is a leading group that has an important role in National Energy Development Strategy. In order to take the important mission assigned by Government, the corporation built “Strategy for sustainable development of Viet Nam Coal-Mineral Industries Holding Corporation Limited to 2020, vision to 2030” and signed by Minister of Trade-Industry Ministry under authorized by the Prime Minister in Decision No. 5239/QĐ-BCT October 8th 2010.

The guideline “From mineral and human resource to prosperity” shows that the important role and position of human resource including managers was stressed in the sustainable development of the corporation. In 2015, labor force of Vinacomin was 116.374 employees in which 12.050 qualified management cadres with rule and harmonization. In the past 21 years, Vinacomin always passes difficulties to complete planned operation objectives. Identifying human is a vital factor in business operation, the Vinacomin often cared about training to improve the quality of employees, especially management cadres in terms of morality, knowledge and skills.

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2. General issues of management cadres in Viet Nam companies

2.1. Who are management cadres?

There are different definitions and understanding of management cadres in organizations or companies such as:

- Management cadres are persons who have responsibility to carry out certain objectives through others or to make decisions due to assignment or authorization.
- In narrow meaning: management cadres are top leaders in an organization.
- In broad meaning: management cadres include all persons take part in management system and forming certain functions. They are all persons who do not take part in production directly.
- In this research, study objective is management cadres in broad meaning in companies of Vinacomin.

2.1. Roles of management cadres in company

Management cadres are a basic factor determining an organization's success or failure. They carry out following roles:

- Management role: linking separate divisions, organizing relations smoothly to create a perfect system. They are persons who also apply objective rules into economic operations of the organization.
- Political role: management cadres are persons who have mission to take part in establishing, planning policies of economic development as well as organizing to implement economic policies.
- Educational role: in some extent manager is a model that their staffs can apply. All their behaviors in work and life have educational meaning for everyone.

2.2. Content of management training in companies

2.2.1. Building overall strategy of human resource training and development

Human resource training and development in general and management cadre training in particular is not a discrete activity but it has a relationship to other activities of human resource management mission. As strategy of business, strategy of human resource training and development has short term, medium term and long term strategies. Each strategy has a different importance and close link with each other. All strategies orient to goals of human resource development in general and management development in particular.

2.2.2. Building management training curriculum in companies

a. Training Need Assessment

- Training Need Assessment is to identify which skill should be trained? Belong to which division? Training for which type of employees? When? An organization can find out who need training, what training organizing manner is and which optimum training methods and training levels should be selected.
- Training Need is identified based on analyzing following factors:
- Organization analysis: analyzing business strategy, vision and business goals, organization structure and functions of each department in company.
- Department analysis: identifying which mission and requirements are the most necessary to carry out tasks to reach department's goals. Based on this needed knowledge, skills and behaviors are identified.
- Human resources analysis: analyzing strengths, weaknesses in qualification and skills of management staffs in relation with requirements of works to identify demand of training in qualification and skills.

b. Identifying training goals

Identifying training goals is identify results must be gained of training programs. These results include:

- Detailed skills must be trained
- Skills must be gained after training
- Quantity and structure of learner's
- Time of training

c. Training planning

Training planning is carried out based on completely identifying training need and training goals. Training plan is an action base for a whole of cycles or year of training with related objects: training program organizers, objects of training programs and efficiency control of training programs.

d. Implementing training program

Implementing training program includes: selecting training objects, building training program and selecting training methods, identifying training costs, selecting and training trainers.

- Selecting training objects is to select specific management staffs to train based on studying and identifying their training needs and motivations, impacts of training to employees and qualifications of each person.
- Building training program and selecting training methods
- Training program is a system of subjects and lessons used in training that shows which knowledge and skills must be trained and how long.
- Suitable selecting training methods not only help companies to reach their goals but also help them to optimize the time and costs of training.
- Estimating training costs

Estimating training costs ensures cost using with right purposes and objects. Training costs includes opportunity costs and financial costs. In calculating, financial costs are used which are real costs invested in specific training activities. It is calculated in terms of 4 aspects: costs for trainees, costs for trainers, costs for training equipment and costs for training administrations.

- Selecting trainers

Trainers or training providers are persons who are teachers or provide services, training programs matching with training goals and objects of organizations. Companies can choose trainers from internal or external resources.

e. Evaluating training efficiency

Results of the training programs include: awareness results, satisfaction of the trainees, knowledge applicable and skill receivable from the training programs, positive behaviour changing. Therefore, foundations for evaluating the programs and results of training are through 4 main levels:

- Level 1: Reaction: Do trainees like the program? Is program content suitable for practice? Are training goals reached?
- Level 2: Knowledge: Do trainees understand knowledge, skills and content of the course?
- Level 3: Application: How many percentage of knowledge are applied in practice? What extent?
- Level 4: Behaviour: Do trainees' behaviour change in positive way after joining the course?

3. The situation of management training in Vinacomin

3.1. The situation of management staffs of Vinacomin

Up to December 31st 2015, total labor of the corporation was 116.934 employees in which management staffs were 12.050 persons with 40 Ph.D., 751 masters, 30.863 bachelors and 15.278 graduated from vocational schools.

Management staffs of Vinacomin were about 20.639 up to December 31st 2012. Age and qualification structure of management staffs in the corporation (before Dong Bac Company separation) is shown in table 1.

Table 1. Structure of management staffs of the corporation in 2013

Title	Number (persons)	Age				Qualification			
		<30	31-45	46-55	>56	Post- graduated	Bachelor	Vocational school	Workers
Whole group	20.639	4.162	9.472	4.257	2.748	785	15.372	4.103	379
%	100,00	20,17	45,89	20,63	13,31	3,80	74,48	19,88	1,84
I. Leaders	11.711	845	5.253	3.051	2.562	514	7.995	2.910	292
%	100,00	7,22	44,86	26,05	21,88	4,39	68,27	24,85	2,49
1.Group 1 (1st level)	167	2	48	66	51	36	131		
%	100	1,20	28,74	39,52	30,54	21,56	78,44		
2.. Companies (2nd level)	7.365	409	3.982	2.368	606	394	5.923	776	272
%	100	5,55	54,07	32,15	8,23	5,35	80,42	10,54	3,69
3. Departments (3rd level)	3.984	417	1.102	567	1.898	76	1.764	2.124	20
%	100	10,47	27,66	14,23	47,64	1,91	44,28	53,31	0,50
4. Under department (4nd level)	195	17	121	50	7	8	177	10	
%	100	8,72	62,05	25,64	3,59	4,10	90,77	5,13	

II. Professional staffs	8,928	3,317	4,219	1,206	186	271	7,377	1,193	87
%	100	37,15	47,26	13,51	2,08	3,04	82,63	13,36	0,97

Source: Statistical report of Vinacomin

From table 1, age and qualification structure of management staffs in the group in 2013 as follow:

- Leaders and management staffs were 11,711 persons, account for 56,7%, staffs were 8,928 persons, account for 43,3%.
- Age structure: Age structure of management staffs in the Group is reasonable. Leaders at group level and company's levels were younger compare to 2010 in which management staffs at age of 45-55 was account for 68,22%, above 55 was account for 30,54%.
- Qualification structure: Number of management staffs at middle level and workers reduced in comparison with before 2010 period but the rate is still high, overall average was 21,72%.
- Numbers of post-graduate management staffs, especially Ph.D. was low (3,37%), in which most of them worked in institutes and schools under the Group (62%)
- In scientific research, technology and design consult, number of qualified staffs. Qualification in manufacturing, building and technology is still low in comparison with qualification of the region and world.

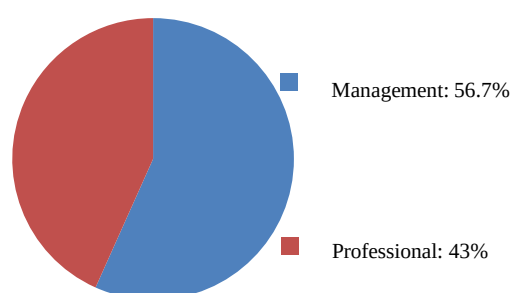


Fig. 2. Structure of Management and Professional Staff of Vinacomin in 2013

From analysis of the situation of human resource including management staffs, some shortcomings were drawn as follows:

- Business attitude and business administrative qualification is still unsound and do not meet requirements of globalization and international economic integration.
- The number of management staffs in the Group is large but lack of qualified staffs. While in the decade of 60-80 of 20 centuries, a lot of management staffs of Vinacomin were trained in mining in Soviet and Eastern Europe. The number of those persons is reducing due to retirement.
- Foreign language skills are low. The number of staffs with good English skills is still not much.
- Ability of information technology has a lot of shortcomings. As evaluation of Information Technology Department of Vinacomin in 2013, the application of information technology was lower than other groups and state companies. As result of a research, based on grade of UN with Atlas method of 4 criteria THIO "Technology, Human, Information, Organization", information technology index of the Group was 60/100, at low level in comparison with region and world.
- Some management staffs, especially young staffs do not like to work. Self-study to improve qualification of management staffs is still low. Taking part and writing research papers for domestic and international seminars are not paid attention.

3.2. Management training planning

Yearly management training plans are built base on training need assessment. Training need assessment is based on business plans, management plans for the next year and results of survey on training need.

For building management training plans, Personnel Department of Vinacomin based on business strategy of the Group and compared to available human resource to evaluate punitively and qualitatively to identify which divisions and sectors need to add more staffs (to recruit more staffs) and which division, skills, management staff need to train to improve qualification. In addition, training plans were built based on job description for each position and trainers can identify needed knowledge and skills and from demand of labors.

3.3. Content building and organizing of training in Vinacomin

The group built sustainable development strategy in which pointed out two main resources for sustainable development is a comparative advantage as well as a motivation, that is “From mineral and human resource to prosperity”.

Based on personnel planning and staff requirement, in over the past years, the group and members had a lot of efficient training manners such as:

- Regularly alternate staffs in different positions and organizations to train and challenge staffs.
- Diversifying training forms for recent management staffs and next generation such as:

3.3.1. Director training

From 1999, Vinacomin Business School (VSB) the training form was maintained. Now, this training form has been being changed 3 times. In the period of 2006-2011, the director training was changed to a high-ranking business administration training under cooperation with Business Administration Faculty (Hanoi School of Business-HSB), National University. In the period of 2012-2015, it was changed to staff resource training (Reverse director classes- Vinacomin) with HSB. From 2015 to recent, this program is undertaken by VBS. Learners after graduation well developed and held important positions in the Group and its members.

3.3.2. High ranking next generation management training of the Group

From 2005, the Group had plans of training staffs under the planning of high ranking next generation management staffs of Vinacomin. Besides domestic training and staff exchange, the Group sent staff abroad to train foreign language and management knowledge. In August 2013, Vinacomin organized high ranking classes for next generation management staffs with criteria of high quality programs and trainers to provide knowledge of creation in changing world.

3.3.3. Post-graduation training

In the past years, besides promoting self-paid post-graduation study in domestic universities, the Group cooperated with domestic and foreign universities to send management staffs with partial funded for fields that suitable to demand of the Group. In 2014, there were 19 persons studying at Ph.D. level and 124 persons studying at Master level.

3.3.4. Foreign language training

Vinacomin always care about foreign language training (English, Polish, Japanese) for management staffs to improve skills of communication, working and to prepare staff resources to join projects abroad. Based on practice experience, if foreign language training was done in domestic efficiency of training would be reached. Therefore, from 2013, the Group changed training form to mixed form that trainees were trained domestically in 6-9 months then they would be sent to abroad to have opportunities to learn, communicate to improve foreign language skills per qualification of the trainees. In over past 21 years, the Group organized for 178 in-position and reserve staffs to learn foreign language in which there were 6 classes with 80 learners mixing domestic and abroad training.

3.3.5. Training under foreign cooperation projects

Training in Japan under NEDO project of management ability improvement in mining was undertaken in cooperation program between Vinacomin and Japan Agency of New Industry Technology and Energy Development. In the period of 2002-2006, through NEDO, the Group sent 585 employees to Japan to learn and practice technical transfer in coal mines. From 2007 to recent, the group sent 534 trainees.

3.3.6. Training program building

In 2012, the Group cooperated with German partner in improving quality of human resource training of Vinacomin to 2020 through project “Training internationalization in mining to ensure sustainability- TRAIN@MINE” cooperating between the group and 4 German partners (MIBRAG, RAG, Emscher Wasser Technik and Lepzig University) -2012-2015)

Beside centralized training, Vinacomin facilitate time and cost for staffs to study to improve their qualification (post-graduation study, foreign language learning)

3.4. Shortcomings in management training in the Group

- Long-term management training plans were not built. Training programs were not based on training need assessment. Training need assessment in term of each member company and each management position were not concerned thus training results did not bring into play impacts to organizations.

- Group –level and member-level training system did not establish standard training procedure. Course designing did not apply ADDIE model (Analysis, Design, Development, Implementation, Evaluation) that is analyzing, designing, developing, implementing and evaluation were not done when organizing a course.
- Training programs did not had curriculums. They were still unspecific and hollow for different management levels thus training process were inefficient in improving management ability in different levels. Moreover, training programs were lack of standard textbook according to each module of knowledge, skill and qualification that were suitable with each job position.
- Classifying management staffs were still based on traditional criteria but not on criteria close to characteristics of the Group. As a result, efficiency of training program, especially management training, reduced.
- Classes organized with large number of trainees thus quality of training could not improve while trainer forces were still weak and short of. Force of trainers were not established due to lack of clear policies of promotion.
- Cost of training now still depends on regular in Circular 206/2012/TT-BTC of Finance Ministry thus organizing high quality programs were limited.
- Rules for trainees were not strong enough so some trainers and companies still ignored training. Many leaders thought that training was not as important as completing plans and getting profits.
- Policies of using post training staffs were not concerned much thus it did not promote management staffs actively join in training process to improve management abilities and did not create learning culture in the Group and members.
- Expanding international cooperation in training in general and management training in particular were not concerned. These problems restrain training capacity as well as efficiency of training.

4. Solutions to perfect management training in Vinacomin to 2020 and vision to 2030

To develop management force of Vinacomin, a lot of solutions must be implemented from training need assessment, program building, trainer force preparing, association and cooperation in training to company culture building as well as post-training policies. In the scope of this research, the authors mention following main solutions:

4.1. Perfecting training need assessment

Training need assessment is a process of identifying “gap” between expected results and real results to find out the lack of knowledge, skills and attitudes to well complete goals of an organization. Therefore, before building training programs in Vinacomin and members it should be assessed which management staffs must be trained and what knowledge, skills and attitude must be trained.

To find out the lack of knowledge and skills while analyzing the gap of job results of management staffs in Vinacomin, model of training need assessment will be applied as following:

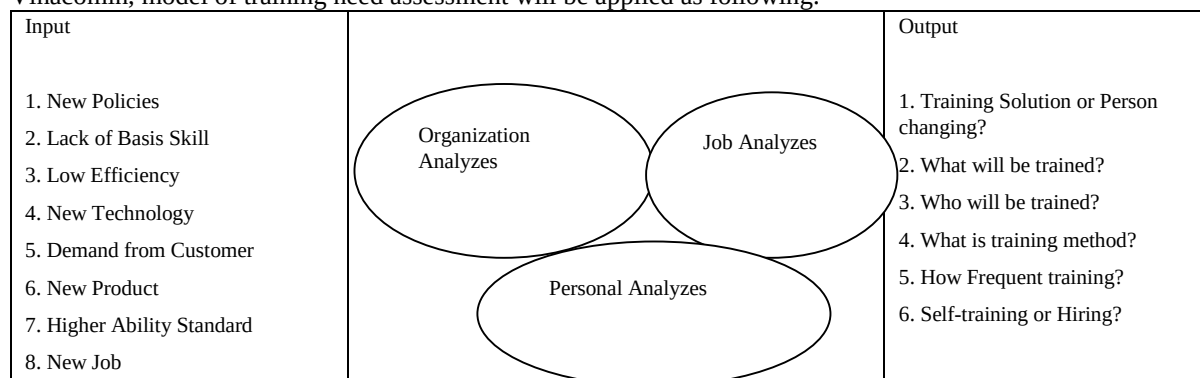


Fig. 3. Model of training need assessment in companies

4.2. Building training programs for management staffs in terms of management levels to meet management capacity

Based on 4 factors: Attitude-Thought-Knowledge-Skills and management level classification, development management staffs training will be oriented and program content will be designed suitable of each group of management staffs to select training methods, organizing and implementing methods and evaluating result according to following chart:

Based on objectives and needed knowledge, a chart of knowledge and skill orientation is built as following:

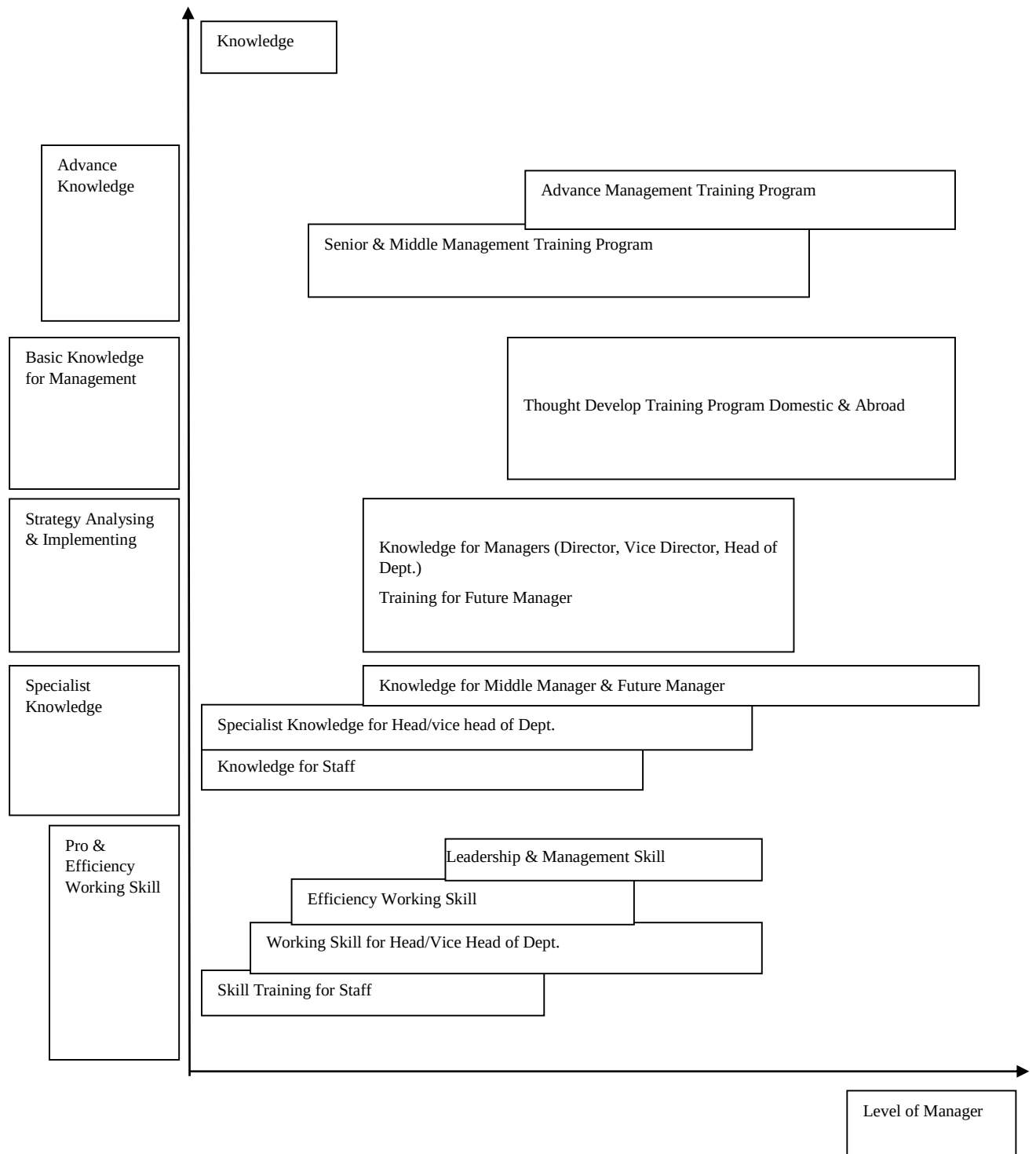


Fig. 4a. Training Program for Level of Manager

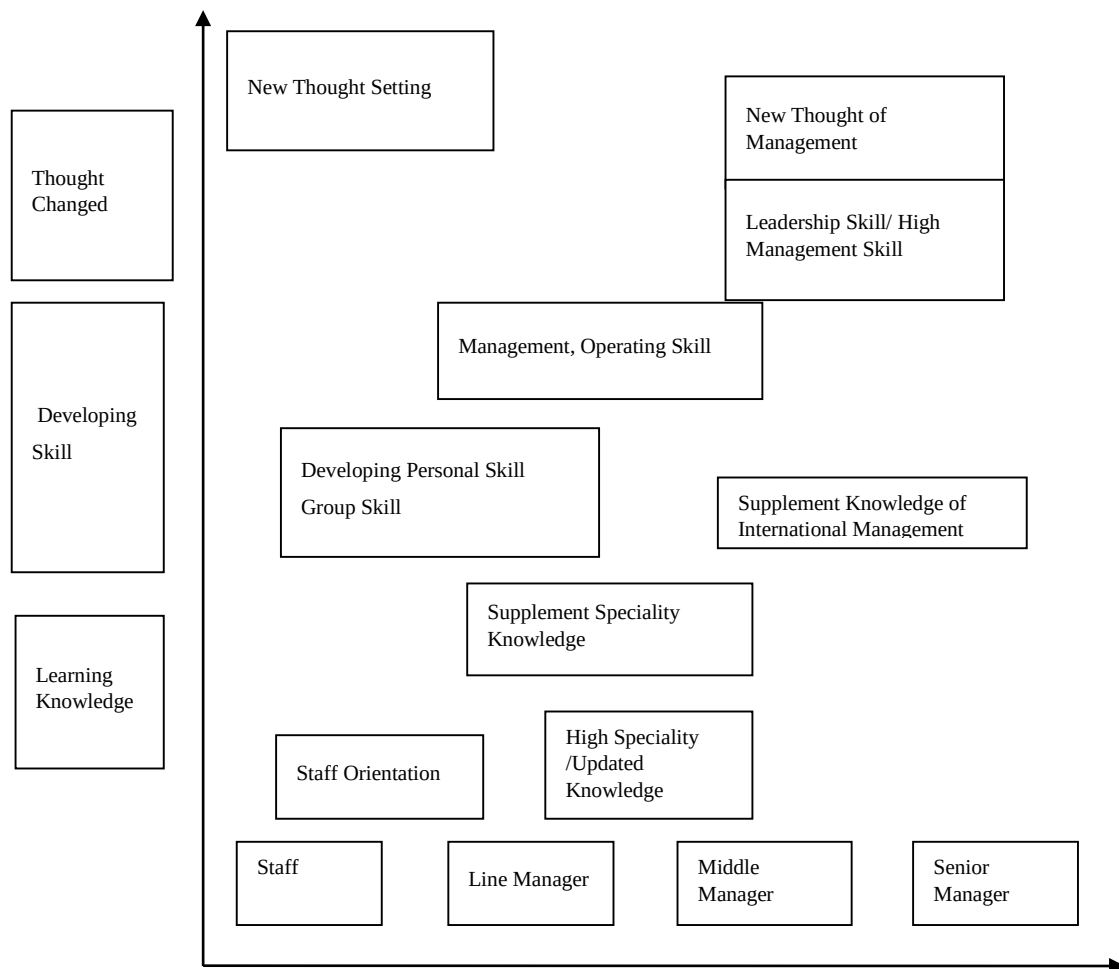


Fig. 4b. Knowledge orientation for management staffs

4.3. Building sound policies of post training using

Post using training is a problem that must be concerned by leader of Vinacomin. Plans of post training using should go along with training program. Using and exchanging employees must be concerned. Employees using must follow a rule of “right person, right job” to ensure the efficiency of investment in human resource development to avoid waste in condition of limitation financial source.

Management staffs must be arranged suitable work in term of qualification after training. They must be facilitated work and time to apply trained knowledge and skills to practice. In working, leaders should create environment of learning promotion and fair competition to help them to see clearly promotion path to motivate them to study. Moreover, training results should close link with wage, bonus and welfare regime. If training activities are isolated, efficiency of training will not be right evaluated as well as trainers will have no motivations and training will be considered unprofitable investment.

4.4. Building trainer forces

In Vinacomin, there are a lot of in position and retired staffs who trained professionally and had long experience in mining thus a regime of promoting them to join training process of the group must be established.

To implement this solution, firstly, Personnel Department proposes and builds regular of internal standard trainers. Then, a list of internal trainers must be built through scanning all divisions, departments with high qualified employees to ensure internal requirements. They should be trained training skills (teaching skills, lecture designing skills) to help them to give lectures confidently and attractively.

Besides policies of financial and non-financial promotion should be launched to motivate them to teach and improve their teaching knowledge and skills.

4.5. Building learning culture in company

To build a learning environment, leaders of companies and departments should be a mirror of learning and have a leadership style of learning and development promoting. This will have strong impact and spread to all employees in companies and develop sharing and learning culture.

To build learning promotion culture in companies, leaders should have vision, development strategy which all staffs deeply understand and commit to implement goals of organizations including learning goals and personal capacity development. Leaders should arrange right persons to right positions to promote the best capacity of employees that satisfy them. Working environment should be friendly, and widely sharing information to everyone can take part in training programs of the Group and members.

5. Conclusion

In the trend of development of the world and international integration process, leaders should be aware clearly more important role of human resources to development of an organization. Training and development of human resource including management staffs is a sustainable investment to help companies develop stronger.

The year of 2016, an anniversary of 80 years of coal mining industry and 21 years of Viet Nam coal-mineral Industries Holding Corporation Limited foundation, Vinacomin always considers human resource is the most important resource that is endogenous resource dominating development process and its overwhelming strength is “unlimited” or “infinite” if training and using is suitable. Therefore, in overall process of establishment and development, the issues of high quality human resource training and development, the Group often cared about training to improve the quality of employees, especially management cadres in terms of morality, knowledge and skills. In the new development process in which “globalization” becomes the magnetic needle for all actions, human resource training including management training will be more and more important in sustainable development of Vinacomin.

The research analyzed the situation of management training in Vinacomin to right evaluate shortcomings in management training of the corporation. Based on that, some solutions to perfect management training in the corporation were proposed.

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International Conference on Economic Management in Mineral Activities (EMMA)

Opportunities, challenges and solutions for labor in the mining sector in the context of international labor movement

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Abstract

Official establishment of ASEAN (AEC) on 31st December 2015 and Viet Nam signing in Free Trade Agreement TTP and series of FTA have made it easier for Vietnam Labor Force to migrate abroad. Labor migration has opened up opportunities and also posed challenges to high quality labor force in Vietnam companies in general and mining firms in particular. This article focuses on analyzing both opportunities and challenges of mining labor force in the circumstances of international labor movement. Additionally, some solutions are proposed to develop quality of labor force to meet the need of skilled and competent labor in mining companies.

Keywords: International labor force migration; Quality of labor.

1. Situation of labor force and tendency of worker movement in mining industry

According to statistics, by the year 2015, about 110,000 employees are working in coal mining firms of Vietnam National Coal – Mineral Industries Group (Vinacomin), of which workers in tunnel mine accounts for 38 percent. In recent years, there has been a gradual increase in number of workers leaving their jobs especially workers in tunnel mines. Notably in 2013, number of resigned workers approximated to number of newly recruited ones. There was a shortage of labor in many coal mining firms, even in enterprises which have good benefit packages such as Nam Mau Coal Co., Vang Danh Coal Co., number of workers resigning is still high. In the development strategies of coal mining industry, by the year 2020, coal mining output from drift mines is planned to account for 65 percent of total output. However, shortage of labor especially in drift mines is a big challenge to coal mining industry to achieve the output target.

Current problem of labor shortage which Vinacomin is now facing with is quite critical. In 2014, not only experienced workers in mining quit their jobs but also students in mining colleges dropped out of school. Additionally, in recent years, admissions of Hanoi University of mining and geology and Quang Ninh University of Industry have experienced difficulties in both quantity and quality, scores in entrance exam of these universities are in average level (around 15-17). Although TKV Coal Vocational College not only opens admission during twelve months but also have their staffs seek for students in admission fairs from plain to mountainous areas, the college fails to gain target admissions and number of dropout students still increases. Quang Ninh TKV Coal Vocational College achieved only 50% of its admission target in 2013 and 90% in 2015-2016. Contrary to current situation, 10 years ago, admissions to mining vocational colleges was competitive as number of applicants from rural areas was quite high. Many people even needed to take advantage of their close relationship to be accepted to mining colleges.

Remarkably, in recent years, coal mining industry has provided many benefit packages for its employees and students. Per capita income of this industry is higher than income of other industries and average income of whole country. Moreover, coal vocational college TKV not only covers tuition fee, living expenses for its students but

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also offers job opportunities for them right after their graduation. Tuition fee in Hanoi University of Mining and Geology and Quang Ninh University of Industry is lower compared with fee in other universities in Vietnam. Regarding working facilities and conditions in mining industry, workers are provided transportation (not only for working work but also for commuting from home to work), accommodation (with full facilities such as dining room, bathroom with electric heater), healthcare services (health check twice per year, lungs purification, holidays...). Furthermore, there are many activities for mining workers to enrich their mental life. However, all above mentions benefits and treatments still cannot keep and appeal more labor to mining industry.

Besides hard and dangerous working conditions, there are many reasons for failure in appealing labor and enhancing engagement and commitment of current employees in coal mining sectors. When Vietnam economy is now more and more integrated and developed, people who have strong financial support from family will have tendency to study abroad, others will choose to study to be white-collar workers. Additionally, Vietnamese prefer having a stable position in government offices to directly producing goods as blue-collar workers. Despite having high income, pitmen rarely have time to enjoy their life after working shift hours therefore they would feel fed up and quit the job. Moreover, due to lack of positive information of coal mining industry, many people are afraid to work in this sector.

2. Movement of high-quality workers: opportunities and challenges to labor force in mining industry

After 10 years of negotiations, the ASEAN Economic Community (AEC) was officially established on 31st December 2015, all ASEAN countries with high expectations on AEC strive towards economic development strategies and development of high quality and skilled human resources. According to blueprint, by 2025, AEC will create 14 million new jobs for workers in ASEAN countries. However, this objective will not be attained unless the agreement on free flow of labor migration is kept. In reality, the current labor movement among ASEAN countries is not popular, especially in Vietnam, number of migrant workers is still low. Current situation not only go against the key objective of AEC but also create difficulties in achieving the objective of strengthening economic integration in the region. Therefore, to get benefits from AEC, ASEAN countries have to promote the movement of skilled labor flow. However, according to experts of Southeast Asia, the process of licensing, educational requirements and uncertainty about the regulations of both employers and employees in ASEAN are the barriers to skilled labor mobility in AEC. In addition, currently there are differences in education and training systems among ASEAN. It is necessary for ASEAN countries to implement standardization processes to ensure the quality of labor.

Liberalization of labor in the AEC just began with the Mutual Recognition Agreements (MRAs) which allow practitioners in eight professions to practice in other ASEAN Members through mutual recognition of their qualifications (by building regional professions registration system), yet until now only 2 MRAs have been fully implemented. However, when AEC succeeds in facilitating the free mobility of skilled labor in the region, there would be more difficulties for Vietnam Labor if they are lack of the necessary skills (language, professionalism ...). Additionally, as ASEAN countries have different targeted priorities to economic development and product diversification, demands of labor in these countries are also different. Specifically: automobile manufacturing and high-tech production such as electronic components, software, electronic chips are focused in Malaysia, Singapore; while minerals and natural resources mining industries are developed and expanded in different countries which have large mineral deposits e.g. oil and gas extraction in Indonesia, Brunei, Malaysia and Vietnam; coal mining in Vietnam and Indonesia, copper, bauxite in Malaysia, Vietnam, Indonesia, the Philippines; lead and zinc in Myanmar, Thailand, Indonesia, the Philippines. Southeast Asia produced great chromium output accounted for 1/6 of the world and Vietnam holds the largest chromite reserves (22.8 million tons at Co Dinh - Thanh Hoa). It can be seen that although demands of labor in ASEAN countries are different, there is a common feature i.e. they all focus on mineral and natural resource mining industries which is the basis for economic development. Therefore, it is obviously essential to have more high-quality labor and international labor migration for cooperation activities in exploiting minerals and natural resources in the region.

Signing in TTP and FTA agreements helps Viet Nam labor market more open, which means there are more opportunities as well as challenges to mining labor force in particular.

In regard to opportunities, ASEAN has wide labor market with nearly 600 million people having similarity in physical health and cultural mindset. Moreover, the basic for economic development in these countries is minerals and natural resources mining. Additionally, as ASEAN market is an attractive destination for foreign direct investment, in recent year, the region has achieved economic growth of over 5%. In summary, in the near future, there would be big demand of high quality labor force in mining industry.

Establishment of AEC enables and facilitates easier movement and travel within ASEAN. With the development of land and aviation transport, it is more and more convenient for people to work abroad. However, there are not many international labor movement of mining industry within Vietnam. Specifically, until now there is only one Indonesian company cooperates and invests in coal mining industry. In gold mining, despite having 100% FDI, operation scale is still small and workers are mainly local people. Additionally, overseas Vietnamese labors mainly work in construction in Malaysia, oil and gas extraction in Brunei, some Vietnamese companies

with 100% FDI invest in mining in Laos and Myanmar. Number of labor in mining industry move to foreign companies is very small and inconsiderable. Recruitment within ASEAN for key positions in mining companies has not ever occurred.

Regional integration creates more opportunities which are also big challenges to Viet Nam Labor market. Lack of good physical health, professionalism, foreign language proficiency makes it difficult for Vietnamese workers to take advantages of opportunities in competitive regional labor market. Easier movement of labor is also a risk of brain drain when high quality human resources of Vietnam can move to work in other countries. This means there would be less skilled labor for mining industry.

3. Suggestions on improving labor force of mining industry in international labor force movement

International Labor Movement in general and high-quality labor migration in Vietnam in particular have been occurred and increased. Thus, to overcome the challenges and enhance our competitiveness in economic integration, it is suggested that universities, vocational colleges and enterprises in mining industry put in great effort to working out these following methods:

Firstly, education institutes need to design and provide students modern and practical curriculum and training programs which are used for all universities and vocational colleges in mining industry. In reality, in mining industry, human resources with university degree and higher degree mainly come from Hanoi University of Mining and Geology and Quang Ninh University of Industry, some from Geology Departments of Hanoi National University, University of Transportation and Communications, Vietnam National University of Agriculture, others from land surveying sector of Hanoi University of Natural Resources and Environment. Coal Vocational College TKV focuses on training for human resources under university levels. However, there is little cooperation in developing and exchanging professional knowledge, defining targeted number of students and career orientation to fit and meet the demand of human resources in mining industry. It is necessary for universities and colleges in the industry to participate in scientific conferences to come up and unify new modern, suitable curriculums and training programs.

Secondly, it is essential to improve quality of education to be in line with the high-quality human resource requirements of international integration. According to the requirements of the Ministry of Education and Training, students graduating from universities need to communicate in foreign languages in international workplace. However, in reality, not many students in university meet this requirement, this situation is even worst in colleges and lower education degree. Vietnam laborers are unable to work overseas due to poor language and practical skills. Moreover, as many majors in universities are outdated, after graduating, students are neither able to apply and manage new technologies nor work overseas. In short, it is substantial to have international integrated curriculum and training programs in which foreign language proficiency is put in top priority as the critical factor of educational efficiency.

Thirdly, it is also necessary to promote international cooperation in both vocational training and recruitment. At present, Hanoi University of Mining and Geology has collaborated with many universities in Russia, Eastern European countries and China in mining education and training programs. In the near future, other universities and colleges related to mining industry are encouraged to further promote international cooperation activities instead of just sending students to study overseas without caring about the educational result and job allocation after graduation.

Fourthly, education institutions in mining industry need to build strong connection with enterprises to have proper recruitment and benefit packages for talents. For example, Hanoi University of Mining and Geology and mining companies have held many job fairs to offer opportunities for fresh graduate students. However, number of students getting their right and desired jobs are small. Many companies which had short time for preparation and insufficient information failed to define and meet their need of human resources. Therefore, universities and companies in mining industry are encouraged to promote supportive activities for students such as rewarding scholarships for excellent students, offering and facilitating internship as well as job opportunities instead of just providing statistics for students for final thesis.

Fifthly, it is critical to keep skillful workers from quitting their jobs. As mentioned above, in recent years, there has been an increase in number of employees dropping out in mining industry especially in drift mining despite having very good benefit packages. It is necessary for both coal sector and its members to take this problem serious and put it in top concern. Coal sector in general and mining companies in particular are highly recommended to satisfy their employees' need by not only paying high salary but also enhancing their social life, working conditions, mitigating risks so that workers are work at their highest capacity and perform their best.

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Solutions to develop human resource for the implementation of the master plan on development of the Viet Nam Coal Industry to 2020, vision to 2030

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Abstract

According to the decision No. 403/QĐ-TTg dated March 14, 2016 by the Prime Minister, the master plan of the Vietnamese coal industry to 2020 and vision to 2030 was approved. The essence of the master plan is to build the Vietnamese coal industry to become industrial development, high competition, advanced technology of exploration, exploitation, selection, processing, and usage coal and to ensure sufficient domestic demand of coal. Development of human resource is significantly important to ensure the completion purpose of the coal industry development, thus, the article proposes solutions to development of human resource in coal companies of Vietnam National Coal - Mineral Industries Holding Corporation (Vinacomin), Dong Bac Corporation, etc. The main solutions include empowering investment in human, assuring quantity, standard and reasonable structure of employees, raising labor productivity, reducing cost and increasing salary of employees. Moreover, the article recommends the government to build safety bonus policy in underground mines and the minimum wage for coal branch, etc. The solutions intensify to recruit labors in coal mining companies, especially in coal underground mining companies.

Keywords: human resource, development of human resource.

1. Foreword

On March 14th 2016, the Prime Minister approved the Decision No. 403/QĐ-TTg regarding the adjustment of the Viet Nam Coal Industry Development Plan to 2020, vision to 2030 (hereinafter referred as Decision 403) which aims to develop the Viet Nam coal industry into a developed industry with enhanced competitiveness, advanced technological competence in comparison with other countries in terms of exploration, extraction, selecting and enrichment, processing, utilization, and meeting the local coal demands. To achieve this overall goal, the Decision 403 has emphasized specific objectives as follows:

- Coal exploration

- + Dong Bac coal deposit: by 2020, coal exploration will be completed to a depth of -300 m and even below -300 m in some areas to ensure sufficient reserve and reliable resources to be mobilized for operation by 2025. By 2020, it is expected to upgrade about 1,0 billion ton of 333, 334a and 334b level to reliable reserve and resources (222 and 332 level). By 2025, it is expected to basically complete coal exploration to the bottom of coal deposit to ensure sufficient reliable coal reserve and resources to be mobilized for operation during the period 2021 - 2030 and 2030 onwards. By 2030, it is expected to upgrade the remaining resources of from 333, 334a and 334b level to 222 and 332 level.

- + Red River Coal Deposit: By 2020, coal exploration for Nam Thinh Coal Deposit and part of the Nam Phu II coal mine, Tien Hai district, Thai Binh province for development and implementation of a pilot coal mining project. Based on the survey results and overall evaluation of coal resources contained in the ground part of Red River Coal Deposit and the outcomes of pilot coal mining projects, the area of coal exploration will be widened to scale up coal exploration to industrial level, by using appropriate mining technologies.

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- Coal mining: Commercial coal production of the whole coal industry estimated for respective periods in the coal mining plan: Approximately 41 - 44 million tons by 2016; 47 - 50 million tons by 2020; 51 - 54 million tons by 2025 and 55 - 57 million tons by 2030. For the Red River coal deposit, over the period 2021 – 2030, the pilot coal mining project will be implemented to lay the foundations for scaling up the coal mine to be operated at industrial level; targeting to reach commercial coal production (equivalent) of approximately 0.5 – 1.0 million tons by 2030. Commercial coal production by the entire coal industry can be adjusted to fit actual market demands at specific point in time (including coal exploration and importation) to sustain the overall viable performance of the economy.

- Coal losses: By 2020, it is expected to reduce coal losses resulted from underground coal mining to approximately 20% and below 20% by 2020 onwards; coal losses resulted from surface coal mining to about 5% and below 5% by 2020 onwards.

- Coal selecting, enrichment and processing: By 2020, it is expected to put into service coal selection and enrichment plants in Quang Ninh to optimize coal transportation and enrichment works and to ensure compliance with coal zone urban development plans, transport and seaports development plans and required environmental protection. By 2020 onwards, coal processing will be diversified to produce a variety of coal products to meet the market demands.

- Environmental protection: By 2020, coal mining activities by all the mining areas are expected to meet all applicable environmental standards.

- Coal markets: to meet local coal demands, in addition to appropriate coal exportation and importation.

To achieve the above objectives, the contents of the master plan as provided in the Decision 403 has been amended against the Plan provided in the Decision No. 60/QĐ-TTg dated January 9th 2012 by the Prime Minister. In order to realize this adjusted plan, key mining companies in Viet Nam namely Viet Nam National Coal - Mineral Industries Corporation- Vinacomin, Dong Bac Corporation, will need to apply various measures such as diversification of financing sources, including establishment of joint venture or partnership with foreign companies in implementing coal mining projects in locations that are not yet able to apply mining technologies, enhancement of researches, technological transfer and know-how of advanced technology and skills in coal exploration, mining and processing, etc. In particular, studies are to be conducted to find solutions for human resources development needed for the realization of the master plan under the Decision 403.

2. Definitions and status of human resources development in coal mining industry

Human resources development is defined as the process of developing physical, mental strength, ability to perceive and take over knowledge, skills, social dynamics and human creativeness; culture; historical traditions, etc. From social perspective, human resources development is the process of increasing in terms of quantity (scale) of human resources and of quality of human resources, and thereby creating increasingly appropriate human resources structure. From individual perspective, human resources development is the process of making humans grown up, provided with social competence (physical, mental strength and personality) and enhanced social dynamics. Human resources development is the process of creating changes, movements in terms of quantity, structure and quality of human resources to fit with specific phases of socioeconomic development at different levels (national, regional, and local, etc.) in order to meet human resources demands for production, services and daily life. Human resources development help to provide improved human potential, enhanced occupational competence, job creation, and improved life quality, socioeconomic position of all people classes thereby, contributing to the social development. Therefore, associated with the objective of realizing the master plan, human resources development for the coal industry should be interpreted as the process of creating changes and movements in terms of both quantity, structure and quality of human resources as such to meet the viewpoints and plan of coal industry development, and at the same time promote human potential, improve living standards for the Vietnamese mining labors.

In accordance with the decision No. 12750/QĐ-BCT dated 20/11/2015 by the Minister of Industry and Trade, approving the restructuring of Viet Nam Coal Industry for the national industrialization, modernization and sustainable development to 2020, vision to 2030, the key players of the Viet Nam coal industry only include two, namely Viet Nam National Coal - Mineral Industries Corporation (Vinacomin) and Dong Bac Corporation (DBC). Regarding resources management, the Decision 403 also assigns Vinacomin and DBC to take main responsibility in the management, exploration and mining activities for Dong Bac coal deposit and Red River coal deposit in accordance with the plan. The coal production in 2015 by Vinacomin reached 37.6 million tons, while the planned target in 2016 is 39.87 billion tons which is sufficient to meet 84% of local coal demands of the year in accordance with the Decision 403. Hence, this article shows the study of the status of human resources development in the Viet Nam coal industry, representative by Vinacomin.

In 2015, the total average workforce in Vinacomin is 124.4 thousand persons with the average wage of 8.6 million VND/person/month, 2,5% higher from 2014, in which the average wage of persons involved in coal production is expected to be 9.2 million VND/person/month, reaching 100% of the planned target and 3,5% higher than the previous year. Human resources development in Vinacomin in recent years has achieved many targets in

terms of scale, structure, and quality when the workforce tends to be younger, human resources structure changes positively (reduced indirect while increased direct laborer ratio), occupational skills and life quality of the labors have been improved (the number of labors experienced in vocational training, joining examinations for occupational grade improvement, occupying graduate and post graduate titles, training on occupational skills, leadership, production management etc.). However, human resources development at Vinacomin is also seeing some gaps, as follows:

- + Abundant workforce, but of imbalanced structure: there is currently redundancy of management workforce but Vinacomin is still in a shortage of skillful workers; oversized in number of indirect workers but it is difficult to recruit new miners, especially underground. In 2015, technological operators accounted for 61.5%, auxiliary and service workers accounted for 26.4%, managers accounted for 12.1%. In comparison with the management workforce target of 9% of Vinacomin, there are currently redundant 2,830 managers. Meanwhile the number of miners is 37,009 (of which 25,318 are hewers and miners), Vinacomin felt short of 1,300 miners in 2015.

- + Although the workforce quality has been improved, the labors are not yet observant to working disciplines, for example, they quit jobs on their own, taking leaves without any reason. Many companies have formulated and applied performance indicators where the average number of working days in a month is considered as one of the performance indicators for evaluating the quality of field or workshop managers. However, this has not helped much in preventing miners from quitting their jobs or taking leaves without giving reasons. A survey completed by the Trade Union of Vinacomin in coordination with Viet Nam Institute of Workers and Trade Union shows that when laborers were asked if they would be willing to “dedicate themselves with their current jobs on the long run or not”, up to 48.3% of the asked workers with average income of 3-5 million VND/month said “would not”; for workers with average income of 5-7 million VND/month, the same answers accounted for 37.9% of the asked. Labors do not dedicate themselves to coal industry for many reasons; but mostly due to the inappropriateness of the wage policy and currently there is no minimum wage that can truly reflect the value of the intensive workforce in the coal industry. There is limited number of labors with high occupational grade and managers are also relatively poor in foreign language skills, knowledge, financial experience, commercial and legislative issues, competence for mining technologies for coal beds with complicated geological conditions, human resources management and corporate culture, etc.

- + Labor productivity has not been improved, and even tends to decrease, due to (1) no breakthrough in mining technologies as in previous periods while the ratio of mined coal production progressively increases and (2) mines go further and deeper leading to other complicated requisites for the production in term of safety management, geological conditions, ventilation, etc. The number of technological workforce seems to be redundant due to changes in way of organizing production activities, management, and the use of more advanced technologies. Meanwhile no change has been made to the assessment system, workforce strategy as well as the appropriate amendment of some procedures and standards to match actual needs. This has forced the allocation of technological workforce in accordance with the existing workforce strategy, resulting in redundancy, waste and then reduced productivity of the workforce. To ensure labor safety for the Viet Nam coal industry, maintaining benefits and encouraging labors to propose solutions for improving safety at work, the establishment of a bonus fund is of critical importance. The safety bonus will significantly contribute to an appropriate evaluation of labor productivity.

3. Some solutions for human resources development to implement the Viet Nam Coal Industry Development Plan to 2020, vision to 2030

To implement the Viet Nam Coal Industry Development Plan to 2020, vision to 2030, the Decision 403 provides some solutions to secure long term coal supply, mobilized investment capital, science and technology, safety, environmental protection, and climate change response. It also emphasizes some orientations as follows:

- + Human resources training: To increase investment, enhance cooperation – linkage, innovate training method in order to create readiness and prepare human resources for the implementation of the Plan.

- + Mechanisms and policies on human resources development: The government will issue mechanisms and incentive policies which to recruit miners and/or hewers in coal mines.

From the above gaps in human resources development in Vinacomin in the recent years and the oriented solutions provided in the Decision 403, more details should be discussed:

3.1. Establishment of mining safety bonus fund

First, Vinacomin needs to urge the mother company and its subsidiaries to implement the Circulation No. 995/LDTBXH-LDTL dated 23/03/2015 by the Ministry of Labor, Invalids and Social Affairs regarding safety bonus for labors who work in coal, mineral mining and mine construction companies. To sign agreements with employees, representative of labors has the right to know about the bonus entitlement, subjects of safety bonus in order to formulate a safety bonus fund based on the wage fund. This will encourage mining staff strictly apply safety measures in their work and thereby, helping to minimize accidents and risks, contributing to stabilized

production activities. The payout of safety bonus shall be depending on labor safety performance and on the subsidiaries in accordance with corporate policies.

Nevertheless, the formation of bonus fund based on the wage fund will not have positive impacts on the maintenance of quantity and quality of the workforce in the Viet Nam coal industry. Therefore, it is necessary to propose that idea to the government, to recruit laborers to work in coal mines, particularly the miners or hewers, the safety bonus fund should not be extracted from the wage fund and be accounted as reasonable cost to in a concerned term. The formula to determine safety bonus fund is as follows:

- Plan based safety bonus fund:

$$T_{KH}^{AT} = LDh \times Hcb \times Lcs \times Mtt \times 12 \text{ months} \quad (1)$$

$$DG_{KH}^{AT} = \frac{T_{KH}^{AT}}{GTGT_{KH}} \quad (2)$$

Where:

- T_{KH}^{AT} : planned safety bonus fund in a year.
- LDh: planned number of laborers entitled to safety bonus in a year (proposing to the government that special attention should be attached to miners or hewers).
- Hcb: Planned pay rate in a year
- Lcs: Base wage in accordance with governmental applicable regulations.
- Mtt: Safety bonus amount (Mtt = 20%, applying the maximum bonus amount in accordance with the Joint Circular No. 35/2005/TTLT-BLDTBXH-BTC dated 16/12/2005).
- DG_{KH}^{AT} : Planned price unit for wage calculation for safety bonus based on value added indicators in a year.
- GTGT_{KH}: Planned value added of company in a year.
- Safety bonus fund shall be:

$$T_{TH}^{AT} = DG_{KH}^{AT} \times GTGT_{TH} \quad (3)$$

T_{TH}^{AT} : Safety bonus fund to be applied in a year as mentioned above

GTGT_{TH}: Value added of the company in a year.

In principle, safety bonus for a group of people or individuals shall follow the applicable labor safety provisions for production activities in accordance with applicable standards, procedures, and technical regulations issued by the competent authorities. A group of people or individuals violating safety rules shall be disposed of monthly, quarterly or even yearly safety bonus accounting from the date of violation, based on the extent to which losses are caused, scope of impacts, and responsibilities. To ensure the government approval of the safety bonus fund, Vinacomin should promptly develop proposed mechanism and policies to mining staff, particularly for miners in accordance with the decision No. 2146/QĐ-TTg dated 01/12/2014 by the Prime Minister. Furthermore, it necessary to subsidiaries to establish safety bonus regulations matching their production activities for application and payout of safety bonus for groups of people or individuals.

3.2. Determination of minimum industry wage

According to the provisions of the Labor Code, the minimum wage of each industry is determined by the industrial collective agreements and stated in the industrial collective labor accord. However, such industrial minimum wage is not allowed to be lower than the regional minimum wage promulgated by the government. The industrial minimum wage reflects three factors, which are (1) working quality and working conditions under the industry's demand, demand-supply relation of the industry, and (3) factors related to positions, roles, and attraction of the industry. Hence, if the Viet Nam coal industry can issue its industrial minimum wage, the quantity and quality of the workforce can be improved through minimizing the number of high-grade labors leaving their jobs, raising labor productivity, and attracting high qualified human resources, etc.

Minimum wage in general and industrial minimum wage in particular can be determined by applying one of the four methods, namely (1) Using indicators of the minimum labor demand for the simplest work, without being trained, under normal conditions and in need of bringing up their children; (2) Using information from survey of the lowest wage and remuneration on the labor market being offered by companies for simple work (without being trained) in companies (by regions, industry, occupation, and ownership). (3) Based on the capability of the economy and (4) Using indicators of rate of living cost devaluation in comparison with the initial term of the defined minimum wage. Among these four methods, method (1) is considered the main method for determination of the minimum wage to protect the rights and benefits of labors.

However, the usage of the above methods for determination the minimum wage in the coal industry may not be successful in terms of signing collective labor accord because the accord cannot be reached among parties on

wage issues, as wage is paid in companies owing to the business performance. Meanwhile, it is necessary to ensure that the minimum wage of the coal industry is not allowed to be lower than regional minimum wage. This is obviously a challenge to companies in downturn phase. Therefore, determination the industrial minimum wage based on the company's performance can be as follow:

+ In case $VA_2 \geq VA_1$:

$$WI = Wb + Wb \times (VA_2/VA_1 - 1) \quad (4)$$

- W_I : Minimum wage of the industry
- W_b : Base wage as promulgated by the government.
- VA_2 : Value added in the reported year.
- VA_1 : Value added in the root year.

Notes: In case W_I calculated using formula (4) is lower than the regional minimum wage, W_I will be determined as equal to the regional minimum wage.

+ In case $VA_2 < VA_1$: W_I is determined equal to the regional minimum wage.

3.3. Some other solutions

- Promoting the re-arrangement of workforce in subsidiaries of Vinacomin to ensure an appropriate structure of managers, service staff and workers, and to reduce the workers (indirect laborers) rate by 9%.
- Formulating policies that attract and give incentives to mining students, including exemption of tuition, 100% financial support for food and accommodation during study, arrangement of companies for students to complete their probation with payment of up to 70 ÷ 80% of product based wage, and provision of jobs for graduate students.
- To establish incentives policies for Viet Nam coal mining workers, particularly for miners. These may include the widening of wage gap rate based on technologies used, working conditions, and life support for the workers like provision of accommodation, construction of radio broadcast stations, and library for mining workers, sports centers, cultural halls, kindergartens, etc. In order to make workers feel secure during their work.

4. Conclusion

Comprehensive implementation of the solutions on human resources development will contribute to achieve the objectives provided in the Viet Nam Coal Industry Development Plan to 2020, vision to 2030 in accordance with the Decision 403. The key solutions that need to be implemented now include: To propose to the government the establishment of safety bonus fund for the coal industry; To determine of minimum wage for the coal industry; Vinacomin and Dong Bac Incorporation will promptly formulate proposed mechanism and policies specific to mining labors, particularly to miners in accordance with the Decision No. 2146/QĐ-TTg dated 01/12/2014 by the Prime Minister; Vinacomin's subsidiaries and Dong Bac Corporation establish policies that give incentives to miners and appropriate mechanism on wage and bonus payment, etc.

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Strengthening State Management on human resource development of Viet Nam coal industry

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Abstract

The article analyzes the status quo of state management on human resource development of Viet Nam coal industry in recent years based on four main aspects: (i) Orientate the development of human resources; (ii) Set up legal framework and environment for human resource development; (iii) Implement human resources development; (iv) Monitor and inspect the enforcement of human resource development policy of Viet Nam coal industry. The paper proposes solutions to strengthen state management on human resource development, ensuring and improving socio-economic efficiency of Viet Nam coal industry.

Keywords: Viet Nam coal industry; Human resources; State management; Vinacomin.

1. Introduction

The coal industry is facing a shortage of qualified and skilled labors, which also poses a threat on Vinacomin in the context of the knowledge economy that is reflected in the level of law acknowledgement, strategic management, human resources management, management and decision-making skills, financial management, risk management and international business. Especially when Viet Nam comprehensively participates in the ASEAN Economic Community (AEC) and the Trans-Pacific Partnership (TPP), the human resources of Viet Nam coal industry struggle with a great number of challenges in upcoming periods. The paper is conducted to propose solutions to strengthening state management (SM) on the human resource development (HRD) in Viet Nam coal industry based on some scientific basis in internationally economic integration.

2. Weaknesses of state management on human resource development in Viet Nam coal industry

The most striking feature of management on production and business activities, particularly on human resource management in Viet Nam coal industry is that all activities are conducted following commands from Vinacomin. The corporation assigns quotas of such indicators as business performance, coal price, yield, and payroll, wage etc., to each unit. Therefore, Vinacomin's companies are less independent, less self-responsible and less flexible in business management.

Viet Nam coal industry is facing a shortage of qualified and skilled labors in fields of mining extraction and electro-mechanics, which also poses a threat to Vinacomin in the context of the intellectual economy which requires knowledge legal issues, strategic management, human resource management, decision-making skills, financial management, risk management and international business. Especially when Viet Nam deeply integrates into the world economy after the establishment of the Asean Economic Community (AEC) and the conclusion of the Trans-Pacific Partnership (TPP) negotiation, human resources of Viet Nam coal industry have to struggle with a great number of challenges in upcoming periods (Phuong Huu Tung, 2015). To achieve the national strategic objectives

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of human resource development by 2020 and the development strategy of Viet Nam coal industry by 2020, vision to 2030, labor market under the context of internationally economic integration plays an important role, affecting SM on HRD in Viet Nam coal industry.

The paper proposes solutions to strengthen SM on the HRD in Viet Nam coal industry in internationally economic integration process.

3. Theoretical and practical framework of state management on human resource development in Viet Nam coal industry

3.1. Major contents of state management on HRD in Viet Nam coal industry

a. Contents

(i) *Management Entity*: The government on behalf of the State and National Assembly issues resolutions, decisions, circulars, and directly manages Vinacomin, the coal industry, HR of Viet Nam coal industry.

(ii) *The objects of SM on human resource development in Vietnamese coal industry*: they are coal-related companies, particularly the one conducting coal exploration, extraction, processing, trading, export – import. They belong to Vinacomin, Northeast Corporation - Ministry of Defense, and joint-venture companies engaging in coal manufacturing and trading in Viet Nam.

(iii) *The methods of SM on HRD of Viet Nam coal industry*: Management subjects have impacts on managed objects in many ways such as economic, administrative, educational methods and the combination of those methods in the process of SM on HRD.

(iv) *The tools of the SD on HRD of Vietnamese coal industry*: Those tools can be divided into four categories:

Legal tool: It includes the Constitution of Viet Nam (2013), Company Law, Minerals Law, Education Law, Vocational Training Law and other resolutions, decisions, decrees and circulars of the Government on industrial, mining industry, national human resource and coal industry developments.

Planning tool: It is composed of strategies, plans and programs for socio-economic development, strategies and annual plans for the development (including HRD) of the coal industry, Vinacomin.

Policy instruments: It comprises policies for socio-economic development, industrial, national energy, minerals, natural resources, coal industry development, Vietnamese HRD and coal industry's HRD.

National assets: It includes facilities, infrastructure, transportation, capital, Science and Technology of the State, specifically office buildings; state budget; natural resources; state funding (state treasury, foreign currency reserves, cash, gold, silver, precious stone, etc.); infrastructure, state companies, and state information systems which are used for state management on human resource development of Viet Nam coal industry.

b. Some basic functions of human resources development management process

(i) *State's orientation on human resource development*: Orientation on HRD is to define ways and transformation of human resources in order to achieve a particular target, which is based on features of human resources in each specific period.

(ii) *Establish legal framework for human resource development*: Environment for HRD includes factors and conditions which create the context for and development of human resources like laws introduced by the National Assembly, regulations, decisions, and circulars of the Government, ministries, industries, the corporation, local areas related to strategies, planning of HRD in the fields of those organizations and companies.

(iii) *Implement human resources development of organizations*: The State mainly supports the development of human resources and guarantees legal basis to implement policies related to those organizations' planning and strategies of human resources development.

(iv) *Monitor HRD of organizations*: Regarding this function, the State verifies, assesses the status quo of human resources development in organizations; monitors human resource management based on legal regulations and, hence, proposes solutions to achieve targets of state management on human resource development of organizations.

3.2. The context of SM role in the HRD in Viet Nam coal industry

3.2.1. State's orientation for HRD of Viet Nam coal industry

The state is responsible for orienting and regulating HRD via the enactment and implementation of legal documents such as strategies, plans and programs for HRD at both national and local levels. Until now a great number of national strategies and plans related to HRD in the 2011-2020 period had been issued. They include Educational Development Strategy for 2011-2020 (Decision No. 711/QĐ-TTg of the Prime Minister dated 13/06/2012), Vocational training development strategy in the period of 2011-2020 (Decision No. 630 / QĐ-TTg of the Prime Minister dated 29/05/2012, Hanoi) and Vietnamese human resources development strategy in the period of 2011-2020 (Decision No. 579/QĐ-TTg of the Prime Minister dated 19/04/2011, Hanoi). Based on those strategies and plans, Ministry of Industry and Trade sets up strategic direction and planning of sectors and

comprehensively launches orientation of HRD of Vietnamese coal industry in order to enhance physical, mental, spiritual health of workers. Strategic orientation of HRD for Vietnamese coal industry (Law No. 60/2010/QH12 dated 17/11/2010 of the National Assembly, Hanoi) includes the following contents:

Developing labor force with the goal of "*Intellectual + Loyalty + Discipline + Unity = Victory*", in which: (i) technical workers are healthy, skilled, professional, comply with work safety for themselves and their co-workers, respect customers, share with the community, preserve and promote traditional values of the coal – minerals industry; (ii) management board has global business mindset, creative thinking, sensitivity; aim for economic, social and environmental efficiency; preserve internal unity; respect partners, customers; share with the poor, local communities; promote the tradition of the sector; enrich the brand name of Vinacomin.

Actively training human resources from lower to higher levels, from low-qualified workers to become technical and management employees: establishing and developing the system of educational institutions at all levels of the corporation which meets national, regional and international standards.

Localization of human resources by: (i) prioritize recruitment, training and employment of human resources of local areas where projects are operated, particularly give priority to families whose lands are within the project area, ethnic minorities and poor families; (ii) prioritize recruitment, training and employment of people who are relatives of poor coal workers or those suffering from disastrous work accidents. It is necessary to grant scholarships for pupils, undergraduate students, and graduate students sent to study at different schools by the corporation.

Giving allowances to people who have back-breaking, harmful or dangerous works (especially in underground mine tunnel), who work in remote and disadvantaged areas either domestically or overseas.

The recruitment of leaders and managers of the corporation and its members (in which Vinacomin holds 100% of charter capital or majority shares) must be carried out in a competitive and transparent manner.

Constructing cultural and sports facilities for both employees and communities; supporting employees in improving housing conditions, participate in conservation and development of indigenous cultural values.

Maintaining and developing core values of traditional culture and corporate culture of the Viet Nam coal and minerals industry which are acceptable in the process of industrialization, modernization, integration and globalization.

Developing and widely promoting the brand name of Vinacomin, contributing to enhance the reputation, business performance and corporate value of the corporation and its member companies.

3.2.2. *Creating a legal framework and environment for human resource development of the Viet Nam coal industry*

The system of legal frameworks for HRD (including legislation, laws and other legal documents) has been gradually amended and passed. Many legal documents related to human resources development such as Education Law, the Law on Higher Education, Labor Law, Social Insurance Law, the Law on Vocational Training, officer-state Law, etc., have been promulgated, amended. The government also issued many legal documents guiding the implementation of laws, simultaneously issued a number of mechanisms and policies on HRD, such as Decision 36/QĐ-TTg dated 06/01/2012 issued by Prime Minister on the establishment of the National Council of education and human resources development for 2011-2015 (Decision No. 36 / QĐ-TTg of the Prime Minister dated 01/06/2012, Hanoi) and Decision No 1127/QĐ-TTg dated 24/08/2012 on the establishment the National management committee for implementation of development planning and training for workforce to meet the needs of society in 2011-2020 (Decision No. 1127/QĐ-TTg of the Prime Minister dated 24/08/2012, Hanoi).

The government had issued Decision No. 1216/QĐ-TTg dated 22/07/2011, approving plans of Vietnamese workforce development in 2011-2020 (Decision No. 1216/QĐ-TTg of the Prime Minister dated 22/07/2011, Hanoi). These legal documents create a favorable legal environment for and motivate the HRD in terms of both quantity and quality.

Until now there are two legal documents of the State that directly affect and dominate coal production and trading, including HRD of Viet Nam coal industry:

Firstly, "Development strategies of Viet Nam coal industry until 2015 and orientations towards 2025" according to Decision No. 89/2008/QĐ-TTg dated 07/07/2008 (Decision No. 89/2008/QĐ-TTg of the Prime Minister dated 07/07/2008, Hanoi) on human resource training and development:

Focus on training and improving qualifications of staffs, technical workers; build qualified workforce who are able to operate new technology and advanced equipment;

Develop the specialized schools for coal industry, strive to build Viet Nam Coal - Minerals vocational colleges which meet international standards; create opportunities for continuity between different educational levels including universities, colleges, secondary and technical workers; build standardized programs in the coal industry for training-intensive sectors; send competent engineers to study at prestigious foreign universities, which helps meet the development of the coal industry;

Release preferential policies to attract qualified employees;

Secondly, “Adjustment of developing plans of Viet Nam coal industry by 2020, with perspective towards 2030” according to Decision No. 403/QĐ-TTg dated 03/14/2016 (Decision No. 403/QĐ-TTg of the Prime Minister dated 14/03/2016, Hanoi) on human resources of Viet Nam coal industry:

Invest more in technology, equipment, especially gas warning systems, fire prevention, water podium warning and preventing systems, etc., to create safer working and secure workers; create professional mining emergency forces.

Promote investment, strengthen cooperation and diversify training methods to ensure human resources for the implementation of developing plans for Viet Nam coal industry until 2020.

The state issues regulations and preferential policies to attract employees to work in the coal mines, especially employees working in underground coal mines.

3.2.3. Implementing HRD for Viet Nam coal industry

a. Develop labor force

In the period 2011-2015, coal workforce has many positive changes:

Workers are younger and have better health: the percentage of workers aged less than 45 comprises 82%, and the proportion of workers aged 31-45 decreased from 23.1% to 19.6% and the figure for young workers aged less than 31 increased from 59.8% to 62.6% (Vinacomin 2016).

Coal workers are more qualified and skilled than before: the rate of workers obtaining university degree or higher qualifications increased from 14.9% to 16.7%, the figure for workers having college degree grew from 3.1% to 3.7%, whereas the proportion of medium educational level reduced from 9.6% to 8.3%. The number of qualified workers also rises. The percentage of workers of level 5 soars from 15.6% to 17.6%. The figure for workers of level 6 increases from 9.4% to 10.2%.

Training fields are more suitable: the fields of training are more suitable. Accordingly, the percentage of workers joining in technical fields increased from 15% to 19.4%, the figure for economic sectors witnesses a reduction from 8.8% to 7.7%, and for other professionals (less manufacturing and business related activities) drops from 3.7% to 1.5%.

Labor structure according to the production area has been adjusted in order to improve labor efficiency: the percentage of workers in major manufacturing sector increases from 63.1% to 65.4%; the figure for supporting, auxiliary sectors reduces from 25% to 23.4%; and the percentage of workers in indirect areas goes down from 11.9% to 11.3%. The proportion of supporting and auxiliary workers falls by 8.3% compared with that in 2011, approximately equivalent to 1,974 people. The percentage of indirect employees falls by 7.1% compared to that in 2011, approximately equivalent to 794 people (Vinacomin 2016).

b. Training human resources in Viet Nam coal industry

Self-training low-qualified workers to become well-qualified ones, workers to become technicians, managers is effectively implemented in the corporation. Each unit maintains vocational training activities and upgrading skills for employees. The new graduated engineers work as direct manufacturing workers to gain work experience, who are transferred to management departments, and then to managing officers of workshops. Workers having management skills are elected and sent to study at universities to become managers. Vinacomin’s power plants self-train their human resources as core elements when developing new plants.

Vinacomin has two mining vocational training schools of managed. They were invested in physical facilities, teacher qualification. Viet Nam Coal-Mineral vocational college is one of the schools with the best facilities in Viet Nam. Business Administration College lacks facilities, permanent teachers and cannot afford to award diplomas and certificates (just the venue for the training and cooperating with other training institutions).

c. The status quo of implementing localization of human resources

For coal and minerals mining and processing projects using surface technology, localization of human resources is very convenient due to labor abundance (supply surplus demand). Because the features of surface mining jobs which are not too heavy, and not requiring high qualifications, local people can meet those standards, creating a potential labor force.

For the coal mining projects using underground technology, the production of alumina, power plants: the job is extremely heavy, hazardous or dangerous, resulting in that people in local areas (Quang Ninh), even children of current mining workers are reluctant to become mining workers. The data show that, the percentage of miners living in Quang Ninh province comprises about 30%, the rest comes from Red River Delta, North-Middle of Viet Nam, even some mountainous provinces in the North.

For the alumina, electricity, or chemical projects: these are high-tech and modern projects which require well-qualified labor for operation and control positions. Meanwhile, local workforce almost cannot undertake the jobs as the projects of Vinacomin are mainly located in remote areas (alumina projects in Lam Dong, Dak Nong; power projects in Lang Son, Bac Giang; copper projects in Lao Cai). This is a specific industry; it is difficult to attract

high-quality employees in local areas. Local people mainly act as supporters, auxiliary workers with simple or indirect jobs.

3.2.4. Operational control and supervision of HRD in Viet Nam coal industry

At the central and local levels, strengthening the inspection system and accelerating audit in order to prevent negative activities, corruption and waste are considered the focus of the SM on HRD.

Labor inspection is currently not strong enough to detect almost all conflicts between employers and workers as there are more than 100 companies of Viet Nam coal industry. Inspection, checking, monitoring, cases of violating laws and policies on human and HRD are not frequent and serious enough. For example, some violation cases of labor rights are not detected by the state agency but by social communities, creating public dissatisfaction and annoyance. Furthermore, as coal workplaces are located far from residential areas, highways, it is difficult for workers to have access to law and security agencies and legitimate rights of workers.

3.2.5. Weaknesses and their causes of the SM of HRD in Viet Nam coal industry

HRD planning has not entirely been coherent with orientation of strategic development, development planning; some oriented policies of HRD such as giving priority in recruitment, training and employment of people who are relatives of coal workers suffering from disastrous work accidents or of poor ones are delayed to be implemented; recruitment of leaders and managers of branches and the corporation (100% of charter capital or hold shares and capital distribution held by Vinacomin) is not conducted in a competitive and transparent manner; others are not neutral and flexible, leading to low quality of implementation.

SM of HRD are being dispersed between state departments and governmental departments, among the Ministry of Labor and Social Affairs, Ministry of Education and Training, Ministry of Health, other related ministries; and among local areas where headquarters of Viet Nam coal companies are located. This leads to the problem that a coal firm has to comply with regulations of various Ministries, authorized committees; hence it is confused in implementing some coal business activities and developing human resources of Viet Nam coal industry.

The legal documents were issued but some are lack of consistency: The regulations of state management on human resource development are reflected in many legal documents such as laws, Government regulations, decisions of Prime Minister, etc. But practical application of laws and assignment and administration of the Government and relevant ministries and local authorities are not completely clear, consistent and effective. Vocational training education, for instance, is managed by both two authorized ministries including Ministry of Education managing professional colleges and Ministry of Labor - Invalids and Social Affairs regarding management of vocational training in the same training facility (College Coal - Minerals of Viet Nam).

Enforcement of legislation is weak: The Directive No. 21/CT-TTg of Prime Minister on boosting state management on coal business has clearly stated: illegal extraction, transportation and coal business still occur and will continue occurring in the future; violation of regulations on labor safety and environmental protection in coal manufacture and trade is relatively common; dissemination and popularization of legal education of coal production and trading are less effective; inspection and checking mining extraction, processing and trading has not been considered proper. This causes many difficulties to coal manufacturing and business activities, and affects badly coal employees' spirit.

Implementation of HRD is inadequate. It is reflected in the following issues:

Foreign language skills of leaders, technical and professional staffs at direct manufacturing units is very limited, so it is difficult to send officers for training abroad and to adapt to advanced technological management and techniques. Communication and presentation skills of most of employees are insufficient.

There is imbalance of training levels. Mining-educated engineers are redundant. They have to work as manufacturing workers and have not opportunities to work at functional departments;

Labor force is both redundant and deficient due to lack of workers in underground tunnels, redundancy of workers for surface, supporting and auxiliary jobs. Due to lack of workers the mining units must recruit labor from the mountainous provinces that are unqualified, easy to quit and have poor sense of discipline and professional work style. Therefore, the goal of building loyal workforce for Vinacomin and companies has not been achieved.

During previous years, mining units have seriously implemented localization of human resources. However, the obtained results are quite limited, not consistent across sectors and regions.

Inspection, monitoring and violation punishing activities in implementing policies and laws on human development and human resources are not frequent, in time and serious. Inspection of coal industry faces obstacles due to weak organization and workforce. For example, there are a few sector and interdisciplinary inspectors in Quang Ninh province. There are also lacks of standards, criteria based on evidence to reflect coal business efficiency in inspection process. This is due to lacks of supporting and prevention inspecting systems. Thus, inspection is conducted after an incident occurs.

4. Solutions to boost SM of human resources in Viet Nam coal industry

Firstly, innovating state management roles in orientation and control of human resource development

It is necessary to review and compare planned goals for humanity and human development with the current guidelines, policies, legislation, especially with strategies, planning, plans; programs, projects of economic and social development of the coal industry. Improvement of quality of strategic planning, avoiding unrealistic and infeasible plans.

HRD planning within the development of Viet Nam coal industry and coal business-based areas should be set up; boosting forecasts of HRD and human demands; issuing policies regulating educational scale and framework to meet the development of Viet Nam coal industry, to address imbalance and waste of training.

Secondly, completing legal framework and environment for the development of human resources of Viet Nam coal industry

Implementing Resolution of the 12th Party Meeting and Resolution 29/NQ-TW dated 04/11/2013 on basic revolution and perfection of education – training which have oriented and defined that the government should create a favorable and equal environment for all sectors of society to participate in providing public services, including the provision of training for Viet Nam coal industry; Simplifying administrative procedures in order to maximize non-state resources in training and developing human resources for Viet Nam coal industry.

Amending and promulgating guiding documents of implementation of Company Law, the Law on tertiary education, the Education Law, the Law on Vocational Training, which helps create the legal framework for private companies to exploit mineral resources; ensure competitive and equal operating environment, regardless of the corporate form, the ownership form of those companies. This enables the creation of new jobs and an active, creative working environment for employees who have been working in coal industry to transfer to new jobs.

Reviewing and improving the system of legal documents regulating coal business in order to improve management of state of coal business namely: Resolution No. 02-NQ/TW dated 25, April 2011 of Politburo on the strategic orientation of mineral and mining industry by 2020, vision to 2030; effectively and efficiently implementing Mineral Law 2010; implementation of Decision 21/CT-TTg dated 26/08/2015 on strengthening state management with business operations of coal production. According to the Decision, Prime Minister requests Vinacomin, North-East Corporation to enhance manufacturing activities to improve coal quality and meet domestic demands, reduce inventories of low quality coal; control units to comply environmental regulations, work safety. These conditions help to boost salary, and the living standard of employees, encourage their safety and contribution to coal industry.

Thirdly, innovating control of the State in the HRD for Viet Nam coal industry

Continuing to reform management mechanism of Viet Nam coal companies to boost independence and self-responsibility of state companies.

Raising awareness of levels and sectors and entire society of State policies and laws on coal business and HRD.

Continuing to strengthen, improve and enhance capacity, effectiveness and efficiency of management on the HRD; depends on the need of strengthening SM on HRD; assigning a particular unit the responsibility to implement HRD of Vinacomin, North-East Corporation and the areas where their member companies operate.

Implementing the Government Resolution of 08/2004/NQ-CP dated 30/06/2004 on boosting management delegation between the Government and Authorities. Vinacomin and North-East Corporation are primary organizations of state management delegation to the local levels, businesses through giving authorization to leaders and managers who are power and responsible for production and business.

Implementing the State's policies of re-structuring coal industry including human resources re-structure: coal companies, corporations, two-level companies should have properly number of departments and vice presidents. Completing restructure projects complying Decision 324/QĐ-TTg and Decision 37/QĐ-TTg of the Prime Minister in the period 2015 onwards: reduce the number of workforce, restructure auxiliary and manager workforce, annual reduction rate of about 2-6% until reaching the suitable rate.

Fourthly, improving inspection and supervision of the HRD for Viet Nam coal industry

The government sets up legal frameworks, conduct inspection and supervision of law enforcement, creates a healthy and competitive environment for coal manufacturing and trading. It is necessary to innovate organization and activities, promote and ensure independence and self-responsibility of the Viet Nam coal industry. This connects employees' benefits and responsibilities to business efficiency, motivate productivity, work efficiency which are the two aims of human resource development of Viet Nam coal industry.

Strengthening the inspection department of Viet Nam coal industry at all levels. Completing the legal framework for inspection, monitoring and evaluation units in the energy industry, particularly coal business and manufacturing. The specialized management agencies should develop and promulgate standards and criteria as a basis for checking and supervising the effective operation of those units. It is necessary to share benefits with surrounding communities, improve information access abilities, work in a transparent manner and motivate community participation. They are basic revolution to ensure equality in exploitation, management of coal resources; widen co-management in exploitation of natural resources and expenditure for natural resource

exploitation, environmental protection. Indeed, this helps to accomplish coal business high efficiency in coal business and provide the foundation for human resource development in Viet Nam coal industry.

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Application of JDI model to investigate job satisfaction of employees working on Viet Nam oilrigs

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Abstract

Working on the oilrigs of Viet Nam has many special characteristics that are so different from other industries. To measure job satisfaction of workers on the oil-rigs, the article uses the adjusted JDI model, which includes 6 elements: nature of work, opportunities for training and promotion, income, leadership, co-workers and working environment. The original JDI model is adjusted to be suitable for this research to understand the priorities of workers on 6 specific elements. The article uses SPSS to run Multi-Regression-Analysis (MRA) to find the importance level of those elements and how each of them affects the job satisfaction of workers working on Viet Nam oilrigs. The factors affect the satisfaction of the employees can be put in strongest to weakest order as follows: environment (F5), the nature of work and wages (F1), colleagues (F4), opportunities for advancement (F3), leadership (F2). From this result, the author offers recommendation for human resource managers to issue and create policies to enhance job satisfaction among employees working on Viet Nam oilrigs.

Keywords: Job satisfaction, oilrigs, environment, characteristics.

1. Introduction

Compared to many other industries, oil and gas industry contributed larger to the state budget. The income level of employees working in this sector reached 6.5 million VND to 40 million VND per month, which is higher than the average income of workers in the country in 2015 (on average 3.8 million VND per month). In addition, the working environment offers employees with modern machinery system, the opportunity to study and visit overseas, the access to knowledge and modern working methods in the world. With such conditions, having a job in the oil industry is the dream of many workers. However, employees working in the oil industry always requires raising the level of technological skills to reach grasp science and technology knowledge and accumulate experience. Working conditions especially for workers on offshore rigs are more difficult than in other industries such as the long working time (12 hours/shift), dangerous space, hot climate, noise pollution of drilling machinery or mining, dust and toxic chemicals. Under these pressures, workers must comply safety regulations strictly to prevent themselves and other mates from risks. All these things affect the employees in some certain extent, such as psychologic, labor productivity and labor safety. Thus, it leads to the phenomenon that workers leave their jobs or change to work in other foreign companies for better working conditions and benefits. Therefore, it is significant to assess the satisfaction of employees working in the oil industry, especially on offshore rigs. Consequently, managers can provide workforce policies of organizing labor force, arranging jobs, wages and benefits. Such policies will assure workers with long-term committed in the oil industry.

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2. Theoretical review and research models

2.1. Theoretical review

In fact, to promote production, workers' encouragement and workers' compensation, the managers must stimulate them by physical and mental factors which are shown in the paying system (financial) ; the nature of work (non-physical). The measurement of job satisfaction of employees will ensure encouragement, maintaining and development of employees in order to improve labor productivity in the company.

There are so many different concepts on the job satisfaction of employees. According Vroom (1964), job satisfaction is the state in which the employee has effectively-clear orientation towards work in the organization. For Locke (1976), job satisfaction is that workers are really excited for their work. Porter et al (1975) mentioned the job satisfaction as the reaction of a person for the job. Quinn and Staines (1979) suggested that job satisfaction is a positive job reaction. Dawis & Lofquist (1984) stated that job satisfaction is the result of the consideration of the extent to which the working environment of the employees meets their personal needs.

In general, job satisfaction happens when employees like the work they do and they like the characteristics of the job (Spector, 1997).

2.2. Research models for job satisfaction

Researchers Smith, Kendall and Hulin (1969) of Cornell University developed model JDI (Job Descriptive Index) to assess the level of satisfaction through 5 factors, which include the nature of work, promotion and training opportunities, leadership, colleagues, and income. Besides, the study of Luddy (2005) in the health sector in South Africa is also applied in this study. In Viet Nam, there are several research regarding these issues, such research as Tran Kim Dung's research (2005) conducted in Ho Chi Minh City, Lien Nguyen's research (2008) in Long An, Kien Dao's research (2013) in Hanoi.

Boeve (2007) conducted a study of satisfaction with the faculty members including physician, physician assistants at medical schools in the United States on the basis of two-factor theory of Herzberg and Job Descriptive Indicators of Smith, Kendall and Hulin.

Weiss, Dawis, England & Lofquist (1967) developed model MSQ (Minnesota Satisfaction Questionnaire) includes 20 factors rated overall satisfaction with each aspect, including the ability to use, achievements, activities, promotions, authority, company policies, compensation, colleagues, creativity, independence, safety, social services, social status, moral values, the recognition, responsibility, the chief iron-man, the iron-technical expertise, diversity, working conditions. Şerife Zihni Eyupoglu and Tulen Saner (2010) also used the model to perform research their MSQ.

Model JSS (Job Satisfaction Survey) of Spector (1997) is built to be applied to businesses in the service sector, including 9 elements assessed the level of satisfaction and attitudes including salary, advancement opportunities, working conditions, supervision, colleagues, loved the work, communicate information, unexpected rewards, benefits.

In the above-mentioned models, Minnesota Satisfaction Questionnaire (MSQ) is more specific but too long and causes difficulties in the process of gathering information and research. Spector JSS model is shorter, but a number of factors go into details as surprise gifts, favorite work to characterize differently in different job.

Compared to the above-mentioned restrictions, firstly, the JDI model has a disadvantage of a huge number of items asked (72 question entries). It makes it difficult for the survey to be processed. Secondly, the use of question answer format "Yes – No" to ask the Original JDI will be difficult for the evaluation of many different perceived levels of workers. Thirdly, JDI model has no measure of job satisfaction on overall (Spector, 1997) but on the basis, this model is of high-value regarding theory and practice; Kerr (1995) suggest that JDI has good content and contains true concepts and reliable basis. Prince (1997) believes that JDI is a tool to measure job satisfaction of employees. Therefore, this is the foundation for building paper presents the research model in applications for employees working on offshore rigs Viet Nam.

2.3. JDI model

JDI model was developed by Smith et al (1969), together with Minnesota Questionnaire of Wess et al (1967). This is a tool to assess job satisfaction with more than 1,000 researchers using this model. JDI model was originally designed with 72 different questions which asked about the 5 elements of work, which are (1) the nature of work, (2) opportunities for training and promotion, (3) leadership, (4), co-workers and (5) income. Those are 5 factors that affect the job satisfaction of employees. Today, researchers used the "**adjusted JDI**" with items are designed with Likert scale. This helps to assess better the reception of workers and the number of questions is less than the original JDI (Tran Kim Dung, 2005; Ha Nam Khanh Giao & Vo Thi Mai Phuong Giao; Dao Trung Kien, & et al, 2015). Basically, the 5 elements used to assess job satisfaction of employees in the JDI model are good. Below are their definitions:

- Nature of work: the content of the work must be in line with workers' capabilities, be inspiring, be challenging but also be flexible. Appropriate working arrangements will exploit the labor's potential, increase labor productivity and make employees feel comfortable at work.

- Training and promotion opportunities: the workers must be given training opportunities, improve skills and ability to work, and given a chance to higher positions. Workers will feel satisfied with a job which gives them the training opportunities and the chances to be promoted.

- Leadership: a manager of employees, leadership brings satisfaction through communication, showing interest, fair treatment and recognition of the contributions of worker, which also shows the management capabilities of leaders.

- Colleague: who work with the same job title, with similar kind of work. The relationship between colleagues is the relationship of competition and support. Workers will feel satisfied with the work if their jobs are well supported by colleagues, a friendly environment will help and create fair competition on the rewards and promotions within the organization.

- Income: the payment that employees receive from their work. Satisfaction happens if fair payment for workers both inside and outside the organization.

JDI model has a huge role in assessing satisfaction level of the employees with jobs they are doing. This is a tool determined by quantification, helping administrators to quantify the key factors to meet the needs of workers.

2.4. Application of JDI model to assess job satisfaction of the employees working on Viet Nam offshore rigs

Employees have to work on offshore rigs with spatial conditions, continuous long working hours. In addition, production and labor are organized with special characteristics, which are different from workers in other manufacturing companies. The authors decided to choose "adjusted JDI model" that has 6 elements, including 5 key elements of the original model and another element: workplace environment. The function with 20 variables and a scale observer representing the overall satisfaction of employees (with observed 3 variables) is shown in the table 1. These factors' change in different directions will also change the level of job satisfaction.

Table 1. Scale and the factors affecting the level of satisfaction of employees

Scale	Signals
Nature of work	BCCV
Work provides promotion and makes good use of personal capacity	BCCV1
Work has interesting features	BCCV2
Work has pressures, challenges and requirements	BCCV3
Individual performance is easily noticeable	BCCV4
Income	TL
High salary	TL1
Salary is enough to cover living expenses	TL2
Salary match up with individual effort	TL3
Salary and other income are fairly paid	TL4
Other fringe benefits to support workers' life	TL5
Co-workers	ĐN
Intimate relationship with co-workers (workers are nice)	ĐN1
Co-workers can work well in a team and group	ĐN2
Co-workers support one another to perform well	ĐN3
Leader	LĐ
Leaders refer to your opinion with tasks relating yours	LĐ1
Support from leaders	LĐ2
Leadership style is fair, social and calm	LĐ3
Opportunities for training and promotion	CHTT
Many opportunities for promotion	CHTT1
Fair promotion policies	CHTT2
Training and career development	CHTT3
Working Environment	MTLV
High Pressure	MTLV1

Ensure safety and security	MTLV2
General job satisfaction	HL
In general, I am satisfied with this job	HL1
I am loyal to the company	HL2
I am happy to work for a petroleum company	HL3

To process the information collected by these factors, the authors use research methodology based on a combination of qualitative and quantitative research. Qualitative research method was first implemented in order to conduct preliminary research through focused group discussions with workers who are working on different rigs Viet Nam: *Vietso Joint Ventures*. Preliminary research results are used to complete the study questionnaires and are selected with quantitative assessment factors to measure the level of satisfaction to develop a research model.

Methods of quantitative research were conducted to gather opinions of employees working on offshore region with regard to the level of their satisfaction with current job. To sample representative, audiences are chosen to conduct a live interview (face to face or phone calls): sampling method is used on each rig for 5-10 people. Total number of persons selected for the survey is 150 people.

The authors designed a questionnaire with the scale and the observed variables using Likert scale of 5 levels (Likert, 1932) with a choice range from option 1 (completely disagree) to option 5 (completely agree), thus, to identify the major factors affecting the satisfaction of the employees working on the rig.

To quantify factors that affect job satisfaction, the research was conducted in 3 steps:

Step 1: Check the quality of the scale (factor): Using Cronbach's Alpha to test the quality of the construction scale. With the overall coefficient greater than 0.6 and a correlation coefficient greater than 0.3, the correlation is chosen and vice versa.

Step 2: Analyze the factors explored (EFA): Variable weighted 0.4 in the EFA will be disqualified

Step 3: Use multiple regression analysis (MRA) to estimate the impact of factors affecting work motivation (independent variable) and to the satisfaction of the employees (the dependent variable). The regression equation has the form as follows:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 \quad (1)$$

X1: The nature of work

X2: Wages, bonuses and allowances

X3: Colleagues

X4: Leadership

X5: Opportunities for training and promotion to first

X6: Work Environment

3. The results of the model applied research on job satisfaction of employees

Using SPSS 22.0 to process data, which comes from surveys, questionnaire and interviews of 150 direct employees (taking into consideration the employees and their direct managers) in the different units in the joint venture Vietso-petro.

3.1 Assessment of the quality of the scale

Through Cronbach's Alpha testing, no change in the total 23 variables were excluded and test results are shown in Table 2.

Table 2. The characteristics and scale variable quality

No	Scale	Characteristic variables	Cronbach's Alpha coefficient
1	BCCV	BCCV1, BCCV2, BCCV3, BCCV4	0.872
2	TL	TL1, TL2, TL3, TL4, TL5	0.835
3	ĐN	ĐN1, ĐN2, ĐN3	0.749
4	LĐ	LĐ1, LĐ2, LĐ3	0.835
5	CHTT	CHTT1, CHTT2, CHTT3	0.877
6	MTLV	MTLV1, MTLV2	0.810
7	HL	HL1, HL2, HL3	0.858

Thus, by using the Cronbach's Alpha test, the model with 7 scales ensures good quality with 23 unique variables. In particular, the Cronbach's alpha coefficient is greater than 0.6 and the correlation coefficient is greater than 0.3.

3.2. Exploratory factor analysis

Using a scale by KMO (Kaiser-Meyer-Olkin) to assess the suitability of the EFA model in research, testing and simultaneously, identify correlation of observed variables, which is a represent from Bartlett test. The EFA results are shown in Table 3.

Table 3. Results of EFA by using KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.831
Approx. Chi-Square	1380.088
Bartlett's Test of Sphericity Df	190
Sig.	.000

Thus, the analysis shows that KMO = .831 satisfy the condition: $0.5 < \text{KMO} < 1$. EFA is appropriate for analyzing the actual data, and Bartlett's test have Sig. < 0.05 (i.e. observed variables have linear relation with representative factors).

The sample size in the study was 115, which meets the conditions: $100 \leq 115 \leq 350$, it means the load factor is 0.55. From the results of exploratory factor analysis, the detail of each factor is shown in Table 4.

Table 4. Model used to analyze factors affecting employees' job satisfaction

(Rotated component matrix)					
	Component				
	1	2	3	4	5
BCCV1	.801				
BCCV2	.629				
BCCV3	.754				
BCCV4	.724				
TL1	.600				
TL2	.704				
TL3	.789				
TL4	.769				
TL5	.834				
DN1				.739	
DN2				.825	
DN3				.680	
LD1		.843			
LD2		.845			
LD3		.738			
CHTT1			.825		
CHTT2			.873		
CHTT3			.907		
MTLV1					.861
MTLV2					.835

The table shows that the characteristic variables have the load factor, which is greater than 0.55. There are five components representing the job satisfaction of employees with the characteristic variables being rearranged differently from the original theoretical model (6 components).

Component 1 includes the variables: BCCV1, BCCV2, BCCV3, BCCV4, TL1, TL2, TL3, TL4, and TL5. Variable TL1, TL2, TL3, TL4, TL5 belongs to TL in initial but after EFA analyzing, it is integrated with BCCV. This component is named F1 (The nature of work).

Component 2 includes variables: LD1, LD2, and LD3. Component is named F2 (Leader).

Component 3 includes the variables: CHTT1, CHTT2, and CHTT3. Component is named F3 (promotion opportunities).

Component 4 includes variables: DN1, DN2, and DN3. Component is named F4 (co-workers).

Component 5 includes variables: MTLV1, MTLV2. Component is named F5 (Working environment).

3.3 Perform a multivariate regression analysis

To identify factors affecting job satisfaction of employees working on offshore rigs, it is essential to conduct multivariate regression analysis (dependent variable is HL and 5 independent variables are F1, F2, F3, F4, F5), showing the overall function with overall correlation as follow:

$$HL = 0,361 * F1 + 0,104 * F2 + 0,113 * F3 + 0,298 * F4 + 0,411 * F5 \quad (2)$$

Result shows that the variable "work environment" has strongest impact on "job satisfaction" with the highest coefficient of 0.411. Similarly, the variable "nature of work" has coefficient of 0.361; variable "colleagues" has coefficient of 0.298; variable "opportunities for promotion" coefficient of 0.113 and the last is the variable "leadership" having coefficient of 0.104.

Based on results from multivariate regression analysis, the standardized regression coefficients can be converted into a percentage in the table 5.

Table 5. Importance level of each factor

Independent Variables	Absolute Values	Percentage (%)
F1	0.361	28.05
F2	0.104	8.08
F3	0.113	8.78
F4	0.298	23.15
F5	0.411	31.93
Total	1,287	100

To the dependent variable, variable MTLV contributes 31.93%, variable BCCV contributes 28.05%, variable DN contributes 23.15%, variable CHTT contributes 8.78% and variable LD contributes 8.08%. This indicates that in the oil and gas extraction industry, working environment of the employees have special characteristics compared with other sectors, so the working environment affects greatly job satisfaction of the employees.

4. Conclusion

The results of the measurement model show that the scale is achieved and reliable. Through testing with case studies with 150 employees working on the rig, the satisfaction of their work is related to the 5 components with 23 observed variable factors. These affect the satisfaction of the employees in strongest to weakest order: environment (F5), the nature of work and wages (F1), colleagues (F4), opportunities for advancement (F3), leadership (F2).

On the basis of these factors, the human resource management in the oil industry should have policies and measures to encourage employees working on offshore rigs and meet their specific needs and expectations of employees, from which, to enhance the labor productivity, and maintain labor loyalty. Specifically, managers need to pay more attention to the work environment characteristics of the oil and gas industry improving labor psychology, occupational safety.

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The situation of the quality of official staff in mid-central geological division at present

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Abstract

The quality of human resources, in particular and the quality of official staff plays an important role to decide the rising development of state non-business organizations and geological sector. The paper analyzes the quality actual situation of official staff in Mid-Central Geological Division of Viet Nam with the groups of specific assessment criterion. From the analysis, some measures are proposed to better the quality of official staff of the Division to meet new requirements. This is fundamentals for organizations such as Viet Nam General Department of Minerals and Resources, colleges and universities to build the strategies of training and developing qualified human resources. This is the basic for the units belonging to Viet Nam General Department of Minerals and Resources, colleges and universities to build the strategies of training and developing high-quality human resources.

Keywords: quality; competence; qualification, employment.

1. Introduction

The salary of officials who are Vietnamese citizens and working in a state non-business units according to employment contract is originated from the state fund according to law provisions. These officials' role is to serve in the essential public sector, including providing people with "invisible" products. Qualification of official staff is a system of qualities and values, structured as an all-sided form. These requirements consist of political and ethical qualification, competence and experiences. These factors have a close relationship among each other and also complement to each other.

The Mid-Central Geological Division is a state non-business unit under the direct management of Viet Nam General Department of Geology and Minerals. The role of the Division is to organize and carry out basic geological surveys, investigation into mineral resources and minerals exploration in Mid – Central and High Land area. As a peculiar unit in the field of providing the professional consulting services on geology and minerals, the division has been involving in hundreds of national projects. In the recent years, the division has been developing fast and ranks the leading top of geological branch on professional competence the income of workers. However, in the competitive economy of international integration, human factors are the most important factors to develop state non-business units, including the field of geology, the division continues concerning about development of its official staff in order to build a more effective organization with both quality and competence to meet challenged working requirements in the new period. Therefore, the evaluation on of official staff's qualification is an important foundation for the leaders to make decisions to retain and develop official staff.

2. The situation of the qualification of official staff in Mid-central Geological Division

The official staff of the division is divided into two major groups:

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The management and administration part: consists of the leaders and officials working for the departments assisting the leaders.

The immediate manufacturing part: consists of manufacturing managers; immediate supervisor, labors working in executing units of geological projects as Test Laboratory, project teams, subdivision named 501, 505, 506. This part accounts for the largest proportion of the total whole official staff.

2.1. According to the group of competence and qualifications

This is the most important group of criteria for staff assessments, including criteria as educational background, trained professional knowledge, job skills, seniority, working experience and health condition.

* The educational background and professional ability: The division official staff generally has a relative high level. The level is higher in the year than in previous year. High level concentrates in the management and administration part, which is the basis to improve management and implementation of succession plan of the whole organization.

Table 1. The quality of official staff according to degree in stage of 2011-2015

Year \ Degree	2011		2012		2013		2014		2015	
	Number	Rate %	Number	Rate %	Number	Rate %	Number	Rate %	Number	Rate %
Doctor					0					
Master	4	1.8	6	2.7	11	4.7	11	4.8	23	11.5
Bachelor	80	36.5	80	36.2	79	34.1	79	32.0	61	30.5
College	7	3.2	7	3.2	7	3.0	7	3.1	4	2.0
Immediate	69	31.5	69	31.2	81	34.9	84	36.8	69	34.5
Workers	59	26.9	59	26.7	54	23.3	53	23.2	43	21.5
Total	219	100	221	100	232	100	228	100	200	100

* Working skills: According to the survey of working skills, 100% employees know about the importance of professional skills in the working process. The trained rate of basic professional skills is relative high as informative technology and foreign language, but the others are at a low rate. The training policy of the division has actually not concerned about training the professional skills for the official staff. They are mainly trained at working place during the process of carrying out the geological project without sending the officials to training organizations. The participants in the courses of geological informative technology, geological project managers, planning and tendering skills are at not high rate.

Conducting the survey on teamwork skills with 120 officials in both management and administration part, and immediate manufacturing part, the results is shown in Fig. 1.

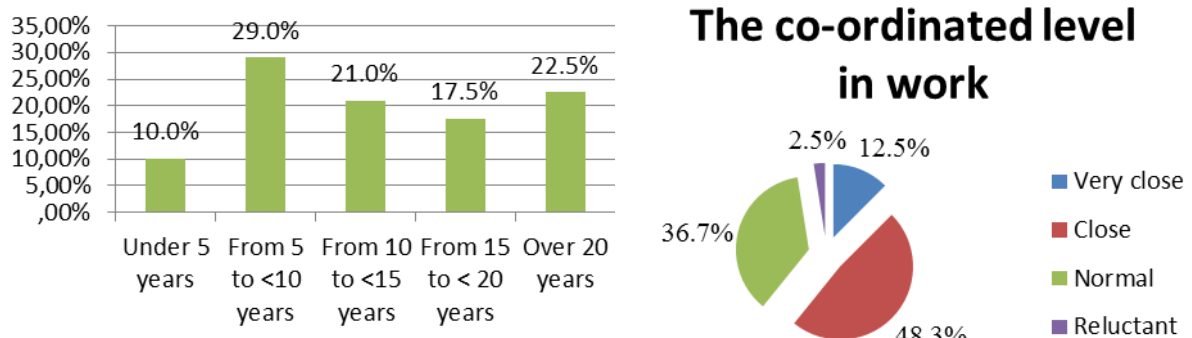


Fig. 2. The working seniority in 2015

* Working seniority: This criterion refers to working experience and how long the official has been working at the division. This demonstrates the job love loyalty with the chosen organization. This is also an important criterion for the science studying organization. The assessment result is presented in the Fig. 2.

The working seniority of 5-10 years accounted for the highest rate (29,0%); the working seniority of under 5 years accounted the lowest rate (10,0%) and this also belongs to project teams with the geological engineers and young bachelors who have just graduated from the universities. The rate having working seniority of over 20 years is at 22,5%, this numbers help to transmit the professional knowledge and experiences to the descendent. Most of the official staff has working seniority and experiences. In the near future, numbers of over 20 years

will be reduced because of retirement. However, the numbers of 10-20 years are rather high and well trained; this is an opportunity for the Division to build a young, qualified and experienced official staff to contribute to the sustainable development of the Division in the future.

* A special criterion for the official working the geological field is the physical strength. The indexes of age, height and weight are used to evaluate the physical strength of Division physical strength.

The age: The average age is 33. The age of the division is relatively young, and good enough to meet the really difficult working conditions characterized in the field of geology. The young, well-trained dynamic and creative staff can quickly adapt new knowledges and technologies know-how. However, the group also lacks of experiences and job motivation, thus, if assigned tasks are challenging, they tend to feel more stressful than other senior groups. In fact, many officials left the job to move to another field with more favorable working conditions.

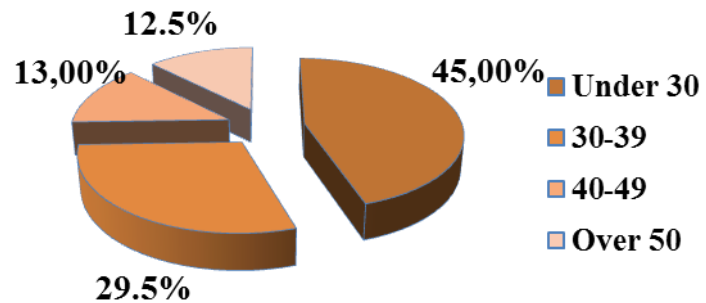


Fig. 3. The age division of staff in 2015

The height: Height is an essential parameter to assess the quality of the official staff on the health aspect. According to Decision No. 641/QD-TTg, approving the whole project on Vietnamese physical strength and stature period of 2011-2030 and setting a target of human resources development to achieve the average height of 1,67m. In comparison with the aimed average height, the height of Mid-Central Geological Division is better. The highest group of 1.60-1.69m accounts for 59.0%. The height of over 1.70m is of young staff and in the immediate manufacturing part. There is only 1.0% has the height of under 1.50m.

The weight: Weight is also a parameter affected directly to the health of official staff. The weight of Division is mainly from 60-69kg (59.0%) distributing in the project teams, the weight of under 50kg is at 9.0% is mainly in the immediate manufacturing part and are female officials.

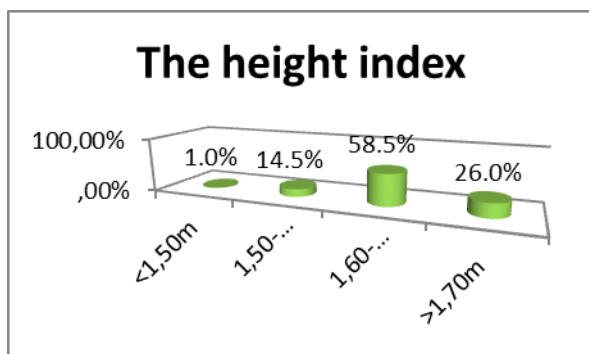


Fig. 4. The height and weight index of officials in 2015

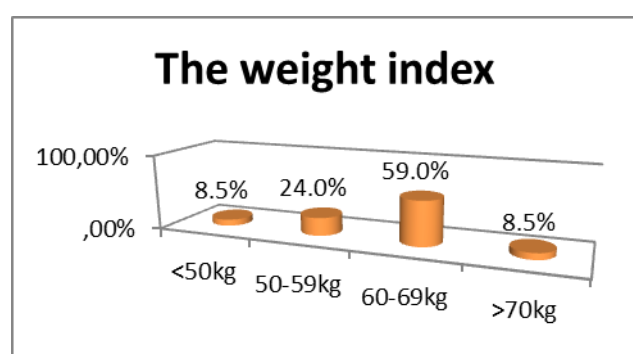


Fig. 5. The weight index of officials in 2015

2.2. According to the will and capability reflect and the level of taking on the work

Work attitude, mentality and pressured working ability are three key elements to reflect the official's will and capability. The level of work undertaken is to assess the capability to implement the practical duties of the officials.

A survey indicated that most of officials understand their responsibilities. Hence, they always try their best to solve the work before informing to the leaders of departments. However, there are still several less dynamic officials, who cannot meet the deadline. Although, their responsibilities are so not heavy, they tend to give up their work too early when have some troubles. Some uses working time to do personal stuffs, chat with colleagues, leave the working position, surfing the web, facebook. Some comes late but leave the office too early if the leaders are not at the office.

According to the opinions of the project chairmen, who directly manage and control the immediate manufacturing, over 80% of employees obey the rules and disciplines in the field. However, the working results are not so good because of lacking experience. It is waste of time to process the documents at the office stage. The reports must be edited and reprinted will cause the waste of time and cost. Several officials considered the organization as a temporary stop before finding a better job. Some engineers did not dare to receive the tasks entrusted by the division leaders, they were not confident about themselves, did not take the initiatives in

implementing their duties. In some situations, they violated the rules in the field, such as: not obey the labor safe regulations (wear protective clothing, hats, shoes, etc.) or not to comply strictly with the itinerary regulations in the field.

According to the official staff assessments in Table 2, the rate of outstanding and good levels tends to decrease in the following years. If in 2011 the rate of outstanding level was 41.2%, it was 17.0% in 2015; there is 1.5% of officials assessed incomplete. This proves that the assessment of official staff tends to actual true quality.

Table 2. The result of official assessment in stage of 2011-2015

Year	Total	Assessment level							
		Excellent		Good		Complete		Incomplete	
		Number (person)	Rate (%)	Number (person)	Rate (%)	Number (person)	Rate (%)	Number (person)	Rate (%)
2011	219	89	40.6	99	45.2	6	2.7		
2012	221	68	30.8	133	60.2	20	9.0		
2013	232	54	23.3	157	67.7	8	3.4		
2014	228	58	25.4	155	68.0	15	6.6		
2015	200	34	17.0	148	74.0	15	7.5	3	1.5

2.3. According to the suitability in whole staff framework

Within an organization, the qualification of human resources is reflected by the quantity and quality, together with professional degree, genders and age.

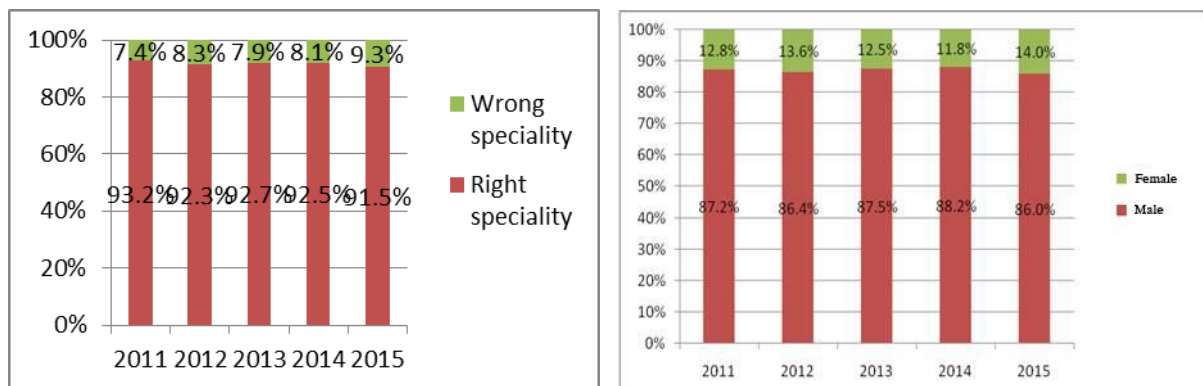


Fig.6. Some criteria of staff demonstrated in percentage

As a state non-business unit, the function of Mid-Central Geological Division is to organize, carry out and consult the services of basic geological surveys. It also conducts investitation into mineral resources and minerals exploration, and other science and technology tasks. Therefore, the official staff is mainly arranged suiting with the trained specialty reaching over 90.0% graduated from Hanoi university of Mining and Geology, Hue University of Science, Hochiminh city university of Science, Tuy Hoa Industrial College, etc. The rate of wrong specialty is 8.1% concentrating in the management and administration positions. This has esixed for 5 years as the results of non-long-term plan recruitment.

The basic geological surveys on mineral resources and minerals exploration require staff to work in the mountainous areas with many difficulties. Therefore, this job requires good health, which tended to be more suitable for male officials. As can be seen, the numbers of male officials are dominant. Female officials (the average rate of 12.9%) concentrate in the management and administration position and laboratory and test department.

Geological technical officials is at the rate of over 70%, while accounting and statistic officials are stable at the rate of 8.5%, and planning officials around 4.0%, administrative officials from 7.9 to

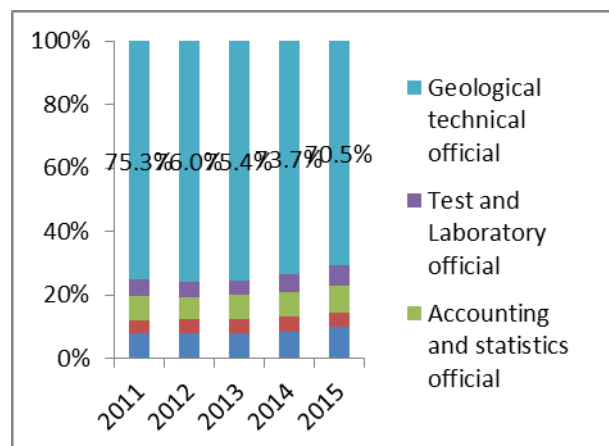


Fig. 7. The official staff framework according to organization

10,0%, Test Laboratory officials from 5.1 to 6.5%. The accounting - statistics and administrative officials are a little excessed. The group of planning officials are provided with underqualification permanent workers. In the group of accounting - statistics officials, there are over 50% of staff occupying master degrees. Besides, the synthesis of financial reports are not carried out by every officials so they do not have much experience in handling of complicated accounting operations. Administration officials are in excess of clericals and administrative section but in lack of officials in the organization and labor section. The officials in Test Laboratory are young and the capability of sample analysis is not very high. Those samples are analyzed are mainly heavy-grained, lamella, lithologic; the skills of chemical sample analyzing must honed to be better. The analyzing section is now excessive but the processing section is insufficient. The undertaken sample analysis contracts are not abundant.

3. Measures to improve the official staff quality

Combination with the developing objectives and orientations to 2020 some measures to improve the official staff qualification are proposed as follows:

Firstly, strengthening the competence of current staff by training. The training has to be tailored according to each staff's professional specialty. Other important training programs are foreign languages training besides of professional skills training. Furthermore, building policies are necessary to encourage and improve the physical strength and health for the staff, especially the geological technical staff to reduce the number of sick leaves.

Secondly, Framework of official staffs by rearrangement of staff base on their qualification and job requirements should be conducted. Responsibilities to motivate the officials to actively contribute their knowledges to the development of the division are enhanced. It is necessary to have a clear layoff policy and retain well-qualified officials and laydown the incompetent staffs and building long-term recruitment plan and recruitment procedure to select the qualified candidates for the division. Changing the standards and procedure of appointment of management officials to a post, using the standards of qualifications, competence, quality and responsibilities for work is the important appointment criteria instead of popular conception "An old fox not easily snared" in so many state non-business units, it means that having a long working time is surely a leader. Also, an important thing to aware is that "being a leader is only a temporary job, it is not forever", the appointment to a post is carried out in the specific periods.

The last, improving the methods of calculating salary and other benefits to attract high-quality human resources. At the same time, the division might create better working environment for talented staffs. The salary should to be adjusted to be suitable for new human resource development plan. Therefore, income and working environment should be paid more emphasis in the next years to come.

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Solutions to improve financial situation and business efficiency of Viet Nam National Coal - Mineral Industries Holding Corporation Limited (Vinacomin)

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Abstract

In recent years, due to the downturns of the global economy, oil prices and coal- minerals prices have been plummeting. This fact is creating big challenges to the domestic economy and difficulties for companies, including Viet Nam National Coal-Mineral Industries Holding Corporation Limited (Vinacomin). For Vinacomin, the conditions of exploitation and trading of coal-minerals are facing difficulties, complexity, severe impacts of climate change and tax policy including higher fees. This leads to an increase in investment cost; affecting production and business efficiency and financial situation of Vinacomin. This article analyses the situation and then proposes solutions to improve the financial situation, and to enhance the level of safety and efficiency of business operations of Vinacomin.

Keywords: Finance; business efficiency

1. Introduction

Viet Nam National Coal-Mineral Industries Holding Corporation Limited (Vinacomin) is one of the biggest state-owned economic corporations of the country. It operates in the coal, minerals and energy sector, and is one of three main pillars to ensure the national energy security. Since its establishment in 2006, Vinacomin has achieved tremendous results and plays an important role in meeting the demand of Viet Nam's energy. By 2015, the total assets of Vinacomin reached 138,709 billion VND, an increase of 6.4 times compared to 2006. The equity level of Vinacomin is not only preserved but also increased, reaching 38,573 billion VND. Some indicators of production and business results are shown in Table 1 and Table 2.

Table 1. Some business indicators in 2010-2015 of Vinacomin

Unit: Billion VND							
Nº	Indicators	2010	2011	2012	2013	2014	2015
1	Total assets	82,787	103,423	117,198	125,909	133,754	138,709
2	Total net revenue	66,771	82,202	71,430	67,727	78,710	80,440
3	Earnings before income tax	8,466	8,632	3,470	2,872	2,816	895
4	Pay for taxes	11,552	16,150	13,880	11,955	12,909	13,767

Source: Report on general economic subjects of Vinacomin

Table 2. Some financial indicators from 2010 -2015 of Vinacomin

Nº	Indicators	2010	2011	2012	2013	2014	2015
1	The debts / Total assets	0.69	0.69	0.7	0.71	0.72	0.72
2	Liabilities / Owner's equity	2.17	2.20	2.43	2.77	2.67	2.73
3	Current ratio	1.02	1.09	0.93	1.10	0.98	0.88
4	Quick ratio	0.88	0.72	0.51	0.46	0.44	0.37

5	Inventory turnover	8.08	9.13	6.31	3.38	3.77	3.75
6	Rate of return on assets	12.0%	9.3%	2.2%	1.7%	1.6%	1.0%
7	Rate of return on owner equity	40.3%	31.5%	7.5%	6.9%	6.4%	2.73%

Source: Report on general economic subjects of Vinacomin

The data in Table 2 shows that the financial situation Vinacomin is still relatively healthy, but some financial indicators have dropped sharply in recent years, especially the indicators reflecting business performance. The debt/owners' equity has increased but still within the limits of financial security (3 times lower than the advisory level). Situation and solvency review of Vinacomin is positive. In particular, Vinacomin has no overdue debts.

However, the analysis of financial situation and business performance of Vinacomin shows that there are some problems as follows:

1.1. The need for increased investment

If business efficiency of Vinacomin significantly reduced, it will lead to financial balance problems including lack of investment capital to expand production and technological innovation. According to Coal Planning Adjusted (2015) of Vinacomin, in the periods 2015-2020, the investment capital of Vinacomin will be approximately 80,924 billion VND for coal production in which capital for expansion and renovation is 73,672 billion VND of investment and capital for maintaining capacity is 7,252 billion VND, investment capital for auxiliary systems coal production is about 29,140 billion VND. In the periods 2021-2030, investment capital for coal production needs about 121,036 billion VND, including capital for new construction; and renovation, expansion needs about 185,645 billion VND, investment capital for maintain capacity needs about 16,315 billion VND, investment capital for auxiliary systems coal production needs about 45,856 billion VND. The total investment capital of the periods 2015-2020, that Vinacomin needs, is about 110,064 billion VND, while the periods 2021-2030 the company needs 137,75 billion VND. Thus, the demand for investment capital to expand production, technological innovation is huge. However, the business efficiency declined sharply (profits of Vinacomin decreased from 8,632 billion VND in 2011 to only 2,816 billion VND in 2014 and 895 billion VND in 2015) would limit the possibility of accumulating capital, while the conditions of small owner's capital will create huge pressure on the financial balance of Vinacomin.

1.2. Raising capital for investment

Business and production lacks diversification of forms and sources, and are incompatible with market economy; mining conditions are more volatile leading to unreasonable capital structure. To meet the demand for development investment, in the past, the mobilization of Vinacomin mainly through the following channels:

- Raising capital through bank credit.
- Raising capital through state credit state (VDB).
- Raising capital in the form of export credits (ECA).
- Raising capital with domestic and international bonds.
- Raising capital from equalizations.
- Raising capital from social investors.

However, until now raising capital is mainly from commercial loans by local commercial banks and from abroad, and forms of mobilization by issuing bonds and outsource is limited, socialization investment only initial implement (only 2 conveyor projects implemented by socialized investment, which are (1) Coal conveyor project from Mao Khe coal mining to Dong Trieu thermal power Plant - total investment capital of 180 billion VND and (2) Coal conveyor line project from Mong Duong coal mining to Mong Duong thermal power Plant 2 - total capital investment of 184 billion VND). Moreover, raising capital has not diversified and is heavily dependent on commercial loans that made capital's structure less flexible, ignoring the advantages of each capital fund as well as various raising capital methods and unreasonable cost. In particular, raising capital investment is not consistent with the characteristics of the coal mining sector, such as: (1) High capital investments, primarily create fixed assets, especially passive fixed assets (buildings, architectures, roads, factories, etc.) should be of high fixed costs and slow capital recovery; (2) Mine construction volumes are seasonal fluctuations during the year and for each period in the mine life, leading to the production capacity is created sometimes missing or redundant, low efficiency, including labor's performance utilization. It is also one of the causes affecting the missing demands of capital and business performance is unsatisfactory.

1.3. Inventories increased highly, high receivable debts in some units of Vinacomin

By the end of 2015, the value of inventories of Vinacomin was 16,998 billion VND, up 6.5% comparable to beginning the year, which mainly coal inventories did not consume (about 8.75 million tonnes respectively 10,517 billion VND); even in the first 7 months of 2016 coal inventories amounted to 11 million tonnes, mostly

good quality coal with a total value of about 17 trillion VND. Although Vinacomin has implemented regulations to limit inventory to units in Vinacomin (maximum 6% demand for the whole year), however high inventory values in many units such as Ha Long coal company, Nam Mau coal company, Cao Son coal JSC, Hon Gai coal, etc. Besides, the management of receivables that have not been done thoroughly lead to receivables of whole Vinacomin at the end of 2015 up to 23.1% in comparison with the beginning, while receivables amount of coal increased from 4,404 billion VND (early 2015) to 5,636 billion VND (end of 2015), increased by 27.97%, mainly due to sale for EVN power plants but did not receive money.

The increase in inventories and receivables showed that the difficulties of selling coal as well as clearing debts have become more apparent. Consequently, it led to the fact that working capital was slow-moving and cash flow decreased sharply (from 5,178 billion VND to 2,123 billion VND). Company needs to use more commercial loans to balance the payment. Therefore, the interest cost is getting higher. Imbalanced cash flow often occurs and negatively affects the financial situation of companies in Vinacomin. These are major challenges for the financial situation of Vinacomin at present.

1.4. The financial situation

The financial situation in some aspects tend to deteriorate because of a big integrated liability of all companies under Vinacomin; and the ratio Liabilities/Owner's equity of many subsidiaries exceed the advisory limitation. By the end of 2015, total liabilities of Vinacomin are 100,136 billion VND, increasing 3,354 billion VND (by 3.46%) from year beginning, while the average of short-term debts accounted for nearly 30%, the average long-term debts accounted for 37% of the total capital of Vinacomin.

In year 2015 the ratio Liabilities/Owner's equity of Vinacomin was 2.73; the parent company (Vinacomin): 1.97; One member limited liability companies: 3.25; Joint stock companies: 2.67. Generally, this ratio of Vinacomin remained safety but in many units, this ratio exceeded limitation under the provisions (3 times). In particular, a number of subsidiaries that ratio exceeds highly the permitted level such as Manufacturing engineering JSC., (12.27), Ha Lam coal JSC., (11.39), Northern area coal Trading JSC., (10.61), Quang Hanh coal company (8.05), Tay Nam Da Mai coal JSC., (9.83), etc., and even some units in special supervision (such as Ninh River shipbuilding JSC., Waterway transport JSC.,). Many subsidiaries of Vinacomin have to borrow huge commercial loans in conditions limited financial resources, which then led to the potential of loss financial security, unbalanced capital and bared interest burden to pay.

1.5. Conditions of coal mines

The condition for mining coal is increasingly difficult and complex. However, coal companies have to deal with changes in new tax policies, which regulate higher royalties and fees. Besides, sales volume and prices are falling sharply. The capital efficiency tends to decline, especially in many subsidiaries under Vinacomin. Activities in the field of minerals - energy, financial performance of Vinacomin depends heavily on mining geological conditions and the market situation. In the past few years the world's coal market has been declining both in demand and selling price due to the sharp fall in oil prices and the impact of measures to respond to climate change. Meanwhile, competitive pressures in the domestic market on the rise, especially coal market by rival domestic and imported coal from overseas. By increasingly deep exploitation in Vinacomin, long-distance transport costs make the investment and rising prices (cost of coal consumption in 2014 and 2015 at more than 1,440 thousand VND/ton, in which taxes and fees accounted for over 20%). The cost prices increased in difficult conditions have negative impacts on business efficiency, and capital efficiency of Vinacomin significantly reduced; driving the whole Vinacomin and its subsidiaries to difficulty in accumulating raising capital as well as financial resources.

2. Solutions to improve the financial situation and business efficiency of Vinacomin

To improve the situation and enhance the level of financial security as well as business efficiency, the author proposes a number of solutions for Vinacomin as follows:

2.1. Ensure raising capitals with reasonable structure to meet the demand of investment and improve financial security

To perform the business development objectives set out by 2020, with a vision to 2030 (especially for coal, electricity, minerals, metallurgy projects), the company has to increase the owner's equity on the basis of improving business efficiency to accumulate necessary capital and implement strategies to mobilize and to diversify funding. To diversify capital mobilization, the company should:

- Promote implementation of socialized investment, especially from public-private partnership (PPP), choose the appropriate financial structure for each period of investment. For instance, in the production stage, financial

structure can be different in stages of initial investment, operating and mine closure. The company might strive to attract investment through social forms of investment of at least 30% of the new capital requirements. It can help to meet the demands of development investment capital of Vinacomin simultaneously. Consequently, it also reduces the pressure to increase owner's equity in accordance with the provisions of the Minerals Law, as well as pressures on recruitment of employees, and improve the ratio liabilities/owner's equity with high level of financial security and business efficiency.

- Enhance capital mobilization forms by issuing bonds in domestic and international capital market in order to reduce commercial loans from banks with higher interest rates. The bond issue could help mobilize funds from a transparent, highly competitive market. Non-bank financial institutions such organizations as financial companies, asset management companies, insurance companies and fund management companies are also inclusive.

2.2. Strengthening business administration

Enhancement of business administration with regard to finding suppliers might include importing a reasonable amount of coal from foreign countries. Vinacomin should do better cost management to improve business performance, and make efficient use of funds to increase owner's equity accumulation:

- Focusing on reasonable consumption and a smooth, coordinated production process. In particular, for the coal production, it is better to match the market's quality requirement with the capacity of each coal mines. It also helps to meet the market demand, avoid overstocked inventories, which might cause capital loss. New sales channels should be established and empowered regularly, assuring a reasonable cost to improve competitiveness to boost coal sales. The progress of receipt, delivery and payment of coal is examined as commitments in signed contracts. There should be a mechanism to encourage customers to pay in advance, for traditional customers and buying coal as schedule commitments.

- There might be a lot of disadvantages in the period when coal prices decline. It requires the company to have suitable strategies and solutions to the import of coal.

- Solutions to reduce costs, control costs from at all stages in the production process, should be adequate. Regulatory mechanisms, self management of costs, enhance operating discipline and effective monitoring should be continued. Companies of Vinacomin need to build plans to manage costs in line with their appropriate situation and the market conditions at each stage of production to ensure financial balance.

2.3. Settling debts

- For receivables: companies should conduct a review with regard to which customers have large receivables, receivables fall into outstanding debts, and doubtful debts. Solutions to take back receivables should be performed regularly to avoid slow-moving capital. If companies have doubtful debts, not claiming, they need to actively handle under current regulations as to make provision base on delinquency debt's age or expense to clear inability recovery debts. Accordingly, the doubtful debts have been made provision, these companies can not afford to withdraw, shall be settled by the provision, the deficit shall be charged to the expense of company. Vinacomin may sell receivables/debts under law regulation including debts in terms, doubtful debts, and inability recovery debts to payback capital. The prices of sold debts based on agreements of the parties and take responsibility by themselves for the decision to sell the receivables.

- For liabilities: Due to huge liabilities of Vinacomin, many companies have loans that are much larger than owner's equity. Therefore, to avoid imbalances capital and reduce financial risk, companies need to be proactive in making source of payment such as debts collection and selling surplus assets; seeking appropriate solution to reduce difficulties for companies on cash flow to pay debt. While making investment decisions, companies should research to adjust loan maturity date in line with life cycle of an investment project in order to avoid the inability to pay debts, contributing to a healthy financial situation. They should also improve the management efficiency, using of trading capital; ensuring appropriate capital structure in line with industry and business sector; using capital to ensure principles and effects, as well as stable cash needed for balance of payments; and ensuring balance on the ratio loan/owner's equity.

2.4. Intensifying to sold out inventories to improve capital efficiency and cash flow

To improve the financial situation as well as the efficiency of using capital, Vinacomin actively promote the consumption of inventories at companies. On the basis of the plan of consumption in the coming years, the corporation should closely follow market movements to direct timely production operation, keeping inventories at a reasonable level; focusing on improving the quality of coal, and maintaining a flexible product's structure to meet the rising domestic and export demand of coal. In the trading, to keep abreast of market requirements, keeping good relationships with clients, strictly controlling the quality of coal and delivery schedule for stable production of manufacturing companies.

For materials and commodities, Vinacomin should settle commodities, which have low quality, technical backwardness, stagnation, slow rotation to payback capital. Examining, checking and reducing materials reserves have dropped to a reasonable level to reduce capital stagnation, reduces the damage caused by excessive materials storage. Intensifying sold out inventories will help Vinacomin improve capital using efficiency, solving financial difficulties, and improving cash flow for production and business of its subsidiaries.

3. Conclusion

The paper aims to analyze and assess some financial issues of Vinacomin at the moment. Consequently, some solutions to overcome disadvantages in finance management, assuring safety of financial system, improving cashflow of Vinacomin. These solutions can support Vinacomin to better the business results in globalization and climate changes.

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Research on application of Miller-Orr model to manage cash capital in Nui Beo Coal Joint Stock Company

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Abstract

Cash capital is the most flexible asset in many companies and is used for daily business transactions. Therefore, determining a reasonable reservation of cash capital to ensure solvency and to improve profitability is an important goal of financial management. Dealing with this issue, researchers over the world have developed some typical models such as Baumol model, and Miller-Orr model, etc. In this article, the authors apply the Miller-Orr model by using the data of Nui Beo Coal Joint Stock Company to calculate an optimal reservation for this entity.

Keywords: Cash; profitability; budget; capital

1. Introduction to cash management models

Cash capital is not profitable asset (for cash) or has very low interest rates (for bank deposits). Holding this type of asset is very important due to 3 reasons: transaction, reservation and investment. But holding too much cash will make companies lose an amount of capital for production and business. Therefore, companies need to calculate an optimal cash capital reserves (funds) to maximize value properties while ensuring demands for daily transactions. To determine the optimal level of budget reserves, Baumol model and Miller-Orr model are often used.

- The Baumol cash management model

Baumol model proposed by William Baumol in 1952 is based on the assumption that companies have discrete cash flows with stable net flows, remaining unchanged through periods. Optimum budget line - M^* is determined according to the following formula:

$$M^* = \sqrt{\frac{2 \times Mn \times Cb}{i}} \quad (1)$$

Where:

Mn - Demand for cash over the period.

Cb - Transaction costs (brokerage, commission, etc.).

i - Opportunity cost for holding cash.

However, the application of this model is difficult, because it is not practical that net cash flows are stable and constant over periods.

- The Miller-Orr cash management model

Aim of building a more appropriate budget line model, Merton Miller and Daniel Orr based on random fluctuations of net cash flows, and variance of income - expenditure budget to compare differences in the average value of a quantity (symbolized Vb). Therefore, unlike the Baumol model, Optimum budget line - M^* of

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Miller-Orr model will not be a fixed rate which fluctuate from $M_{\min}$ (lower limit amount) to $M_{\max}$ (monetary limit on).

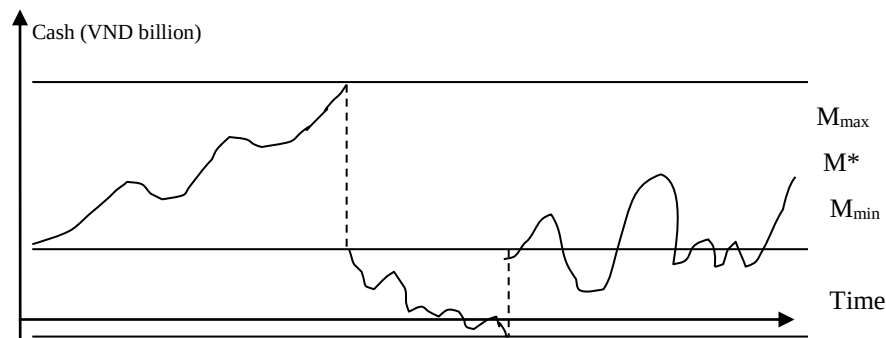


Fig. 1. Miller-Orr cash management model

Then M^* is determined according to following formula:

$$M^* = M_{\min} + d/3 \quad (2)$$

Where, d - spread between $M_{\min}$ and $M_{\max}$:

$$d = 3x \left(\frac{3}{4} x \frac{Cb \times Vb}{i} \right)^{1/3} \quad (3)$$

Note: variance and interest rates should be expressed in daily terms. Variance = squared standard deviation

In reality, the Miller-Orr model is more widely used because it can be fully applicable in context of random fluctuation cash flows of business. Optimum budget line - M^* will be an important basis for companies for cash management. In particular, companies can adjust cash surplus by using liquid assets such as investment in securities, savings, loan; otherwise, they can compensate cash deficit by selling securities, savings withdrawals, etc.

2. Applying Miller-Orr model to cash management in Nui Beo Coal JSC

Nui Beo Coal Mine was established in 1988 and was transferred to a joint stock company in 2006. Its capital is now worth VND 370 billion, of which 53% belongs to the state. Currently, cash management at the company is primarily based on experience and focusing on problem solving. Therefore, the company needs to apply the Miller - Orr model with the following specific steps:

Step 1: Determine minimum cash balance

Based on data of cash and cash equivalents account balance at the end of 12 quarter period (1st quarter 2013 to 4th quarter 2015); and combined with experiences of accounting officers, research suggests that 8.67 billion VND is safety minimum budget line for the company.

Step 2: Determine fluctuation range of cash - d

Nui Beo Joint Stock Company have not opened savings deposits at banks, and not held liquidity stock; therefore, i factor in the formula should be determined by savings deposit interest rate with 12-month terms. Through observation published data on 12-month term interest rates banks in 3-year period (2013, 2014, 2015) Authors calculated average interest rate by 7.83%/year.

Cb factor is transaction costs, it is calculated using the interest rate savings deposits lost when companies withdraw money early (skipping some other negligible costs as travel expenses, nonparticipating withdrawals costs, etc.). With a sight deposit interest rate by 0.8%/year, if withdrawals before maturity date, the opportunity cost is 6.53%/year (Cb is calculated by 6.53%).

Vb factor is cash variance and can be calculated based on quarterly cash flow statements (from 1st quarter 2013 to 4th quarter 2015). Cash variance after calculated is 950.64 billion VND in Excel tool.

Applying the formula (3) the authors calculate $d = 25.23$ (billion VND)

Step 3: Determine optimum and maximum budget line

$$M^* = M_{\min} + d/3 = 17.08 \text{ (billion VND)}$$

$$M_{\max} = M_{\min} + d = 33.9 \text{ (billion VND)}$$

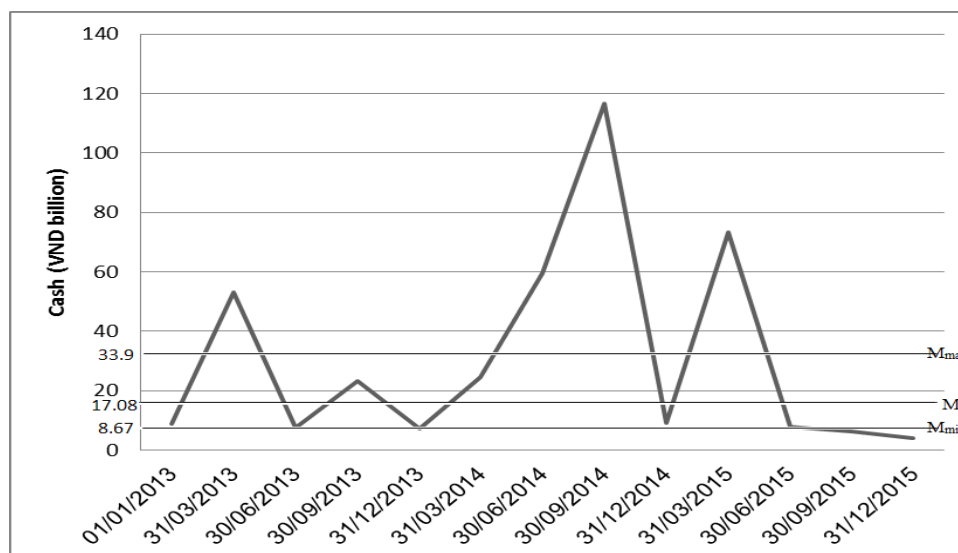


Fig. 2. Cash flow management of Nui Beo JSC calculated from Miller - Orr model from 2013 to 2015

Step 4: Adjust surplus (deficit) budget

After determining the optimum budget line M^* , the company needs appropriate adjustment of cash flows plan to ensure payment capability, while increasing profitability. During the period, if the difference budget line exceeds from 8.67 to 33.9 (billion VND), chief accountant will determine treatment measures to bring budget to M^* . The authors used data on the abridged cash flow statement 2015 of the Nui Beo Company, from which suggest suitable adjustment measures.

Table 1. Cash flows statement of Nui Beo coal joint stock Company in 2015

Target	Code	1 st Quarter (billion VND)	2 nd Quarter (billion VND)	3 rd Quarter (billion VND)	4 th Quarter (billion VND)
Cash flows from operating activities	20	(3.40)	(102.50)	(22.63)	140.39
Cash flows from investing activities	30	(80.88)	(9.28)	(63.13)	(128.59)
Cash flows from financing activities	40	148.41	46.38	84.22	(14.13)
Net increase in cash and cash equivalents (50 = 20+30+40)	50	64.13	(65.40)	(1.54)	(2.33)
Cash and cash equivalents at beginning of period	60	9.10	73.23	7.83	6.29
Cash and cash equivalents at end of period	70	73.23	7.83	6.29	3.96

According to the cash flows statements of the company, cash and cash equivalents at the end of last 4 quarters are not optimal; in which, the 1st quarter beyond the upper limit M_{max} and the 2nd, 3rd, 4th quarter beyond the lower limit M_{min} of the fluctuation range. Therefore, budget line should be adjusted to M^* . In particular, budget line at the end the 1st quarter at 73.23 billion VND, exceeding the upper limit M_{max} (33.9 billion VND), need to be adjusted to M^* (17.08 billion VND) with amount of the difference is 56.15 billion VND. In theory, if the budget is surplus, companies can apply some treatment methods such as: loosening credit policy, loan repayment, buying liquid securities, entrust investments, saving, loans, etc. For Nui Beo coal JSC., repayments short-term loans of the previous period are the most suitable choice (lending rate of 12%/year). This adjustment will increase cash flows to pay the loans, and reduce the cash flows interest payments in 4 quarters with changed data are presented in the Table 2.

Table 2. Cash flows statement of Nui Beo coal joint stock Company in 2015 after the loan repayment in 1st quarter 2015

Target	Code	1st Quarter (billion VND)	2nd Quarter (billion VND)	3rd Quarter (billion VND)	4th Quarter (billion VND)
Reducing interest payment due to loan repayment before maturity date		1.74	1.74	1.74	1.74
Cash flows from operating activities	20	(3.40)	(102.50)	(22.63)	140.39
Cash flows from investing activities	30	(80.88)	(9.28)	(63.13)	(128.59)
Cash flows from financing activities	40	148.41	46.38	84.22	(14.13)
Increasing loan repayments before		57.89			

maturity date					
Net increase in cash and cash equivalents (50 = 20+30+40)	50	7.98	(63.66)	0.20	(0.59)
Cash and cash equivalents at beginning of period	60	9.10	17.08	(46.58)	(46.38)
Cash and cash equivalents at end of period	70	17.08	(46.58)	(46.38)	(46.97)

However, the adjustment of budget balance of cash capital in the 1st quarter to M^* made the budget line at end of the 2nd quarter (VND 46.58 billion) lower than the M_{min} . It should be raised to M^* at VND 17.08 billion. Therefore, the need to adjust the difference is VND 63.66 billion.

In theory, if the budget is deficit, companies can apply some methods such as: tightening credit policies, encouraging customers to pay early to enjoy the discount, or selling liquid securities, withdraw savings, recover joint venture investment, etc. The cash flows from investing activities and financing activities are long-term and should not be adjusted to cash management. Nui Beo coal JSC. has not hold liquid stocks, no saving deposits or short-term investments in other companies. Credit policies dealt with the client from the initial; thus, if they are changed, it will affect the sale of products, business relationships, and financial ability of partners. Therefore, short-term loans are the most appropriate choice, helping to increase cash flows for the company in 2nd quarter in 2015. By using short-term loans, the company will have to pay the cost of capital equal to the interest rate of the loans (about 12%/year). Hence, the payments of loan interests and proceeds from short-term loans in the 2nd, 3rd, 4th, quarter will change (see Table 3).

Table 3. Cash flows statement of Nui Beo coal joint stock Company in 2015 after the short-term loans in the 2nd quarter 2015

Target	Code	1 st Quarter (billion VND)	2 nd Quarter (billion VND)	3 rd Quarter (billion VND)	4 th Quarter (billion VND)
Reducing interest payment due to loan repayment before maturity date		1.74	1.74	1.74	1.74
Increasing interest payments due to short- term loans			(1.97)	(1.97)	(1.97)
Cash flows from operating activities	20	(3.40)	(102.50)	(22.63)	140.39
Cash flows from investing activities	30	(80.88)	(9.28)	(63.13)	(128.59)
Cash flows from financing activities	40	148.41	46.38	84.22	(14.13)
Increasing cash flow by short-term loans received			65.63		
Increasing loan repayments before maturity date		57.89			
Net increase in cash and cash equivalents (50 = 20+30+40)	50	7.98	0.00	(1.77)	(2.56)
Cash and cash equivalents at beginning of period	60	9.10	17.08	17.08	15.31
Cash and cash equivalents at end of period	70	17.08	17.08	15.31	12.75

After the adjustment in the 2nd quarter, the budget at the end of the 3rd quarter and 4th quarter are greater than the lower limit M_{min} , so Nui Beo coal JSC. does not need further adjustment.

3. Assess the impact of budget adjustments after applying the Miller-Orr model

Considering business results in 2015, due to short-term loans in the 2nd quarter financial expenses increased respectively 5.91 billion VND. Paying original debt in the 1st quarter making financing costs also decreased 6.96 billion. Other items remain unchanged, thus, in combination, the profit before tax increased by 1.05 billion, corporate income tax increased by 0.231 billion VND (assuming the additional taxes paying in 2016). Profit after tax increased 0.819 billion VND.

On the assets side of the balance sheet date of 31st December 2015, cash and cash equivalents increased of 8.79 billion VND (from 3.96 to 12.75 billion); on the liabilities and owners' equity side: short-term loans rose 7.74 billion VND (from 57.89 to 65.63 billion), payable corporate income tax increased 0.231 billion VND, undistributed profit rose 0.819 billion VND. Total liabilities and owners' equity increased of 8.79 billion.

After applying Miller-Orr model, business results of Nui Beo coal joint stock Company has increased of 0.819 billion VND profit after tax. Total assets, total liabilities and owners' equity of the company have increased of 8.79 billion VND. Considering financial ratios of the company before and after applying the Miller-

Orr model are showed on table 5, this model effected clearly on improvement of 2 aspects: payment capability and profitability ratios.

Table 4. Some financial ratios of Nui Beo coal Joint Stock Company before and after applying the Miller-Orr model

Target	Before applying Miller–Orr model (VND /VND)	After applying Miller–Orr model (VND/VND)	Difference (+/-)
Instant liquidity ratio	0.006849	0.021663	0.014814
Liquidity Ratio	0.914961	0.917301	0.00234
ROA	0.039142	0.039766	0.000625
ROS	0.037544	0.038143	0.000599
ROE	0.135533	0.137697	0.002164

4. Conclusion

The application of Miller-Orr model of cash management in the Nui Beo coal JSC. will bring positive effects, helping businesses financially secure and increase profitability. Company needs to to use this model to calculate M^* yearly, or when the parameters C_b , V_b , i majorly changes in the model, company adjusts the balance of cash capital quarterly or monthly. Although the fluctuation of cash flows a lot more complicated, but it is possible with the help of accounting software to apply this model.

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International Conference on Economic Management in Mineral Activities (EMMA)

Several determinants of stock price of a mining company under Vinacomin, a case study of Vang Danh Joint Stock Company

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Abstract

In general, there are many determinants of stock price of a mining company. These determinants can be classified by: fundamental factors, technical factors and market sentiment. The research is conducted to understand how fundamental factors (determinants) affect the movement of stock price of a mining enterprise while other factors include technical factors and market sentiment is not included in the research. There is also a positive relation between company performance and stock price. In the research, the author also points out one case study which is Vang Danh Joint Stock Company, one of companies under Vinacomin.

Keywords: Stock price; determinants; fundamental technical; sentiments

1. Introduction

Many factors can affect a stock's price of a mining company. In general, stock prices are determined in the marketplace, where seller supply meets buyer demand. But unfortunately, there is no clean equation that can point out exactly how a stock price will behave. There are a few deciding factors about the forces that move a stock up or down. These forces fall into three categories: fundamental factors, technical factors and market sentiment.

1.1. Fundamental Factors affects stock price of a mining company

In an efficient market, stock prices would be determined primarily by fundamentals factors. Fundamental factors include but not inclusive:

- **Beta coefficient:** Beta coefficient is a measure of sensitivity of a share price to movement in the market price. It measures systematic risk which is the risk inherent in the whole financial system. Beta coefficient is an important input in capital asset pricing model to calculate required rate of return on a stock).
- **Dividends-price Ratio:** The dividend yield or dividend-price ratio of a share is the dividend per share, divided by the price per share. It is also a company's total annual dividend payments divided by its market capitalization, assuming the number of shares is constant. It is often expressed as a percentage.
- **EPS:** Earnings per share can be considered the portion of a company's profit allocated to each outstanding share of common stock. Earnings per share serve as an indicator of a company's profitability. However, data sources sometimes simplify the calculation by using the number of shares outstanding at the end of the period.
- **ROE:** Return on equity is a measure of profitability that calculates how many dollars of profit a company generates with each dollar of shareholders' equity. The formula for ROE is: $ROE = \text{Net Income} / \text{Shareholders' Equity}$. ROE is sometimes called "return on net worth."

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- **ROA:** Return on assets (ROA) is an indicator of how profitable a company is relative to its total assets. ROA gives an idea as to how efficient management is at using its assets to generate earnings. Calculated by dividing a company's annual earnings by its total assets, ROA is displayed as a percentage.
- **P/E** is short for the ratio of a company's share price to its per-share earnings. As the name implies, to calculate the P/E, simply take the current stock price of a company and divide by its earnings per share (EPS): $P/E = \text{Market Value per Share} / \text{Earnings per Share}$
- **P/B:** The price-to-book ratio is a ratio used to compare a stock's market value to its book value. It is calculated by dividing the current closing price of the stock by the latest quarter's book value per share. Also, known as the "price-equity ratio"
- **Financial Leverage:** Financial leverage is the degree to which a company uses fixed-income securities such as debt and preferred equity. The more debt financing a company uses, the higher its financial leverage. A high degree of financial leverage means high interest payments, which negatively affect the company's bottom-line earnings per share.
- **Company performance:** some company-specific factors can affect the share price: news releases on earnings and profits, and future estimated earnings; announcement of dividends; introduction of a new product or a product recall; securing a new large contract; employee layoffs; anticipated takeover or merger; a change of management; accounting errors or scandals.

1.2. Technical factors affect stock price of a mining company

Technical factors are the mix of external conditions that alter the supply of and demand for a company's stock. Some of these indirectly affect fundamentals. (For example, economic growth indirectly contributes to earnings growth.) Technical factors include the following:

- **Inflation** – This article mentioned inflation as an input into the valuation multiple, but inflation is a huge driver from a technical perspective as well. Historically, low inflation has had a strong inverse correlation with valuations (low inflation drives high multiples and high inflation drives low multiples). Deflation, on the other hand, is generally bad for stocks because it signifies a loss in pricing power for companies.
- **Economic Strength of Market and Peers** - Company stocks tend to track with the market and with their sector or industry peers. Some prominent investment firms argue that the combination of overall market and sector movements - as opposed to a company's individual performance - determines a majority of a stock's movement. For example, a suddenly negative outlook for one retail stock often hurts other retail stocks as "guilt by association" drags down demand for the whole sector.
- **Substitutes** - Companies compete for investment dollars with other asset classes on a global stage. These include corporate bonds, government bonds, commodities, real estate and foreign equities. The relation between demand for U.S. equities and their substitutes is hard to figure, but it plays an important role.
- **Incidental Transactions** - Incidental transactions are purchases or sales of a stock that are motivated by something other than belief in the intrinsic value of the stock. These transactions include executive insider transactions, which are often prescheduled or driven by portfolio objectives. Another example is an institution buying or shorting a stock to hedge some other investment. Although these transactions may not represent official "votes cast" for or against the stock, they do impact supply and demand and therefore can move the price.
- **Demographics** - Some important research has been done about the demographics of investors. Much of it concerns these two dynamics: 1) middle-aged investors, who are peak earners that tend to invest in the stock market, and 2) older investors who tend to pull out of the market in order to meet the demands of retirement. The hypothesis is that the greater the proportion of middle-aged investors among the investing population, the greater the demand for equities and the higher the valuation multiples.
- **Trends** - Often a stock simply moves according to a short-term trend. On the one hand, a stock that is moving up can gather momentum, as "success breeds success" and popularity buoys the stock higher. On the other hand, a stock sometimes behaves the opposite way in a trend and does what is called reverting to the mean. Unfortunately, because trends cut both ways and are more obvious in hindsight, knowing that stocks are "trendy" does not help us predict the future. (Note: trends could also be classified under market sentiment.)
- **Liquidity** - Liquidity is an important and sometimes under-appreciated factor. It refers to how much investor interest and attention a specific stock has. Wal-Mart's stock is highly liquid and therefore highly responsive to material news; the average small-cap company is less so. Trading volume is not only a proxy for liquidity, but it is also a function of corporate communications (that is, the degree to which the company is getting attention from the investor community). Large-cap stocks have high liquidity: they are well followed and heavily transacted. Many small-cap stocks suffer from an almost permanent "liquidity discount" because they simply are not on investors' radar screens.

1.3. Market sentiment affects stock price of a mining company

Market sentiment refers to the psychology of market participants, individually and collectively. This is perhaps the most vexing category because it matters critically. Market sentiment is often subjective, biased and obstinate. For example, stock buyers can make a solid judgment about a stock's future growth prospects, and the future may even confirm projections, but in the meantime the market may myopically dwell on a single piece of news that keeps the stock artificially high or low. And buyers can sometimes wait a long time in the hope that other investors will notice the fundamentals. Market sentiment is being explored by the relatively new field of behavioral finance. It starts with the assumption that markets are apparently not efficient much of the time, and this inefficiency can be explained by psychology and other social sciences. The idea of applying social science to finance was fully legitimized when Daniel Kahneman, a psychologist, won the 2002 Nobel Memorial Prize in Economics. Many of the ideas in behavioral finance confirm observable suspicions: that investors tend to overemphasize data that come easily to mind; that many investors react with greater pain to losses than with pleasure to equivalent gains; and that investors tend to persist in a mistake. Some investors claim to be able to capitalize on the theory of behavioral finance. For the majority, however, the field is new enough to serve as the "catch-all" category, where everything economists cannot explain is deposited.

Different types of investors depend on different factors. Short-term investors and traders tend to incorporate and may even prioritize technical factors. Long-term investors prioritize fundamentals and recognize that technical factors play an important role. Investors who believe strongly in fundamentals can reconcile themselves to technical forces with the following popular argument: technical factors and market sentiment often overwhelm the short run, but fundamentals will set the stock price in the long-run. In the meantime, investors can expect more exciting developments in the area of behavioral finance since traditional financial theories cannot seem to explain everything that happens in the market.

2. A case study about stock price of Vang Danh Joint Stock Company

2.1. Introduction of Vang Danh Joint Stock Company

Vang Danh Coal JSC (TVD) is engaged in the exploitation, processing and trading of various types of coal. TVD's products include cobbles, dust-coal, peat-coal and other kinds of minerals. TVD is also involved in the construction of mining structures and the trading of construction materials. TVD's other activities include the loading, unloading and transportation of coal, as well as the repair of mining equipment and vehicles. TVD is based in number 185, Nguyen Van Cu Street, Vang Danh Ward, Uong Bi District, Quang Ninh Province, Viet Nam.

2.2. Analysis of fundamental factors affecting stock price of TVD

To understand how those elements affect the stock price of a mining company and understand which element affect the stock price the most, author goes into research the stock price performance of Vang Danh Joint Stock Company. In this section, the author analyzes several key fundamental factors affecting the stock price of TVD. As can be seen from the table 1, TVD has market capitalization of 252 billion Vnd and the number of stock available are approximately 45 million. The beta co-efficient of TVD is 0.13 meaning that about 13% movement of TVD stock price can be explained by the movement of the market price. In other words, stock price of TVD is also affected by general economic environment, which affects the market performance. The EPS is about 300 Vnd, which is on average low in the market, explaining why the TVD's stock price does not increase after news of earnings. The ROA and ROE, if compared to the current interest rate, show that the company is performing not so effectively. Because of low effectiveness, the stock price went down from 2014 to 2016. Financial leverage is almost 6, which would mean the company is borrowing too much. However, if compared to other companies in the same industry, the company financial leverage is not so bad. The P/E and P/B ratios manifest the stock price is not at risk of speculation.

Table 1. Key fundamental factors that affect stock price of TVD in 2016

Criterion	Amount
Market Capitalization	252 (billion Vnd)
Number of stock available	44,965,149
Dividends/Price	12.50 %
EPS (4 latest quarters)	300 (Vnd)
ROA	0.47 %
ROE	2.80 %

Financial Leverage	5.72
P/E	18.69
P/B	0.50
Beta	0.13

Source: Vndirect security corporation's website

Company performance is certainly one of key fundamental factors that affect the stock price of the companies. In the period, other elements such as announcement of dividends; securing a new large contract; employee layoffs; anticipated takeover or merger; a change of management; accounting errors or scandals will be excluded from the research. The authors analyze the company performance from Q1, 2013 to Q1, 2016.

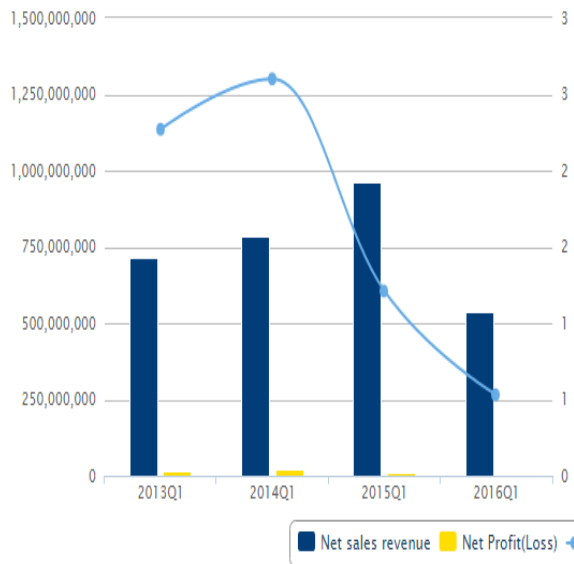


Fig. 1. Net sales revenue and Net profit of TVD from 2013, Quarter 1 to 2016 Quarter 1 (Unit: 000 Vnd)

Source: TVD's company financial publications

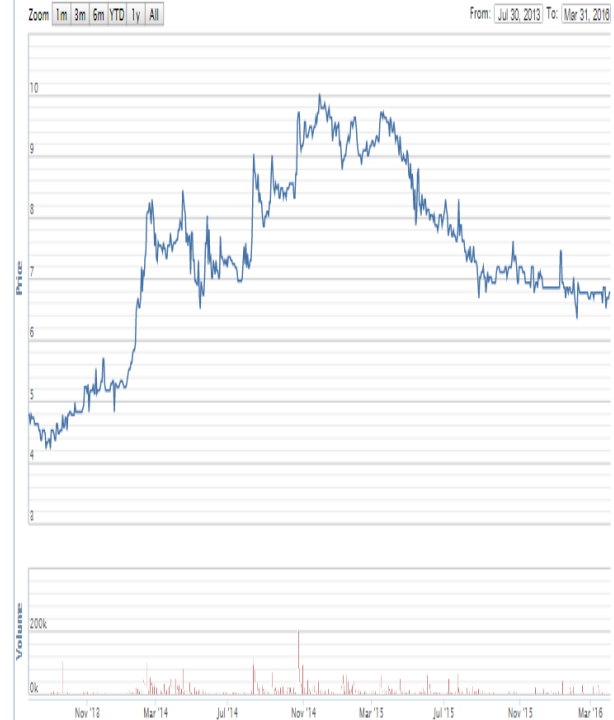


Fig. 2. Stock price movement of TVD from 2013, Quarter 1 to 2016 Quarter 1

Source: TVD's company financial publications

As can be seen from Fig. 1 and Fig. 2, Stock price of TVD is positively related to the company performance. Net sales revenue increased from Q1, 2013 to 2014 and then went down to Q1, 2016. Meanwhile, the stock price of TVD moved in the same directions, increasing from 4,000 VND in Q1, 2013 to 10,000 VND in 2014 and then went down to 6,200 VND in Q1, 2016. The company performance, especially, the news about revenue and profits are one of the factors that affect the stock price of the company.

In conclusion, TVD's stock price movements are determined by many factors including fundamental factors, technical factors and market sentiment. However, the limit of this research is that it does not analyze how technical factors and market sentiment affect stock price of a mining company, instead, it does develop understanding with regard only to fundamental factors. Several fundamental factors include Beta coefficient, Dividends-price Ratio, Earnings per Share, Return on Assets, P/E, P/B, Financial Leverage and Company's performances.

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Completion of some accounting contents about cost and product stages-cost in Vinacomin - Cao Son Coal Joint Stock Company

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Abstract

The actual survey conducted at Vinacomin - Cao Son coal joint stock company (Cao Son coal JSC) shows that there are some disadvantages in cost accounting and cost of goods manufactured according to production stages; at the moment, costs are mainly identified, classified according to two criteria: cost contents and cost factors. However, other classification criteria are not applied; the costing account system cannot provide such information as cost limited by the norms, actual cost, etc. Accountants need to use estimation and allocation methods to allocate and collect information about cost and calculate cost of goods manufactured according to production stages.

To deal with these disadvantages, in order to provide information related to cost for cost administration. This article proposes solutions to enhance cost accounting and define cost of goods manufactured according to production stages such as: add criteria to identify and classify costs; complete recording costs; complete cost collection and allocation, and improving methods to calculate cost of goods manufactured according to production stages of the company.

Keywords: Cost accounting; cost of goods manufactured according to production stages; cost accounting management

1. Introduction to production and business situation of Vinacomin - Cao Son coal joint stock company

Cao Son Joint Stock Company is a company directly managed by Viet Nam National Coal-Mineral Industries Holding Limited (here after called Vinacomin). In 2015, the company was performing under many difficult conditions. Vinacomin set up high targets for Cao Son JSC although production conditions in 2015 are getting much harder than that of previous years. Production conditions requires the company to exploit coal at deeper level. Therefore, there are more solid earth, rocks and other substances to be excluded in the exploitation process. Those jobs require better lifting methods. Besides, the company was also affected by a historical flood happened at the end of July until the beginning of August. The flood damaged severely main roads and drainage ditches. Despite so many difficulties, the company has outperformed the targets that Vinacomin had assigned. The business performance of Cao Son JSC is shown in the Table 1.

Table 1. Business performance of Cao Son Coal JSC from 2014 to 2015

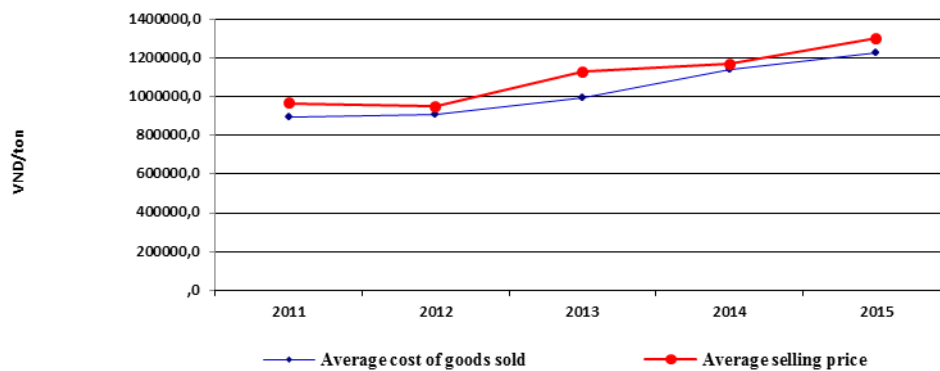
An example of a column heading	Units	Implementation in 2014	Implementation in 2015	Compare 2015/2014 (%)
Soil and Rocks uploading Volume	m ³	28,062,698	33,238,454	118.45
Coal output	Ton	3,579,005	3,684,735	102.95
Quantity of coal sold	Ton	3,488,606	3,594,131	103.02
Revenue from coal	VND million	4,077,263	4,679,870	114.77

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Profit before tax	VND million	5,645	22,322	395.42
Average income	VND/person/month	6,004,000	6,933,000	115.47

(Resource: Compiled from the 2014-2015 Annual Report of Cao Son Coal JSC)

In addition, the company continued to solve other production and business management problems: high soil and rock separating coefficient (10,21 m³/ton in 2015); mining area was not expanded; machines and equipment used for many years has been degraded with unstable operation and low productivity; while the high debt/equity ratio (6.44 in 2015 - more than double the level of state management regulation) is another challenge for the company in seeking funds from outside to renew machines. One of the problems was high production costs: the average cost of soil and rock separating and the average cost of coal mining are increasing every year. This increase has resulted in closer gap between production cost and coal price, (refer to the Fig.1). Therefore, cost accounting and calculation of cost of goods manufactured should be paid more attention to manage production cost of the company.



Unit: VND/ton					
Targets	2011	2012	2013	2014	2015
Average costs of goods sold	898,395	911,049	996,171	1,143,467	1,227,451
Average selling price	965,382	949,288	1,128,919	1,168,737	1,302,086

Fig. 1. Average costs of goods sold and average selling price from 2011 to 2015

However, the research shows that the situation of cost accounting and calculation methods of calculating costs of goods sold are having some disadvantages that need to be further studied and improved.

2. The situation of cost accounting and calculation method of cost of goods manufactured according to production stages in Vinacomin - Cao Son coal JSC

Cao Son Coal JSC is applying opencast technology, which divides production into many stages. To match the characteristics of each production stage, cost accounting of the company is conducted according to the production stages. Therefore, the costs of goods sold had been calculated on the total cost happened at production stages. For example, cost incurred is documented and grouped by cost factors, such factors as machines, equipment and parts. Cost accounting also calculate cost by workshops or working sites. The cost of goods manufactured is calculated in conformity with guidelines issued by Vinacomin. Some contents of the guidelines are presented as followed:

- **Arising cost points:** Initial arising costs related to the following specific subjects are defined as origin of arising costs in the company:

- + Equipment, machines in production: drilling, digging, automobiles, auxiliary equipment, etc
- + Staff service auxiliary production department: the cost of electricity and water department, repairs, tires, turn signals, cooking staffs, safety staffs...
- + General management workshops level: costs related to the manager, deputy manager, statistical staff and common costs of construction sites and workshops...
- + General management company level: costs related to function departments and the common costs for the whole company...

- **Collection costs object:** in reality, the Company recorded address, reflecting the information on actual costs with 2 levels:

Level 1: Cost under elements (fuel, spare parts, regular repairs, power, operating labor costs, depreciation and other expenses, ...) are detailed by each machine, equipment, including:

- + Drilling machines;
- + Mine exploding entire construction site;
- + Excavators;
- + Bulldozers;
- + Car transports;
- + Sieve and drain gas;
- + Car making tyre;
- + Serving vehicles (tanker, spraying water);
- + Pumps.

Level 2: Costs are aggregated under the objects

- Each construction site, workshop
 - + Extraction sites 1, 2, 3, mechanical, road and bridge, drilling construction site;
 - + The main transport workshops 1, 2, 3, 4, 5, 7, 9
 - + Auxiliary parts: network stations workshop, water supply, transportation 6, 8, electromechanics.
- Each functional department
 - **Product cost object:** According to the stages, the company has successfully charged cost of goods manufactured according to production stages under the guidance of Vinacomin but not details all the stages, including the following types of product cost information:
 - + Drilling;
 - + Brushing;
 - + Unloading;
 - + Carriage;
 - + Soil and rock separating;
 - + Raw coal;
 - + Sorting;
 - + Cleaned coal;
 - + The cost of goods manufactured
 - * *Cost accounting and calculation method of “cost of goods manufactured” have advantages as follows:*
 - + Costs have been detailed to each major equipment, auxiliary serving convenience for cost limited by the norms and cost management tied to each equipment and the operator.
 - + Costs are recorded at each points to be included into each exploitation stages and to help to calculate cost of goods manufactured.
 - But also exist disadvantages:*
 - + Costs mainly be identified, classified according to two criteria: cost contents and cost factors, other classification criteria are not popular or not applicable; therefore, limiting the providing cost information to meet the needs of business administrators.
 - + Current detailed cost accounting system of the company can not provide information in the same system about allocated cost, the actual cost and therefore, provides cost information for cost management on the basis of allocated cost of goods manufactured according to production stages are applied.
 - + The units outside production such as mechanical bridges and construction sites and some other auxiliary parts are accounted as direct costs. Such cost points as construction sites, main workshops are not reasonable because these departments are organized to cater for the main stages of production (drilling, carriage, unloading, sorting). Therefore, after gathering for construction site, these auxiliary parts, should determine the level of service of the main stages to allocate correctly to product cost according to collecting cost objects and do not use the estimate allocations according to current experience.
 - + Although Cao Son coal JSC in particular and coal mining businesses in general have implemented cost norms but the costs are not collated timely with the norms of stages cost. Therefore, the current accounting of companies only monitors costs daily and settle the costs compared to the allocation monthly (fuel costs, salaries, ...), quarterly (materials, power, etc) thus also making it difficult in cost management, reduce the timeliness and efficiency.

3. Solutions to complete cost accounting contents and calculation method of cost of goods manufactured for Cao Son coal JSC

3.1. Use diversified criteria for identifying and classifying costs

To provide timely information for business management, the company can implement cost identification and classification by different methods and criteria: classified by functions, classified by cost behaviors and classified by relationships with the volume of products. Each classification criteria have its own benefits to managerial accounting, which in turn, aids business management. Therefore, diversified cost classification is

completely necessary. The company can add some cost classifications to meet the different needs of cost information as follows:

Table 2. The criteria for identifying and classifying costs in Cao Son Coal JSC

Recognition criteria used in coal mining businesses	Costs classification	Meet the demand
By function	- Production costs: direct materials cost, direct labor cost, general production cost.	Planning costs
	- External production costs: sales cost, corporate management cost.	Calculate the production cost, cost of goods manufactured
By economic content	Materials costs (including materials, fuel, power);	Planning costs
	Labor costs (including salaries, insurance, meal allowance)	Gather costs for each machine and equipment
	Depreciation of fixed assets;	Calculate the cost of goods manufactured according to production stages
	Hired services costs;	
	Other costs in cash	
By relationship with activity levels	Fixed costs: arbitrary fixed costs and mandatory fixed	Analyze C-V-P relationship, the breakeven point.
	Variable costs: ratio variable cost and rank variable costs.	Flexible estimation
	Mixed costs	Calculate production cost according to accounting standards.
By relationships with objects charged	Direct costs.	Calculate and allocate costs
	Indirect costs.	Determined cost of goods manufactured according to production stages by relationships with objects charged
By relationship with contractual assignment norms	Cost limited by the norms	Analyze the implementation of contractual assignment norms
	Cost excess of the norms	- Determine the arising costs charged to contractual assignment cost of goods manufactured according to production stages.

3.2. Improving the account recorded costs

To meet the requirements of cost management of the company, on the basis of aggregate contractual assignment stages of Vinacomin, the accounting department has to account the actual arising costs, cost limited by the norms (contractual assignment) as the base to finalization costs according to stage.

The relationship between business production and cost of goods manufactured according to production stages in mining process at Cao Son coal JSC in particular and opencast coal mining businesses in general is shown in Fig. 2.

Drilling soil and rock cost	Exploding soil and rock cost	Unloading soil and rock cost	Carriage soil and rock cost	Unloading raw coal cost	Carriage raw coal cost	Sorting coal cost	Sales cost, corporate management cost
Product cost of soil and rock exploitation							
Product cost of raw coal							
Product cost of clean coal							
Overall product cost of clean coal							

Fig. 2. The relationship between production stages and cost of goods manufactured

The opening of detail accounts based on the specificity of the company, which is currently applying product cost management by stages. Actual costs in the period will be classified:

- *Production costs*: direct materials cost, direct labor cost, general production cost.
- *External production costs*: sales cost, corporate management cost.

According to this classification, cost accounting gathers cost and calculates product cost as follow:

+ *For the arising unique cost*: direct material cost, direct labor cost, the Company can use account level 1 detailed by stages to reflect.

Example: For Account 622 - direct labor costs of coal production arising in the period

622.11: actual drilling labor costs

622.21: actual unloading labor costs

622.31: actual carriage labor costs

The technology feature of production is that unloading arranged alternately soil, rock and coal. Therefore, unloading activities including soil and rock unloading, coal unloading, pile unloading. Although these are unique cost, but if they need to allocate company can choose allocation target of the unloading volume each stage, to reflect can open detail accounts:

622.211: actual soil and rock unloading labor costs;

622.212: actual coal unloading labor costs;

622.213: actual pile unloading labor costs.

Businesses can apply stamp granted at excavator while driving to receive loads, and collate at late working time with recorded trip at waste dump and conveyor, simultaneously managing trucks team and unloading volume statistics at each stage as the basis of allocating labor costs operated excavator.

+ *For the actual arising aggregate cost during the period:* general production cost, sales cost, corporate management cost. Currently, the Company tracks cost detailed by cost factors, tracking accounts opened under the guidance of Vinacomin.

Example: For Account 627 - General production costs are detailed:

627.11: actual material for general production costs;

627.21: actual labor for general production costs.

To calculate cost of goods manufactured according to production stages, management accounting can detail:

627.211: actual drilling labor for general production costs

627.212: actual unloading labor for general production costs

627.213: actual carriage labor for general production costs

.....

In addition, management accounting will design the account for cost management according to the norms corresponding to the accounts reflect the actual arising costs for comparison; in order to determine the costs, which are excess of the norms, and analyze the difference, making cost accounting management reports about the implementation of the cost limited by the norms, etc

Example: For Account 621 - direct materials cost is opened as follow:

Table 3. Detailed account 621 – stages of direct materials costs

Account level 3	Account level 4	Account level 5	Content
6211.1			Direct materials cost of drilling stage
	6211.11		Actual arising direct materials cost of drilling stage
		6211.111	Actual arising direct material cost of drilling stage
		6211.112	Actual arising direct fuel cost of drilling stage
			
	6211.12		Direct materials cost according to norm of drilling stage
		6211.121	Direct material cost according to norm of drilling stage
		6211.122	Direct fuel cost according to norm of drilling stage
			
	6211.13		Difference of direct materials cost of drilling stage (Cost excess of the norms)
			Difference of direct material cost of drilling stage
		6211.131	Difference of direct fuel cost of drilling stage
		6211.132	
6211.2			Direct materials cost of exploding stage

Similar to the accounts 622 - direct labor cost and accounts 627 - general production cost are also opened in detail in the way above.

3.2. Completing the collection, allocation and calculation cost of goods manufactured according to production stages at the company

On the basis of the mentioned solutions to complete cost classification, cost recording and cost accounting, accountants can track cost accounting on the basis of cost allocation (contractual assignment), allocate supportive stages to calculate cost of goods manufactured according to production stages more precise. By this, it helps to overcome the drawbacks in the current work of cost collection and calculating cost of goods manufactured according to production stages in the company (described in the Fig.3)

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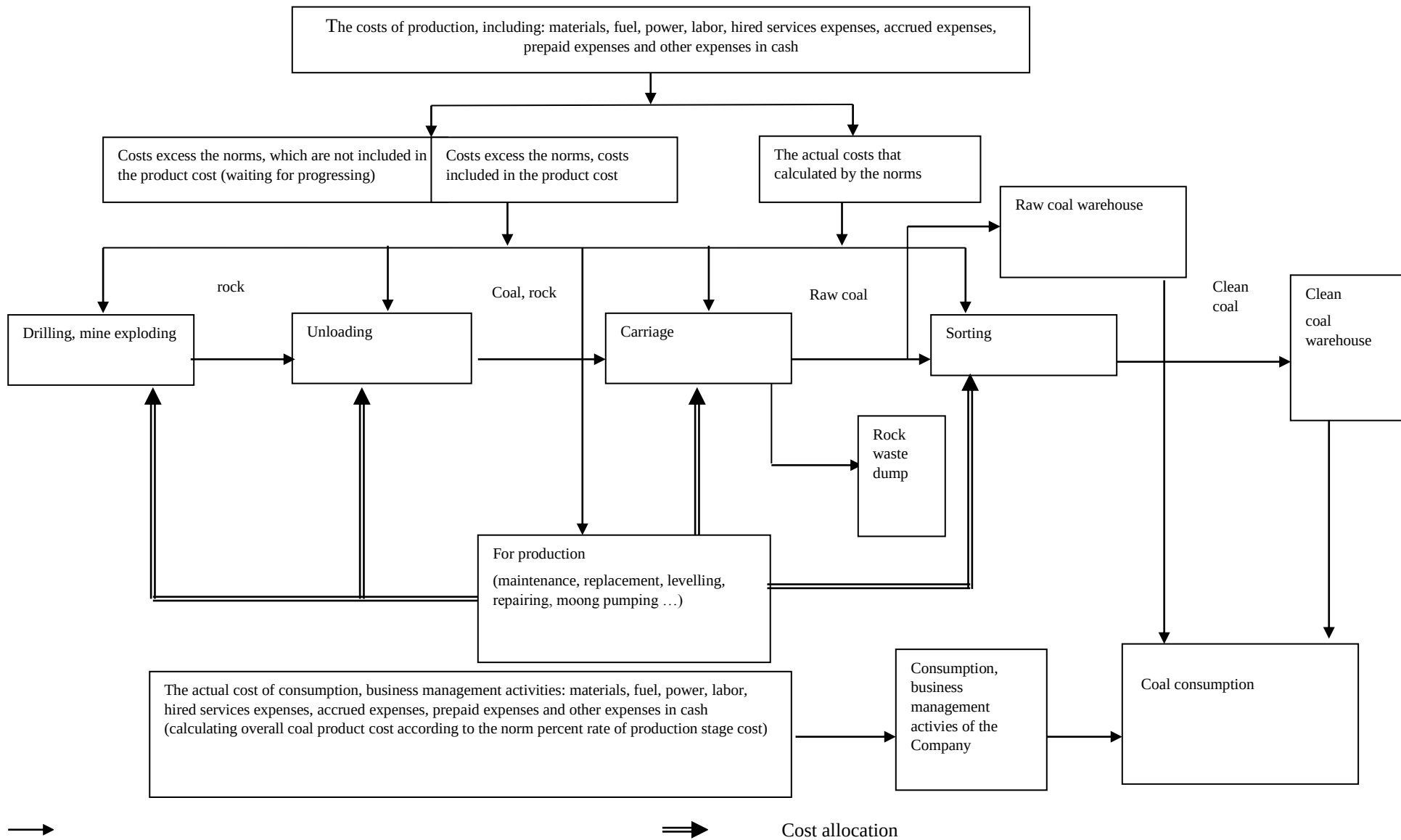


Fig. 3. Diagram of costs collection, allocation according to norms and calculating cost of goods manufactured according to production stages at Cao Son Coal JSC



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Unconventional gas development in Viet Nam: Opportunities and Challenges

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Abstract

Viet Nam is one of the most dynamically emerging countries in Southeast Asia and in the world. With the high rate of economic growth (average about 6-8%/year), the energy demand of Viet Nam in the future will be very huge. Challenge for Viet Nam in the upcoming period is to ensure energy resources for economic development, associated with sustainable development, environmental protection and combat climate change. Therefore, selection and usage of appropriate and effective energy is one of the important factors. Besides, the development of clean energy sources is essential in the future. In present context, the developments of renewable energy sources and nuclear energy have the various restrictions, while traditional energy such as coal and oil is getting exhausted. Consequently, the unconventional gas development can be a good solution for Viet Nam in the future. In addition, the replacement of the traditional energy sources such as coal and oil products plays a role to reduce of greenhouse gas (GHG) emissions, especially in the power sector. This article analyses to indicate the opportunities and challenges for the development of unconventional gas in Viet Nam.

Keywords: Unconventional gas; Energy; Environment; Opportunity; Challenge

1. Introduction

Viet Nam was one of the fastest growing energy consumers among the ASEAN members during the last decade. Its energy demand rose rapidly in line with robust economic expansion. In order to contribute to successfully fulfilling the socio-economic development strategy, the overall objectives of the national energy development strategy up to 2020, and 2050 of vision, are to assure national energy security; to supply adequate high-quality energy for socio-economic development; to exploit and use domestic energy resources in a rational and efficient manner; to boost the development of new and renewable energies, bio-energy and nuclear power in order to meet the requirements of socio-economic development and developing the energy sector in a quick, efficient and sustainable manner in association with environmental protection (1855/QĐ-TTg, 2007). According the estimation of the national energy development strategy, the energy demand in the future will be about 100 – 110 million ton of oil equivalent (TOE) of primary energy by 2020, 110 – 120 million TOE by 2025 and 310-320 million TOE by 2050 (1855/QĐ-TTg, 2007). In particular, electricity demand is very large. Viet Nam's General Statistics Office estimates that electricity demand will continue to grow at recent annual growth rates of 10%-12%, rising from 169.8 terawatt hours (TWh) in 2015 to 615.2 TWh by 2030.

To become a modern industrialized country by 2020, Viet Nam's production and consumption of energies will sharply increase, resulting in higher emission of greenhouse gas. Particularly in power sector, according to the estimation of Ministry of Natural Resources and Environment in normal development scenario, the emission of greenhouse gas due to burning fuels, principally comes from coal in thermal power plants will account for 31.3% of total GHG emission by 2020 and up to 51% by 2030. Therefore, the country can diminish the emission in energy production thanks to cleaner power plants (like natural gas, nuclear and renewable energy) replacing coal power plants. In addition, using efficiently and energy saving is one of solutions to reducing GHG

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emission, protect the environment. Thus, there should be policies to boost research and development of new and renewable energies.

According the National Bureau of Asian Research, the coming years will be the Golden Age of the energy sector using gas. However, according the International Energy Agency (IEA), natural gas will enter a golden age only if a significant proportion of the world's vast resources of unconventional gas can be developed profitably and in an environmentally acceptable manner (IEA, 2012). The unconventional gas is defined in the four major types of reservation: shale gas, coalbed methane gas (CBM), tight gas and hydrate gas (Charles M. Boyer et al., 2007). The characteristics of unconventional gas have the same as conventional gas, so that it is a clean energy. It can be used for the similar purposes as electricity generation, transport or heating. Almost forms of unconventional gas have been known for many years, but there is some challenge to develop producing technologies in a commercially viable manner. The emergence of new technologies to exploit unconventional gas sources has changed dramatically the global energy outlook; it also alters human perception for natural gas resources in which natural gas resources course is identified as "plentiful" instead of "rare" as before. For example, in the United States, thanks to the development of shale gas, natural gas supply is completely assured for nearly 100 years. In the future, gas supply sources will be supplemented a significant volume of gas unconventional sources including coalbed methane, tight gas and especially shale gas. The growth of natural gas resources, well as the encouragement policy to develop them will bring the advantages of gas for traditional fuel sources such as coal and oil. This will contribute to the transition from normal economy to low carbon economy.

The advances in upstream technology have led to a surge in the production of unconventional gas in some countries in the world in recent years. Coalbed methane and tight gas have been produced in the US for more than 20 years. Tight gas has played an important role in the rise of gas production in Canada for more than 20 years and in China for 15 years (Andrews-Speed and Len, 2014). In particular, the shale gas revolution in the US has created the prospect of further increases in production and the emergence of a large-scale unconventional gas industry in other parts of the world. Thanks to the boom of shale gas, the United States has realized many benefits from the development of shale gas, such as greater energy security, reduction of unemployment, greater global industrial competitiveness, and the huge environmental and economic benefits. Especially, the rapid growth of the shale gas production and the strong decline in the natural gas price in the US have led to a reduction in coal consumption in the electricity sector, while the use of natural gas increase in this sector (Wang et al., 2014). Nowadays, the production of electricity from natural gas in the US accounts for about 35% of total electrical production. This has contributed to the considerable decrease of the carbon emissions from fossil-fuel combustion in the US in recent years. Following the report of IEA and the Energy Information Administration (EIA), carbon emission from fossil-fuel combustion in the US is most likely to be back to 1990 levels (EIA, 2013) (Wang et al., 2014).

Except a little research on coalbed methane gas in the north of Viet Nam, there is no specific research on unconventional gas, while Viet Nam is considered as a country has the potential of unconventional gas, particularly shale gas and coalbed methane. There have been a few proposed projects exploiting coalbed methane in the Red river basin in the northern Viet Nam, but they have not performed by many reasons yet. Currently, Viet Nam is taking the steps to prepare the research, assessment of the potential and the ability to exploit and use unconventional gases. If unconventional gases can be exploited and used in Viet Nam, they will significantly contribute to assure national energy security and mitigate environmental impacts. In this paper, the opportunities and challenges that Viet Nam will cope in the development process of unconventional gas are analyzed, in particular the changes in energy policy and environment of Viet Nam after the COP 21.

2. What are the opportunities for the unconventional gas development in Viet Nam?

2.1. Strong growth for energy demand and the shortage of traditional energy in the future

According the report of Enerdata in 2016, Viet Nam will see the largest percentage increase in primary energy demand followed by China and India with 78% in the period 2015 to 2040 (Enerdata, 2016). In the Business-as-Usual (BAU) case of Asian Development Bank report, the primary energy demand of Viet Nam is projected to increase from 67.7 Mtoe in 2010 to 186.0 Mtoe in 2035, the annual growth rate of 4.1% (ADB Bank, 2013). The final energy demand of Viet Nam will continue to increase at the annual rate of 3.3% through 2035. By sector, the industry energy demand will increase at 4.6% per year through 2035, and its share will rise from 25.6% in 2010 to 34.8% in 2015. Transport energy demand will increase at 3.3% per year over the outlook period. Other sectors will increase moderately at 2.3% (see fig. 1).

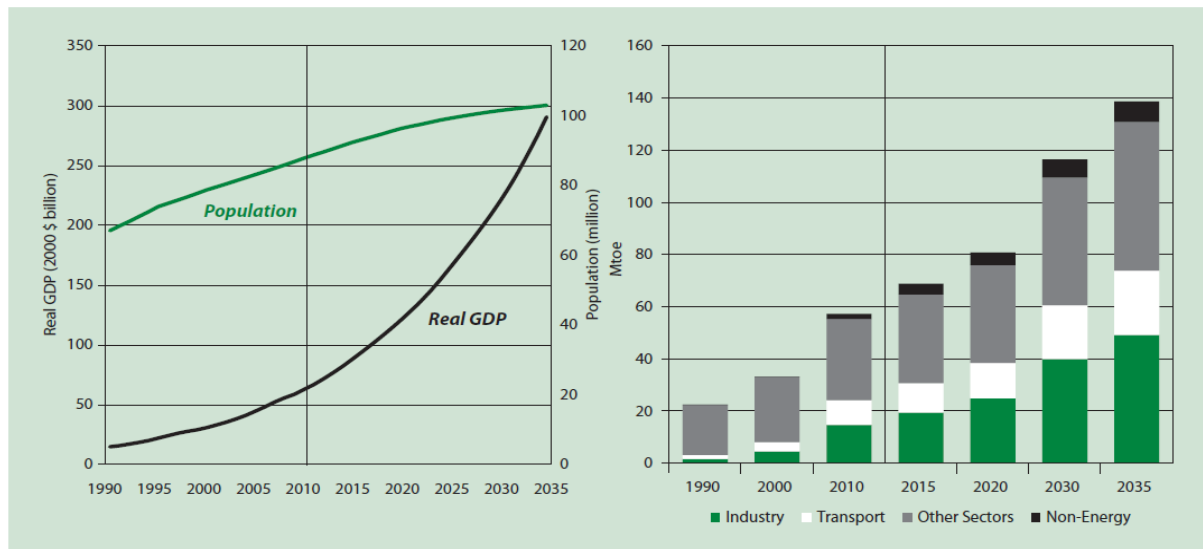


Fig. 1. Population, GDP and Final energy demand in BAU case of Viet Nam

Source : ADB Bank, 2013

Viet Nam's economy is growing fast, energy demand even expands faster than the economy, and electricity demand will dramatically increase. In the context of the strong increase in energy demands, the ability to provide traditional domestic energy resources has limited. The Vietnamese policy makers and planners had been agreed that indigenous energy resources are unlikely to be able to satisfy the increase for national energy demand. In order to sustain the country's socio-economic development in the future, the country will cope with the growth of energy demand. Viet Nam would become a net energy importer around 2015 or even earlier (Minh Do and Sharma, 2011). Many forecasts have shown that Viet Nam will shift from an energy-export country to an energy-import country by 2016. Many experts believe that, if Viet Nam has not promptly the sustainable energy development policy, it will likely become a country depending heavily on the imported energy in the period 2030 – 2050.

For example, according "The master plan on development of Viet Nam's coal industry through 2020, with the prospects toward 2030" (Decision No.60/QD-TTg, 2012), Viet Nam's coal demand will sharply increase in the future. As can be seen in table 1, coal demand in 2015 is 56.2 million tons, 120.3 million tons in 2020, and grows up to 220.3 million tons by 2030. Meanwhile, the output of salable coal produced in the whole industry in 2015 is from 55 to 58 million tons. From 2020 to 2025, the output only reach from 60 to 70 million tons, and it is over 75 million tons in 2030. In fact, in 2015 total output of Viet Nam's coal industry was only approximately 40 million tons. This is a huge shortage compared to the estimated demand. Most of Viet Nam's coal demand is used for power plants. With the low domestic output forecast, Viet Nam will have to import coal in future. According to calculations by experts, Viet Nam starts to import coal from 2016. By 2020, Viet Nam will import about 35 million tons and grow up to 135 million tons in 2035.

Table 1. Forecast demand for coal used in Viet Nam

Coal demand	Unit: million tons							
	2015		2020		2025		2030	
	Basic level	High level	Basic level	High level	Basic level	High level	Basic level	High level
Total	56.2	60.7	112.4	120.3	145.5	177.5	220.3	270.1
In which, coal for electricity	33.6	38.0	82.8	90.8	112.7	144.7	181.3	231.1
Domestic Output	55	58	60	65	66	70	>75	

Source : (Decision No.60/QD-TTg, 2012)

In recent years, the annual coal export volume in Viet Nam has cut to fill growing demand from domestic coal-fired power plants. Viet Nam began importing coal to satisfy power plant demand in 2011, importing annually 9.5 thousand tons of bituminous coal from Indonesia (VPBS, 2013). Viet Nam's state-owned oil and gas group (PetroViet Nam) is reportedly planning to purchase 10 million tons of coal per year from Australia and Indonesia in 2017 to supply three new power plants. Vinacomin has the plan to increase imports, with purchases to be made from Australia and Russia (Ho, 2014).

According “the National Master Plan For Power Development For The 2011 - 2020 Period With The Vision To 2030” (Master Plan VII), by 2020, the total coal thermal power capacity will be about 36,000 MW, producing about 156 billion KWh (accounting for 46.8% of total electricity production), consuming 67.3 million tons of coal. By 2030, the total coal thermal power capacity will be about 75,000 MW, producing about 394 billion KWh (accounting for 56.4% of total electricity production), consuming 171 million tons of coal (Decision No. 1208/QD-TTg, 2011). The Vietnamese government encourages to develop other power sources like renewable energy (wind energy, solar energy, biomass energy...); hydropower resources; nuclear power and thermal power plants using natural gas. However, coal thermal power capacity still accounts for a large proportion in the structure of power sources in the future. This will affect the targets and commitments of Viet Nam on the environmental protection, emission reduction of greenhouse gases and climate change. The charts below show the targeted capacity of power plants in 2020 and 2030 and their respective percentage in the total capacity under the Power Master Plan VII.

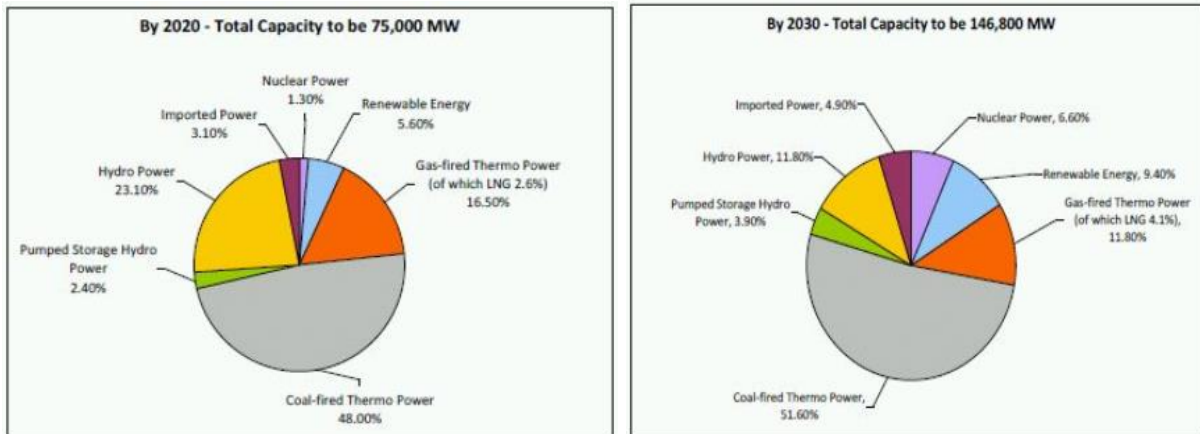


Fig. 2. Structure of power sources in 2020 and 2030

Source: Decision No. 1208/QD-TTg, 2011

In the sector natural gas, the increase of foreign investment during the past decade resulted in greater natural gas exploration, significant growth of Viet Nam's natural gas reserves proved. The country currently produces as much natural gas as the national consumes. The consumption of natural gas in Viet Nam has grown steadily since the late 1990s as a number of offshore gas fields came into production. At that time, supply demand for gas has matched, but in order to support modernization and economic growth, the supply of primary energy forms will have to grow. Natural gas has become an increasingly important fuel for Viet Nam, with its share in power generation at 34.2%, rating second only after hydroelectricity in 2012. The figure 3 present natural gas output of Viet Nam recently. The natural gas output increased from 1 Bcm in 2000 to over 10 Bcm in 2015. At present, about 85% of natural gas demand in Viet Nam for power generation, 10% for the production of fertilizers and the rest is consumed in other sectors. However, the current gas supplies can only undertake 60% of electricity demand and 30% of fertilizer demand.

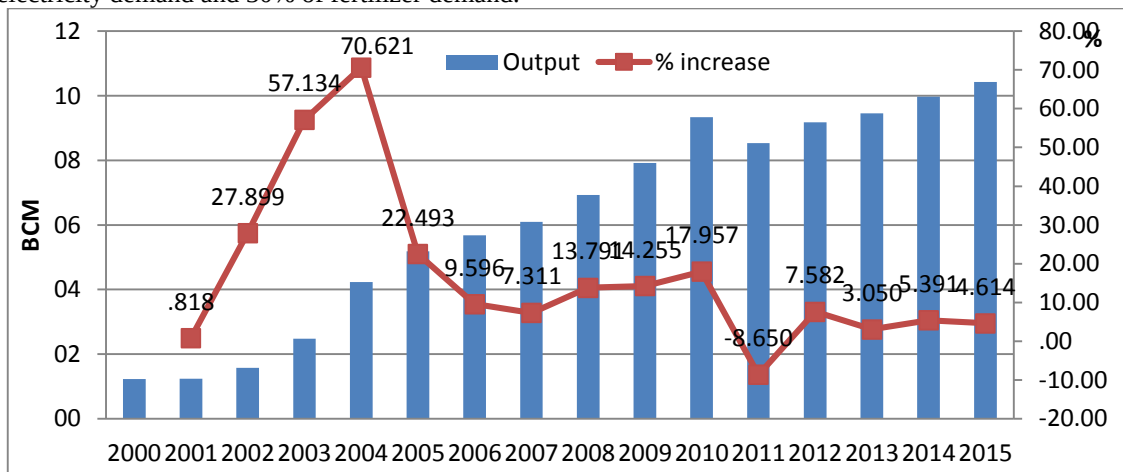


Fig. 3. Output of natural gas in Viet Nam recently

Source: PetroViet Nam, PVgas

Although a number of new gas fields were put into operation recently, natural gas production in Viet Nam is forecasted to decline rapidly in the next period due to the Bach Ho field in Cuu Long basin depleted and production of Nam Con Son basin decline (VPBS, 2013). In the future, natural gas demand will increase sharply, in particular in the sector electricity. Even though natural gas production is projected to grow, natural gas demand will overtake supply. The total gas consumption in Viet Nam is forecast to reach 17 Bcm in 2025, around 75 percent of which is expected to be used for power generation (Decision No. 1208/QĐ-TTg, 2011). Following the estimation of Enerdata, Viet Nam's gas demand will grow 188% in the next 25 years, from 2015 to 2040 (Enerdata, 2016). Conventional gas is a key energy source for Viet Nam, but it may not be sufficient to meet growing demand in the future. According to the experts, the shortage of natural gas will rise sharply after 2017. As a result, the Vietnamese government has announced plans to import LNG to meet the rising gas demand. The first re-gasification terminal is building in Vung Tau province; it would import 2 to 4Bcm/yr by 2015, expanding to 11 Bcm/yr by 2025. A second LNG import facility with 4 Bcm/yr of capacity is scheduled to commence operation in BinhThuan province by 2018 (APEC-Energy Working Group, 2013).

With the energy demand is set to continue growing. Natural gas has been and will provide an increasing share of this growing supply in the future, although coal will be preferred in Viet Nam on account of its lower price. Viet Nam may choose to import gas or develop its reserves of gas to support the substitution of coal by gas in order to protect environment and offset energy shortage in the future. However, the reserves of conventional gas in Viet Nam are relatively limited. For these reasons, unconventional gas could potentially be part of the solution to satisfy the shortfall.

2.2. The climate change issue and energy policy change after COP21

In the 21st century, the human has to face tremendous challenges, which are the global warming and the climate change issue due to by the human activity, in particular the use of energy. The impact of climate change is enormous; it is already affecting the planet and society, and it will continue to impact the posterity generations. Therefore, all countries have to be responsible and make a positive contribution in combating climate change. At the Paris climate conference (COP21) in December 2015, 195 countries adopted the first-ever universal, legally binding global climate deal. The agreement sets out a global action plan to put the world on track to avoid dangerous climate change by limiting global warming to well below 2°C. The agreement even establishes, for the first time, that we should be aiming for 1.5°C, to protect island states, which are the most threatened by rising sea level. The Paris agreement therefore asks all countries to review these contributions every five years from 2020; they will not be able to lower their targets and are encouraged, on the contrary, to raise them.

As a country is particularly vulnerable to the effects of climate change and sea level rise like Viet Nam, main streaming of this issue into development plans of ministries, agencies and localities is one of the first priorities in responding to climate change. Viet Nam considers the response to climate change a vital issue (2139/QĐ-TTg, 05/12/2011). Viet Nam shows its responsibility for contributing to the international community's efforts to protect the earth climate system. The Vietnamese government has joined and approved the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. Viet Nam's Intended Nationally Determined Contribution (INDC) represents its efforts to contribute to global climate change mitigation to reach the ultimate objective of the UNFCCC, as well as the target to maintain the rise of global average atmospheric temperature below 2°C by the end of the 21st century. Viet Nam's INDC identifies the GHG reduction pathway in the period 2021-2030. With domestic resources GHG emissions will be reduced by 8% by 2030 compared to the Business as Usual scenario. The above-mentioned contribution could be increased up to 25% with international support. In the COP21, despite limited resources, the Vietnamese Prime Minister has committed to contribute one million dollars to the Green Climate Fund for the period 2016-2020, and Viet Nam will continue to implement the national strategies, programs, and plans in response to climate change among various areas with concrete measures.

In the next few decades, coal is still considered a major fuel source for the developing economies like Viet Nam, especially in the sector of power production. Thanks to abundant coal reserves, mostly offered on site and cheap, coal thermal powers still hold an important position for the production of electricity. According to the Master Plan VII, coal power in Viet Nam still accounts for over 50% of the country's electricity production in 2030. The 61 of new coal power plants are planning to building, which expects about 70,000MW of electricity capacity. Estimating greenhouse gas emissions from thermal power plants in Viet Nam accounted for 31.1% in total by 2020 and up to 51% by 2030, in which they are mainly from coal-fired power plants.

Due to facing the challenge of climate change, to ensure that proportion of coal consumption will fall over the world in the future, in particular after the COP 21. To express the commitment of Viet Nam in combating climate change, in a statement issued at the end of January 2016, Prime Minister of Vietnamese government has affirmed that it was essential for Viet Nam to be reviewed, calculated the plan to develop all the coal power plants, no more coal power development. The Prime Minister also affirmed that Viet Nam will strictly implement the international commitments to diminish greenhouse gas emissions and promote the investment for

renewable energy. This statement signaled strongly about reducing reliance on coal-fired power from the Vietnamese government. As a result, *The National Master Plan For Power Development* has adjusted in the 18th of March 2016 according to decision No 428/QĐ-TTg, 2016. The new master plan VII has reduced the proportion of coal fired thermal power and increased gas and especial renewable energy in the total structure of power plant development. The adjustment is corresponding to the global trends in the effort to reduce greenhouse gas emission in the spirit of the Paris Agreement in December 2015. The table 2 below presents the targets of master plan VII before and after adjustment.

Table 2: The targets of master plan VII before and after adjustment

	<i>Coal power</i>	<i>Gas power</i>	<i>Hydro power</i>	<i>Renewable energy</i>	<i>Nuclear power</i>	<i>Total</i>
Master plan VII						
in 2020						
capacity (MW)	36000	12400	19200	1500**		75 000 MW
% capacity	48	16.5	25.5	5.6		
% Output	46.8	24	19.6	4.5		330 billion KWh
Master plan VII adjusted						
in 2020						
capacity (MW)	26000	9000	21600	1650*		60000MW
% capacity	42.7	14.9	30.1	9.9	1.3	
% Output	49.3	16.6	25.2	6.5	2.1	265 billion KWh
Master plan VII						
in 2030						
capacity (MW)	75000	17300	23000	8200**	10700	146 800 MW
% capacity	51.6	11.8	15.7	9.4	6.6	
% Output	56.4	14.4	9.3	6	10.1	695 billion kWh
Master plan VII adjusted						
in 2030						
capacity (MW)	55300	19.000	27800	18000***	4600	129500 MW
% capacity	42.6	14.7	16.9	21	3.6	
% Output	53.2	16.8	12.4	10.7	5.7	572 billion KWh

Note:

* Only for wind and solar power

** Only for wind power and biomass power

*** Including small hydropower, wind power, solar power and biomass power

Source: Decision No 1208/QĐ-TTg, 2011; Decision No 428/QĐ-TTg, 2016

Although there has been a downward adjustment of the capacity of the coal power plants, and the increase of electricity capacity from clean energy sources such as natural gas, renewable and nuclear. As can be seen from the data on Table 2, the capacity of the thermal power plant in Viet Nam is still very high.

How do we mitigate the GHG emissions that drive anthropogenic global warming? The first best solutions are replacing high-carbon fossil fuels by low-carbon renewable energies or systems with higher energy efficiency facing technical and economic barriers in the short term. A feasible second best solution can be to replace high-carbon fossil fuels by not-so-high-carbon fossil fuels. Natural gas can substitute coal (Jenner and Lamadrid, 2013). Natural gas is known as the cleanest fossil fuel since it burns roughly half carbon dioxide and three fourths less nitrogen oxide than coal and almost no sulfur dioxide, carbon monoxide, black carbon, particulates, and mercury (Nature, 2009). Natural gas can be used in many ways to help to reduce the emissions of pollutants into the atmosphere. Burning natural gas in the place of other fossil fuels emits fewer harmful pollutants. So that currently, natural gas is considered to be an important energy source in the energy transition of countries in the world, in particular it is set to replace coal in electricity generation. The table 3 below compares emission levels among fossil fuel.

Table 3. Fossil Fuel Emission Levels (Pounds per Billion Btu of Energy Input)

Pollutant	Natural gas	Oil	Coal
Carbon Dioxide	117000	164000	208000
Carbon Monoxide	40	33	208

Nitrogen Oxides	92	448	457
Sulfur Dioxide	1	1122	2591
Particulates	7	84	2744
Mercury	0	0.007	0.016

Source : (EIA, 1998)

In fact, the development of nuclear power plant in Viet Nam is much adverse opinion. The deployment constructions of nuclear power plant Ninh Thuan 1, Ninh Thuan 2 are progressing very slowly. While the potential of renewable energy in Viet Nam is evaluated better to develop, but the elements of technology and the cost of production has led to limit its development. Therefore, Viet Nam should promote to use natural gas in many sectors in the future, especially in the field of electricity generation. In condition the remaining proven reserves of conventional natural gas are insufficient to satisfy demand; the government of Viet Nam is keen to seize the opportunity offered by unconventional gas.

2.3. Potential and development of unconventional gas in Viet Nam

2.3.1. Potential of unconventional gas resource

Viet Nam's unconventional gas industry is in its infancy. Nearly all of Viet Nam's oil and gas production has come from offshore, with the exception of some small gas fields in the north of the country which were brought on-stream in the 1970s. The most promising area for unconventional gas is believed to be located in the Hanoi trough, in the north of the country. Until now, there is not much publicly available information about unconventional gas potential in Viet Nam. Only a handful of resource assessments have been conducted for in place or technically recoverable unconventional gas in the Viet Nam. Small volumes of in-place CBM resources have also been defined in Viet Nam. CBM resources were tested in the Hanoi basin under a recent commercial exploration project. The Australian E&P Dart Energy estimated 10 Bcm of technically recoverable CBM resources within its concession, out of nearly 30 Bcm of total gas in-place (APEC-Energy Working Group, 2013). No publicly available data exist for shale gas or tight gas resource at this time, although the Hanoi basin appears to have organically rich shales. Recent studies of Viet Nam's conventional petroleum geology provide insight into its unconventional gas potential. Table 4 shows the results of the evaluation of potential unconventional gas in Viet Nam recently.

Table 4. Viet Nam's unconventional gas resources

Resource	Resource estimates	
	Gas in-place (Bcm)	Technically recoverable (Bcm)
Shale gas	n/a	n/a
CBM*	30	10
Tight gas	n/a	n/a
Total	30	10

* According to Dart Energy concession area in the Hanoi Basin.

Source : ARI, 2012 ; (APEC-Energy Working Group, 2013).

A number of potential areas for CBM development exist in Viet Nam. The Red River Basin is an economically important area of northern Viet Nam. The area has coal deposits at depths of 250 to 1,200 meters spreading over a 3,500 square kilometer area (Böhme et al., 2011). Gas content of the basin's sub-bituminous coal is estimated at 0.94 to 1.6 m³/ton, the conservative resource estimates ranging from 170 to 280 billion m³ (Thai Son DO, 2008). Another interested area is the Quang Yen Basin in northeast Viet Nam, it covers approximately 5,000 km², but CBM potential has not been assessed.

Although the resource base for coalbed methane and shale gas is unlikely to be very large, any additional domestic gas supply would be welcomed by the government as the demand for gas is growing very rapidly. Viet Nam may have CBM, shale gas and tight gas potential in other basin but has not been assessed. The close proximity of these unconventional gas resources to key markets justifies further more detailed evaluation of their potential. The outlook for unconventional gas production in Viet Nam will depend on the results of ongoing geological assessments and the government's willingness and ability to put in place supportive measures (Philip Andrews-Speed and Christopher Len, 2014). At the end 2015, the General Department of Geology and Minerals of Viet Nam starts to take steps in the research and assessment of shale gas potential in Viet Nam.

2.3.2. The development of unconventional gas in Viet Nam

Whereas numerous companies are actively developing conventional reserves in Viet Nam, but there are not many firms having attempted unconventional gas exploration. Up to now, most of Viet Nam's CBM activity has been confined to the Red River Basin. Coalbed methane was first explored in Viet Nam from 2008 by Dart Energy. Dart Energy signed a production sharing contract (PSC) with PetroViet Nam in a CBM concession block of 2,610 km² in the Red River Basin, referred to the Hanoi Trough. Dart Energy holds 70 percent in the block, while a subsidiary of PetroViet Nam accounts for the remaining 30 percent. The block is in the vicinity of the Tien Hai-Thai Binh industrial area and approximately 150 km southeast of Hanoi. In 2009, Dart Energy completed phase 1 of an initial eight-well exploration drilling campaign. In 2010, Dart Energy commenced the second phase of exploration drilling, they focused on deepening a number of the earlier exploration wells (a total of 13 wells were drilled, ranging from 400 to 1500 meters in depth (T Vu -Viet Nam Petroleum Institute, 2011), which indicated some potential for commercial CBM production at greater than 1,000 meters' depth. Dart Energy has been given approval for an extension of the PSC exploration period for the purpose of enabling further technical and pilot research.

After that, by the early 2010, Keeper Resources obtained a CBM production sharing contract in Thai Binh province. The project proceeded with the signing of drill site construction and preparation contracts, after acquiring land access approvals, Keeper did not actually drill. This project appears to be dormant. In early 2013, PetroViet Nam entered into the first shale gas contract with Mitra Energy for Block MVHN/12KS in Thai Binh province. PetroViet Nam developed also a joint venture agreement with Italian utility ENI SpA early 2013 allowing ENI to enter into partnerships for CBM and shale oil exploration projects in Viet Nam. PetroViet Nam and ENI are conducting a comprehensive study of unconventional gas resources across Viet Nam (Koh - Rigzone, 2013; Le N A, 2014). Thus the potential of unconventional gas in Viet Nam remains at an early stage of delineation and appraisal. Table 5 shows volumes of speculative CBM and shale gas production for Viet Nam by Energy Working Group of APEC.

Table 5. Outlook for Viet Nam Unconventional Gas Production (BCM)

Year	Shale gas	Coalbed Methane	Total
2025	1	2	3
2035	2	3	5

Source : (APEC-Energy Working Group, 2013)

3. Viet Nam's challenges when develop unconventional gas

3.1. The uncertainty of unconventional gas resource

As mentioned above, except CBM, there is not any information about the other unconventional gas. The drilled holes in Viet Nam have been very limited, thus the detailed geological information on unconventional gas formations is inadequate and unavailable. The lack of geological data information of onshore sedimentary basins in Viet Nam may increase the risks for investors. To date, limited CBM testing has occurred in the Hanoi Basin. There is minimal data on the shale gas or tight gas deposits of Viet Nam. Until now, only a small number of exploration wells have been drilled in Viet Nam. So that it very difficult to estimate the potential of the resources. The uncertainty of the estimations will significantly influence the future of unconventional gas industry and the national energy policies. As it is still early days and its prospects remain unclear, unconventional gas development is not considered a top priority for the government. For the same reason, the government has not yet set any targets or provided any forecasts for unconventional gas production. Consequently, the development of unconventional gas in Viet Nam will have to face with the uncertainty of resource potential and the geological challenges.

3.2. Demography, water resources and access to land

Due to the characteristics of unconventional gases, the exploration and exploitation of these resources are very different from conventional gas. The extraction of unconventional gas is more complex and particularly difficult. In general, we have to use the horizontal drilling and hydraulic fracturing methods to optimize the gas recovery (Nakano, 2012). Physically, unconventional gas extraction is an intensive industrial activity with a large amount of drilling required to achieve and maintain significant production. The process of field development need to use a huge area of land for large-scale drilling, transportation, installation of essential heavy equipment and requires using a lot of fresh water, in particular exploit shale gas (Gunningham, 2014) ("Shale Gas," n.d.) (Gao, 2012). Thus, access to land, water and population density will greatly affect the development of non-conventional gas.

The hydraulic fracturing technology in the production of unconventional gas consumes a large volume of fresh water. On average, we need from 12–20 million liters of water per horizontal well in shale gas production. CBM extraction does not always involve fracking – at least not in the early years of an operation. But as gas flow starts to decline after a few years, wells are often fracked to increase productivity. The water consumption will grow while the number of wells and production increase. Certainly, such large volume water, high rate of withdrawals from local surface or ground water sources has a significant impact on local water system. It can affect large numbers of people, especially where population densities are high (Andrews-Speed and Len, 2014).

Compared to other countries in the world that has been unconventional gas development, Viet Nam has abundant water resources. According the statistics of United Nations, renewable freshwater resources per capita in Viet Nam is more 10000 m³/per compared with about 8000 m³/per in the USA and more 2000 m³/per in China (see the table 6). Viet Nam has the dense river network, and groundwater resources are abundant, but the shortage of water is aggravated in the 6 months of dry season. In addition, the majority of unconventional gas potential is located in the Red River Delta, which is the main granary of Viet Nam. Diverging water supply from the agriculture to unconventional gas production could be catastrophic, it affects to national food security, in particular, the contaminated water can pollute the farmlands. As a traditionally agricultural country, Viet Nam has to deploy water resources heavily in the agricultural sector in which there is roughly 70% of inhabitants employed (General Statistics Office of Viet Nam, 2014). For social and economic reasons, the government always priorities the residential and agricultural use of water rather than industrial usage. Therefore, the development of unconventional gas industry will depend on the water competition from other economic sectors, especially agriculture, local communities nearby of the basins.

Table 6. Comparison of water resources between Viet Nam, United State and China

Country	Precipitation (Million m3)	Internal flow (Million m3)	Inflow of surface and ground waters (Million m3)	Renewable freshwater resources (Million m3)	Renewable freshwater resources per capita (m3)
United State	6 440 000	2 460 000	18 000	2 478 000	7 951
China	6 172 800	2 840 500	21 400	2 861 900	2 140
Viet Nam	604 008	366 500	524 710	891 210	10 233

Source: United Nations Statistics Division 2011

High population density is another challenge. With the population density around 290 persons/Km², Viet Nam is one of the most densely populated countries not only in Southeast Asia but also in the world. Unfortunately, the sedimentary basin that is considered high potential of unconventional gas in Viet Nam is located in area with the highest population density. Table 7 shows that the Red River delta has the highest population density about 1000 people per km². The provinces such as Hanoi, Thai Binh and Hung Yen have very high population densities. Generally, the high population density represents a high level of occupation of land. This will generate many obstacles with investors who want to access to land to develop unconventional gas.

Table 7. The population density in Viet Nam in 2011 (persons/km²)

Country / Region	2011	2012	2013	2014
United States	34	34	35	34
China	143	144	145	145
Viet Nam	283	286	289	293
Red river delta	949	-	-	971
Hanoi	2013	-	-	2087
Thai Binh	1138	-	-	1139
Hung Yen	1242	-	-	1244
Hai Duong	1038	-	-	1055
North Central Coast	199	-	-	202
Mekong Delta	427	-	-	431

Source : Data World Bank, 2015 ;General Statistics Office Of Viet Nam, 2011 and 2014

Moreover, according the Constitution of Viet Nam and the Petroleum Law, the gas resources are owned by the state and the rights of the resource are administered by the central government. The land itself is also owned by the state, though individuals and corporations can hold the rights to use the land. It differs from the law in United State where the private ownership of land is also owner the underground resources and they receive profits from the activities of producer. Thus, producers may have access to land and resources with less

difficulty (Stevens, 2012)(Lozano Maya, 2013). Meanwhile, Viet Nam's national law allows for the compulsory acquisition of land from current users for projects that have socio-economic development purposes. As such, individual land users occupying the land do not have any rights to the revenue from the underground resources. Consequently, there exists no economic incentive for the current land users to support the exploration and development of unconventional gas (Hoang Ha, 2014).

Also according to Hoang Ha, compensation and relocation have been considered the most pressing problems for projects with socio-economic development purposes. For economic and social development purposes, the existing occupants of land are only entitled to the land compensation tariff published by the government, which are well below the market price. While compulsory land recovery for the exploration and development purpose of unconventional gas may fall within economic and social development purposes, which are loosely defined terms. The outcome has been that land disputes and controversies with the local governments have been on the rise and have become increasingly complex (Hoang Ha, 2014). This lack of economic incentive for existing land users is a key challenge for unconventional gas exploration and development.

3.3. *Technique, technology and infrastructure factors*

One factor strongly influencing the development of unconventional gas is technique and technology, especially horizontal drilling and hydraulic fracturing. They play an important role in increasing production and lowering operating costs. However, the unconventional gas in Viet Nam is still in the primary stage, Viet Nam do not know much technique and technologies in the field. Another difficulty arises from the absence of specialized onshore drilling and gas production equipment. Not only the country lacks the experience of onshore gas exploration and production, but it also lacks the manufacturing capacity for such specialized equipment (Philip Andrews-Speed and Christopher Len, 2014). Both Viet Nam oil and gas group (PetroViet Nam) and Viet Nam national coal - mineral industries corporation (Vinacomin) lack the expertise of onshore gas exploration and production. There are also no comparably qualified Vietnamese private exploration companies. Besides, Viet Nam is limited capacity from local service providers, skilled labor and lack of the capability and expertise to produce advanced equipment. Therefore, the foreign investors are essential for the development of unconventional gas in Viet Nam.

Another major challenge relates to gas transportation infrastructure. The experiences of the countries that have developed unconventional gas have shown that the infrastructure is a very important factor to ensure the development of unconventional gas, especially gas pipeline systems. However, the infrastructure for Viet Nam's gas industry is very poor, in particular gas pipeline onshore. Nowadays, Viet Nam has three large offshore gas pipeline systems, they connect the southern gas fields with power plants and onshore gas distribution systems. These include the 250-mile Nam Con Son pipeline run from Lan Tay, Rong Doi, Rong Doi Tay to Phu My. The Bach Ho pipeline transmits associated gas from the Bach Ho field to the Phu My power complex. A third pipeline runs from the PM-3 Commercial Arrangement Area between Viet Nam and Malaysia to the Ca Mau combined-cycle power plant. The onshore pipeline network is very limited, about 30km in Tien Hai, Thai Binh, but it is best developed in the Hanoi trough where CBM and shale gas is prospectively seen to be most favorable. In addition, PetroViet Nam has the monopoly of gas off-taker and the 'default' exclusive concession right to develop pipeline transportation systems. There is also a lack of regulations providing for third-party access to pipelines. As a result, the gas transmission issue has significantly constrained to the development of unconventional gas in Viet Nam.

3.4. *Market and price mechanism*

Market structure is an important factor when we consider the possibilities of development of unconventional gas on large scale. In Viet Nam, the energy sector in general, oil and gas in particular are dominated and monopolized for a long time by state-owned companies such as Vinacomin in the coal industry, EVN in electricity industry and PetroViet Nam in oil and gas industry. There is no competition in the energy sector either upstream or downstream, which created monopolies in markets and prices of administrative frameworks. The monopoly of state-owned companies and the state intervention did not reflect market price for energy in Viet Nam, and they do not stimulate the investment in the energy sector. The gas market in Viet Nam is relatively immature with a high degree of government control. According to the researchers, the most serious constraint to the development of natural gas resources in Viet Nam is possibly the condition of the domestic gas market (Hoang Ha, 2014)(Philip Andrews-Speed and Christopher Len, 2014).

One of the challenges to the government is the gas price. Its determination to keep domestic lower gas prices has delayed the development of offshore gas fields and may well delay the construction of LNG import terminals. For example, In 2009-2010, the price paid for gas delivering onshore from the offshore southeast coast varied from less than US\$2/ MMBtu to more than US\$3/MMBtu (from the Cuu Long Basin and the Nam Con Son Basin), whilst production from the far southwest received prices as high as US\$6-7/ MMBtu (from the PM3- CCA field gas). The price paid for gas by power stations at that time range between US\$3 and

US\$4.50/MMBtu (APEC-Energy Working Group, 2013)(Philip Andrews-Speed and Christopher Len, 2014). As a consequence, it also limits the attractiveness for investors in the development of unconventional gas resources in Viet Nam.

In the *National Energy Development Strategy*, although the Vietnamese government has confirmed that the policy for energy prices is considered a breakthrough policy aiming to quickly abolish monopoly and subsidization in energy production and consumption. Energy prices should be determined under the market mechanism (Decision No. 1855/QD-TTg, 2007). Gas price is increasing in Viet Nam, rising from \$4.80USD/MMBtu in 2011 to \$5.19 USD/MMBtu in March of 2013 (VPBS, 2013). The natural gas price for March 2015 was \$5.2 USD/MMBtu (The Economic Times, 2015). However, natural gas price is also at the low level compared to international market rates.

Traditionally, gas sales negotiations have been based on a pre-determined internal rate of return for gas owners, and one difficult part of negotiation has been the uncertainty in the largely investment cost due to the uncertainties of geology and number of wells to be drilled (Hoang Ha, 2014). Until now, the price paid to the producing company has been negotiated on a basis field between PetroViet Nam and the producing consortium. The price which the government is prepared to pay is itself constrained by the low level of electricity prices as well as the government's inability and unwillingness to subsidize the producers. The often prolonged period required for price negotiation, as well as concerns over the profitability of the business have affected the investment sentiments of some foreign companies. Also according to Hoang Ha, there will be more challenges when the same negotiation model is applied to the project for unconventional gas development. So that, the monopoly of PetroViet Nam and the lack of appropriate gas pricing mechanism will constrain the development of unconventional gas, even conventional gas production in Viet Nam.

3.5. Regulatory information

Viet Nam's natural gas sector is controlled by the state-owned Viet Nam's national oil company PetroViet Nam, which is monitored by the Ministry of Industry and Trade. PetroViet Nam takes on a combination of commercial and non-commercial roles, thereby affecting its performance as an oil company and adding to the cost of doing business for foreign companies. PetroViet Nam acts as both regulator and business partner of foreign investors. According Andrews-Speed and Len, all foreign oil companies have to encounter the national oil companies and the government agencies. Most of producers of conventional or unconventional gas in Viet Nam face two obstacles: the first is the government's reluctance to pay what foreign companies seem to be an acceptable price for gas and the second is the lack of third-party access to pipelines (Andrews-Speed and Len, 2014).

Similar to the countries in area, most of petroleum operations in upstream, both conventional and unconventional, are conducted through the production sharing contract (PSC). According the experts, model PSC however are not appropriate for unconventional gas activities (Andrews-Speed and Len, 2014). In addition, the terms of PSC in Viet Nam, especially in financial terms, are not flexible, they do not reflect the variation of market and discourage foreign investors. For example, the royalty is high, the terms of profit sharing and cost recovery based on production without relying on market price (LE Minh Thong, 2013).

Viet Nam has been restricted the existing systems for petroleum regulation to unconventional gas. At present, there are not any specific legal documents for the unconventional oil and gas in Viet Nam, even shale oil and gas has not been recognized as an independent mineral. Although the amended Petroleum Law issued in 2008 by the National Assembly explicitly mentions CBM and encourages foreign investment in its exploitation, and some contracts were signed to assess and develop the potential for CBM and shale gas also. However, there are currently no specific targets for unconventional gas production. Unconventional gas development is not a top priority policy for the government.

4. Environmental protection and waste water management

Although unconventional gas is known as the cleanest fossil fuel, without good practices in the process of extraction, transportation, distribution and use can generate lot of environmental concerns. The environmental impacts will be especially severe in countries where environmental regulations are undisciplined and the effective environmental regulation is not strong as in Viet Nam.

Firstly, to exploit unconventional gas, we have to use particularly technologies, in particular hydraulic fracturing. The chemicals represent from 0.5 to 2% in fluids of hydraulic fracturing; many of them are toxic and carcinogenic (Wang et al., 2014). These hydraulic fracturing fluids are injected directly into the ground and they can influence groundwater sources. In particular, CBM extraction, because CBM is typically found at much shallower depths than shale gas (about 1000 meters underground, compared to 2000–3000 meters for shale gas), the risks such as groundwater contamination are increased. In addition, the flow-back or "produced" water from fracturing fluid might contaminate the water surface. They may adversely influence human health and the quality of the environment if they are untreated or directly discharged onto the land or into streams, rivers and

lakes. Although under the Viet Nam's Environmental Protection Law, discharging waste water shall require a permit granted by the Minister of Natural Resources and Environment (Circular No 47/2011/TT-BTNMT, 2011). However, the regulatory systems for environmental protection and water management are underdeveloped. There are insufficient deterrents to violations of the law to environmental protection in Viet Nam.

Other key problem for unconventional gas development that caused much anxiety and controversy is its impact to climate change. Unconventional gas contains more than 90% of methane (CH₄) which is the second most important greenhouse gas after carbon dioxide. In particular, methane is a very powerful greenhouse gas compared to carbon dioxide. Methane has a much shorter life time but its GWP (global warming potential) greatly outweighs CO₂, (over 20 times more potent than carbon dioxide on a mass basis over a 100 year time period)(Jenner and Lamadrid, 2013),(US Environmental protection agency, n.d.). Some researchers worry that expanding production of unconventional gas could result in the increase in the release of methane as fugitive emissions during the drilling, completion, production, transportation and use of natural gas. In a recent report, Professor David Mackay concluded that *"without global climate policies ... new fossil fuel exploitation is likely to lead to an increase in cumulative GHG emissions and the risk of climate change"* (David J C Mackay and Timothy J Stone, 2013).

Besides, unconventional gas development takes place onshore in a large scale, it would have a significant impact on local landscapes, risks for tourism industry. Because the addition of hundreds even thousands of wells, the infrastructure requirements would include access roads, water management facilities and pipelines network, so that it would damage the natural landscape.

5. Conclusion and proposition

Under the pressure of energy demand for economic development, as well as the climate change prevention issue, the diversification of energy sources - especially clean energy sources are an urgent requirement for Viet Nam to ensure the socio-economic and environmental objectives in the future. While forecasts of renewable energy sources such as wind, solar, biomass, etc. only occupies a small share in the total energy supply in Viet Nam (6.5% in 2020 and up to 10.7% in 2030 according to the Master Plan VII adjusted). Natural gas has been and will provide an increasing share of the growing supply, although coal will be preferred in Viet Nam on account of its lower price. Natural gas may be chosen to support the substitution of coal by gas on environmental grounds. However, the reserves of conventional gas in Viet Nam are relatively limited, and according to forecast, net imports of gas in Viet Nam will rise fast from 2017. Although, there are not clear data about unconventional gas resources, Viet Nam has been considered potential of the resource. For these reasons, Viet Nam could exploit the potential source to meet energy demand in the future.

The article has analyzed the opportunities, the potential for the unconventional gas development in Viet Nam. Besides the opportunities to develop, the unconventional gas development in Viet Nam will have to face a lot of difficulties and challenges that indicated the insights in the paper. Although there is still uncertainty on the development of this resource, but according authors, Viet Nam should have specific actions to ensure the sustainable development of the gas industry in general, unconventional gas in particular, including:

- The Vietnamese government should take the national basic research programs related to unconventional gas. Unconventional gas has not yet been adequately evaluated, it is therefore necessary to have a specific plan and appropriate investment for investigation, exploration and assessment in order to clarify the resource potential and reserves. It is necessary to study the establishment of an energy development fund to provide the supports for investment in the new energies as unconventional gas, encourage and speed up survey and exploration activities. Moreover, Viet Nam needs the national science and technology support program for research and development of technology in the unconventional oil and gas fields. Besides, Viet Nam should learn from experience and cooperate with countries that have successfully developed these resources.
- It is essential to establish a system of environmental regulatory and policy framework and apply the advances in environmental standards in an appropriate manner aims. They can ensure the harmony between energy exploitation and use with environmental management. In the case of unconventional oil and gas resource development, the government should set up specific regulations corresponding to each activity in the development process to monitor, manage and mitigate the environmental impact.
- The production sharing contract (PSC) is the preferred contractual format for foreign investors, but modifications are required to make the appropriate mechanisms for the operational and commercial characteristics of unconventional gas production. Especially, the revised financial terms will increase the attractiveness for foreign investors in this sector.
- Viet Nam needs re-structures the energy sector in order to step by step development for energy market towards competitive market. Reforming energy prices should be determined under the market mechanism, in particular price of gas and electricity. Acceleration of the abolition of subsidization and monopoly in energy sector aims stimulates investors. Even in the absence of unconventional gas development, this also creates an incentive for businesses to increase imports of natural gas such as LNG.
- To mitigate the environment issue and climate change induced by energy use, as well as to encourage the development of clean energy sources, Viet Nam should develop policies related to environmental tax, CO₂

emissions generative tax and specially to soon establish carbon market. Viet Nam needs to establish legal frameworks and a pilot market instruments in selected sectors/regions to create the domestic carbon market instrument and connection to international market.

The assessment of the potential for unconventional gas is a very early phase in Viet Nam. Therefore, it is necessary to carry further studies in order to clarify the potential and the possibility for developing the resources as well as ensuring the safety and protection of the environment during the exploitation and use of unconventional gas.

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Completing royalty policy in the direction encourage or oblige to explore fully the coal resources

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Abstract

Royalty-labile prices are important tools that combined with other management tools support Government authorities to strengthen the management and supervision of the mineral resources excavation under the legislation. This article mentions the basic advantages of the royalties' policy, and offers some solutions to amending the policy with the essential concept of fully mine the coal reserves.

Keywords: Royalty-labile; royalties' policy; royalty-labile prices

1. The disadvantages of the royalties' policy

In Viet Nam, the royalties were first collected in 1991 according to the Royalties Ordinance enacted in 1990, amending in 1998 and 2008. In 2009, the 12th National Assembly promulgated the Law on Royalties, replacing the Royalties Ordinance. To implement the Law on Royalties, the Government and the National Assembly Standing Committee have enacted many decrees and decisions. However, to date, the royalties' policy still has some shortcomings in tax calculation.

1.1. The natural resource output used for royalty calculation

Nowadays the royalties are calculated on the exploitation output, but not the mineral reserves that can be exploited. This might cause the increase in the resource losses during mining and simultaneously cause tax losses.

In addition, exploitation output is enumerated by mining companies. In many cases, to evade the royalties, companies might enumerate a lower quantity than the real output. Being the representative of the unique owner of the national mineral resources but the government cannot control the income from the royalties.

1.2. Royalty-labile prices

The price for tax calculation is the price per unit of the product that is exploited excluding the Value Added Tax (VAT). It cannot be less than the price for tax calculation prescribed by the Provincial People's Committee. Thus, the price for tax calculation includes the mineral sorting and enriching value; the higher the sorting and enriching costs are, the higher are paid. Consequently, mining companies tend neither to exploit the resources section of poor quality nor to deep process the mineral.

For a specific kind of mineral, a specific royalty-labile price for tax calculation is set, which usually differs from provinces. This causes unfair competition among mining companies in different provinces and tax losses.

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1.3. The royalty rates

The current royalty rate is applied almost in the same or insignificantly different way for deposits of the same type of mineral although they have big differences in mining conditions. For example, the current rate for all underground anthracite mines is 7% and for all open-pit anthracite mines is 9% (from 01.07.2016 under the Resolution No. 1084/2015 /UBTVQH13 the figures will increase to 10% and 12% respectively), although the underground and open-pit anthracite mines have big differences.

The tax rate primarily increase and derived from the aim of balancing the government budget without considering the real mining efficiency. This trend of modification contrasts with the characteristics of the mining process in a life of mine (the mining conditions become increasingly difficult, the price of the products increases with the mining depth). For instance, price of anthracite coal has increased from 1% (underground mining) and 2% (open-pit mining) (under the Ordinance on Royalties in 1998) to 7% and 9% respectively nowadays and is going to be 10% and 12% respectively from 07/01/2016 as mentioned above. In this context, mining companies have to find ways to survive, including the selection of exploiting only the good section of the reserve and leaving the bad section behind. The royalty rates and collected taxes increase, but a part of mineral reserves will be lost. This is against the policy of considering mineral resources as important resources that must be mined with the maximum amount.

Those are the basic shortcomings of the royalties' policy of Viet Nam, which have big impact on the target of exploiting the maximum amount of coal resources. Therefore, it is necessary to make amendment to develop the policy by encouragement or enforcement to mine fully coal resources.

2. Solutions to develop the royalties' policy with the concept of encouragement or enforcement to mine fully coal resources

According to the Law on Royalties, royalty calculation is based on the taxable amount of resources, the royalty-liable price for tax calculation and royalty rates. In which:

- + The taxable amount of resources is the number, weight or volume of resources that is actually exploited in the tax period;
- + The royalty-liable price for tax calculation is the price per unit of the product that are exploited, exclusive of Value Added Tax (VAT);
- + The royalty rate on coal products: fluctuates from 4% to 20%.

Royalties calculation under the above mentioned basis has several shortcomings that make the losses of coal increase. Therefore, royalty's calculation basis and the royalty rate need to be changed to encourage or enforce to explore fully coal resources.

- About the natural resource output used for royalty calculation: The natural resource output for royalty calculation should be the exploitable coal reserves according to the approved design.

When the royalties are calculated for the exploitable coal reserves, mining companies are forced to find appropriate methods to exploit the maximum amount of (underground) coal, avoiding the situation of companies that abandon the coal field with complicated geological conditions.

- About the royalty-liable prices: The price for tax calculation should be the price of raw coal but not the selling price after selecting, and transporting coal to consumers.

- About the royalty rate:

There should be a flexible frame royalty tariff, depending on the advantages and disadvantages of each group of mines and each period of the mine life with two following principles:

First, high royalty rate is applied for mine groups with advantageous conditions and vice versa.

Second, in the same mine, a higher royalty rate is applied in the easy mining period and a lower one in difficult mining phase, provided that the average royalty rate for the whole mine life is equal to the one applied for that mine in the first principle.

The above recommendation shall be performed as the following steps:

The natural values or economic rent are determined by the following formula [1]:

$$G = \sum_{t=1}^n [D_t - (C_t + I_t \times i)] \quad (1)$$

$$R = \sum_{t=1}^n \left[D_t - \frac{(C_t - I_t \times i)}{(1 - T_{dn})} \right] \quad (2)$$

This formula includes:

G: Natural values of the mine (VND)

R: Economic rent (VND)

D_t: Revenue of the year No. t (VND)

C_t: Cost of the year No.t (VND)

I_t: Capital of the year No.t (VND)

i: Interest rates on capital (%)

T_{dn}: Income tax rate (%)

n: The life of mine (year)

Step 2: Divide mines into groups. Mines can be divided into 3 or 5 groups as described in Table 1, based on economic rent per revenue.

Step 3: Defeminizing the appropriate royalty rate for each mine based on economic rent per revenue to be the average royalty rate for the life of mine.

Step 4: Dividing the life of mine into 3 periods: beginning, developing and depressing period; determining an appropriate royalty rate for each period respectively to the average royalty rate defined in Step 3.

The above suggestion can be summarized as follows:

+ The basic formula to determine the royalties:

$$TN = Q_{THD} \times P \times T \times a \quad (3)$$

This formula includes:

Q_{THD}: the coal reserve exploited in the period (tons)

P: price of raw coal (VND /ton)

T: royalty rate (%)

a: return coefficient under the approved design

+ The royalty rate should be researched based on the actual data to specify different levels under the criteria in the following table:

Table 1: Classification of the resource tax rate for mine groups

Mine group	Production condition	Economics rent per revenue	Average tax rate (%)	Individual tax rate for each period		
				Beginning	Developing	Depressing
1	Very advantageous					
2	Advantageous					
3	Normal					
4	Disadvantageous					
5	Very disadvantageous					

It is necessary to calculate economic rent of all available mines to specify the royalty rates for each group of mines based on economic rent per revenue. This is not difficult to calculate this indicator thank to the computer. However, specification the royalty rate for each period of a mine is more complicate. Nevertheless, in the circumstance of increase in tax and fee that becomes a liability for companies, it is extremely necessary to determine the average royalty rate for each mine based on economics rent per revenue to ensure the target of maximizing mined coal resources.

3. Conclusion

Royalties' policy is completed with the initiatives related closely to the royalty bases: natural resource output used for royalty calculation, royalty-liable prices and the royalty rate. The initiatives suggest the natural resource output used for royalty calculation is the exploitable coal reserves, the royalty-liable prices is the price of raw coal, and the royalty rate is determined depending on the advantages and disadvantages of each mine type and even each period of the mine life - this initiative is based on the economic rent per revenue ratio. To amend the royalties' policy as mentioned above, the government, coal companies and other authorities should co-operate in exploiting coal resources, designing and management of exploitation. This is the prerequisite of a reasonable economical exploitation of coal resources in Viet Nam.

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Resolution No. 1084/2015 / UBTVQH13, Table of resource tax rate, issued on December 10th 2015, came into force on July 1st 2016.



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Disadvantages on management of natural resources tax in Viet Nam state budget revenues – A case study of Quang Ninh

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Abstract

This paper comes from the fact that royalties tax contributes to Vietnam state budget approximately 30,000 billion VND, accounting for about 3% of the total state budget collection (estimated in 2016). Revenues from this tax are not sufficient to offset the cost of natural resources management in many provinces. Quang Ninh province, which gains annually over 4,000 billion VND of royalties, has become the place of experimental management policy of royalties before this policy is applied for the entire country. However, there is no mechanism for controlling exploitation output and actual sales prices. Moreover, companies complain that royalty rates are too high and unreasonable. Besides, the rates have been calculated and defined by the People's Committees of separate provinces, which lead to huge differences between actual sales prices and regulated prices among provinces. This inadequate and inappropriate situation creates many gaps which cause loss in state budget revenues in the period of 2011 – 2015. Solutions and recommendations for Vietnam government to the natural resource tax management problems are addressed and emphasized in this article.

Keywords: Natural resources tax, state budget revenues, taxable prices, resources management.

1. Overview of Viet Nam royalties

Natural resources are country's power, fundamentals of manufacturing processes, and also potential financial flows for development and investment. Natural resources tax is one of the financial instruments in performing state administration of mining activities of corporations and individuals in Viet Nam. The better natural resources tax is managed by the government which contribute to protect, exploit, rationally and effectively use and save natural resource, the higher contribution of tax revenues to state budget is.

Previously, there was no clear guideline or policy in natural resources tax in Viet Nam except for some collections from natural resources exploitation activities. In 2009, the Law on Royalties was promulgated. However, because government management on royalties is inefficient and tax management just concentrates on some main types of resources, there are still many omissions and loss on tax revenues and other collections of royalties. Moreover, coordination among levels of government, management agencies, functional departments, and tax authorities is inadequate which also led to state budget losses.

According to the law on tax administration, content of natural resources tax management includes these principal steps:

- Propagate and assist taxpayers
- Manage natural resources tax registration and declaration in the local area.

While these activities can be applied flexibly, in some areas, there are still many difficulties and faults during implementation which causes several consequences for the environment of economy and society. In royalty management, determining the yield of natural resources is essential to calculate tax amount on mining activities. The amount of tax payment is calculated by volume, quantity or weight of natural resources; corresponding taxable price, and royalties' rates in a tax period.

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$$\text{Royalty in a tax period} = \text{Natural resources output liable to tax} \times \text{Royalty-labile prices} \times \text{Royalties rate}$$

If local government imposes royalties per natural resources unit, tax payment will be determined as follow:

$$\text{Royalty in a tax period} = \text{Natural resources output liable to tax} \times \text{Imposing tax per unit of natural resources}$$

Imposing natural resources tax based on database of provincial tax authorities, in accordance with tax imposing provisions will be applied to corporations which have not fully implemented accounting systems, invoices, and regulation on tax fraud and taxable prices by each provincial People's Committee.

At the stage of evaluating natural resources output, many unsolved problems have been discovered, which are:

- + Mining companies try to lobby tax authorities to determine the quantify of natural resources in each ore lower than actual proportion, or to even omit some kinds of resources in the ore after inspection. For example, some copper and nickel ores have been detected that they have a high proportion of gold but never be mentioned when calculating taxable amount. This situation is quite popular and in this case, while profits go to companies, the loss belongs to state budget.

- + Exploiting corporations have been giving several reasons such as having no separate accounting method, incapability of tally, low sales to have imposing tax. This not only causes great loss on natural resources, national budget but also leads to environment destruction, high environment fees for natural resources exploitation if remedial measures are required.

Regarding royalty-labile prices, according to the authors' research and the Law on Royalties in 2009:

The royalty-labile price is the exploiter's selling price of a unit of natural resource product, exclusive of value-added tax. In case the natural resource's selling price cannot be determined yet, the royalty-labile price shall be determined based on either of the following grounds:

- + The regional market's actual selling price of a unit of natural resource product of the same grade, which must not be lower than the royally-labile price set by the People's Committee of a province or centrally run city (below collectively referred to as provincial-level People's Committee);

- + In case the exploited natural resource contains different substances, the royalty-labile price shall be determined based on the unit selling price and content of each substance, which must not be lower than the royalty-labile price set by the provincial-level People's Committee.

Exploiting companies will sell mining products via affiliate companies with lower prices in comparison with People's Committee's imposing prices. This is also domestic transfer pricing in order to minimize their tax payments, and investigation of these cases is not simple. The difference between royalty-labile price of local governments creates gaps of the collection of taxes when one firm has mining activities in at least two provinces.

- Management of debts and collection of royalties

Traditional coercive measures include deducting money from tax payers' bank accounts, freezing taxpayers' bank accounts, withholding a portion salary or income, distraint, and holding auction for taxpayers' assets, withdrawing tax code, suspending firm's invoice, and revoking business license.

- Inspection of tax compliance

The inspection activities of tax authorities are based on analyzing related information of taxpayers, and database of taxation departments. Tax compliance will be assessed and tax fraud signals will be investigated in order to find out illegal clues. These actions are implemented annually to retrieve money for state budget. However, during inspection, there are many cases of corruption, harassment when tax officials ignore issues to avoid detect mistakes, or mismatch in calculating and imposing tax payment.

2. Royalties collection in Quang Ninh

Quang Ninh is well-known for its diverse natural resources with high capacity and top quality. There are about 250 mines which have been discovered, including 33 kinds of minerals such as coal, limestone, clay for cement, bricks, and tiles' factory, sand, gold, iron ore, antimony, ilmenite, phosphorite, mineral water, etc., in which coal and limestone account for a large proportion. Anthracite is principally distributed in Quang Ninh coal basin, and is nearly 250 kilometers from Dong Trieu to Cam Pha city. The widest place is Yen Tu – Trang Bach with 15 kilometers, while the narrowest one is in Cai Bau Island, which is far lower than an average size, 8 to 10 kilometers.

Three main areas of mining are Mao Khe – Uong Bi – Hoanh Bo, Ha Long and Cam Pha. According to reports of Viet Nam National Coal – Mineral Industries Holding Corporation Limited, total coal reserves of this province is estimated at 10.5 billion tons, of which 3.5 billion tons has already been geographically explored and mined. It reaches the highest rank of coal mining in the entire country, stands for 67 percent in total. Exploiting more or less 60 million tons of coal annually has to be separated from 300 million tons of derelict land. This not only impacts negatively to environment, landscape and urban planning but also becomes one of the top concerns of both mining companies and local government.

Besides, other valuable minerals which are being used to produce building materials such as limestone in Hoanh Bo with billion tons of reserve, clay to manufacture top quality of bricks and tiles in Gieng Day – Ha Long city, Tan Mai kaolin and pyrophyllite, and Van Hai white sand are important raw materials of for the production of ceramics, refractory bricks and tiles, and glass construction. Whereas, there are iron ores in Hoanh Bo and Van Don; phosphorite ores in Hoanh Bo and Dong Trieu; ilmenite ores in Mong Cai; gold ores in Tien Yen and Hai Ha; antimony ores in Cam Pha City and Hai Ha district; granite in Luc Phu - Mong Cai, Hoanh Mo - Binh Lieu, etc. Additionally, there are underground springs of mineral water for drinking, bathing cures distribute in Quang Hanh, Khe Lac, Dong Long.

Hoang Nga (2014) confirms that 384 factories are manufacturing products from natural forest and plantation; of which 127 units belong to state owned, limited, and joint stock companies. The rest are small-sized sawmills and furniture manufacturing with low quality, and supply to local consumption only (household business) Most of them are woodchips workshop, and stands for 67%. They are mainly in Hoanh Bo, Tien Yen, Van Don, and Cam Pha.

Natural resources tax contributes over 3.700 billion VND to local government revenues, nearly one-fifth in total domestic turnover. Thus, overcoming limitations on natural resource tax management is not only increasing budget revenues, but also decreasing loss and waste of national resources. Table 1 illustrates the proportion of tax revenues by types of business are located in Quang Ninh from 2011 to 2015:

Table 1: Quang Ninh royalty collection by types of business, from 2011 to 2015

(VND million)						
No	Total amount of collected royalties	2011	2012	2013	2014	2015
A	Total domestic revenues	10.023.707	13.988.356	13.571.620	16.447.991	19.938.559
B	Total natural resources revenues	1.539.579	3.055.801	3.240.335	3.249.964	3.790.732
1	Central State-owned companies	1.464.591	2.853.458	3.019.221	3.115.125	3.545.532
2	Local state-owned companies	2.076	11.244	12.695	14.79	20.641
3	FDI companies	58.889	167.840	173.862	87.662	130.136
4	Tax and services of private owned companies	14.022	23.258	34.556	32.798	94.423
C	Royalties recovery / total revenues	15%	22%	24%	20%	19%
D	Tax revenues growth	-	198%	106%	100%	117%

(Source: Quang Ninh Department of Taxation)

According to table 1, natural resources tax revenues in 2011 accounted for only 15 percent in total domestic revenues of Quang Ninh. One of the reasons is that the number of companies exploiting natural resources is small (113 mining firms) which led to low output of natural resource. In comparison with 2012, total volume of mining resources in 2011 was just slightly over one – third, equivalent to 36%. In 2012, the royalty revenue accounted for 22% of total revenue of Quang Ninh, increased nearly double (198%). The primary reason is that the number of mining companies reached the peak which led to increase in total natural resources taxable price by more than 15.300 billion VND. From 2013 to the end of 2015, revenues kept going up stably, however, the contribution to domestic turnover decreased from 24% to 19%, because of the growth of other taxes revenues.

The proportion of royalty revenues illustrated in Table 2 shows that natural resources tax revenue of mining coal contributes a major part to total royalty revenues:

Table 2: The proportion of royalty revenues by types of natural resources, from 2011 to 2015

(VND million)						
No	Types	Natural resources tax				
		2011	2012	2013	2014	2015
1	Coal	1.338.269	2.478.376	2.933.710	3.330.016	3.535.540
	Percentage of contribution	98,73%	97,92%	98,49%	98,53%	95,09%

2	Water resources	8.284	14.804	4.751	16.193	31.148
	Percentage of contribution	0,61%	0,58%	0,50%	0,48%	0,84%
3	Natural forest and plantation	36	36	13	5	2
	Percentage of contribution	0,0027%	0,0014%	0,0004%	0,0001%	0,0001%
4	Other natural resources	8.837	37.713	30.168	33.457	151.423
	Percentage of contribution	0,6520%	1,4901%	1,0128%	0,9900%	4,0726%
	Total	1.355.426	2.530.929	2.978.641	3.379.672	3.718.114

(Source: Quang Ninh Department of Taxation)

From 2011 to 2015, royalties' revenues declared by companies increased gradually, especially rose in 2012. Thanks to significant increase in number of exploiting companies, expansion in scales of production, equipment investment, and modern technologies which improve productivity dramatically, royalties' revenues have been more and more grown.

According to the two tables, it can be confirmed that coal is the substantial resources which brings about the most proportion in total natural resources tax revenues of Quang Ninh province. Thus, authors' research and analysis focus on this resource from 2011 to 2015 in order to seek out limitations, problems, and recommendations and practical solutions.

3. Limitation in natural resources tax management in Quang Ninh province

First, tax department uses data provided by the resource mining companies, which leads to errors in determining quality of coal to apply the corresponding tax rate and Royalty-liable prices. Those errors result in faulty calculation according to the People's Committee's regulations. In addition, due to the lack of reliable IT system, tax department fails to accomplish given work load, and is unable to monitor mining, inventory, or assess the quality of coal inventory, categorize or examine coal. Those issues caused heavy loss to national budget during the period of 2011-2015.

Second, there is a lack of cooperation between tax department and resources and environment department. Although government departments have the authority to provide license of mining resources to organizations or individuals, they do not provide such documents to tax department for administration and tax collection. In case the documents are provided, they often do not include essential information such as address, phone number, tax code of resource mining companies, resulting in difficulties for tax agency in enumeration and tax collection.

Third, there is conflict in tax collection procedure. Different departments of tax agency have not come to an agreement about tax collection management in general and natural resources tax in particular. The conduct and taxation management in some provinces are not strict; tax agency does not actively engage in providing advices to local authorities. In addition, the implemented procedure applies primarily for natural resources tax management of organizations or companies paying tax with tax collection, not individuals who mine resources in a small scale or in different time periods.

All the limits originate from the inability to determine the amount and taxable price as stated in the first part of the article. To tackle those limits requires the revealing of the causes and the consensus of General Taxation Department, Ministry of Environment and Resources, Ministry of Science and Technology, and the transparency and responsibility of local authorities.

4. The causes of disadvantages in natural resources tax management in Quang Ninh province

The first cause, as mentioned, derives from natural resources tax regulations themselves. These regulations do not accord with Tax administration law in general and the practice of resource mining in local areas in particular. The most significance is the determination of taxpayers, tax bases, mining quantity, and taxable prices. Moreover, the procedure for tax declaration registration is complicated, causing trouble to companies and the management system.

- Taxpayers: the lack of regulation in collecting natural resources tax for individuals mining resources or building on the area sold to construction material companies should be addressed. For individual mining, because if individuals who buy resource do not sign agreement to authorized resources sellers to pay tax, they are exempted from tax enumeration. That leads to tax evasion.

- Output and royalty liable prices: Although the mining of resources especially mining of coal in Quang Ninh province is being tightened, illegal mining still exists, causing loss to national budget, damaging the environment, and eroding the trust of citizens on transparency of resource management. Companies tend to invoice when requested by buyers, which decreases the total amount of mining and seriously violates tax regulations. According to Law on Royalties in 2009, companies being involved in mining resources would declare and pay themselves; tax agency calculates tax and fee according to the data provided, and thus, lose control over the production and selling of natural resources. Companies could easily enumerate lower statistics

or do not finish their tax duty. It is also hard to determine the amount of resource and royalty liable prices or determine a common taxable price for a particular resource in the whole country. The difference between taxable prices among different provinces also causes a gap that could be taken advantage of as cost shifting in FDI companies.

Calculation of tax payment and related fees based on exploited amount makes companies focus on high-quality resources that are easy to exploit, which causes serious waste to national resources. Current royalty management could be conducted only on companies with fixed address. Tax collection and environmental protection fee collection from individuals directly mining has not been well-managed due to huge area, manual mining which leads to incorrect declaration.

According to the law, royalty liable price is the price of resources regardless of place of selling; in case the resources are not sold after mining but processed before selling or become materials for other products, the price is as defined by province-level People's Committee or the price of the previous month. In addition, there is no regulation to distinguish between raw resources or processed resources. Natural resources management and tax management are easier and more simple thanks to regulation on sales price which is shown in the invoice and the same as royalty liable price regardless of market. However, as regulated, royalty liable price would also include other cost such as transportation, preservation or other services, thus mining companies would try to exclude those costs from price or write different invoices. Obviously, in case it is not possible, taxation calculation on the total cost would erode regulation of royalties. In addition, this would lead to the situation that same resources, sometimes extracted from the same places will have different royalty liable prices.

Second, some organizations and individuals do not follow tax regulations. Some organizations in Quang Ninh province have not registered for tax codes, or have not fully accomplished their tax duties.

Third, tax officials do not meet the requirement of modern tax management and technology. The rate of IT application in tax management is low compared to other countries. Some applications are not suitable for practice.

Fourth, although there is improvement in quality and quantity of tax management, the distribution of employees in charge of royalty collection does not correspond to the practice of resource mining in different areas. Tax employees do not have enough information about mining and business of resource mining companies. The IT system and database are not synthesized, causing difficulties in monitoring, supervising tax compliance of companies.

5. Solutions and suggestions

First, it is necessary to check the method to determine resource tax payer from tax collection procedure, resource regulations, clearly define types of resources liable to tax in accordance with its quality and use value and in order to avoid conflicts in law and to increase state budget.

Second, those who are authorized to exploit resources must complete their tax duties. License for individual mining should be limited to ensure the quality of participants and help increase management to prevent cost shifting. In case the seller could not pay tax, the buyer must take on the responsibility.

Third, royalty liable price and output should be applied for crude resources products. The determination of crude resources is based on license provided by the authorities to accurately calculate royal liable price and price in mining license. For some mineral resources, royal liable price is the selling price; for processed resources, the price will be excluded cost of processing or is defined by regulations province level People's Committee. This is also applied to export resources to encourage processing, limit crude exportation, and encourage companies to invest in technology and make use of resources which is granted permit to exploit.

Fourth, exported resource is liable to export tax and non-refundable value-added tax in the previous phase; companies also do not receive tax relief or exemption for resource extraction; and collect environment protection fees. For un-renewable resources, we need to increase tax rate for resource tax to avoid waste and protect the environment.

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Reviewing the implementation of decree 203/ND-CP: regulations and methods for charging mineral mining permit fees at state owned mineral mines

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Abstract

From the outcome of implementing the Decree 203/ND - CP “Regulations for calculating mining permit fees” by the Department of Economics, General Department of Minerals & Geology, the authors presented a comprehensive overview of the current situation. The article highlighted the achievements and the difficulties in the implementation, in the calculation of the fees, in the collection of payment as well as in the inspection activities. At the same time, the article also presented the subjective and objective root cause analysis.

Keywords: Regulations; fees; environmental protection; payment

1. Introduction

The Decree 203/ND-CP, dated November 28th, 2013 and stipulated from January 20th, 2014, detailed the implementation of several sections of the Mineral Resources Law 60/2010/QH12. According to this Law, there are 2 levels required to be compliant with this Decree, including the State level for State-run mines and the Provincial level for province-run mines. In this article, the authors presented the current status of the implementation of this Decree with respect to the State-run mines, done by the Department of Economics and General Department of Minerals & Geology of Viet Nam, highlighting the achievements and remaining issues required to be addressed in the upcoming period.

2. Current status of the implementation of Decree 203 ND – CP “Regulations for calculating mining permit fees” at State-run mines

2.1. Calculated and approved mining permit fees

As of May, 31st 2015, the Department of Economics and the Department of Geology and Mineral Resources have calculated, evaluated and issued the mining permit fees for the following applications:

* For the applications having permit issued before the effective date of the Decree 203/2013/ND-CP, there were 495 applications needed to be revaluated, including 78 cases of metal mines, 70 cases of coal mines, 35 cases of mineral water mines, 86 cases of quarry tiles, and the rest of the cases were limestone and construction materials. In particular:

- There were 412 evaluated applications with total fees of 26,730 billion VND, with the first round of payment summed up to 3,657 billion VND, in which 381 applications had been approved by the Ministry of

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Natural Resources & Environment (NRE) with total amount of 25,274 billion VND and first round of payment summed up to 3,070 billion VND.

- Total number of expired applications: 70 cases as of December 31st, 2013.
- Total number of applications with legal disputes: 02 cases.
- Total number of applications transferred to the local government and returned to the business: 11 cases.

Majority of these applications belong to the construction materials group with permits to be issued by local government, hence they are under local jurisdiction.

* For the applications for permits after the effective date of the Decree No. 203/2013/ND-CP, there were 150 cases required calculation of permit fees. In particular:

- The number of evaluated applications: 104 cases with total fees of 4,487 billion VND and first round of payment summed up to 626 billion VND.
- The number of approved applications: 56 cases with total fees of 2,735 billion VND and first round of payment summed up to 573 billion VND.

2.2. The status and process of calculating mining permit fees

The steps to calculate the mining permit fees:

Business/individual submits mining permit application to the General Department of Geology & Mineral Resources;

The General Department of Geology & Mineral Resources submits a concurrent application to the Department of Mineral Resources & Department of Economics.

The Department of Mineral Resources will organize technical seminars for those applications.

The Department of Economics calculates the mining permit fees based on the total mineral reserves in the application and the outcome of the technical seminars.

The Department of Economics forms a Board of Committee to review the mining permit application of the business or individual, the Board will be responsible for evaluating the legal and technical aspects of the application.

If the Board of Committee approves the application, the Department of Mineral Resources will draft the mining permit and submit it to the Department of Economics.

The Department of Economics collects the permit draft and the permit application to finalize the documentation and re-submit to Department of Mineral Resources.

The Department of Mineral Resources submits the application to the General Department of Geology & Mineral Resources.

General Department of Geology & Mineral Resources submits the application to the Ministry of Natural Resources & Environment.

Ministry of Natural Resources & Environment issues the Decision granting mining permit and Instruction for fees payment to the business/individual.

The business/individual pay the fees according to the Instruction from Ministry of Natural Resources & Environment.

Thus, in theory, the above process will be carried out in steps spanning from lower level departments to higher level units, to create a strong legal basis, to avoid shortcomings in the application review process, to enable the authority, in particular the General Department of Geology and Mineral Resources as well as Ministry of Natural Resources & Environment, with end-to-end control. However, in reality, too many steps in the application process has led to many difficulties for the mining businesses, especially the mining businesses in the South. It is time-consuming for those businesses to apply for mining permit, resulting in intangible economic losses.

2.3. Current status for mining permit fees calculation formula:

The formula for calculating the mining permit fee, as described in Section 5 in the Decree:

$$T = Q \times G \times K1 \times K2 \times R \quad (1)$$

Whereby:

T - The mining permit fees, in VND.

Q - The volume of mineral reserves, in m3 (cubic meter) or ton.

G - The charge per unit, in VND/ volume unit.

K1 - The coefficient of mineral recovery based on methods of extraction.

K2 - The coefficient of socioeconomic conditions.

R - The rate of mining permit fees in percent (%).

In reality, the application of this methodology has shown that:

a) The mineral reserves volume (Q)

According to the definition, this is the mineral reserves with units of ton, m³. However, there are ambiguities in several permit applications:

These mining permit applications have gone through various periods with many modifications from various legal documents. Therefore, the units of mineral reserves volume usually are: geological reserves, industrial reserves or both, especially in some cases, it is the type of the mineral together with annual mining capacity and duration of the exploitation, or just annual mining capacity and duration of the exploitation. This is important information to determine the mineral reserves for calculating the permit fees. However, when used in the formula, it is required to be converted into the volume of mineral reserves within the boundaries of the permitted area. Sometimes, this conversion is challenged with insufficient information and inadequacies.

The permitted mineral reserves volume varies greatly from the actual collected volume. For instance:

- + In generic mines, the primary minerals are classified within the same resource category whereas other secondary minerals will be classified as the same category or lower depending the level of research and their distribution characteristics. However, in practice, it is difficult separate them, because there are cases where there are primary minerals with large amount but having low economic value, and secondary minerals with smaller amount but having high economic value, such as Ban Phuc nickel or nickel-copper mine with copper volume up to 18,000 tons.

- + In quarry tile, the quality and the amount of cracks determine the value of the mines (for examples, the white quarries in Nghe An and Yen Bai province). The approved capacity of these quarries include tiles with volume of 0.4 cubic meter and above, which is why there are quarries with up to 50% tiles while the remainders are classified as rock powder. However, the prices of quarry tiles with different cross section vary greatly (in the range between 2M VND/m³ and 12M VND/ m³). According to the reports from local companies, there are only 1.5% - 2% tiles with large cross section (priced at 12M VND/m³). The unclear valuation criteria and confusing computation method led to misleading results, depending on the perspective of the evaluator.

- + The approved mining area overlap with other projects, which blocking the operation.

Due to the above problems, there are various arguments and disputes between businesses and Mining agencies having granting mining rights. Some of these arguments and disputes have been presented to the Board or to the Ministry of Natural Resources and Environment for the final resolution. At the moment, most of the white marble mining businesses in Yen Bai province have appealed for revaluation of the remaining reserves capacity and re-adjustment of mining levies on the untapped reserves.

b) The charge per unit (G)

The pricing for charge per unit has been described in Article 7 of the Decree, based on the natural resource tax rates issued by People's Committee at provinces and centrally-run cities (collectively, the People's Committee in provinces). However:

Some local governments have not issued the full list of mineral resource tax rates (for examples, Nghe An, Yen Bai have not issued the pricing for gemstones, Yen Bai has not built up the pricing for rare earth ore, white marble, etc.), hence there is no basis to determine the charge per unit.

It is not realistic to apply nature resource tax rate to some minerals with regards to the materials produced by the businesses. The investors would argue that it is the price of processed materials at certain levels and not the price of the raw materials according to the Mineral Resource law, hence led to many on-going debates.

For the same mineral, there are different prices using different units amongst local governments, leading to variations when converting to a common unit. On the other hand, there are many differences with no general consensus between the natural resource tax rates issued by the provinces. For example, the tax rate for mineral water in Khanh Hoa province for Sao Mai 21st Century Ltd. is 6,000 VND/m³ while the tax rate in Binh Thuan province for Vinh Hao Mineral Water Corporation is 2,250,000 VND /m³. This fact led to inadequacies in calculating the mining permit fees for these groundwater sites. Whenever the natural resource tax policy is re-adjusted, there will be difficulties in calculating the tax in arrears, leading to inequalities and lacking of a healthy competitive environment for businesses in the same industry.

c) The coefficient of mineral recovery based on methods of extraction (K1)

Under the provision of Decree 203, open-cast mining has K1=0.9, underground mining has K1=0.6. In reality, open-cast mining effective loss ratio is between 27% and 50% depending on the geological conditions of the mines and mining technologies. On the other hand, mines with similar reserves may have different efficiencies. Therefore, it is difficult to ensure the uniformity amongst mining businesses using the same coefficient in the formula.

d) The coefficient of socioeconomic conditions (K2)

The coefficients of socioeconomic conditions for region with poverty and extreme poverty conditions, according to the List of Areas with Investment Incentives issued by the Government, are as following: mining areas in extreme poverty regions, K2 = 0.90; mining areas in poverty region, K2 = 0.95; the remaining areas, K2 = 1.00. There is no difficulty in using this coefficient to calculate the cost of mining rights. However, there are law-makers who are concerned about the fact that this is already a coefficient of investment incentives. While

considering the investment opportunity, this coefficient has already been applied. Therefore, if it is being applied again in calculating the cost of mining rights, it will be double-counted, thus creating inequality.

e) The rate of mining permit fees (R) (%)

In table R under the provision of 203 Decree, there are ambiguous definitions of mineral mine grouping or impractical grouping, leading to difficulties in calculating the fees for mineral mining permit. For example, there is no fee R defined for Anthracite coal (a very common type of coal in the Northeast coal basin, being actively extracted by Viet Nam National Coal – Mineral Industries Holding Corporation Limited, and belongs to a group which requires substantial mining permit fees).

2.4. Current status for mining permit fees payment

As certified by the Ministry of Finance, in 2014, the total mining permit fees paid to the State budget were 1,275 billion (VND). According to the statistics from State Department of Taxation, from 01/01/2015 to 31/05/2015, the mining permit fees paid to the State budget were 2,313 billion (VND) national wide.

As a matter of fact, these numbers are much lower than the approved and expected fees. Many local governments reported low percentage of businesses voluntarily paid the fees on time, except for large-scale companies with professional practices. Many businesses appealed to the Provincial People's Committee, Department of Natural Resource and Environment, Department of Taxation to extend, delay or defer the payment of mining permit fees with various reasons including difficulties in extraction, sale, finance or temporary activity freeze, or request for re-evaluation of mineral reserves, or re-adjustment of mining permit fees.

In this situation, the local government must take strong measures to enforce the law, coping with the businesses who deliberately delayed the payment. As a rule, if the business does not pay the mining permit fees on time, there will be penalty with late payment fee per day equivalent to 0.05% of the total fees. If the business failed to pay the fee, in addition to the incurred late payment penalty, the government can suspend the mining permit for a period between 4 to 6 months, or revoke it permanently.

2.5. Enforcing and managing mining permit fees payment

Ministry of Natural Resources and Environment has directed its functional units in collaboration with Department of Natural Resources and Environment to perform 30-40 annual inspections at the mineral mines. The results showed that the overall outcome has been improved, mining activities has been more organized, illegal mining and logging have been reduced and overall there are improvements in mining technology, etc. However, this task is still being performed periodically at a low frequency, hence it is not sending a strong message to the illegal businesses and it is not effective in case the businesses deliberately delay the permit fees payment.

2.6. Communication with businesses on mining permit fees payment

The General Department of Geology and Mineral has organized many training courses in the provinces for businesses and individuals in mining industry, to answer questions about the Government's Decree No. 203/2013/ND-CP and other regulations related to mining activities. Besides, the Department also collaborated with Department of Mineral Resources & Environment, radio stations, TV stations in the provinces to produce multiple programs specializing in Natural Resources & Environment. The Ministry of Natural Resources & Environment also organized 6 training courses about natural resources management for Government officers and staffs at Department and State city levels, 2 classes for journalists and 2 classes for industry experts. Thankfully, there have been knowledge improvements for Government officers and substantial increase in people's awareness, contributing to the overall effectiveness of natural resource management.

3. Root cause analysis

3.1. Subjective root cause

Human resources is one of the important factors in management activities in general, or collecting mining permit fees activity in particular. Currently, there are 30 official staffs working at the Department of Economics, of which 100% having university degrees, in the age group < 30 there is 1 staff with Master's degree out of 11, in the age group 30-45 there are 5 staffs with Master's degree out of 11, in the age of 46-46 there are 2 with Ph.D. and 2 with Master's degree out of 8. With such a high quality workforce, it is a great advantage in managing and enforcing mining permit fees payment activity. However, there are still a significant number of young, inexperienced officers (<30 year-old) and the Department of Economics is an organization just founded for about 5 years. Therefore, there are a lot to be learnt and experienced.

Information management system is still inadequate, leading to many difficulties in collaboration and sharing documentation. There is no common gateway for the agencies and businesses to keep track of the current status of the fees payment. It resulted in prolonged payment and inconvenience for mining businesses.

The payment process contains numerous steps and requires tightly coordination between different agencies, both inside and outside the General Department as well as the mining businesses, resulted in inevitably slow progress.

3.2. Objective root cause

The Decree 203 still contains inconsistency with the relevant legal documents, leading to difficulties for management agencies as well as direct impacts on the interests of the businesses.

The payer of permit fees did not strictly comply with the relevant instructions and legal documentation. There are multiple given reasons by the business owners, such as delayed sales, financial difficulty, deferred exploitation, incomplete land lease, on-going landmarks construction, applying for re-adjustment of mineral reserves, wage levels, etc.

Natural disasters or inevitable causes have delayed or prevented the mineral extraction, leading to difficulties in calculating the mining permit fees.

The promulgation of Decree 203 happened in 2013 when the economy was still heavily impacted by the global economy crisis, combined with weak economic recovery, weak demands for mineral materials from the world economies and industrial companies and decreasing prices of mineral materials. Many mining companies were in trouble with decreased business efficiency and they had to maintain business operation at minimum level to survive. Therefore, they could not pay the licensing and permit fees, especially some amount calculated arrears upon the effective date of Mineral Resources Law.

In addition, there are other specific factors directly related to the calculation of the fees, such as mineral reserves (Q), charge per unit (G), and coefficients K1 and K2.

4. Conclusion

Managing and enforcing the payment of mining permit fees is a right policy, and it has received the general consensus from all sectors of the economy and society. Throughout the implementation of the Decree 203/2013 ND-CP, the Department of Economics have completed 495 applications. However, there are a number of issues as mentioned, which creates many difficulties and challenges for the agencies as well as mining businesses in managing and making the payment. All of these issues need to be addressed in order to improve the validity of the Decree and ensure the efficiency of mineral mining investment.

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International Conference on Economic Management in Mineral Activities (EMMA)

Applying the governance framework of ASEAN mining industry to govern the mining industry of Viet Nam

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Abstract

For years, the mining activity of Viet Nam has contributed largely to the economic development of the country. However, during the mineral exploiting process, there are still some problems existing. They are uncontrolled mineral exploitation and serious polluted environment in the mining area. Therefore, applying the governance framework of ASEAN mining industry into governing the mining industry of Viet Nam contributes a transparent and sustainable development to the mining activity.

Keywords: Mining activities; governance; framework

1. Introduction

Mineral mining has an important role which creates the input of the industry. In fact, in industrial scale, mineral mining has met certain requirements on the raw materials for the development of some industries within the country. Regarding exploration license, mineral mining basically has been controlled closely by the State. Licensing compliance with provisions of the law and national mineral planning has met the growing demand for minerals which contributes to the development of economy and society in local area and in country as general. Besides, many mineral exploration and mining activities which have not complied with the provisions of the law affects to the safety, security, and environment within the area. Local people still do not have full benefits from the mineral exploitation. There is no transparency in benefits between mining companies and local area and in national benefits from this activity. Therefore, applying a governance framework of ASEAN mining industry will contribute to a better governance of national mineral resources.

2. The governance framework of ASEAN mining industry

The governance framework of ASEAN mining industry is a set of provisions ensuring that the exploited mineral resources are being used in order to improve the development of human life, promote a balanced economic growth among ASEAN members, and enhance connectivity and economic cooperation within ASEAN. Also, this is a proposal of building standards for governing the mining industry from civil society so that ASEAN members will implement. A good implementation of this governance framework of mining industry will provide a transparency in interests, economic growth, friendly environment, and demonstrate the role and responsibility of society and local communities in managing mineral resources.

Mineral is a non-renewable resource. Today, the exploitation has to go deeper into the ground and further to deeper seas. Thus, it requires a very high mining technology and capital investment. Spending capital investment and many desired benefits of different mining organizations lead to a relationship of interests among nation, investors, and local people around the mining areas who are increasingly abused. These conflicts of interests have reduced the growth rate of the national economy, caused a loss to the national income, destroyed the ecological environment, and seriously affected to the living of local people within the area. In term of

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governing the mining industry, many countries having a huge mineral resource in ASEAN region are facing with this challenge. The Corruption Perceptions Index (CPI) by Transparency International organization and the Natural Governance Resource Index (NGRI) by Natural Resources Governance Institute are both at a low rate. So, it is essential for ASEAN region to manage the mining industry in a way that can improve the prosperity of each country and ASEAN region. One of the initiatives for this problem is the governance framework of ASEAN Mining Industry (which is done by USAID and Natural Resources Governance Institute in the framework of the IKAT - US project of the social organizations alliance in the Southeast Asia).

2.1. Background

ASEAN has many justifiable reasons to support a tremendous role of the mining industry on the path of economic integration in the region. Firstly, the ASEAN countries are blessed with abundant reserves of fossil raw materials, energy, and mineral resources. Secondly, the role of the mining industry in the construction of AEC is supported by the continuous growth of this industry in many ASEAN countries. Thirdly, there is a significant contribution of the mining sector to the economy of ASEAN countries. Despite a dynamic growth and continuous investment to the mining industry in the area, several factors still prevent this industry from a full potential development. A major obstacle in many ASEAN countries is a weak governance at different levels, including a lack of legislation and reliable mechanisms to ensure the transparency, accountability, and to support relationships between the government and non-governmental organizations. A good governance requires a proper economic management, law enforcement, involvement of people, transparency, accountability, and ability to foresee problems of public governance. Mining industry is especially sensitive in matters of governance at every level. A good governance must be implemented comprehensively in the entire value chain of the industry. It is illustrated through a series of activities of the sector:

Searching – Exploring → Exploiting → Recruiting, Enriching → Processing minerals → Commercializing minerals → Using proceeds from mineral mining.

Therefore, the mining industry in ASEAN requires a strong and effective policy framework within the area. Its sustainable development depends on a strategic orientation, including: ensuring application of institutional framework, legislation, and regulation in pursuit of economic, social, and environmental objectives; ensuring accountability of transparency and consultation of stakeholders; and establishing effective systems to deliver practical benefits to the people.

2.2. Governance Framework

2.2.1. Protect Environment

- + Establishing a restricted area for mining activities (NO – NO – ZONE).
- + Assessing the influences to environment and society
- + Preventing dangerous waste disposal
- + Claiming and auditing mechanism
- + Recovery fund
- + Managing environment of small and handicraft mines.

2.2.2. Respect and Protect Human Rights

- + Respecting and protecting human rights in all mining activities
- + Respecting and protecting local community, influenced community, and local people
- + Complying with the international human rights mechanism in disputed area
- + Claiming mechanism
- + Guiding resettlement and compensation
- + Co-operating in peace among people having a right to exploit huge mines and people having a right to exploit small mines.

2.2.3. Transparent Solution and Accountable Explanation

- + Penalty for providing wrong, incomplete, and misleading information to the public.
- + Implementing Extractive Industries Transparency Initiative (EITI)
- + Fighting against mineral smuggling
- + Mineral market certification
- + Database of mineral resources
- + Publicizing data relating to the revenue and the use of it
- + The process of decision-making transparency.
- + Monitoring small and handicraft mines.

2.2.4. Reasonable Financial Action Framework for Economic Growth

- + Regulatory framework for optimizing and protecting revenue
- + Transferring all revenues into the budget system
- + Setting targets for the basic infrastructure
- + Investing in the basic knowledge resource base system
- + Developing added value
- + Sharing the revenue with local communities
- + Establishing natural resource funds
- + Competitive auctioning and tendering

3. Applying The Governance Framework of ASEAN Mining Industry Into Governing The Mining Industry of Viet Nam

The basic content of applying the governance framework of ASEAN mining industry into governing the mining industry of Viet Nam is illustrated as below.

3.1. Mineral Mining Environment

Mineral mining environment is about the concentration of components in mining area. The average content of these elements in the earth's crust depends on their mass proportion in there. According to a research by F. Clarke (1847-1931), this average content is determined as in the table below:

Table 1: The Clarke index of elements in the earth's crust

Element	Clarke index	Element	Clarke index	Element	Clarke index
Oxygen – O	49.3	Potassium – K	2.35	Manganese – Mn	0.10
Silic – Si	20.0	Hydrogen – H	1.00	Barium – Ba	0.05
Aluminum – Al	7.45	Titanium – Ti	0.61	Cromium – Cr	0.03
Iron – Fe	4.20	Carbon – C	0.35	Copper – Cu	0.01
Calcium – Ca	3.25	Chlorine – Cl	0.20	Tin – Sn	0.003
Sodium – Na	2.4	Phosphorus – P	0.12	Tungsten/Wolfram – W	0.007
Magnesium – Mg	2.35	Sulfur – S	0.10	Lead – Pb	0.0016

With this proportion (Clarke index), the human does exist and develop. In order to get the value of these indexes, the earth must undergo hundreds of millions of years. This mass proportion will generate an average value of elements' concentration in the earth's crust and with this concentration, people and the biological world exist. Mineral mining will make the elements' concentration within an area increase. When this value increases, the concentration of some elements also rises in compared with Clarke index in this area which affects to human's health. Only when the proportion of elements in a mine area returns to Clarke index (of course it cannot be back to exact values. It is still a bigger number, but still safe), the mine is opened. With that logic, management bodies should have solutions for both protecting environment and ensuring an effective mining. This is a challenge for mining management bodies: planning mining areas, establishing restricted area (this is an area which is preserved and protected by law, has biological value and spiritual and cultural values, etc.).

3.2. Transparency and Accountability in Mineral Activity

The key point is that doing well at assigning and decentralizing state management over minerals helps to manage mineral transparently and define clearly responsibilities of departments which relate to mineral activities management:

- + Hierarchical principles: Must match with the decentralization of economic management of the country; every policy of decentralizing mineral resource regime must unify on the basis of managing mineral resource at the State level; transparency in revenues and expenditures; reasonable split proportion of revenues; enhance reactivity in management; ensure the fairness on the basis of minimizing the disparity in economic – social benefits among local, regional, and national levels.

- + Content of decentralization: Decentralizing contents related to managing and operating mineral mining from the central to local levels (issuing, organizing event, checking, monitoring, etc.); decentralizing contents related to management and operation issues in issuing documents about order and responsibility of the authorities.

According to an amendment in 2010 of the Mineral Law of Viet Nam, the authority of licensing mining activities is illustrated as follows:

- The Ministry of Natural Resources and Environment: Provide mineral exploration licenses and mining licenses except those under the jurisdiction of the Provincial People's Committee.

The Provincial People's Committee: Provide mineral exploration and mining licenses for common construction materials and peat, minerals in scattered mineral areas which have been delineated and announced by the Ministry of Natural Resources and Environment.

Licensing artisanal minerals.

- + Ensuring harmonious relationship among the income of mining organizations with people, with local and national interests. Ensuring basic rights for the people within the mining area in accordance with the law, including paying attention to compensation payment, employment when resettled in new areas.

- + Good management of small mines, manual distribution and exploitation, ensuring the fairness to mining organizations in a large scale.

3.3. Distribution of the revenues from mineral activities which are reasonable and consistent with the economic conditions of the country

It is essential to increase the fund investment for exploration and evaluation of some key major mines, build a transparent database for auctioning organization, and do bidding competitively within licenses, privileges use, and mineral exploitation.

A need of optimizing the value added from using mineral resources will develop other activities such as agriculture, forestry, and mining tourism. This creates a potential integrated economic zone even though the income from mining is not high. Investing in a deep processing, developing supporting industries, and the industry whose inputs are mineral raw materials (oil processing, metallurgy, etc.) is also necessary.

There are also other recommendations such as checking and tracking problems derived from the state budget remittances of the mining organization, monitoring closely the payment and licensing for mineral mines which have been exploited in order to recover the searching and exploring costs that the State budget spent before, determining the proportion of distributing benefits among local, regional, and national levels, and investing in infrastructure development and improving the ecological environment conditions.

4. Conclusion

The governance framework of ASEAN mining industry is considered as an initiative of managing mineral resource exploitation in ASEAN region in general, and helps to manage the mineral resources of Viet Nam in particular. This framework helps to govern the mining industry well in an integration and cooperation process, including three main areas: economic, security – politics, and culture – society which also contributes to the development of the area. To Viet Nam, this governance framework helps the management of mineral resources in Viet Nam to approach systematically the problems of environmental protection around the mining area. It helps to balance harmonically the interests of mineral mining organizations and the people at local, regional, national levels. For the macro benefit of the government, it is a requirement for the transparency in management as well as the rights of communities and mining companies. The responsibility of investing local infrastructure, improving ecological environment condition, promoting an accountable and transparent development of the mining industry contributes to a sustainable economic growth at local, national, and regional levels.

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Current status of lending activities and solutions to improve lending activities of Viet Nam environment protection fund

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Abstract

Viet Nam Environment Protection Fund (VEPF) is a State-run financial organization. Its function is to provide financial supports in the field of environmental protection. From the establishment (2002), Viet Nam Environment Protection Fund used financial tools to support and remedy environmental pollution like a financial assistance such as loan with preferential interest rates, sponsor and co-sponsor for environmental protection projects, deposits for environmental restoration in mineral exploitation and loans guarantee act to execute projects related to environmental protection. Besides, it provides Certified Emission Reductions (CERs) and gets deposit for mining recovery. VEPF achieves some good results in its lending activities; however, there is some disadvantages that need to be improve. The article analyses the situation of VEPF's lending activities and proposes solutions to improve lending policy in order to support customers of the fund to approach capital sources easily.

Keywords: Environment protection; loan; mining recovery

1. Introduction to lending activities of VEPF and achieved results

VEPF established on June 26th, 2002 according to Decision No 82/2002/QĐ – TTg (Decision 82) of Prime Minister of Government and being attached to the Ministry of Science, Technology and Environment. In March 3rd, 2008, Prime Minister promulgated Decision No 35/2008/QĐ – TTg (Decision 35) on organization and operation of Viet Nam Environment Protection Fund replaced Decision No 82/2002/QĐ - TTg. VEPF is not only a state-run financial organization but also a functional environment protection fund which receives capital from the national budget; domestic and international organizations and individuals' sponsors to support financially for environmental protection activities on a national scale. Aside from the head office in Hanoi, VEPF located representative offices in some provinces, decided by the Environment Protection Fund Management Board, and is allowed to locate agent offices on the board according to the stipulation of the government.

VEPF is a non-profit organization, however it still preserves share capital and self-compensate cost management. Regulation of organization and operation of VEPF is due to Minister of Natural Resources and Environment promulgate in accordance with Decision 35 and presents stipulations of State.

VEPF has two major obligations: (1) Receiving capital sources as defined in Article 6 of Decision 35 to create business capital sources; (2) Supporting finance for programs, projects, activities in nature and biodiversity protection to prevent, protect and overcome pollution and deterioration and national, multi-section, multi-region, environmental risks or resolve comprehensive environmental issues. Additionally, VEPF has more five functions, includes: (3) Being coordinate sponsor with domestic and international finance, Global Environment Fund (GEP), foreign environment funds, sector and local funds to lend environment projects in accordance with norm, functions of VEPF to serve environment protection activities based on rules; (4) Investigate, approve level, time and forms of supporting finance for projects, tasks of protecting environment that use investment support capitals from VEPF according to regulations on organization and activities of

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VEPF; (5) Using unemployed capital without state origin and agreed by capital providing organizations and individuals to buy government bonds according to law; (6) Registering, examining and managing certified credits of reducing green-house omissions (here in after called Certified Emission Reductions (CERs); one CER is confirmed by a ton of CO₂, equivalent); registering receiving, dividing and selling CERs to CERs owners or original sources of CERs; collecting fees of buying CERs to pay for collection expenses, extracting to support reporting propaganda activities of clean development mechanism (here in after called CDM); setting up, constructing, investigating and approving documents of investment projects according to CDM (here in after called CDM projects); managing and examining implementation of CDM project and other purposes relating to CDM according to regulations by law; supporting prices for products of CDM projects according to law regulations; (7) getting deposit for mining recovery.

According to article 6 in Decision 35, VEPF's operating capital includes:

- Legal capital from State Budget

Legal capital of VEPF is distributed by State Budget, increasing from 200 (Decision 82) to 500 billion VND within two years (Decision 35). Every year, VEPF is supplemented capital from non-business expenditure source in State Budget to compensate the sponsor expenditures for environmental protection projects. Besides, VEPF ensures that operating capital is 500 billion VND at least. Through three turns of capital allocation by Ministry of Finance on December 2003, April 2004 and December 2004, the total of distributed capital was 200 billion VND (reach to 100 percent by law). On January 2009, VEPF was distributed 100 billion VND on the fourth turns of capital allocation. Up to this time, the total of legal capital of VEPF is 1000 billion VND, including 500 billion VND is distributed by State Budget.

- Capital from other sources

+ Deduction of 50% from source of collecting environment protection fee for sewage, exhaust fumes, solid waste, mineral exploitation and other fees of protecting environment according to law regulations

+ Compensation of damaging environment (receipts of State Budget) from organizations, individuals according to law.

+ Deduction of 10% (each year) from capital to manage environment protection.

+ Subsidies, supports, contributions, investment mandates from local and foreign organizations, individuals. Nowadays, entrusted capital source is 20.47 million USD, equivalent to 440 billion VND.

+ Fees of buying CERs

+ The supplementary capital sources according to law regulations

Table 1. Operating capital of VEPF until January 1st, 2015

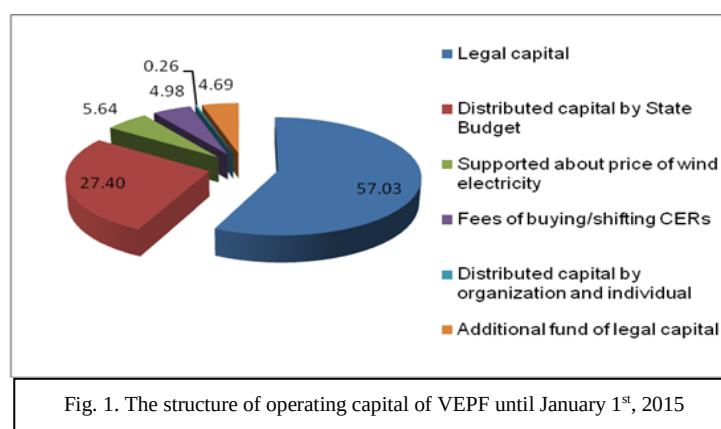
Capital sources	Amount (billion VND)	Ratio (percentage)
Legal capital	500	57.03
Distributed capital by State Budget	240.24	27.40
Supported price of wind electricity	49.44	5.64
Fees of buying/shifting CERs	43.65	4.98
Distributed capital by organization and individual	2.32	0.26
Additional fund of legal capital	41.11	4.69
Total	876.76	100.00

Source: Website of Viet Nam Environment Protection Fund <http://www.vepf.vn>

The structure of operating capital of VEPF (Fig. 1):

Table.1 and Fig.1 show that the ratio of capital focus mainly on legal capital (state budget distribution) (57.03%) and additional capital source from state budge (27.4%), the other capital sources take small ratio. This will cause difficulties in activity of using capital.

For usage of capital, VEPF finances capital to overcome consequence of environmental disaster and to design, and to deploy projects for restoration environment, programs, plans of Prime Minister. Besides, VEPF supports finance to organize prizes of environment, commend and reward the advanced typical organizations, individuals about protecting environment according to Decision of Minister of Natural Resources and Environment. In



addition, VEPF coordinates sponsor with domestic and international finance, Global Environment Fund (GEP), foreign environment funds, sector and local funds to lend environment projects in accordance with norm and functions of VEPF under the law.

Activities of using capital of VEPF includes:

- Lend with preferential interest
- Interest rate support
- Sponsor and co-sponsor
- Clean Development Mechanism (CDM)
- Price subsidies for environment protection products
- Deposits for environmental restoration in mineral exploitation
- Entrusted loans

Table 2. Result of activity of using capital until January 1st, 2015

Activities	Amount (billion VND)	Ratio (percentage)
Lending with preferential interest	524.5	69.98
Support of interest rate	0.817	0.11
Sponsor projects for protecting environment	24.21	3.23
Support price of electricity to projects for wind electricity	17.67	2.36
Clean Development Mechanism (CDM)	85.07	11.35
Deposits for environmental restoration in mineral exploitation	97.21	12.97
Total	749.477	100.00

Source: Website of Viet Nam Environment Protection Fund <http://www.vepf.vn>

Ratio of using capital activities (Fig. 2):

The total of granted credits until January 1st, 2015 reached 749.477 billion VND. The table 2 and Fig. 2 can show that activity of using capital is mostly activity of lending with preferential interest (approximately 70%), activity of receiving deposits for environmental restoration accounts for 12.97%, activity of performing mechanism, policy of CDM projects accounts for 11.35%; other is about 5%. In these activities, activity of lending with preferential interest makes up the biggest density of total, author will analyze more deeply and give some suggestions to lending activity:

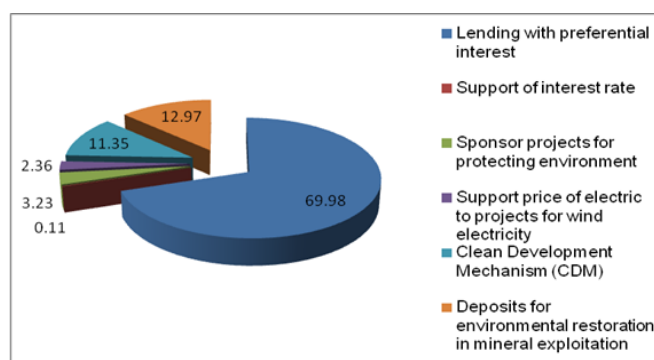


Fig. 2. Ratio of using capital activities until January 1st, 2015

Debit balance of lending until January 1st, 2015 reached 524.5 billion VND, including lending to invest, construct the station of gathered processing sewage in industrial zone by entrusted capital source of World Bank (WB) is 72.17 billion VND.

According to preferred lending fields, VEPF approved loans to 175 projects with total of granted credits accumulated to 452.33 billion VND, including 50 projects for industrial waste treatment with total of loan of 252.04 billion VND; 76 investing sewage and exhaust fumes treatment projects with total of loan of 101.46 billion VND (environmental pollution treatment for organizations according to Decision 64: 13 projects, sewage treatment for companies: 28 projects, environmental pollution treatment for traditional villages: 32 project, others: 3 projects); 5 household waste treatment projects with total of loan of 9.12 billion VND; 31 projects of deploying eco-friendly, energy-saving technology and products of protecting environment with total of loan of 45.69 billion VND (deploying eco-friendly, energy-saving technology: 23 projects, producing products of protecting environment: 8 projects); 13 projects of socialization of waste treatment with total of loan of 14.02 billion (Table 3).

Table 3. Amount and number of projects according to preferred loan fields until January 1st, 2015

No	Fields	Amount (billion VND)	Number of projects
1	Industrial waste treatment	252.04	50
2	Sewage and exhaust fumes treatment	101.46	76

2.1	Environmental pollution treatment for organizations according to Decision 64	16.47	13
2.2	Sewage treatment for companies	75.78	28
2.3	Environmental pollution treatment for traditional villages	5.96	32
2.4	Others	3.24	3
3	Household waste treatment	39.12	5
4	Deploying eco-friendly, energy-saving technology and producing products of protecting environment	45.69	31
4.1	Deploying eco-friendly, energy-saving technology	13.55	23
4.2	Producing products of protecting environment	32.14	8
5	Socialization of waste treatment	14.02	13
Total		452.33	175

Source: Website of Viet Nam Environment Protection Fund <http://www.vepf.vn>

The data on Fig. 3 shows that the lending for industrial waste treatment is the highest loan, accounting for 55.72% in total; the following is of sewage and exhaust fumes treatment, accounting for 22.43%. The loan of deploying eco-friendly, energy-saving technology and products of protecting environment made up 10.1% in total, the loan of household waste treatment was 8.65% in total, the rest was 3.1%.

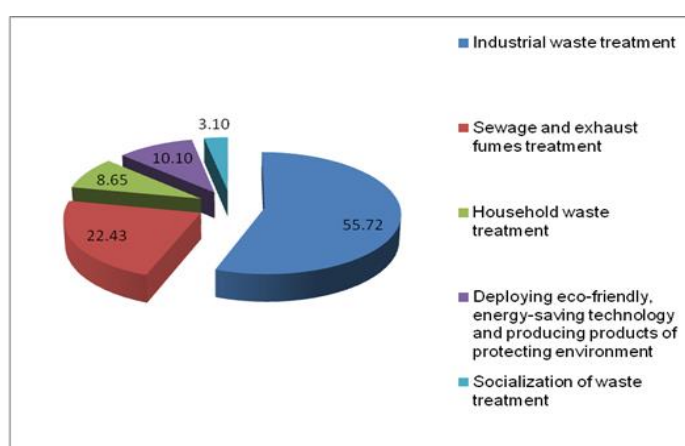


Fig. 3. Ratio of lending according to the preferential field up to January 1st, 2015

Together with disbursement, task of loan recovery is carried out with investors by agreement. Until now, VEPF has no bad debt and no debt extension.

Among over 175 projects, VEPF had 13 projects relating to Decision 64/2003/QĐ-TTg of April 22nd, 2003 of Prime Minister of Government approving “the plan for thoroughly handling establishments which cause serious environmental pollution”. Projects which VEPF lent with preferential interest, mainly concentrated on constructing stations of sewage treatment in industrial area, constructing dust filter system in cement factories, textile factories and investment of buying specialized equipments in tasks of collecting and transporting waste.

Activity of preferential loan was a major activity of VEPF, it counted for nearly 70 per cent in total capital. These projects were steady urgent but the activity of preferential loan only gathered on several projects which caused serious impacts on environment and need capital to handle the environmental pollution. Most of this projects was in the plan for thoroughly handling establishments which caused serious environmental pollution. Some achievements were:

- Loan capital was used properly for VEPF’s targets and was disbursed in progress of project. Examination of used loans showed effectiveness and the loans did not turn to bad debt and doubtful debts. Loan collection was carried out in agreement by investors.

- Lending interest rate of VEPF is more attractive than the one of trade banks. In 2016, the one of VEPF is 3.6% per year. The average interest rate for lending is about 42% of the one of trade banks (the regulation is lending interest rate is not over 50% compare to average rate of credit institutions in the same period).

- It is necessary to launched one more channel of mobilizing loan capital with preferential interest rate for environmental protection companies, especially for small and medium companies which use backward technologies and have serious difficulties in approaching capital sources, including capital from commercial banks.

- VEPF achieved several improvements in loan mechanisms and regulations, such as reducing unnecessary legal papers, enforcing law better, transparency more improved, approaching information more easily, administrative proceeding more simply, etc.

In addition, lending activity ensured the principle of capital preservation to make a decrease in financial burden of environmental protection projects and was supervised more closely because they run a private mechanism for controlling.

In summary, lending activity of VEPF achieved good results, approached projects for protecting environment, activities which need to support. However, this activity still exist some given restrictions.

2. Restrictions and suggestions for improving lending activities of VEPF

2.1. Restrictions

- Loan regulations are fairly close but it brings highly subjectivity. In 2015, VEPF's criterions of approving projects include:

- Criterion 1: The urgent and effective environmental protection
- Criterion 2: The size and characteristics
- Criterion 3: Economic and solvency
- Criterion 4: The replication and sustainability
- Criterion 5: The advantage of application of appropriate technology, especially the technology in the country
- Criterion 6: Serving directly to the State's policies of protecting environment

In this criterions, criterion 1, 2, 3, 6 is acceptable, but the rest is really difficult to customers to reach. These cause difficulties in approaching VEPF's fund.

- Some difficulties that customers used to meet in setting up a loan file from VEPF can be mentioned:

- Dissatisfaction with the request of guaranteed assets: according to VEPF's regulations, loans must be guaranteed by mortgaged assets or the third party as warrantor or assets formed from loan capital. In fact, many projects did not satisfy the conditions for ensuring loan because of some reasons such as: no mortgaged assets or insufficient valuable mortgaged assets or illiquidity mortgaged assets such as backward fishing boats, seafood processor, etc.
- Amount of loan was too small: according to VEPF's regulations, the limited level of loan is not over 70% total of invested capital. Capital source of VEPF is mainly distributed from state budget but the small number of companies is lent at the maximum level.
- Companies had no warrantor: according to VEPF's regulations, borrowers must be guaranteed by the third party who send a guaranteed letter to VEPF, this ensures a more safety for getting back the debt. However, it causes some difficulties in procedure of loan for borrowers.
- Mortgaged assets met difficulties in selling: according to Decree No. 59/2007/ND-CP on solid waste management, borrowers are allowed to use assets which took form in loan capital to pledge. Nonetheless, these mortgaged assets are usually projects for serving targets of environmental protection, improvement. Therefore, this make a slow profit, even a failure of profit and really difficult to be sold. For instance, rubbish incineration furnaces, storage, etc.
- Information which was supplied companies and investors was uncompleted.
- Bonds between VEPF and intermediate units or relating offices.
- Legal forms were not complete, especially is small-scale companies or individuals.
- Loan time-limit for projects could be fluctuate between 3 months and 15 years, but in fact, normally is 5 years and based on VEPF's balance on capital, repayment ability of companies. Nevertheless, it is too short in comparison with the life circle of environmental protection project (from 10 to 30 years, normally).

- Lending objects were not diversified: according to VEPF's regulations, objects lent with preferential interest rate are organizations and individuals who have projects for environmental protection; investment projects for preventing, protecting and overcoming pollution and deterioration and national, multi-section, multi-region, environmental risks or resolve comprehensive environmental issues. Nevertheless, the above analyzed documents showed that lending objects concentrate on projects for handling sewage at industrial zones and factories (it counts for nearly 56% the total of lending projects), projects for handling dust filter of cement factories and textile factories (it counts for over 22% total), the rest ones are projects for purchasing equipment to serve the waste collection, transportation and handling.

2.2. Suggestions for improving lending activities of VEPF

- Loan criterions should be more specific. It could be designed for each project based on elaborating norms, VEPF should arrange norms in order of preference as bases to choose project.

- Flexibility in choosing guarantors and examiners for mortgaged assets. It should have obvious regulations on mortgaged assets, guaranteed assets, risk management and risk handling when guaranteed assets met difficulties in selling.

- Interest rate should have an expanse instead of fixing for all projects (in 2016, it is 3.6% for all projects). Loan interest rate can fluctuate between two and six per cent depending on property and loan time-limit of each project. VEPF can base on some following criterions to give interest rate:

- Property of project (can be preferential projects or trade villages or individuals or state-owned companies or industrial zones)
- Loan time-limit
- Interest rate of banks
- Rate of inflation
- Rate of exchange
- Changes in economics and society

For out-of-date loan interest rate, VEPF should choose the level of interest rates higher (approximately the average interest rate for trade banks)

- Flexibility in loan time-limit (short-term, long-term) depends on property of each project. For example, loan time-limit can be from three months to three years for village projects or individual rubbish collection projects. For construction projects in industrial zones or preferential projects, loan time-limit can be longer depending on the period of constructing this projects.

- VEPF should build a mechanism of preferential loan to public units, socialized areas as traditional villages, rubbish collection people, the poor who have a slow education level and their handicraft products are rudimental and cause bad impacts for environment. For this reason, VEPF should lend with interest rate equal to zero percent or should build the policies of financial support more than to lend.

- Environmental protection funds belong to state fund which function is non-profit. Building a mechanism of erasing debt is necessary because nobody can buy them back if they are out of operation.

3. Conclusion

Within the last few years, environmental problems are mentioned regularly and the handling of environmental problems is very urgent. This is not only a problem of individuals or organizations but also of the whole community. Organizations and individuals faced many difficulties when conducted environmental production projects, especially capital shortage. Viet Nam Environment Protection Fund is established and is a State-run financial organization. VEPF used financial tools to support and loan with preferential interest rates for environmental protection projects. For loan activities, although VEPF achieved some good results, but VEPF's mechanisms and policies still have some points in existence. Within the content of framework, the article analyzed the situation of VEPF's lending activities and proposed solutions to improve loan policy in order for organizations and individuals can approach capital sources more easily.

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International Conference on Economic Management in Mineral Activities (EMMA)

Solutions to deal with the drop of crude oil price for PetroVietNam (PVN)

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Abstract

Recently, the cost of the crude oil price in the world drop dramatically because of the political and economic factors. In some particular occasions, price of only 28.35USD/barrel negatively impacted on the commercial activities and benefit of the petrol companies, in general and Petro Viet Nam in particular. By evaluating the negative influence of the petrol price downturn on PVN and discussion on solutions of some companies to confront this problem, the authors propose some solutions for PVN to cope with the decline of petrol price which are not recovered currently.

Keywords: Oil price; fluctuation

1. Introduction

Viet Nam Oil and Gas Group (PetroViet Nam, PVN for short) operates in very wide fields, from upstream (searching, exploring and exploiting oil and gas) to downstream (processing petroleum products, petroleum services, etc.) since the end of 2014, crude oil prices continued to fall, which led to a serious decline in revenue and profit of PVN, especially for businesses operating in the upstream stages. To reduce the negative impact, PVN needs to devise solutions to cope with the situation. The essence of the solution is to minimize the input costs per unit of output. The solutions are considered optimal when they satisfy the criteria above, and associated with each batch of contracts/projects and each specific sector. They must become the application and action guideline for companies of PVN

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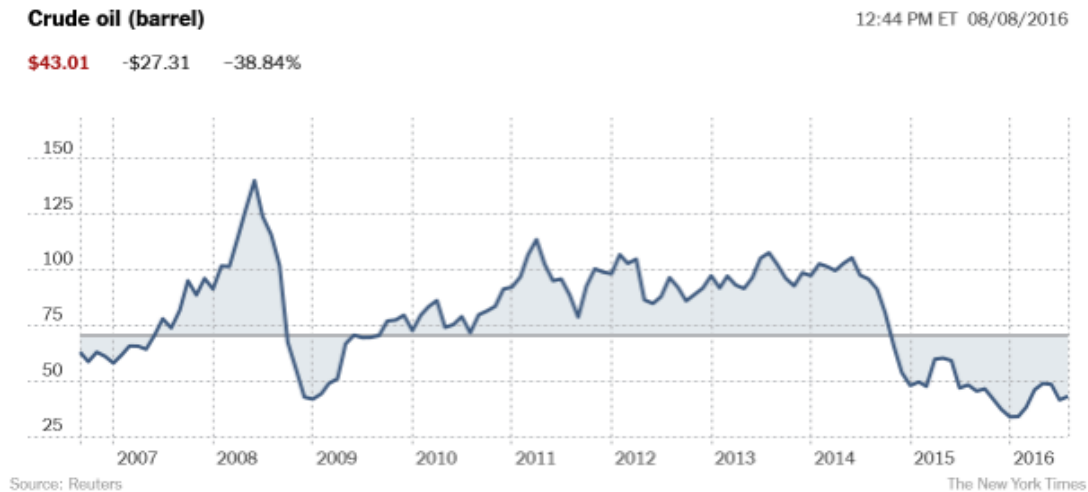


Fig. 1. Variation of petrol price from 2007 to 2016 (adapt to Reuters)

2. The impact of petrol price on PVN and reaction of PVN

The PVN is responsible for 5 main fields: detecting and exploiting petrol, industry of electricity, industry of gases, processing petrol and service of petrol technique. Since 2014, the global petrol price drop has influenced negatively on business activities of this co-operator.

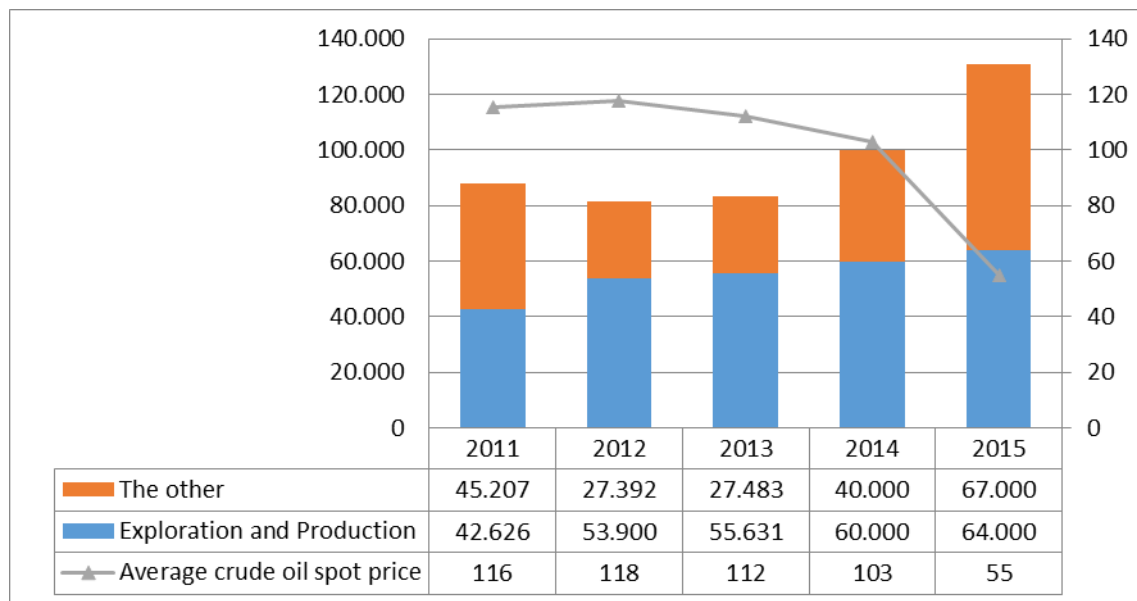


Fig. 2. The chart of PVN investment variation

As can be seen from Fig. 2, the net investment of PVN degraded in the period between 2011 and 2013 and increased after. The income due to petrol detection and exploitation trended to constantly increase for the whole period. The origin of this growth can come from the petrol contract signed before with compulsory stuffs for PVN, as the results, the average petrol price in 2015 was lower 53.38% than that in 2012 while the fund increased by 18.74% in 2015. When the price of petrol dropped without recovery possibility, investment on detecting and exploiting petrol of PVN is contrast to statement in the world, the efficient of PVN was affected in short term. The investment on the rest fields degenerated for the first three years and vice versa in the rest period, especially the industry of electricity. The investment on this field was reduced when petrol price was higher, reduced from 18.093 billion to 10.027 billion between 2011 and 2013 then grew up to 22.000 billion in 2015 when the petrol cost dropped down.

In the circumstance of the petrol cost decline, the petrol production of PVN was partly affected. From figure 3, the yield of petrol grew from 23.91 million tons to 27.6 million tons between 2011 and 2014, and slightly lower in 2015, namely 27.38 million tons. This result is explained by the fact that PVN had to hold the production amount to maintain their turnover, benefit as well as the plan of themselves and Vietnamese government. According to specialists, the continuous decrease of the petrol price in 2016 will be a bad scenario

for PVN, certainly PVN will reduce the exploiting production because the expense to get 1 ton of petrol, namely 40USD/barrel is slightly higher than price of a petro barrel.

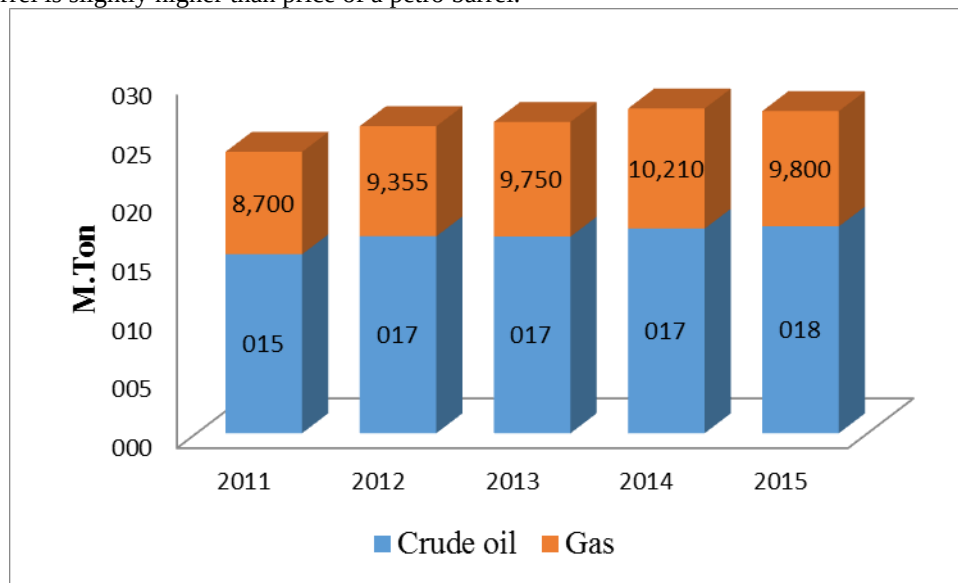


Fig. 3. Bar chart of equivalent petrol production variation

The crude oil price also affects benefit of PVN. As can be seen from Fig. 3, the growth tendency of total benefit is visible from 2011 to 2013 and reversible trend appeared in the rest period. The reduction of petrol price influences most on detecting and exploiting petrol field. Between 2011 and 2015, the decrease by 52.58% of the global petrol price led to a decline of 27.4% for detecting and exploiting petrol field. According to the experts, the crude petrol price continues dropping until 30USD/barrel, that situation will be very bad for PVN because that price is below 10USD the expense for PVN to get 1 barrel of crude petrol. The benefit from other fields, such as processing petrol, electricity, petrol service, etc., is influenced by crude petrol price but with less than detecting and exploiting petrol field. Since 2014, the price of crude petrol has started gone down, the benefit of detecting and exploiting petrol field has slightly tumbled (2.345 billion, lower than 8.5% than that in 2014). The fields with the benefit decline are petrol service and processing petrol. Besides, the industry of electricity benefit has gained as the price of crude petrol decreased because the expense for thermal power plant became lower, while the electricity price has rose. This situation implies that the decline of the crude petrol is bad for the particular branches, but might be good for other ones.

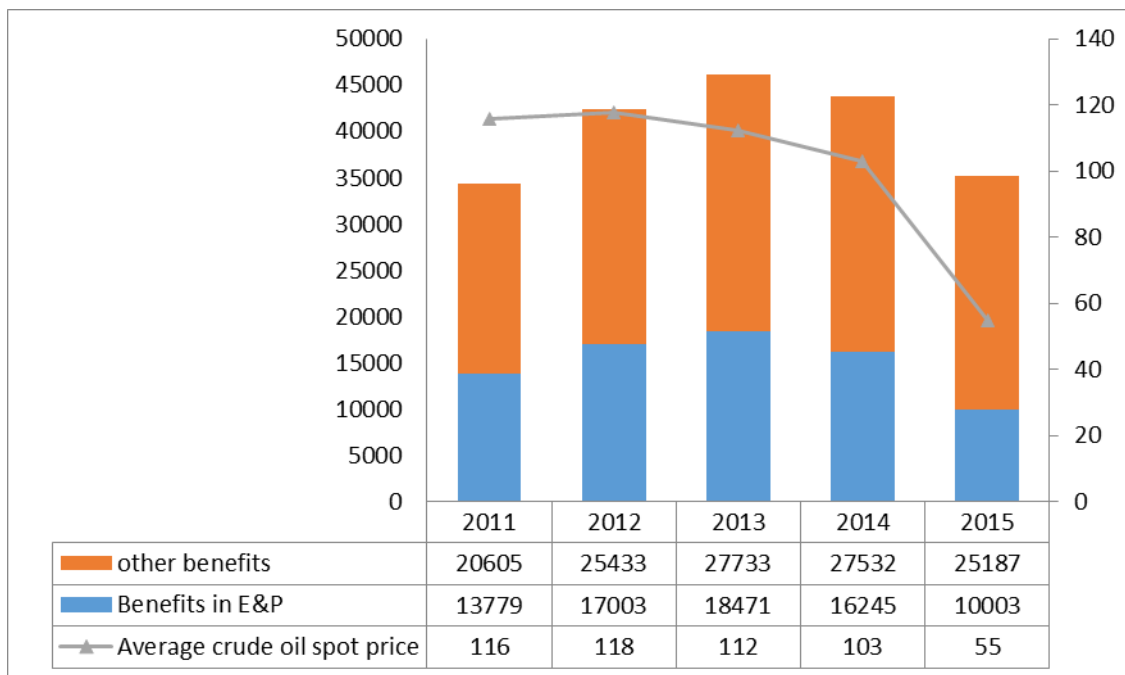


Fig. 4. The graph of PVN benefit variation

3. Solution of PVN

3.1. General purposes

According to analysts, the quick and strong decline of petrol price derives from economics, geography factor in short term, and in the long term the price will recover and increase when the reason for this decline is solved as well as the recovery of global economics and unrenowned characteristics of the petrol.

The solution to the drop of petrol price should be short, medium and long term ones in order to overcome the difficulty, especially the controlling the fund. The production yield of the mines needs to be controlled properly, by ensuring that the exploiting yield is as much as registration to the government; and ensuring properly the balance between the production and price as well as the variation of petrol price in the relevant periods. The mentioned drop is a challenge, but also is a good chance for the company with powerful financial potential and good strategy. Together with reducing the expense to operate and exploit (negotiation/adjustment) is the optimization of the progress corresponding to fund to enhance the project with expense lower than sale price. Projects of exploring and detecting should be approached. Additionally is making good balance to optimize financial and fund.

3.2. Solution to current exploration and exploitation projects

The legal points (the engagement in the contract about sharing production of PSC and request of PVN), equipment, and acceptable risk task are prioritized.

The project evaluating the reserve, or deciding development idea should be taken into account the possibility to develop with low oil price, the orientation of development and aiming to optimize First Oil/First Gas.

To research optimally, reducing the external hire and negotiating with contractor to reduce the research expense can be reached by utilization of human resource.

Other solutions can be optimizing and reducing the expense of exploration, organizing bidding to gain proper price, and considering postponing progress of projects with low potential.

a. Solution to new projects

For developing the new projects: the impact of low petrol price is challenge, but also is the opportunity for companies of petrol. With the current reduction of petrol price, “getting good chance to buy good possession and accepting the risk controllably” is the slogan to determine and sign the contract for new project in order to ensure balance between investment efficiency and financial situation of PVN. Therefore, the following points should be taken into account:

- Focusing on the nations, important sedimentary basins in the location where PVN has projects or high petroleum potential, stable investment and PVN had had the first project
- Concentrating on projects with traditional oil, offshore region with potential, the strategy is going with experienced operation of government
- The chance to buy mine is in high priority (project for development and exploitation): with reserve which is determined from developing projects, preparing for exploiting with proper cost of purchase with current situation of petrol cost (reduce risk of exploring)
- Recognizing the preferred projects based on benefit, the short pay-back period, etc., in financial capacity of PVN
- Updating, predicting the price regularly and controlling the possible chance to conduct up-to-date

b. Solution to development and exploiting projects

For these projects, determining, optimizing the steps for operation and find out solution to reduce expense, the following point will be noted:

- *Capital expenditure (CAPEX)*: controlling articles and selecting the necessary ones
- *Working capital (OPEX)*:
 - + Enhancing the information exchanging between contractor and government in order to utilize the chance for sharing expense: mob/demob, service, equipment, devices, etc
 - + Enhancing the negotiation to reduce price or delay the payment with providers, including all long term signed contracts, such as FSO/FPSO.
 - + Taking into account replacing expat by high quality employee of Viet Nam, adjusting the policy for employee to match with PVN situation upon the decline of petrol, campaign the staffs to save.
 - + PVN aids the contractor to negotiate the price and the chance for sharing the service of the ship and helicopter.

In order to cope with the crude oil price scenario consecutive decline in recent years, PVN has abreast of changes in oil prices to implement timely measures to cope with the worst volatility of the market. According to

the action plan No. 668/CTr-DKVN dated 01.29.2015 and Directive No. 1479 / CT-DKVN dated 03.15.2016 of PVN, there are 9 cutting costs categories as follows:

Table 1. Name the portfolio reduction required by PVN

No	Name list	Reduction targets as required by PVN
1	Fuel costs, raw materials, equipment, energy	Reducing minimum 5%
2	Materials and equipment using in warehouse	Increasing minimum 20% compared to the planned
3	Reduce purchasing new equipment	Reducing minimum 20% to the plan
4	Discounts supplies / equipment	Reducing minimum 5% compared to the contracts signed
5	Self-perform repair and maintenance work	Reducing minimum 20% compared to the planned
6	Negotiating discounts service contracts	
	- For services outside PVN	Reducing minimum 30% compared to the contracts signed
	- For services inside PVN	Minimize to the cost price of products and services
7	Reducing financial costs	Reducing minimum 5% compared to the planned
8	Reducing operating costs/ management costs	Reducing minimum 10% compared to the planned
9	Cost-saving investments	
	- Project cost reduction	Reducing minimum 10% compared to the planned
		Reducing minimum 5% compared to the contracts signed with businesses outside PVN
	- Discount negotiation of service contracts signed	Minimize to the cost price of products and services for businesses inside PVN

According to the above list, all the expenses are adjusted by PVN to the maximum reduction (service costs, the value of contracts signed with businesses outside PVN, repair and maintenance costs, purchasing new equipment costs, etc.)

Table 2. Budget implementation of PVN

No	Name list	2014			2015		
		Budget	Implementation	%	Budget	Implementation	%
1	Exploration	1,270,936,519	1,193,547,554	94	1,223,038,183	839,281,998	69
2	Mining development	1,930,133,948	1,879,451,124	97	1,244,407,406	893,722,982	72
3	Exploited	479,516,711	449,043,533	94	363,577,900	363,700,459	100
4	Operating costs	1,939,713,037	1,653,040,956	85	1,779,221,318	1,441,137,856	81
5	General and Administrative costs (G&A)	225,017,237	255,597,617	114	240,704,419	164,825,256	68
	Total	5,845,317,452	5,430,680,784	93	4,850,949,226	3,702,668,551	76

According to the table 2, almost all the implementation costs were cut down from the budget allocations in 2014 and 2015. Only G&A costs were exceeded budget by 14% in 2014. With the crude oil price scenario decline in 2015, the implementation costs continue to be reduced compared to budget. In detail, G&A costs were biggest reduced by 32%, exploration costs by 31%, mining development costs by 28%, etc. The result is that total cost of implementation was only 76% compared to budget.

4. Conclusion

To sum up, the decline of petrol cost impacts negatively on PVN, and the impact depends on the influenced fields. The PVN has the particular strategies and solutions to confront the impact. However, the solution is relatively general and not for the particular object. Therefore, the authors propose 3 solutions to particular contract and project in order to minimize consumption and boost efficiency of PVN.

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International Conference on Economic Management in Mineral Activities (EMMA)

Application of Business Model Canvas to strategic management and planning of Vang Danh Joint Stock Company, Vinacomin

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Abstract

In this article, the author uses the contents of the business model canvas which is developed by Alexander Osterwalder. The canvas offers a big picture about how a company is doing its business through nine strategic blocks: Customers, Value Proposition, Customer Relationship, Key Activities, Key Partners, Key Resources, Channels, Revenue and Costs. Those are the most important factors that a manager of any business needs to consider when managing its business. A case study of Vang Danh Joint Stock Company is also presented in the article. Conclusions are drawn based on analysis of business model canvas of the company.

Keywords: Business model canvas; strategy; planning

1. Introduction of business model

A business model describes the rationale of how an organization creates, delivers and captures value. A business model is the way in which a company generates revenue and makes a profit from company operations. Analysts use the metric gross profit as a way to compare the efficiency and effectiveness of a firm's business model. The business model concentrates on value creation. It describes a company or organization's core strategy to generate economic value, normally in the form of revenue.

The model provides the basic template for a business to compete in the market place, it provides a template on how the firm is going to make money, and how the firm will work with internal players (firm's employees and managers) and external players (stakeholders such as customers, suppliers, and investors). Business models are an essential part of strategy – they provide the fundamental link between product markets, within the industry, and the markets for the factors of production such as labor and capital. Therefore, it is of great importance to understand the business model of any business. In this paper, the author introduces the Business Model Canvas (BMC).

2. Business Model Canvas

The Business Model Canvas is a strategic management and planning template for developing new or documenting existing business models. It is a visual chart with elements describing a firm's or product's value proposition, infrastructure, customers, and finances. It assists firms in aligning their activities by illustrating potential trade-offs. The Business Model Canvas was initially proposed by Alexander Osterwalder based on his earlier work on Business Model Ontology. Since the release of Osterwalder's work in 2008, new canvases for

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specific niches have appeared, such as the Lean Canvas. The Business Model Canvas reflects systematically on business model, freely to map each of its elements to real business components.

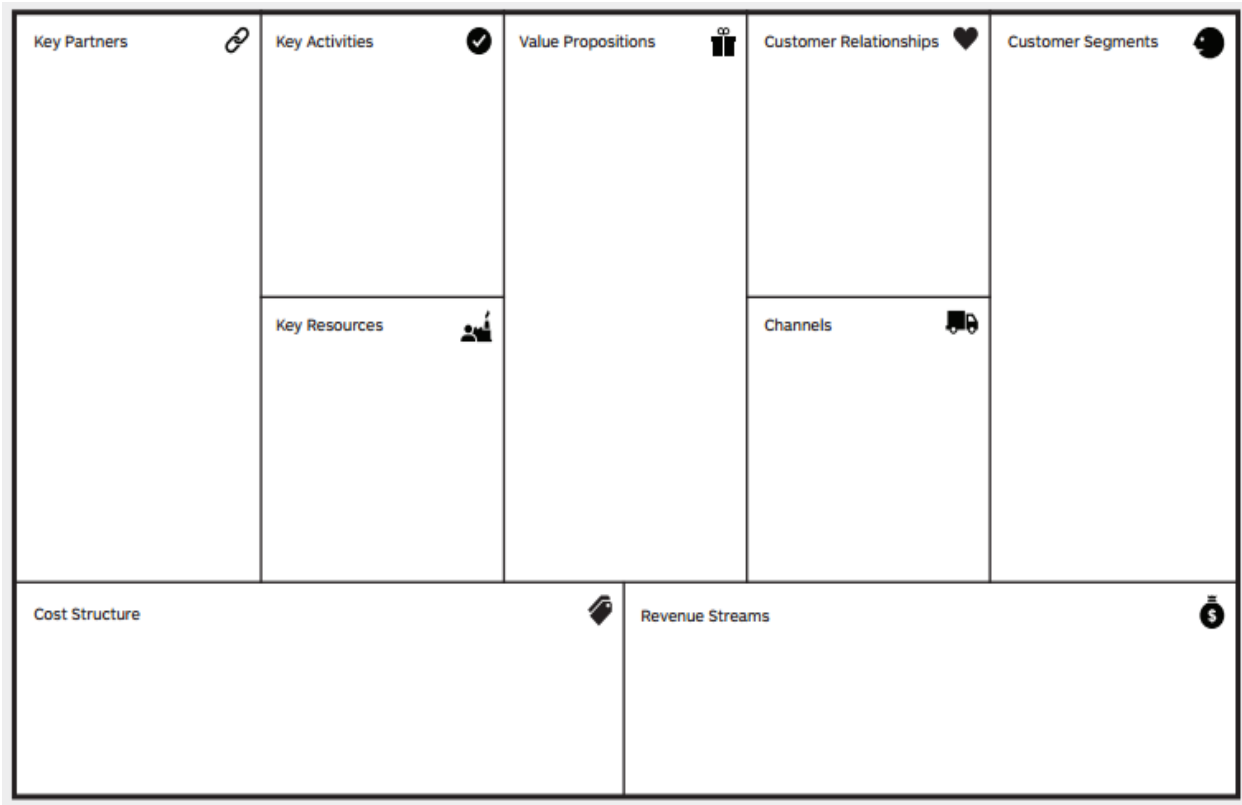


Fig. 1. Components of Business Model Canvas

Source: A Osterwalder, Y Pigneur – 2010, *Business model generation: a handbook for visionaries, game changers, and challengers*, p. 32.

The business model canvas contains 9 blocks which represent for 9 elements, which include: Customers, Value Proposition, Customer Relationship, Key Activities, Key Partners, Key Resources, Channels, Revenue and Costs.

2.1. Customer Segments (CS)

Customer segment defines the different groups of people or organizations a company aims to reach and serve. Customers comprise the heart of any business model. Without (profitable) customers, no company can survive for long. In order to better satisfy customers, a company may group them into distinct segments with common needs, common behaviors, or other attributes. A business model may define one or several large or small Customer Segments. An organization must make a conscious decision about which segments to serve and which segments to ignore.

Customer groups represent separate segments if:

- Their needs require and justify a distinct offer
- They are reached through different Distribution Channels
- They require different types of relationships
- They have substantially different profitabilities
- They are willing to pay for different aspects of the offer

2.2. Value Propositions (VP)

The collection of products and services a business offers to meet the needs of its customers. According to Osterwalder, (2004), a company's value proposition is what distinguishes itself from its competitors. Value proposition describes the bundle of products and services that create value for a specific Customer Segment. The Value Proposition is the reason why customers turn to one company over another. It solves a customer problem or satisfies a customer need. Each Value Proposition consists of a selected bundle of products and/or services that caters to the requirements of a specific Customer Segment. In this sense, the Value Proposition is an aggregation, or bundle, of benefits that a company offers customers. Some Value Propositions may be

innovative and represent a new or disruptive offer. Others may be similar to existing market offers, but with added features and attributes.

2.3. Customer Relationships (CR)

Customer relationships describes the types of relationships a company establishes with specific Customer Segments. A company should clarify the type of relationship it wants to establish with each Customer Segment. Relationships can range from personal to automated. To ensure the survival and success of any businesses, companies must identify the type of relationship they want to create with their customer segments.

2.4. Channels (CH)

Channels Describe how a company communicates with and reaches its Customer Segments to deliver a Value Proposition. Communication, distribution, and sales Channels comprise a company's interface with customers. Channels are customer touch points that play an important role in the customer experience. A company can deliver its value proposition to its targeted customers through different channels. Effective channels will distribute a company's value proposition in ways that are fast, efficient and cost effective. An organization can reach its clients either through its own channels (store front), partner channels (major distributors), or a combination of both.

2.5. Key Partners (KP)

Key partners describe the network of suppliers and partners that make the business model work. Companies forge partnerships for many reasons, and partnerships are becoming a cornerstone of many business models. Companies create alliances to optimize their business models, reduce risk, or acquire resources. We can distinguish between four different types of partnerships:

- Strategic alliances between non-competitors
- Competition: strategic partnerships between competitors
- Joint ventures to develop new businesses

2.6. Key Activities (KA)

Key activities describe the most important things a company must do to make its business model work. Every business model calls for a number of Key Activities. These are the most important actions a company must take to operate successfully. Like Key Resources, they are required to create and offer a Value Proposition, reach markets, maintain Customer Relationships, and earn revenues. And like Key Resources, Key Activities differ depending on business model type.

2.7. Key Resources (KR)

Key resources describe the most important assets required to make a business model work. Every business model requires Key Resources. These resources allow a company to create and offer a Value Proposition, reach markets, maintain relationships with Customer Segments, and earn revenues. Different Key Resources are needed depending on the type of business model. A microchip manufacturer requires capital-intensive production facilities, whereas a microchip designer focuses more on human resources. Key resources can be physical, financial, intellectual, or human. Key resources can be owned or leased by the company or acquired from key partners. Questions to be answered:

- What Key Resources do Value Propositions require?
- What Key Resources do Distribution Channels require?
- What Key Resources do Customer Relationships require?
- What Key Resources do Revenue Streams require?

2.8. Cost Structure (C\$)

Cost structure describes all costs incurred to operate a business model. This building block describes the most important costs incurred while operating under a particular business model. Creating and delivering value, maintaining Customer Relationships, and generating revenue all incur costs. Such costs can be calculated relatively easily after defining Key Resources, Key Activities, and Key Partnerships. Some business models, though, are more cost-driven than others. So-called "no frills" airlines, for instance, have built business models entirely around low Cost Structures.

2.9. Revenue Streams (R\$)

Revenue stream represents the cash a company generates from each Customer Segment (costs must be subtracted from revenues to create earnings). If customers comprise the heart of a business model, Revenue Streams are its arteries. A company must ask itself, for what value is each Customer Segment truly willing to pay? Successfully answering that question allows the firm to generate one or more Revenue Streams from each Customer Segment. Each Revenue Stream may have different pricing mechanisms, such as fixed list prices, bargaining, auctioning, market dependent, volume dependent, or yield management.

3. Application of Business Model Canvas to Strategic Management and Planning of Vang Danh Coal Joint Stock Company, Vinacomin

3.1. Introduction of Vang Danh Coal Joint Stock Company

Vang Danh Coal JSC (TVD) is engaged in the exploitation, processing and trading of various types of coal. TVD's products include cobbles, dust-coal, peat-coal and other kinds of minerals. TVD is also involved in the construction of mining structures and the trading of construction materials. TVD's other activities include the loading, unloading and transportation of coal, as well as the repair of mining equipment and vehicles. TVD is based in number 185, Nguyen Van Cu Street, Vang Danh Ward, Uong Bi District, Quang Ninh Province, Viet Nam.

3.2. Several business indicators and business performance of Vang Danh Coal Joint Stock Company

Table. 1 Several Business Indicators and Business Performance of TVD

Business Indicators	Year 2014	Year 2015
Total Asset (billion Vnd)	1,891	2,265
Short-term Asset (billion Vnd)	598	482
Long-term Asset (billion Vnd)	961	1,783
Debts (billion Vnd)	1,442	1,799
Ownership equity (billion Vnd)	449	466
Revenue (billion Vnd)	3,309	3,494
Profit after taxes (billion Vnd)	57	94
ROA	0.03	0.04
ROE	0.1269	0.2017

Source: TVD's financial publications

3.3. Application of Business Model Canvas to Vang Danh Coal Joint Stock Company

Theory of business model canvas (BMC) is applied to Vang Danh Coal Joint Stock Company (TVD). The BMC is presented by the Fig. 2. The business model canvas offers the general figure of how the company is running. It also provides strategic thinking about how the company should behave in the business environment. Specifically, one of the most important factors regarding any business is value proposition, which is the value that company delivers to customers. TVD provides customers with high-quality coal and super distribution channels. Regarding to cost structure, in 2015, proportion of materials, labor, fixed asset depreciation, outsourcing & utility and other costs are 25%, 38%, 12%, 10% and 15% respectively. In total, material and labor costs make up more than 50% of the total costs. Strategically, the company have to reduce the proportion of materials and labor costs to other costs. Besides, key resources include: more than 90 million tons of coal available; 140 thousand residents around the coal seams providing many workers; developing organization structure; resources allocated from Vinacomin; high-skilled workers; enough capabilities for large scale coal production. However, there should be more developments on technologies to better production. Another important resource is human resource can be evaluated and developed if the company focuses on training and educating labor. Refer to channels, it is one of company's strong point because the company has access to 3 main transporting means including river, high-way and trains. Key partners include Vinacomin, Vinacomin - Environment management company, Thermal power joint stock company, Mao Khe engineering plant, Yen Cu Materials production companies, Quang Ninh Cement and Construction Joint Stock Company and other companies under Vinacomin. However, under ownership of Vinacomin, the company is delivering values in accordance with Vinacomin value allocation policies. As can be seen, from the strategic point of view, the company is strictly controlled by Vinacomin. Under this management, it is really difficult for the company to have its own strategic development. Almost all coal that is exploited by the company is sold to Da Bac Logistics

Company. In the same way, almost all suppliers of the company are Vinacomin-owned companies. It means that the business model canvas offers no strategic value to customer relationship and customer segments. Those are also the limitations of this research.

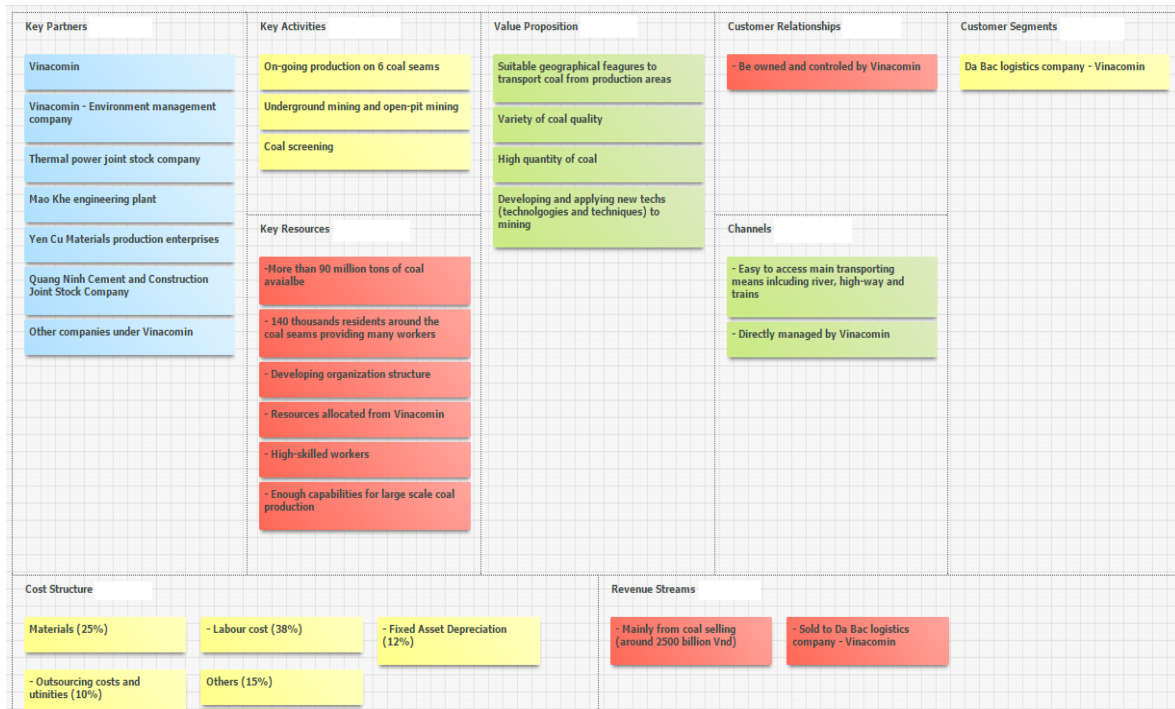


Fig. 2. Business Model Canvas of Vang Danh JSC

4. Conclusion

The business model canvas offers the big figure about how the company is making money. It is important to understand that there are several special characteristics of mining companies under Vinacomin and these characteristics hamper the author from truly grasping all values from the business model canvas. However, the canvas still contributes value to research because it helps to clarify other blocks, which are included in the business model.

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International Conference on Economic Management in Mineral Activities (EMMA)

Deployment of integrated information systems in the Viet Nam National Coal - Mineral Industries Holding Corporation Limited– Opportunities and Challenges

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Abstract

Management information system is an essential part of enterprise management system. Information and data which are output to support decision-making process according to each managing field are stored and processed in separate information system. Many disadvantages consequently come from separated database and difficulties in sharing information among company's management functions. With the development of modern information technology, the birth of integrated information systems helps to solve the disadvantage of separate information systems. This system which is established based on overall approach in managing the whole companies integrates information from many sources and synthetic functions for the purpose of sharing information resource with all parts of organization. However, the implementation of this system is very difficult because of many reasons. In 2010, the Viet Nam National Coal – Mineral Industries Holding Corporation (Vinacomin) set up a project aiming at implementing this system but it was unsuccessful. This paper discusses about challenges and opportunities of Vinacomin and suggests the solutions to successfully deploy the integrated information system in Vinacomin in future.

Keywords: Management information system; Integrates information system; opportunities; challenges

1. Some basics of integrated information systems

For business operations, companies need to do a lot of different administrative functions. Typically, the information supporting decision-making in each administrative function are handled and processed separately within its corresponding management information system, which is not shared with other systems. However, to make decisions, senior leaders and managers need overall information, which can be obtained from many different management information systems. On the other hand, processing information in this system may required information provided by other systems. In other words, the output of this information system may be the input of other information systems. Similarly, the information updated in a certain stage of the information system instantly become general information for others people in the same line of work. Those people rely on this new information and the new status of the job to make suitable decisions. Finally, coordination of the operation on the same information system will help reduce, eliminate sometimes unnecessary conveyance via printed materials, telephone, or meetings. That requires the integration of information from different systems.

Integrated information systems are management information system that integrates information from multiple sources and aggregate functions to share information with all business units in the organization. That is a solution, which consists of multiple modules to simulate and manage activities of companies with standard procedures. Therefore, integrated information system is built based on the overall approach of the management of company-wide level and integration of information of all functions of the company from the beginning into a supporting system of processing information at company level. This is a cross-functional system rather than the software to "pair" the outputs of the individual systems.

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The most distinctive feature of integrated information systems in comparison with many other existing separate management information systems (such as financial management information system, human resource management information system, equipment warranty and maintenance information tracking system, material supply chain management information systems) is the integration aspect. Integrated information systems can be seen as a system that uses only one software and its modules perform the same functions as the separate management software, but this module can also do more in the integrated environment. Integration feature of this information systems are called "organic whole" feature as those modules have tight relationship with each other like the parts of our bodies. Because of this fundamental difference, the approach to build integrated information systems and the understanding of the integrated information system's software also differ from those of the regular information system's software.

In the integrated information system, the information is shared between different parts of the system. Information entered in one place and used everywhere of entire system. Therefore, together with the overall solution of the information system, there should be an innovation in the management method. The management is conducted by processes from tracking information about potential customers, requirements of potential customers to signing and implementing contracts, as well as planning production to implement its commitments to customers, retain customers and expand market share with a minimum time of inventory and reasonable cash flow cycle.

The important features of integrated information systems are: (1) The entire system uses a common database with data clearly defined when building the database structure. That is, all data arising from daily administrative functions of the business will be entered once and only once in a common database. Each functional information system no longer occupies its own private data. The program modules of each function, if necessary, can access to the database to obtain the necessary data for its management objectives. Processing results can be easily shared between modules. In the integrated information system, data are no longer processed in batch, but instead, in real-time and online.

The integrated information system has many advantages: (1) The senior managers can access to all "instant" information in all aspects of business in relation to others rather than the individual pieces of information; fully focus on solving requirements for information processing at all 3 levels of leaders, managers and executors. Integrated properties, created due the tight relationship between modules, help solve the isolation, interrupted or "congestion" between the parts in the process of interaction and communication. The information is automatically rotated between the process steps and is strictly controlled. The information is now centralized, complete, available in time and able to share with everyone who needs information such as customers, partners and shareholders. The leaders also easily control the entire operation of the business through a centralized database and a centralized business processes. (2) The integrated information system uses only one unified common database for all modules and all sub-systems based on "data-centric" point of view. As a result, it is possible to reduce input costs, ensure the consistency and accuracy of baseline data, eliminate the errors that may occur when there are multiple data entries. Workflow speed is increased; Blockages due to the use of asynchronous software in the company is no longer occurs; Minimize the cost of database management; provide accurate data in time for leaders. As a result: the data can be analyzed in various perspectives (possibly called "data mining") to provide the report that support business decision - making.

2. The status quo of the information system of Viet Nam National Coal-Mineral Holding Industries Corporation Limited

The status quo of Vinacomin's information systems are assessed based on their components including human resource, database, communication system, software resource and hardware resource.

Although, the annual total spending on information systems across then corporation is about VND 68 bil. (about VND 30-40 billion of which are funds from member units), accounts for 0.08% of revenue and 0. 1% of the total cost, it is still low compared to those of other firms in the world with average expenditure of 1-1.5% of revenue and in the other Vietnamese ministries with the cost accounting for not under 1% of total cost). However, spending on human resources accounts for only 1-2%, for software is 38% and the rest is spending on hardware. The statistics are compiled in Table 1.

Table 1. Detailed investment in information system of the Viet Nam National Coal-Mineral Holding Industries Corporation Limited

Nº	Indicator	Value (million VND)	Ratio (%)
	Total spending on information system	67,373	100
1.	Spending on hardware	39,094	58
2.	Spending on software	27,307	41
3.	Spending on human resource development	972	1

Source: Vinacomin, Science, Information Technology and Development Strategy Division, Overview report on the application and information technology development of in Vinacomin, March 2016, Hanoi

With imbalanced investments between its components, the information systems of most companies in the corporation do not promote the application of modern information technology. This causes a huge waste.

Human resource of the information systems includes specialized staff (specialists in information technology) and the end users of the information system (data - processing staff, report - preparing staff at the functional departments). However, with such a low level of investment in human resources, human resource of the information systems in Vinacomin still limited. The ratio of companies in the Vinacomin having specialized staff in information technology and communications is less than 57%. The number of specialized staff of information technology accounts for 0.15% of the total employees in Vinacomin. Most of end users of the information systems are not trained basically for using of hardware and software technology. Instead, they learn by themselves and slowly accumulate practical experience.

With relatively large investments in total expenditures for information technology, hardware and communication systems of Vinacomin are quite modern. At the functional departments of companies, almost every employee is equipped with 1 computer and the entire system are networked with a local area network (LAN), wide area network (WAN) or Internet. The parameters of the network connection are shown in the table 2.

Table 2. The status quo of the network connection of the Viet Nam National Coal-Mineral Holding Industries Corporation Limited

Nº	Indicator	Ratio (%)
1.	Average number of computers per staff	13,4
2.	Rate of units having LAN	100
3.	Rate of units having WAN	36
4.	Rate of units having broadband internet connection	100
5.	Average number of computers connected to the internet	89
6.	The rate of units equipped with firewalls and anti-virus	41
7.	The rate of units equipped with backup storage system	14
8.	The rate of units equipped with network security technology	27

Source: Vinacomin, Science, Information Technology and Development Strategy Division, Overview report on the application and information technology development of in Vinacomin, March 2016, Hanoi

All companies in Vinacomin have built their own information systems in each administrative functions. Data processing to prepare reports, provide information and support decision - making has been done manually in some information systems, but conducted using corresponding processing software in most of the systems. Information systems for financial management, cost management, human resource management, are systems using specifically designed software. The rest use general software designed by Microsoft. The statistics are compiled in Table 3:

Table 3. The status quo of the network connection of the Viet Nam National Coal-Mineral Holding Industries Corporation Limited

Nº	Applications	Rate of used units (%)
1.	Accounting software	83
2.	Material management software	51
3.	Human resource management software	74
4.	Mine design, mine surveying, mine geology software	46
5.	Electronic office software	26
6.	GPS Automotive management software	9
7.	Payroll software	17
8.	Statistical software	17
9.	Cost estimate software	9
10.	Cost and production cost management software	9

Source: Vinacomin, Science, Information Technology and Development Strategy Division, Overview report on the application and information technology development of in Vinacomin, March 2016, Hanoi

Although most of the Vinacomin's units have been step by step deploying application software which are developed spontaneously, not according to the standard of the whole corporation, the synchronization and exchange of information between Vinacomin's agencies and its units are very difficult. The software used for

the whole group is limited, the technology management application software and specialized applications are very limited (<10% of the units).

On the other hand, each application software is deployed in each separate information system, holding its own data, does not share information between functions. Meanwhile, companies are unified between management functions, information should be shared with each other, the output of this information system can be the input of other information systems. The existence of separate information systems with their own software according to their administrative functions is the biggest disadvantage of the information systems in Vinacomin.

3. The opportunities and challenges of integrating information systems in Vinacomin

3.1. The opportunities

To deploy an integrated information system, Vinacomin has great opportunities both from external and internal environment, including:

1. The strong evolution of information technology and communication creates opportunities for Vinacomin to easily access to the latest modern technology, which helps Vinacomin build its own modern information systems.

2. The well-known domestic and foreign software companies such as Oracle, SAP, FPT, AZ Solution ... had meetings with the Vinacomin's Science, Information Technology and Development Strategy Division to study the status quo of the corporation's information systems and proposed suitable integrated information system models for Vinacomin.

3. Vinacomin's business environment has changed: In the trend of globalization, Vinacomin increasingly expands the relationship with domestic and overseas partners. As those partners have developed modern information and communication technology applications for their transactions, Vinacomin is required to have compatible changes.

4. The Vinacomin's leaders are rejuvenating. They have the opinions and mindset on business management based on modern technology. The application of modern information technology to business operations is increasingly appreciated. They clearly recognized the advantages of information technology applications in production administration. Especially, with integrated information systems, leaders can get full information about all aspects of Vinacomin's business operations anytime, anywhere, providing the foundation for executive decision making.

5. Finally, in Viet Nam, there are a lot of large and small companies, such as Vinamilk and Petrolimex, successfully deploying integrated information systems. The study of how those companies have implemented their integrated information system helps Vinacomin obtain valuable lessons, which ensures that Vinacomin will deploy its own integrated information systems quickly and most effectively.

3.2. The challenges

The above analysis has shown the need to integrate information systems in each company of Vinacomin and advance to a common unified system the whole Vinacomin. However, to achieve this, not only Vinacomin but also each Vinacomin's company faces many challenges including:

1. System of policies and procedure for information technology development in the whole Vinacomin is still weak. The common procedure and regulations are not developed. There are needs to have more standardizations in companies under Vinacomin. This is the biggest challenge and also the biggest obstacle for the implementation of integrated information systems.

2. Human resources of the existing information systems are still limited, posing a difficulty in deploying integrated information systems. The staff not only has limited professional qualifications but also are reluctant to change from the old familiar information system to new integrated information system, in which everything is standardized (from the process to working style). It is clear that, the software change is not as important as the staffs' change themselves to take advantage of the software. When integrated into a single system, the weakness of a link in the system can affect the entire system.

There is another challenge which is also related to human resource of the information system. That all income and expenses are managed closely, transparently and clearly in the integrated information system making corruption unlikely. As this can reduce "under-the-table" income of some people, they refuse to use this new system.

3. In the currently difficult time of the coal industry: The coal, which has not been processed, is approximately about 9-10 million tons; unit product cost keeps increasing; mining conditions become more difficult, coal price in the domestic market did not increase; The National Energy Securities Policy does not allow Vinacomin to export coal, ... then the deployment of an integrated information system worth millions of US dollar is also a big challenge.

4. Another challenge may arise from the modules of the integrated information system. The reason is that as the deployed integrated information systems does not fully meet their requirements, companies may use additional software to ensure smooth operation. At that time, data exchange problems arise and the challenge is how to combine the integrated information systems with external solutions from the data exchange to working procedures.

5. The last challenge related to the leaders: Leadership do not always thorough understand integrated information system and have company management mindset based on modern technology. They know their requirements and direct the specialized information technology department to implement it. However, this department does not completely understand the procedures and requirements of the company so they may have the problems in the deployment process. That may be the reason why the implementation of the integrated information system may not meet the requirements of companies.

4. Conclusions and Recommendations

The paper analyzes the current status of the information systems of Vinacomin's companies. The content focuses on the components of the information system: human resources, hardware, software, data storage and communication systems. The paper also points out the disadvantages of the existing separate information systems for each administration function and suggests the need to integrate those separate systems in a unique solution: integrated solution. However, to deploy integrated information systems, Vinacomin will face many challenges and opportunities that were indicated in the paper.

To implement integrated information systems, Vinacomin should:

Have an explicit commitment, throughout the various levels of the whole system, on consistency of and concentration in information system development, especially standardization throughout Vinacomin.

Seek advice on information technology development strategy and choosing the right solution for Vinacomin from an independent consultant specializing not only in the field of information technology, but also in the field of mining and mineral processing.

Consult with experts on building strategic management models; complete and unify internal management processes.

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A review at internal economic accounting regime of Viet Nam mining companies

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Abstract

The article presents an overview of the formation and development history of the Internal Economic Accounting Regime in general and in Viet Nam mining companies in particular and figures out issues that need further research for completing Internal Economic Accounting Regime in subsidiaries of Viet Nam National Coal - Mineral Industries Holding Corporation Limited (Vinacomin) as a practical economic management regime.

Keywords: Internal Economic Accounting, Socialism Business, Accounting Regime

1. Foreword

Economic Accounting was first introduced in the 1920s of the previous century in the former Soviet Union as proposed by V.I. Lenin under the Russian term “хозрасчет”, which mean employer’s approach of calculations. This term carries the key ideal of economic accounting as the management regime which helps to remove the government subsidizing role and at the same time uphold the employer role of collective labors in the management of state-owned companies. In the Chinese Literature-Vietnamese dictionary, economic accounting is defined as the “loss-gain trading approach”. This definition at first might seem to conflict with the essence of all companies in the market economy. However, it links closely with the situation of the Soviet Union’s centralized bureaucratic economy at that time, when most of companies were state-owned ones. Economic accounting by the Soviet Union was driven by the following objective premises:

- The government had socio-economic development plan which was the foundation for planning in each company.
- The monetary stability and a reasonable system of prices were the basis for accuracy of wastes or savings.
- The principles of operation of the Economic Accounting Regime in the Soviet Union and what has been being applied in Viet Nam also include:
 - To ensure self-control in business operations of company;
 - To ensure receivables to cover expenses and profit;
 - Companies are encouraged with materialistic benefits and also materialistically responsible for their business performance;
 - To manage all business operations in terms of finance.

In Viet Nam, the Economic Accounting regime was officially applied in 1957. In 1987, by the enforcement of the Party Central Committee of the Vietnamese Communist Party, and the government (Ministries Council), economic accounting was recapped under the term “Socialism Business Accounting Regime”. Since entering into Viet Nam, despite of the fluctuation, economic accounting shows its suitability in state-owned companies, bringing certain efficiencies.

It is important to distinguish two concepts, namely “Economic Accounting regime of the state” and “Internal Economic Accounting regime”. Economic Accounting regime of the state is established by the government, promulgating the relations between the state and state-owned companies in implementation of economic

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accounting principles. Meanwhile internal economic accounting is a mechanism that applies the principles of Economic Accounting regime of the state, providing for the relations between company directors and other business departments as well as the relations among them.

Since Viet Nam joined the market economy (1990), both Economic Accounting regime of the state and Internal Economic Accounting naturally existed in the economy, however they have not been documented. Although Viet Nam National Coal - Mineral Industries Holding Corporation Limited - Vinacomin had not issued any regulations on Internal Economic Accounting at time of its establishment (1986), “planning expenditure” was assigned in its subsidiaries. The Economics-Business Management Faculty of the Hanoi University of Mining and Geology has developed many research on internal economic accounting. However, there are some subjects that need to be further examined in order to improve internal economic accounting the Vietnamese mining companies.

2. Discussion

2.1. Terms and definition

Science is like a river flow which has its origin, inheritability, continuity and different branches. The term is like “a brick” of the science world and it is not an exception. Acknowledging this will help us inherit scientific achievements of the forerunners. A term may differ from countries to countries; however, its connotation should remain consistent as long as there is no change in the phenomenon or things it represents. The Accounting Law (2003) includes 2 terms: Financial Accounting and Management Accounting. According to the definition in Article 4 of the law, Management accounting has similarities with Economic Accounting and other definitions given by the UK, French, and US authors. Even the terms associated with Economic Accounting namely regime, method or mechanism are not yet fully agreed. This proves that it is necessary to have scientific research on terms and definitions of Economic Accounting. In this article, the term “Internal economic accounting regime” is used, maintaining the economic accounting principles originally proposed by the former Soviet Union economists (English terms mentioned above are explanations of the authors).

2.2. Clarification of the current objective premises of internal economic accounting

The previous premise of economic accounting which were considered as objective under the views of the former Soviet Union economists are actually an assumption. It was thought that the state was the key element, assuring the socioeconomic development to happen in accordance with an appropriate plan, maintaining stable prices, etc. This was even true at a specific point in the past but lasted not so long. People who lived in the former Soviet Union in the 1960s-1980s must have been impressed by plenty of goods sold with fixed prices and remain mostly unchanged. However, the stable prices become impossible in an economic market which integrates deeply into the global market. Since Viet Nam first entered the economic market, the state economic plans gradually less mandatory enforcement in setting targets for companies. In contrast, state economic plans set general orientation for a specific economic zone or sector. The currency was subject to constantly fluctuating, primarily was devaluated due to various causes. Therefore, the objective premise of Internal Economic Accounting today has to be the economic market with its essential principles. To adapt with this premise, each company needs to develop its business plan closely with market demands, market prices, and its own competence. This is a real challenge to companies’ managers and especially to Vinacomin. The corporation should take the prime responsibility as it functions as plans development and coordinates the plans of member companies (subsidiaries) with the controlling interest companies. Currently Vinacomin is still well positioned for Internal Economic Accounting since its subsidiaries remain largely state-owned companies or controlling interest companies. There are still disadvantages remaining from the old business operations and they are objective causes significant instability impacts on production and management.

2.3. Internal Economic Accounting has to be a systematic management regime

It is not clear why the term “Internal Economic Accounting” is replaced with “Contracted expenditures” in Vietnamese mining companies. Though they are only terms, the replacement proves that the systematic of Internal Economic Accounting has not been considered importantly. Both theory and practices have shown that to ensure practical performance of Internal Economic Accounting, it is necessary to combine comprehensive elements such as planning – norms – contracting – measuring – statistics – inspecting – analyzing – salary and bonus distribution – information – cooperation, etc. “Contracting” is obviously a procedural element in the contracting between subject and object of accountancy. It can be said that there are disadvantages in all of the above mentioned elements, negatively impact on Internal Economic Accounting.

2.4. Selection of subject and object of Internal Economic Accounting

The subject of Internal Economic Accounting can be individuals, production units, departments, etc. Leaders assign their direct inferior subject with accounting targets. Depending on ways of combinations, different levels of Internal Economic Accounting can be created. Due to typical technologies and production organization in coal mining companies of Vinacomin, Internal Economic Accounting is primarily done at production (or equivalent) level, where the object is the director of a company and the subject of accounting are a forerunner and all workers of this production unit. This is an appropriate choice in terms of subject of accounting, human resources management conditions and space, and equipment, etc. Once the production lines are modernized with advanced technology renovation, the subject of accounting should come close to production team or individual workers. The current level of accounting does not involve administration/management departments, administration/management service staff. The recent restructuring Vinacomin resulted in certain changes in the roles and responsibilities of administration departments that need to be taken into account.

2.5 Enhancement of norms

The premise of Internal Economic Accounting is the system of the economic-technical norms, since these norms determine the maximum labor and materials cost needed for each product. This system is the fundamentals for defining planned targets, contracted targets for production units. Since Viet Nam's transition to economic market, economic-technical norms had changed from governmental administration to company management (either by determined by the company or by external parties). Companies are incompetence in the building, inspecting, and evaluating the norm quality and its adjustment. It is popular to use experience and estimate in determinate norms, especially labor norms. The phenomenon of "scoring" the work of labor to reflect the labor costs is also popular despite of its disadvantage in connection with labor norms. The norm system is also lack of conversion factors from reality to standard conditions. The bidirectional gap between the accounting cost per unit and market prices is still large, which may distort saving or waste analysis, and thereby affecting equal income distribution.

2.6. Selection of scope of Internal Economic accounting targets

It is important to distinguish planned targets and accounting targets (normally monthly targets). At production units, the targets may be relatively comprehensive so as they are compatible with company's overall plan. However, it is not required accounting targets to be as comprehensive as planned targets and the following principles:

- To assign targets that can be managed in production units (the targets can be monitored, collected, analyzed, and influenced)
- To support other targets to be implemented
- To support an equal and appropriate income distribution.

To ensure the principle of managing all companies' activities by money, monetary targets cannot be ignored. However, this does not mean all expenses are collected. In companies that apply contracted expenses, depreciation costs tend to be included as an accounting target, but it should be a parameter of income distribution.

2.7 Finalization income distribution methods of income distribution in production units

There are two methods: (1) income is distributed from company profit to its production units and (2) income is distributed from each production units to its own employees. By source of income, the above methods can be classified into wage-based income distribution method and bonus-based income distribution method. These methods both have input information such as total income, unit cost, completed work volume; additional factor on work under or exceeded plan, labor safety, work quality, roles/importance of departments and compensation for internal cooperative units, etc.

Formula for income distribution is developed under the following principles:

- The subject of accounting is provided with sufficient information in time
- Additional factors are from scientific basis, without double counting
- Formulas have to be published in Internal Economic Accounting regime and periodical revised.

At the moment the available additional factors are not scientific based which fail to encourage all direct employees, encouraging young and creative employees, and having full effects on work quality and occupational safety and health management, etc.

2.8 Applying advanced informatics technology achievements

An important element of Internal Economic Accounting is information, which is required to be accurate and in time providing, meeting the needs of both subject and object of accounting. Application of advanced achievements in Internal Economic Accounting needs to meet the following specific objectives:

- Appropriate information flowchart
- Contributing to reduced labor cost in information usage and processing, and eliminating using documents and procedures
- Improving measurement, statistic, storage, communication, and analysis of both subject and object of management.

3. Conclusion

There is not much specific software available for economic staff of production units and foremen. Despite of periodical workshops on cost management, the internal economic accounting has not achieved its goal of fast and accurate quantification of costs' fluctuation, assessment of impact factors on the fluctuation. Consequently, it is difficult to select optimal solutions for internal economic accounting. These issues require further cooperate research by informatics technology experts and the subject and object of Internal Economic Accounting.

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Using Balanced Scorecard in assessing business performance in coal mining companies

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Abstract

Traditional business performance is assessed with indicators such as profit, return on assets (ROA), return on equity (ROE), etc. However, these indicators used in coal mining companies do not ensure the overall assessment in relation with effective operation of the processes in production and business, the link between performance objectives and resources. This article presents a tool for assessing business performance using the Balanced Scorecard which is expected to help companies have an overall view on their performance in relation with causes and effects so that they can build long-term goals and take advantages of the market to achieve their goals.

Keywords: business performance assessing; coal mining enterprises; Balanced Scorecard.

1. Traditional business performance assessing in coal mining companies

Doing business in the condition of limited non-renewable input, fixed prices, companies set up their business goals to maximize outputs at the lowest cost or, in other words, reach their business targets.

Currently, the assessment of business performance of the coal mining business is done mainly through past data system on the basis of comparison between the outputs and value (revenue) of the business process in a period of time with the cost of in-kind (average number of employees, short-term and long-term value of assets) and cost to produce outputs. Depending on the comparison, the business performance is determined as follows:

- Profit indicators: Return, return on investment (ROI), return on equity (ROE), return on assets (ROA), earnings per share (EPS), etc;
 - Performance indicators: efficiency of short-term and long-term investment, and short-term capital turnover ratio, etc;
 - Expense indicators: expenses of short-term and long-term investment;
- However, assessment based on those indicators has following disadvantages:
- System of indicators used to assess the effectiveness of business which only reflects the final results of the business operations, cannot figure out the effectiveness of business processes. This leads to difficulty in recognizing weaknesses as a basis to bring in solutions to improve business performance of the company.
 - Performance indicator of efficiency does not reflect the development objectives of the business and its strategies or effectively linked the activities of the business units with the performance of the business. Therefore, it is difficult to develop a system of solutions to improve business efficiency.
 - Indicator system made up of the financial ones only is not really sufficient. With coal mining companies, the indicator reflecting the efficiency of the operation and management of production activities and those non-financial should be counted on because these are the two basic activities reflecting business performance of coal mining companies.

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2. Business efficiency of coal mining companies using BSC

2.1. Balanced scorecard model

According to the viewpoint that business efficiency of companies should not only be assessed purely based on the financial aspect but also needs to be assessed comprehensively on the basis of combination of financial and non-financial indicators such as the values offered to customers, society, the good results that companies achieve from the improvement the internal process, the quality of labor and increase organization's management efficiency. The concept of 'Balanced Scorecard' was first introduced by two professors of Harvard University - Robert S. Kaplan and David P. Norton - in 1992. The Balanced Scorecard model has four perspectives of finance, customer, internal processes and learning and development. Balanced scorecard model is described in Fig. 1.

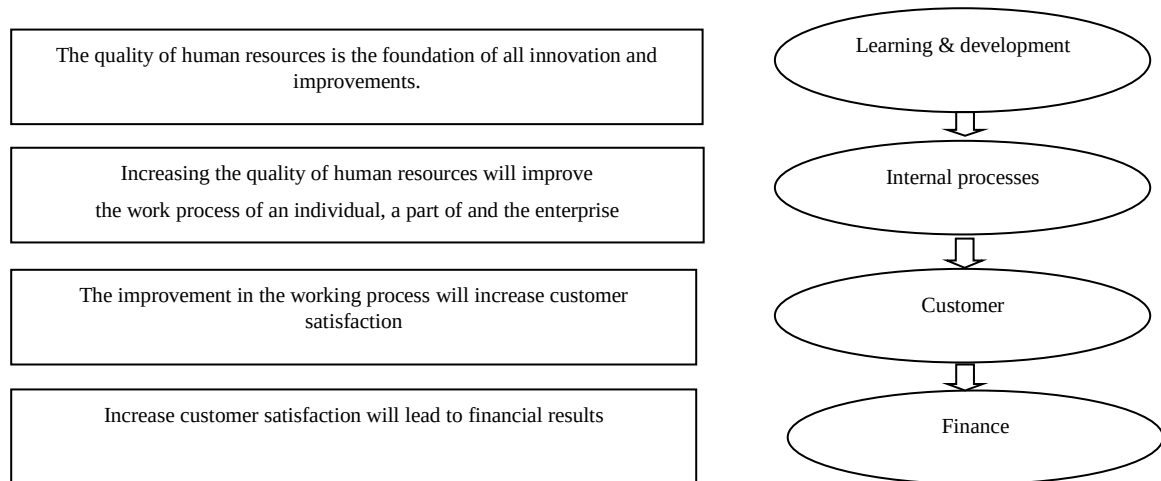


Fig. 1. The relationship between aspects of the Balanced Scorecard model

- Financial aspect: The objective of the financial aspect is to enhance companies' value which is based on the increasing of profit, margins, etc;

- Customer aspect: The goal of customer aspect is related to the value that companies can offer to customers to achieve the financial targets which have been identified. Thus, the fiscal targets will be identified to ensure implementation if customers achieve the value.

- Internal processes aspect: The objective of the internal processes aspect is the changing, innovation of the input supplying processes, manufacturing and consumption process, etc. to offer customers with the highest value. The innovation in internal processes will ensure that companies can reduce their costs, optimize the capital structure, the product structure to increase the value that can be offered to customers to achieve financial goals.

- Learning and development aspect: human resources, information resources are important resources to help coal mining companies innovate and improve their internal processes. The quality of human resources will be the key factor determining the success of innovation activities and improvements in internal processes.

In the Balanced Scorecard model, relationship between the financial and non-financial indicators are closely. They support each other and interact with each other. To achieve good financial performance, the customers, internal processes, learning and development aspect must be in a good review. In other words, the financial indicators reflect the result and non-financial indicators are the cause. The relationship between aspects of the Balanced Scorecard model is shown in Fig. 1.

2.2. Characteristics of business operations of coal mining companies

Indicators to assess business performance of coal mining companies are set up in consideration of the characteristics of the business because each business sector has its own characteristics. Therefore, the system is well defined respectively. Business characteristics of coal mining companies affect the system of the following indicators:

Production and the expenses of coal mining companies depend on geological conditions of mining areas. Therefore, changing the product structure, quality and productivity of the business is not totally of their subjective desire. However, coal mining companies can use technology to cut down on coal loss, relatively increase their raw coal quality and change product structure in the most favorable way to the company to meet

market requirements. Therefore, such indicators are related to the amount of consumption, rising selling price or loss rate of coal, etc.

- Selling products in coal mining companies is decided by their direct management; average price and sales are determined on the basis of the geological conditions and mining costs to ensure the stability in dissimilar companies. This points out that business efficiency of coal mining companies is contributed by the sufficient production process and human management. Indicators to assess business needs to include creative ones to sort out production, labor management and the innovations in any business related process.

When analyzed, the cost of products in coal mining companies is mainly contributed by spending on materials. The efficiency of material supply system should also be assessed via the materials in stock.

2.3. Indicators to assess business performance of coal mining companies

2.3.1. Financial indicators

Financial aspects reflect the final results of business operation of the companies. This result is represented by the financial indicators such as revenue, profit before tax, return on assets (ROA), return on equity (ROE). Those indicators are based on the data provided by accounting reports. The financial indicators are listed in table 1.

2.3.2. Customer indicators

Customers of coal mining companies are mainly industrial companies. Due to the management characteristic of Vinacomin. Dong Bac Corporation, coal trading related companies include the sorting and port screening ones directed by Vinacomin, Dong Bac Corporation and the Government. With such characteristics, the quantity and quality of the product structure is decided by geological conditions and sales policies of the corporation. The customer indicators are shown in table 1.

2.3.3. Internal process indicators

Internal processes are important aspects in the operation of coal mining companies to ensure development. Through operational improvements and innovation activities of internal processes, coal mining companies can reduce the cost of production, changes in the structure of products to increase average selling prices, reducing the capital investment by optimizing material supply and selling, minimizing coal loss. These indicators are shown in table 1.

2.3.4 Learning and development process indicators

Human resources are the subject of all activities within a company. When employees have necessary skills, the loyalty, they contribute to the business performance. Based on the knowledge and skills that employees have through training programs, companies can increase product quality, product recovery rates and production cost savings as well as occupational safety. To gain the knowledge and professional skills needed, employees need to be trained to use up-to-date skills and techniques. Such indicators are shown in table 1.

According to data in table 1, in 2015 the business efficiency of 86 Coal Company Limited was lower than that in 2014. The main reason is that the company had not focused on management. There had been many problems in cutting down the administrative costs on the effective and scientific activities of labor, increasing labor productivity, training and improving the quality of labors for the company, especially the division of labor in important units such as supplies and consumption, etc.

Table 1. Measuring business performance indicator proposed for coal mining companies, example of 86 coal mining company limited

No	Indicator name	Measuring method	Balanced Scorecard perspective	Year of 2014	Year of 2015
1	Pretax profit. Mil. VND	Accounting balance sheet	Financial	12,006.32	6,929.64
2	Return on assets. %	Pretax profit /average assets	Financial	1.23	0.71
3	Return on revenues. %	Pretax profit /Revenues	Financial	1.71	0.93
4	Average income. mil.VND/person-month	Salary fund/average labor	Financial	10.03	9.84

5	Cost. Mil.VND	Cost report	Financial	727,871.48	690,895.49
6	The rate of administrative costs compared to total cost. %	Administrative costs /Total business cost	Financial	3.70	5.71
7	The rate of debts compared to total revenues. %	Average debts/ Total revenues	Customer	0.03	0.02
8	The rate of inventories compared to Total revenues	Average inventories/ Total revenues	Customer	1.92	0.03
9	Average price. Mil.VND/ton	Business report	Customer	1.31	1.35
10	Consumption volum. Tons	Business report	Customer	530,034.07	573,827.96
12	Number of incidents	Safety reports	Internal processes	56	58
13	Number of innovations in technology. in production and labor organization	Report initiative council	Internal processes	2	1
14	Increasing rate of productivity of labor. %	Out put/ Number of direct production workers	Internal processes	-7.5	-13.6
15	The recovery rate of coal. %	Report of the resource wastage	Internal processes	78	79
16	The rate of workers in violation of safety regulations. %	Number of workers in violation /Average number of worker	Learning & Development	2.94	2.87
17	The rate of workers with material supply organization training. %	Number of trained workers/Average number of workers	Learning & Development	0	0
18	The rate of workers with specialization training. %	Number of trained workers/Average number of workers	Learning & Development	2.82	6.27
19	Working skill level	$\sum BT_{ix}Li/\sum Li$	Learning & Development	3.50	3.50
20	The rate of management staff with the proficient in IT	Number of management staff with the proficient in IT / Number of management staff	Learning & Development	0.50	0.52
21	The absence day of workers without a reason	The report of labor using	Learning & Development	0.36	0.39

2.4. The advantage of using the Balanced Scorecard

- Achieving the objectives of business performance on the basis of achieving strategic business objectives of the company. Besides, companies can measure and control the ability to achieve objective business performance of the whole company and its departments.

- Connecting strategic objectives with short-term goals, connecting business goals with the goals of the department and individuals. The goals are concretized by the targets with specific numbers.

- Building solutions to improve business efficiency based on a comprehensive approach to operational aspects of the company from finance to customers, internal processes, learning and development aspects, creating the balance for companies to achieve comprehensive and sustainable development.

- Allocating the goal of the whole company to the stages of the business process to make it easier for company's units to implement and enhance its ability to achieve the general objective of the business.
- Allowing companies to take advantage of the strengths and opportunities of the market to implement the goals.

3. Conclusion

Balanced Scorecard model supply managers a picture of balancing in business performance as well as the motivation factors for companies' growth in the future. The word "Balance" in the BSC means: with the purpose of sustainable development by solutions to improve business efficiency, companies should rely on not only financial solutions but also non-financial solutions such as the customer, internal processes, learning and development solutions. With the objective of ensuring the balance of resources, connecting the strategic objectives with the value provided to customers and business performance, the Balanced Scorecard is considered to be an effective solution for coal mining companies in Viet Nam. However, there are some conditions for them to use the Balanced Scorecard as follows:

- Enhance understanding and commitment of business leaders to use Balanced Scorecard and business efficiency indicator system:
 - Develop strategies and strategy maps of companies in each period;
 - Improve the job title system for individuals, departments within the company;
 - Develop a system of indicators to assess overall business performance and business-unit performance (KPIs);
- Building an information system with its tools to track the results of achieving the targets;
- Building a system of salary and rewards based on the result of achieving the targets;

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The evaluation of effectiveness on technological innovation in coal mining companies under item: "Increasing rate of aggregated production capacity per investment unit cost"

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Abstract

The technological innovation is a measure, which has been chosen to support sustainable development in many companies. However, the technological innovation must be ensured the effectiveness based on certain aspects. The authors of the articles proposed an assessment methodology for effectiveness of technological innovations for coal mining companies according to the "Percentage of increase in aggregate production capacity per unit investment cost", contributes to the system of additional indicators to assess the effectiveness of technology innovation in the coal mining companies.

Keywords: Coal mining company, production capacity, unit investment cost, technological innovation, effectiveness

1. Introduction

When looking for the profits on the market, any business understands the importance of technology in creating competitive advantages and the life cycle of the technology. Therefore, technological innovation is indispensable and consistent with development rules.

By technology innovation, the company will make new products, create motivation for improving labor productivity and product quality, reduce production costs, reform the working conditions for workers, improve the competitiveness of products on the market, and contribute to protect the surrounding environment... However, to choose the suitable technology for maximized efficiency, the company needs assessments of appropriate indicators.

The general principle of the indicators setting to assess the effectiveness of technology innovation is to compare the investment costs with the benefits of technological innovation. There will have the different aspects and ranges concerning with the costs and benefits and it depends on the purpose and requirements of research. In our opinion, although there have been many researchers studied around theoretical system of indicators to assess the effectiveness of investment in general and special investment on technological innovation in particular, but so far it is difficult to give a final norm applied for all research purposes.

In coal mining companies, the technological innovation makes a change of leverage level of existing aggregated production capacity or increasing to a higher level in order to meet the demand market. There will have many ways of investment in the two cases. This article proposes the "the rate of increasing aggregated production capacity per investment unit cost", which is the basis for the selection of investment on technological innovation for coal mining companies. This criterion will help coal mining companies can improve the production capacity of the it's bottlenecks and increase production capacity of the line technology.

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2. Production Capacity

- The production capacity of a company is an ability to manufacture products and provide services on based of existing equipment, labor and all parts of a business in a certain time and under determined conditions.

The production capacity can be calculated for a workshop, for a production stage, for a production line or for the entire production system. The production capacity is a dynamic factor, may vary from time and production conditions. If changing the number of devices, an area of production or improving the management ..., the production capacity will be changed. The production capacity with advanced properties shows the greatest ability of a center of industrial production. The production capacity is realistic because it is determined on the basis of rational use of existing resources of the business.

- The aggregated production capacity is overall production capacity of a set of multiple stages in one line, in a region or in the entire production process of the company.

The determination of aggregated production capacity in coal mining companies should be determined according to coal flow diagram (Fig. 1) which has been mentioned in the curriculum [1] by the formula:

$$P = \begin{cases} \sum P_i \Leftrightarrow i \notin 1 \text{ line} \\ \min \{P_i\} \Leftrightarrow i \in 1 \text{ line} \end{cases} \quad (1)$$

Where:

P: Aggregated production capacity;

Pi: Production power in stage i

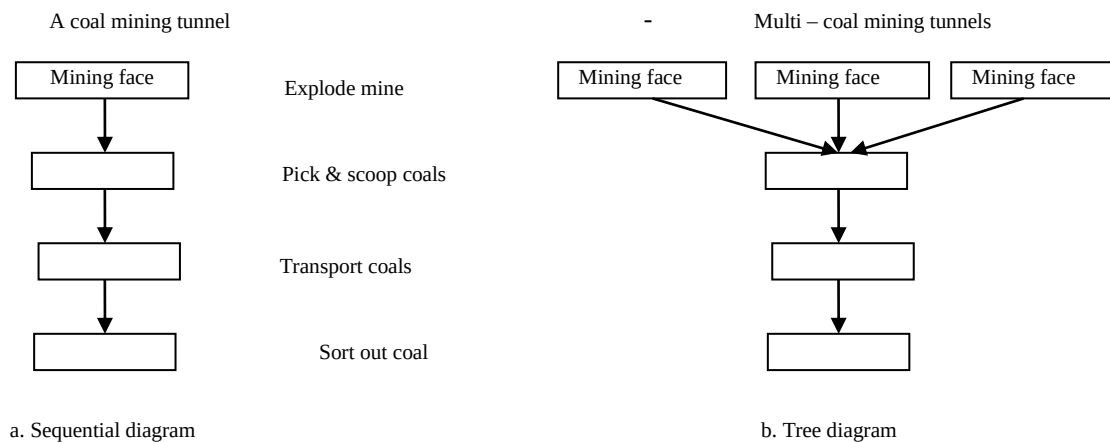


Fig. 1. The schematic flow of coal mining companies

Considering a coal mining company with technological lines, production capacity of each stage can be shown in Fig. 2. The aggregate production capacity is determined as the production capacity of the weakness stage in the technology chain; simultaneously it also determined the production capacity of each wasted stage. In the process of production and trading, coal mining companies tend to have a technological line with production capacity shown as Fig. 3.

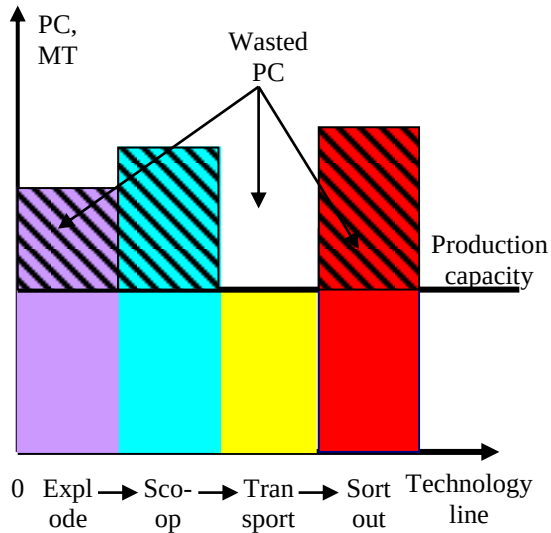


Fig. 2. Production capacity with wasted parts

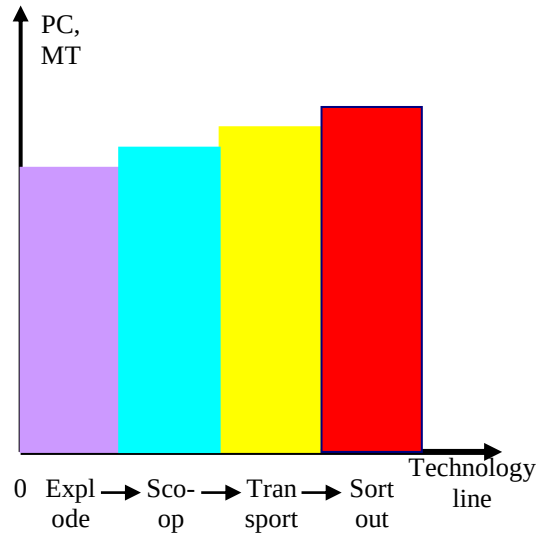


Fig. 3. Utilized production capacity

3. The norm "Increasing percentage of performing production capacity per investment unit cost"

Mining industry is one of the key industries of Viet Nam's economy. Currently, the coal mining industry is facing many difficulties from stages of coal exploration, exploitation, transportation to processing and consumption.

In the context of constant fluctuating market, the world economy is increasingly deeply integrated, development-oriented Viet Nam's economy towards industrialization and modernization has facilitated and stimulated coal mining businesses to apply constantly new technology and technological innovation in coal mining.

Before deciding to technological innovation, coal mining companies usually undergo evaluation of efficacy of new technologies. The criteria were used to analyze and evaluate the economic efficiency - social as net present value, internal rate of return, return capital of the investment (ROI), the rate of the benefit/cost ... The technology was selected is the technology, of which the evaluation criteria is the most efficient in each carried out criteria for the assessment. This new evaluation's method provides only information about the effectiveness of the technology, which had been evaluated. The authors propose the "Increasing percentage of performing production capacity per investment unit cost" to apply for assessment of any various stages of production line, of a region or of the entire production process in the company. However, before using this criterion to evaluate the company must determine the innovation at the stage of transportation (weakness) (shown in Figure 2). It can make higher aggregate production capacity, simultaneously toward to a specialized technology line with production capacity of each stage as shown in Fig 3.

The accuracy of the calculation of aggregated production capacity and the level of leverage of existing aggregated production capacity is a necessary condition for the review on effectiveness of new technology investment in term of production power.

a. In case of technological innovation investment utilized the leverage level of existing aggregated production capacity:

$$T_a = \frac{\mu P}{D_a} \quad \%/billion \text{ VND} \quad (2)$$

Where:

T_a : The increasing percentage of utilize existing aggregated production capacity per investment unit cost, % / billion VND;

D_a : The total cost of investment to utilize existing aggregated production capacity, billion VND.

Investment costs to utilize existing aggregated production capacity consist primarily of costs to eliminate the loss of time of the whole production chain: power cut off, water cut off, loss of signals controls, operational failures, etc...

μP : The increasing percentage of utilize existing aggregated production capacity; %

$$\mu P = \frac{100.(Q_{tm} - Q_{tc})}{Q_{tc}} \% \quad (3)$$

Q_{tc} : real output, MT/hour;

Q_{tm} : Calculating output achieved when technological innovation investment, MT / hour

Calculating output achieved when technological innovation investment Q_{tm} is determined by the formula:

$$Q_{tm} = \frac{(100 + \beta H_{tg}).Q_{tc}}{100} \quad T/hour \quad (4)$$

βH_{tg} : The level of increase time using of production chain can be achieved when technological innovation investment, %

b. In case of technological innovation investment to increase leverage level of existing aggregated production capacity:

$$T_b = \frac{\alpha P}{D_b} \% / billion VND \quad (5)$$

Where:

T_b : The rate of increasing aggregated production capacity per investment unit cost; %/billion VND

D_b : Total cost of investment. billion VND;

Investment costs to increase existing to higher aggregated production capacity D_b consist investment costs technological innovation on main parts, which decides the output (called "essential part"), as the cost for purchasing equipment, installation of equipment, old equipment liquidation, worker training, operating pilot, etc...

αP : The level of increase, %

$$\alpha P = \frac{100.(P_m - P_c)}{P_c} \% \quad (6)$$

P_c : The existing aggregated production capacity, MT/hour

P_m : Calculating output achieved when technological innovation investment, MT/hour

In many investment plans of technological innovation, the best investment plan in terms of increased leverage or increasing existing aggregated production capacity is with max values of T_a or T_b .

For example, the production capacity of coal mining company has been identified as:

$$\begin{aligned} P_{th} &= \min\{P^{EX}, P^{SC}, P^{TR}, P^{SO}\} \\ &= \min\{700, 770, 500, 932\} \\ &= 500 \text{ MT/year} \end{aligned}$$

This company faced the bottlenecks in transportation stage and with the existing aggregated production capacity based on the investment cost of VND 20 billion/year, they will reach 550MT/year, but with the technological innovation on investment cost of VND50 billion/year, the production capacity of the transport stages reaches 920MT/year.

In case of investment for utilization of existing aggregated production capacity

- The rate of increase leverage of utilization of existing aggregated production capacity $\mu P = 10\%$
- The rate of increasing aggregated production capacity per investment unit cost $T_a = 0.5\% / VND \text{ billion}$

In case of investment for improvement of existing aggregated production capacity

- The rate of increase of existing aggregated production capacity $\alpha P = 40\%$
- The rate of increasing aggregated production capacity per investment unit cost $T_b = 0.8\% / VND \text{ billion}$

So businesses should consider choosing investment technology innovation to increase existing aggregated production capacity.

4. Conclusion

The norm of "The rate of increasing aggregated production capacity per investment unit cost" is recommended to additional indicator system for evaluating the effectiveness of investment technology

innovation applied to coal mining companies by the author. Before applying this criterion, the company should determine the production capacity of each stage to know the weakness of the stage in the production line. The results of this determination will help companies to quickly make a decision of investment either by technological innovation to increase existing production capacity or by excluding the weakness stage to utilized existing production capacity in technological lines.

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Solutions to improving fixed assets utilization rate of mining companies

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Abstract

Nowadays, it is increasingly difficult for companies operating in mining industry due to both objective and subjective factors. How to complete the business plan with high efficiency is a big concern of all business administrators including those in mining companies. In these companies, equipment which is directly used in manufacturing activities (referred as fixed asset), normally has high value. Its value accounts for high proportion of the total value of fixed assets and has a great influence on the business performance of the enterprise. Therefore, optimal utilization of current fixed assets in industrial enterprises, especially in the mining industry is one of major concerns which have important implications for improving efficiency of assets in production. This article focuses on researching the use of fixed assets in mining companies as well as giving recommendations to improve fixed assets utilization rate and help enterprise achieve highest efficiency in operation.

Keywords: Fixed assets, equipment maintenance, equipment effectiveness

1. Introduction

In recent years, the mining industry consisting of 15 opencast coal mines and 30 drift coal mines plays a significant and positive role in the development of the country by meeting the need of mineral raw materials for the national economy, greatly contributing to the state budget as well as ensuring social welfares.

Table 1. The expected output of raw coal

Year	Total industry output (Million tons)
2016	41 – 44
2020	47 – 50
2025	51 – 54
2030	55 -57

Source: Decision 403/QĐ – TTg, dated March 16, 2016, Approval for adjusted master plan for Viet Nam's coal industry development to 2020, vision towards 2030

To meet requirements of the above expected output which are getting higher, it is necessary to run effectively all factors such as labor, capital, assets, management in the company. Among these factors, the effective use of assets especially fixed assets in the companies plays the most significant role in improving productivity and business efficiency in the company. Fixed asset utilization rate depends on both subjective and objective factors. Objective factors include larger mining depth, increasing instability of banks and seams in opencast mining, difficult scalability of mining paths at deeper level and complicated ventilation in underground mining, and transformation of geological and natural conditions, etc. Subjective factors are shown in limitations on businesses' asset management skills and workers' understanding on equipment performance, outdated assets

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with reduced efficiency, constraint on application of modern technology into production, low equipment integration level among firms, etc. Application of technology and modern equipment to production is widely used such as combining cutter – loader in drift coal mines production, using coal - cutter in tunneling, monorail with diesel engine in 2010 for transporting in Ha Lam and Nam Mau mines, hydraulic backhoe excavator in selective coal mining technology, automotive-conveyor or automotive-railway for coal transporting in Cao Son mine, etc. However, most of fixed assets are outdated, which causes difficulty in meeting production needs and targets of mining companies.

2. Situation on fixed assets utilization in mining companies in Viet Nam

Through the fact-finding in some mining companies and research papers, it is found that although these companies have managed well value and quantity of fixed assets, they have not been keen on enhancing performance and efficiency of fixed assets. More specifically, although fixed assets are categorized, tagged with numbers and recorded in documents in order to monitor fluctuations in the asset value and operation time and productivity of fixed assets are kept track and collected the root causes of low productivity and inefficiency of fixed assets have not been properly taken into account.

Fixed assets efficiency is a specific indicator for the overall performance when using fixed assets on the basis of combination the parameters which are operation time (working hours), performance and proportion of qualified of product. Fixed assets efficiency (K) is defined by using following formula:

$$K = K_t * K_c * K_q * 100, \% \quad (1)$$

In which: K_t : known as availability of machine and equipment, it is calculated by the ratio of actual operation time and planned operation time of machine;

K_c : Capacity utilization factor of equipment is typically measured by the real capacity/the designed capacity;

K_q : Proportion of qualified product is represented by the amount of quality product/the amount of output.

Thus, according to the formula (1) and the calculation in the accepted project, targeted fixed asset performance of two mines have been collected by the author as following:

Table 2: Summary of equipment performance efficiency indicators in some Mining companies

No.	Company	Max point	Point by scale			Point by the proportion		
			2010	2011	2012	2010	2011	2012
1	Nam Mau	1000	650	700	750	65	70	75
2	Nui Beo	1000	744	761.7	750.1	74.4	76.17	75.01

Source: “Research on assessment criteria of technology innovation and modernization in coal and minerals mining and processing in Viet Nam” Institute of mining science and technology - Vinacomin, Hanoi, 2014

Through the calculation results, it is found that the utilization of fixed assets in the companies is low. According to detailed analysis, the reason for this is inefficiency of operation time, low capacity and poor quality of product. The result causes a great impact on low production efficiency of mining companies because they all require many kinds of fixed assets. After researching, not only are above-mentioned objective factors the reasons for low performance efficiency of fixed assets but there are also other reasons as followed:

The equipment which is outdated and depreciated is easily damaged during operation causing disruption in production and low-usage time. Low performance efficiency is also caused by inefficient working time especially in opencast mining, downtime of excavators, unreasonable diagram for uploading are the root causes of low equipment efficiency.

Fixed assets maintenance of has not been fully implemented and synchronized between the stages and processes, as well as the involvement of the relevant departments or employees causing the disruption in the production. Fixed assets are maintained by operators by daily checking cleaning and lubricating machines and finding out defects.

During operation, if any incident arises, companies often immediately give solutions to troubleshoot for keeping operating instead of finding the root cause of the problem. This is the reason why it takes many resources for companies to troubleshoot problems however, the same incidents still occur after a period of time. Thus, it is necessary to find out and analysis the root cause of incident to solve problems completely.

In summary, in this part, some reasons for low utilization efficiency of fixed assets in mining companies are defined and it is important to troubleshoot the root cause in order to improve the performance of equipment.

3. Solutions for improving fixed assets utilization efficiency in mining companies

3.1. Total Productive Maintenance method - TPM

Effective using time and performance of fix assets are currently low due to the fact that maintenance of fix assets has not been throughout implemented. In current mining companies, although operation and maintenance procedures are defined, they have not been brought to attention properly during production. Equipment is forced to run continuously without periodic maintenance to maximize output. Only when errors occur, maintenance could be carried out. As a matter of fact, maintenance should be performed regularly using right processes, at the right time to maximize the lifespan of equipment. Small maintenance could be handled by the operators during production. Besides the shift hand-over checking, they are able to identify and fix errors that they can do by themselves. If there is any error that is out of their capability, they need to escalate to related departments to do evaluation and troubleshooting. It is important to have a process so that maintenance can be implemented continuously with the active involvement of all relevant departments. Author found that Total Productive Maintenance tool (TPM) could be applied. Targets can be achieved when applying the TPM was presented in Fig. 1.

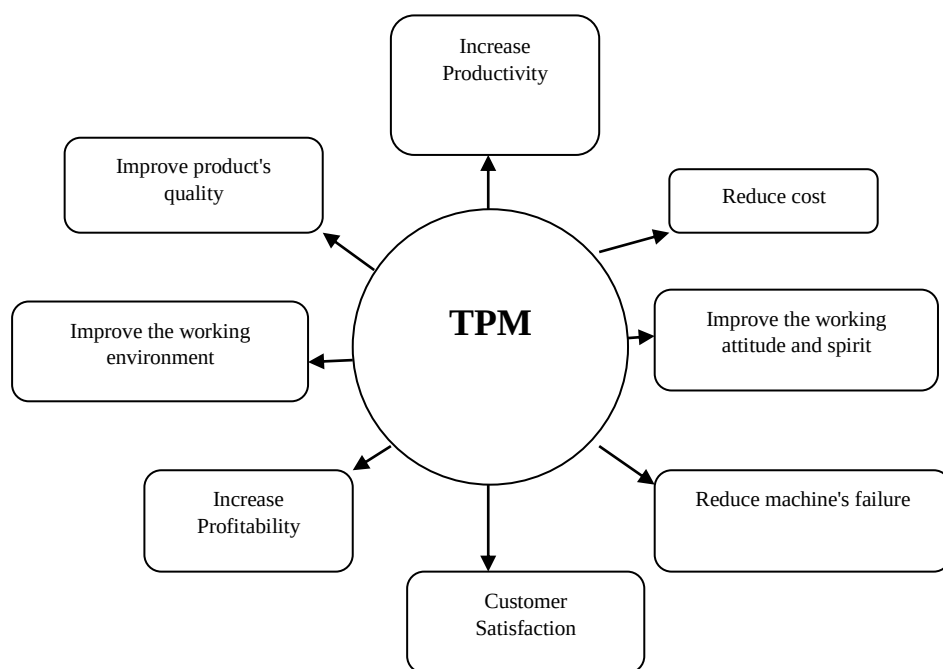


Fig. 1. Targets of TPM

Applying TPM enables operators repairing and maintaining some simple issues. Operators are trained to clean the equipment in proper process and have knowledge about the structure of equipment to detect the problems early.

Applying TPM in mining industry company needs to undergo three stages:

- Preparation stage: It is necessary to improve the role, position, content and importance of TPM. After understanding TPM clearly, business leaders in the mining companies need to introduce and conduct training on the TPM as well as establish the policies and targets of TPM in companies.
- Implementation stage: take all actions required in TPM which are implement in the preparation stage and apply into production to evaluate condition of fixed assets specifically. It is essential to specify and clarify the problems of fixed assets including classifying fixed assets by quality of A, B, C, etc. with number of used year and the quality evaluated by appearance. After solutions are found, electromechanical departments will be responsible for proposing action plan and assigning workers to conduct maintenance for the assets. It is essential to write-down all the maintenance work of fixed assets as basis for next improvement. Departments such as electromechanical department will conduct training on maintenance and operation skills and provide knowledge for employees.
- Maintenance stage: in this stage, TPM is required to be implemented more difficultly, more carefully and skillfully to ensure equipment operating in stable condition achieve the highest performance.

Mining companies can improve the performance of fixed assets by applying TPM by means of reducing downtime of machine. Improving fixed assets utilization efficiency contributes to enhancing productivity

growth of companies, increasing in the product quality, meeting the market demand, creating the safe working environment and improving the workforce standard and awareness.

3.2. Application of “Cause and Effect Graph” into root-cause detection of fixed assets damage

When the fixed asset is damaged, electromechanical and other departments will repair to continue production. However, repair work is just a temporary solution to resume production while to solve the problem completely it is necessary to find the root of issue, record in detail to help maintain the same equipment more smoothly and quickly in the future.

Cause and effect graph which is mentioned in Quality Management subject can be used to solve these problems. Cause and effect graph is a graph showing the relationship between results and causes of the problems. The assets are damaged mainly by human, materials, fixed assets, working environment...

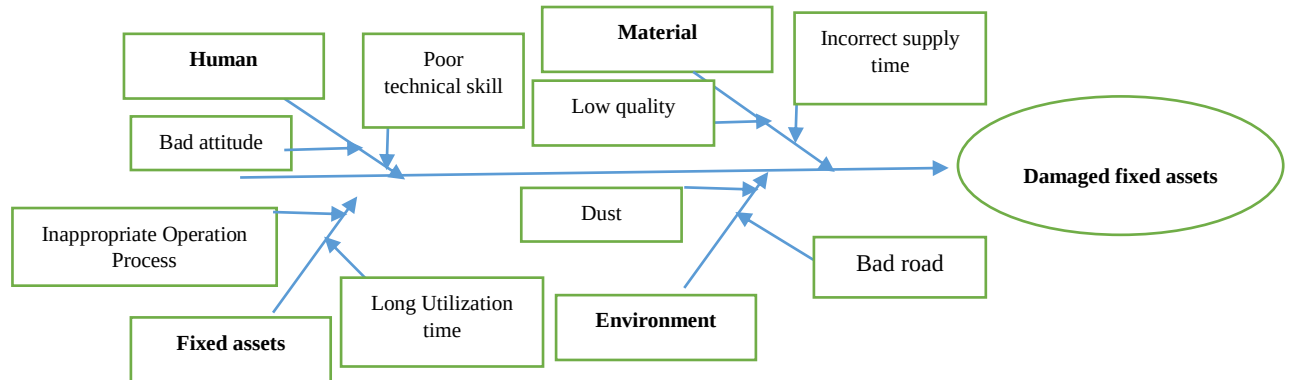


Fig. 2. Cause and effect graph for root of fixed assets damage

Besides the main reasons for fixed assets damages, it is necessary to study more about minor ones. After that, electromechanical departments in mining companies need to evaluate and analyze all the causes in order to come up with suitable solutions to fix completely these damages. Cause and effect graph will help the managers to review exactly the root causes of fixed assets breakdown to solve the problem in a fast, fair and accurate way thereby contributing to improvement of fixed assets utilization efficiency.

4. Conclusion

Optimal fixed assets utilization in mining companies is one of the most substantial priorities to improve the efficiency of business production of companies. Recommendations will contribute to effective management of fixed assets utilization in mining companies.

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International Conference on Economic Management in Mineral Activities (EMMA)

Oil reservoir economic optimization model in Viet Nam and solutions for oil price fluctuations

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Abstract

With eight sedimentary basins containing over 1 billion tons of oil and gas, National Petro Viet Nam (PVN) have implemented 90 production sharing contracts (PSC), Joint Operating Agreements (JOC), business cooperation contracts (BCC) and JV (Joint Cooperation) with international petroleum groups. The total value is up to tens of billions of US dollars. In Viet Nam, PVN has grown to become the biggest conglomerate, a major contributor to the economic growth. Being a part of this process, oil and gas economics science development will be a theoretical basis for investment and development of the oil and gas industry. There are still many different views and a lack of systematic study to establish the economic oil reservoir model. Therefore, the paper suggests solutions for oil reservoir economic optimization. The research result will be the basis for the investment, exploitation, processing of oil and gas, at the same time effectively contributing to oil and gas economic science development.

Keywords: optimization; economic model; oil price; cost

1. Introduction

After 41 years, the Vietnamese oil and gas industry has risen to become a leading production company, accounting for 20% of national budget. In 2015, Viet Nam exploited 29.42 million of crude oil with revenue of 560.1 thousand of billion VND, submitting 115.1 thousand of billion VND to national budget; increasing of 40.5 million tons of oil in equivalent, contributing 676.5 billion VND to social security. Petro Viet Nam Corporation (PVN) has become a complete economic sector from the upstream (exploration and exploitation), midstream (transportation, storage), to downstream (processing, consumption). PVN also invests, and carries out oil and gas development activities in 15 countries and territories overseas. Though facing many obstacles, oil and gas economic science is paid a lot of attention. One of which is lack of a systematic and complete Reservoir Economic Model. In reality, it is rather complicated to have a Oil Reservoir Economic Model Optimization due to many different factors affecting decision to developing oil field or not, both subjectively and objectively, controllably and uncontrollably, or rather natural characters, technology as well as market elements. With the aim to optimize reservoir development, we need to compare its earnings and costs., and clarifying an Economic Model for reservoir development is necessary condition for our making decision on investment. This model would figure out the product function as well as cost function, a base for reservoir Economic Model.

2. Oil reservoir economic optimization model for Viet Nam's continental shelf

Economic model for oil field is complex. In overall, building oil field economic model means improving the oil recovery factor; and reduce risks. Dependence of output on technology and geological conditions, the fluctuation of input costs and selling prices significantly impact on the economic model. Oil reservoir Economic Optimization, in other while, is an increase in profit and profit maximization. More specifically, the difference

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between revenue and cost. Revenue depends on mining production and consumption, as well as price. This paper presents 3 indicators affecting profit, profit maximization, that are output (Q), cost (C) and price (P).

2.1. Product function

As a result of being influenced by many factors, production function determination is complicated. To make simple, we just consider production capacity influenced by 2 factors, technology and number of platforms. Technologically recoverable reserves and production capacity (barrel per year) is performed in the Fig.1.

Production capacity is complex, and affected by natural and technological elements, etc.

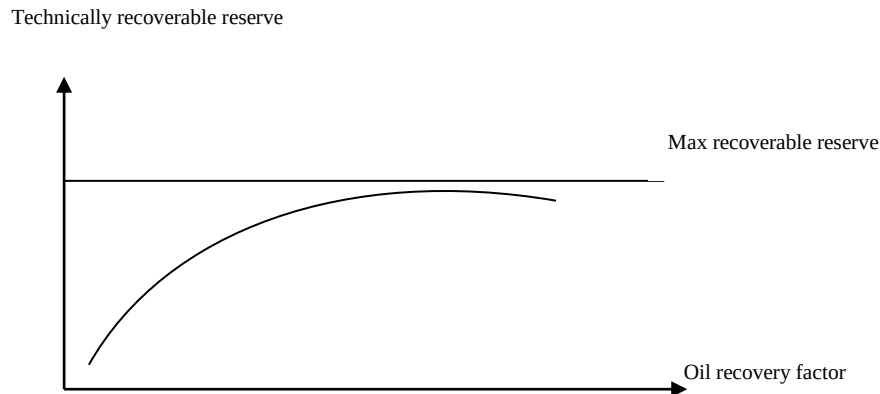


Fig. 1. Technically recoverable reserve as a function of oil recovery factor

Source: Nguyen Duc Thanh – Basic economic issues of Oilfield – Reports collection of Oil and Gas Technology and Science Conference – Technology and Science Publisher, Hanoi, 2010.

In Fig. 1 Technically recoverable reserve increases when oil recovery factor in the exploitation increases.

Oil recovery factor in mining is also a complex quantity which depends on factors, such as technology, and nature, some abnormal oil reservoirs, which contain gas, etc.

In addition, recovery of reserves in terms of technology is a function of the seam (function Hyperbola), a special relationship can be shown in the Fig. 2.

To sum up, technically recoverable reserve is affected by many factors, production capacity and number of platforms. Consequently, a production function for a single oil-gas reservoir can be determined.

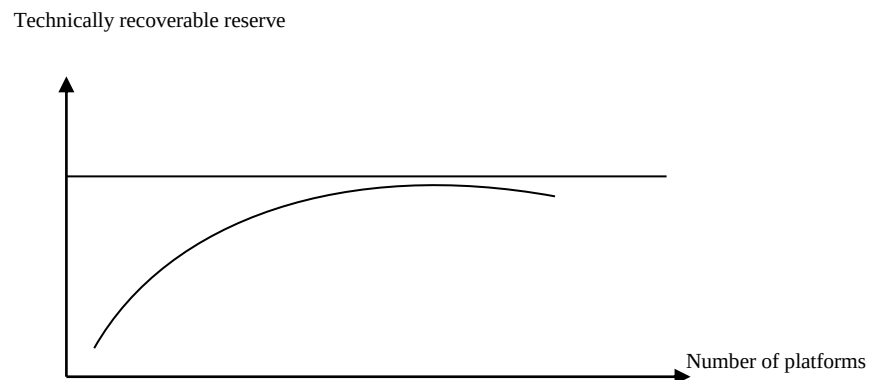


Fig. 2. Technically recoverable reserves as a function of the number of platform

Source: Nguyen Duc Thanh – Basic economic issues of Oilfield – Reports collection of Oil and Gas Technology and Science Conference – Technology and Science Publisher, Hanoi, 2010

2.2. Cost function

Cobb - Douglass is experimental function; it represents the relationship between input and output; or in other words, the relationship between result and factor.

According to Cobb-Douglass function, we have relatively aggregated cost function as following:

$$I = A \times q^\alpha \times V^\beta, \text{ VND} \quad (1)$$

Where:

I – Total capital cost, VND

q₀ – Total capacity rate (production capacity) (barrels/year)

V – Number of platforms

α, β – Constants

A – Constant to convert from barrels/year and number of platforms into VND

On the basis of real cost data, we will estimate the parameter A, α , β . This aggregated cost function takes the main factors one faces on the cost side into account.

We use a cost function with the following properties:

$$\frac{\partial I}{\partial q_0} > 0 \quad ; \quad \frac{\partial^2 I}{\partial q_0^2} < 0 \quad (2)$$

$$\frac{\partial I}{\partial V} > 0 \quad ; \quad \frac{\partial^2 I}{\partial V^2} < 0 \quad (3)$$

The objective of oil-gas field developing is to optimize profit, in other word to optimize target function. According to Nystad (1983), the target function optimization can be described as follow:

$$\max \int_0^{T_K} [q_{(t)} \times p_t - I_{(t)} - b_{(t)}] \times e^{-rt} .dt \quad (4)$$

With the conditions that:

$$\begin{aligned} q_{(t)} &= q[q_0 . V . t] \quad ; \quad I_{(t)} = I [q_0 . V . t] \\ b_{(t)} &= b [q_0 . V . t] \quad ; \quad R_{CN} = R_{CN} [q_0 . V] \\ D_Q &= D_Q [q_0 . V] \quad ; \quad T_I = T_I [q_0 . V] \\ T_{\max} &= T_{\max} [q_0 . V] \quad ; \quad I_{IK} = I_{IK} [a . c . Cc.t] \end{aligned}$$

To maximize the value of a petroleum reservoir by simultaneously varying the production capacity (po) and the geographic distribution of the production capacity (V), the product function defines the accumulated reserves over time; i.e. the integral of the production profile. In order to generate a correct production profile for a given Production Capacity (po) and Number of platforms (V), additionally recognize when production begins to decline. This will be decided by conditions of reservoir technology and will generally occur when one has reached minimum well pressure (platform) at the production site. The point at which scaling down will start is defined by DQ (Fig. 5). This us estimated based on reservoir simulations for a given reservoir in a similar manner as the product function. The function condition will normally have the following properties”

$$\frac{\partial D_Q}{\partial q_0} < 0 \quad ; \quad \frac{\partial^2 D_Q}{\partial q_0^2} > 0 \quad (5)$$

$$\frac{\partial D_Q}{\partial V} > 0 \quad ; \quad \frac{\partial^2 D_Q}{\partial V^2} < 0 \quad (6)$$

Cost function IIK over time, of which regular cost is capital cost function. Moreover, investment and operational time is function of q and V. So that, based on reservoir economic model we could determine Net present value (NPV) as profit function of an individual oil-gas reservoir.

To maximize profit, we need to calculate NPV at the point of decision making, as formula below:

$$NPV_{(O)} = \int_0^t [P_{(t)} \times q_t - I_{(t)} - b_{(t)}] \times e^{-rt} .dt \quad (7)$$

Of which: P_t – Oil price at time of decision making

b_t – Input cost

$NPV_{(O)}$ – Cost linear Function

With the condition: $r = 15\%$; maximum technically recoverable reserve: $1,000 \times 10^6$; Price: 30USD/barrel during project.

In table 1- The economic recoverable reserves differ from the technically recoverable reserves because of production interruption function, thus the marginal cost and marginal income is not the same.

Table 1. NPV Calculation of some oilfields of Viet Nam

Oil field	A	B	C	D
Targets				
Optimal depletion rate per year in % of maximum recoverable reserves	12	7	16	13
Optimal number of platforms	3	6	1	3
Technical recoverable reserves (106 bbl)	803	585	1000	814
Economic recoverable reserves (106 bbl)	778	569	973	789
Net present value (106 USD)	3560	1854	5476	3600

Source: PetroViet Nam, Vietsopectro – production and business performance report of 2015 and Q1, Q2, 2016

In Table 1 - 4 oilfield A, B, C, D, oil recovery factor affecting the recovery of reserves in terms of technology and economy, even if the number of seam is small. However, reservoirs whose recovery factor is big, with favorable mining conditions should have the greatest mining production and therefore the largest NPV.

To optimize the oil field, it is needed to thoroughly and timely consider affecting factors, that is input and output. The biggest factors are output price (in mining); and input price (in processing). Scope of the study only considers the fluctuation of oil prices.

3. Solutions for oil price fluctuations

Viet Nam has 8 oil and gas reserves, stretching from its north to south point, essentially in the continental shelf. PVN has been carrying out 90 PSC contracts, JOC, BCC. In particular, there are over 60 in effect. Over 3 years, due to many reasons the petroleum market fluctuations have been extremely complicated, mainly in downtrend from 160 USD/barrel to 30 USD/ barrel. Scope of the study only takes into account the impact of crude oil price, except for other factors such as input price of raw materials and supplies, labor, depreciation and amortization, ... as well as production, natural and geological conditions,

The fluctuation of crude oil price greatly influences economic efficiency of the mining companies such as Vietsopectro, JOC, BCC, as well as oil refineries and petrochemical companies such as the Dung Quat Oil Refinery (BSR), etc. It could have said that characteristics of the oil market is the fluctuation of oil price, particularly after world war II, the world has been experienced 6 times of fluctuation; the biggest changes from 2004 to now. Sometimes the oil price up to 160 USD/barrel (1 barrel of 159 liters; 1 ton of oil about 7 barrels). Irregular change of oil price as a result of its dependence on many factors, the Fig.3 will outline those ones.

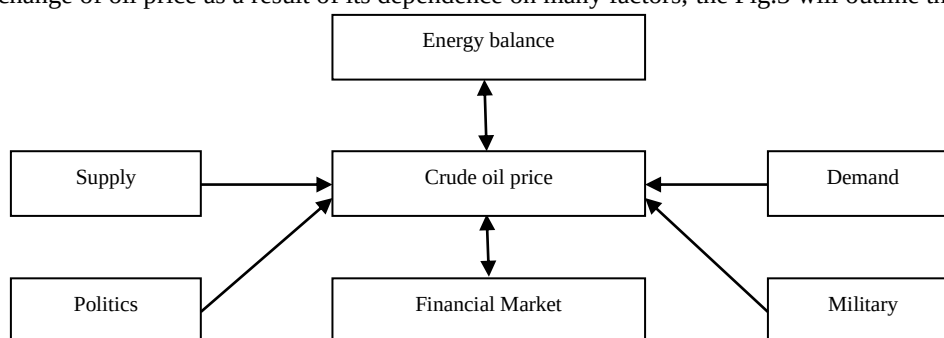


Fig. 3. Diagram of factors affecting the price of crude oil

Source: Nguyen Duc Thanh., Quarterly crude oil price forecast selection in PetroViet Nam., Geology Scientifics and Economics journal., No 47., 7/2014, page 69 - 75.

In Fig. 3 - Oil price is mostly affected by supply and demand relationship. In the short term, supply significantly impacts on prices (OPEC - Organization of Petroleum Exporting Countries - reduced supply, prices rose when countries adjusted demand in 1974, 1979, 1990, 2000); or demand increasing, oil prices rising (in 2003-2004) and especially due to many reasons (2014 - present) oil prices sharply falling; in addition to many other influential factors.

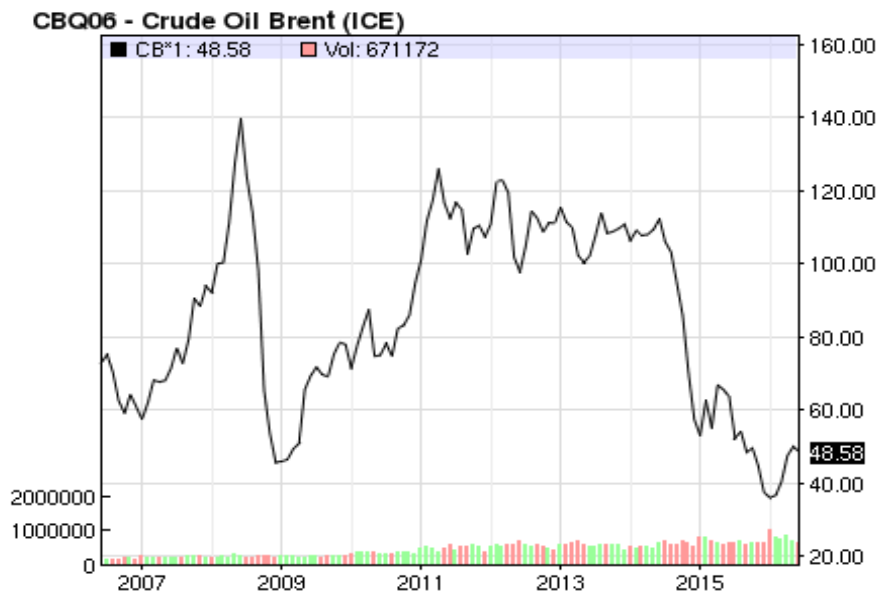


Fig. 4 - Brent Chart 10 recent years (2007 - 5/2016)

Source: NYMEC (04/06/2016)

In the Fig. 4 – Basically, oil field exploitation is effective (even for marginal fields) as crude oil price increasing. However sharply oil price falling in recent years has reduced PVN’s revenue from 2 ÷ 3 billion/year. In 2015, with oil prices at \$ 30 / barrel, PVN’s revenue has decreased 3 million/day. In recent 3 years, PVN has taken solutions to maintain production and meet energy need of the economy and national defense, social security benefit. Diagram of solutions as oil price falling (Fig. 5).

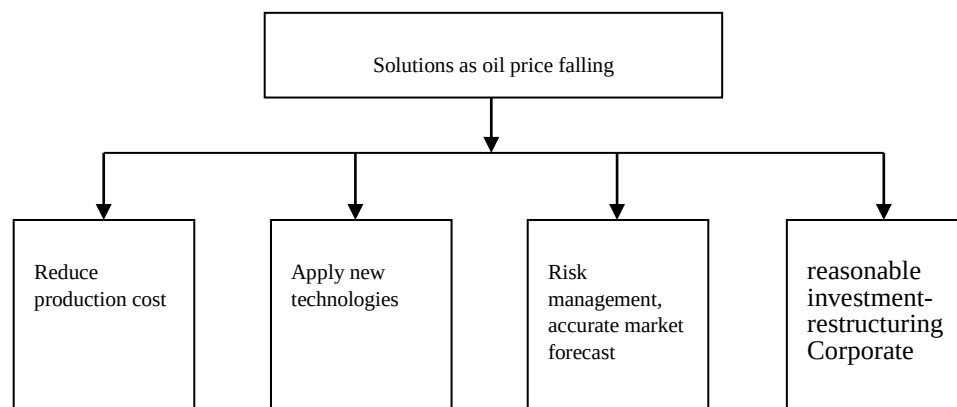


Fig.5. Diagram of solutions as oil prices falling

a. Reduce production cost

Reviewing each cost items, reasonable division of labor, and based on scientific norms, reducing redundant workforce solutions, which includes retiring ahead of schedule, decreasing 10% of management salary; cutting down bonus fund, welfare, shuttle cars.

b. Applying new technologies: Well with small yield, using mild extraction rigs, applying wellhead method to reduce labor from 40 to 10 people; or closing wells. Applying technical innovations, rationalization of operations, horizontal drilling method, laser operation to increase output.

c. Risk management, accurate market forecast

It’s crucial to have a specific plan of implementation, assessment, risk adjustment in the exploration, mining, processing and oil and gas consumption; avoiding and minimizing risks as much as possible. Beside which making accurate market forecast, using specialized software, close watching market to get accurate forecast. When the oil price falls to USD 30 / barrel, revenue and earnings are nearly halved, so that to minimize damage it’s needed to balance production and oil prices each day, each week.

d. Reasonable investment, corporate reconstruction

Reducing investment in deep waters exploration – mining, exploration costs, increasing exploration area; no investment spreading; enhancing product promotion, offsetting discounted products by increasing advertisement

and consumption of biofuel, fertilizer; gas supply for production of LPG; electricity, etc. Some companies reducing labor, changing to commodity production such as Vietubes, using existing capacity as wharves, ships, technical services serving marine transportation and rescue; reusing rig for other purpose as serving defense, tourism and others. Being a long life cycle industry, the oil and gas business needs a long-term investment for short-term and long-term benefits. On the other hand, it could be put some projects into production as scheduled, such as power projects, new oil field operation, collection, new construction, acquisition of a number of foreign plots as Lot 39-01, the Chevron Block B, etc. Besides, it is necessary to follow the world oil market to balance between mining production and the price of oil for each stage mining, processing and export, especially in recent volatility of crude oil prices; promptly and efficiently carry out solutions to solve multi-dimensional relationship.

4. Conclusion

Optimization of oil reservoir economic model, each of oil reservoir in certain conditions, to make development decision, reasonable investment in recent oil price fluctuations (mostly reduce); offering system of feasible solutions (consisting of 4 groups of solutions which cost cutting down is the most important) to help PVN to overcome obstacles to survive and develop.

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International Conference on Economic Management in Mineral Activities (EMMA)

Applying the Four Noble Truths of Buddhism for Mine Safety Management: A Case Study of Mae Moh Mine, Thailand

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Abstract

The risk management is one of the efficient ways to reduce accidents. Mine activities are considered as one of the dangerous works and can cause huge consequences if any accident happens. The Electricity Generating Authority of Thailand (EGAT) takes safety as a priority. Therefore, the Hoshin Kanri and the four noble truths of Buddhism are integrated and applied to the general risk assessment and control, in order to prevent any further accidental occurrences more efficiently. The scope is to focus on non-fatal accidents during 2007 to 2015. In conclusion, a number of non-fatal accidents are reduced and happened less than expectation which is 26% significantly dropped. Therefore, the main application of Hoshin Kanri and the teachings of Buddhism to create a risk management matrix, finding solutions to reduce the accidents in mine activities, are consistent and appropriate.

Keywords: Four noble truths of Buddhism, Hoshin Kanri, Systematic Cause Analysis Technique (SCAT), Mine safety

1. Introduction

Working in a mine is considered to be one of many unpleasant jobs on earth. Mine operations are full of hazards and risks toward accidents which can claim both lives and property damages. In many cases, the consequences lead to operating suspension or eventually mine shutting down. To avoid any working interruption, the Electricity Generating Authority of Thailand (EGAT), responsible for Mae Moh Lignite mine operating, is aware of the accident preventions (EGAT, 2007b). Thus the religious-related concept is applied to safety management. These concept is developed from the Hoshin Kanri and the four noble truths of Buddhism which is the essence of the Buddha's teachings, including Dukkha (suffering), Samudaya (source of suffering), Nirodha (cessation of suffering), and Magga (paths to cessation of suffering). Therefore, the purpose of this research is to evaluate the efficiency of risk management after applying the Hoshin Kanri and the four noble truths to mine activities. This study is focused on the cases of non-fatal accidents during 2007 to 2015.

2. Methodology

In the past, "to resolve to act" was used to determine the cause of an accident occurring at a time. The record was classified by the time of accidental occurrences. The study started with collecting the cause of the accident data from annual reports of EGAT information, Systematic Cause Analysis Technique (SCAT) Chart and data

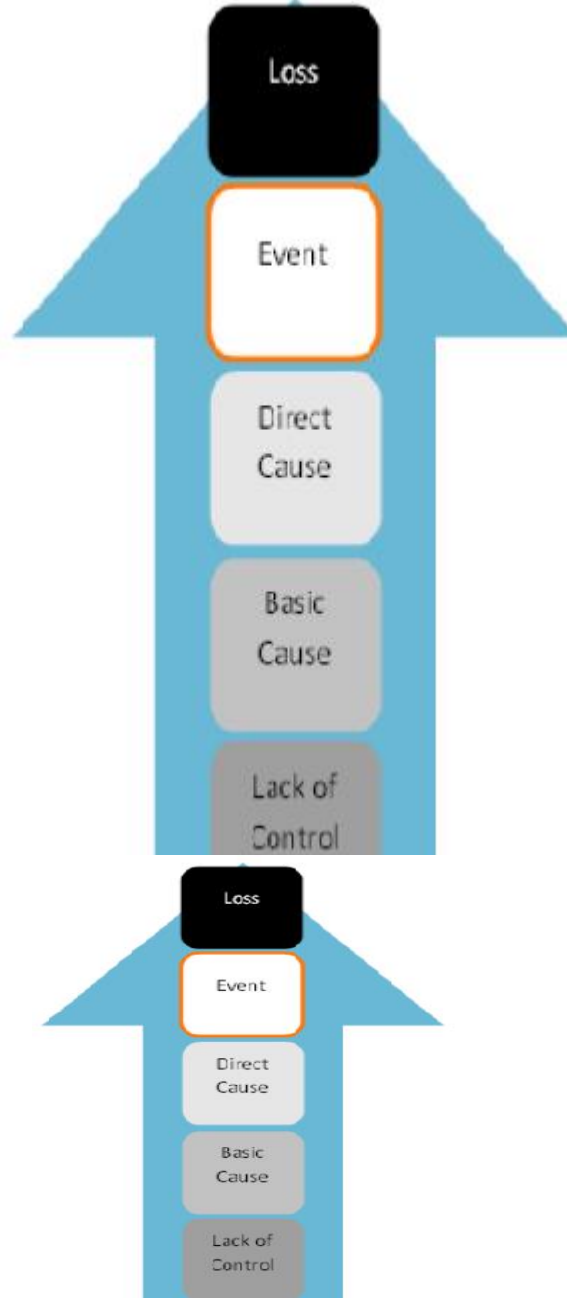
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tables accidents (Priyakorn, P control, applying the Hoshin I (Dukkha), controlling risk (M

One of Lean manufactu (Lueprasithikul, W., 2005). H progress and action at every l pulling in the same direction with the plans of middle m (<http://www.leanproduction.co>

SCAT (Systematic Cause incidents. It is a vertical root shown in Fig 1. The analysis causes and guidance towards guides the user systematically over deficiencies that led to th

Hoshin Kanri concept and “Matrix” for safety managem incorporated as parts of idei (Samudaya) and controlling ri and tactics, under Hoshin Kan



eneral risk assessment and Samudaya), evaluating risk

alled Policy Deployment goals of a company drive npts to get every employee of the company (Strategy) ll employees (Operations)

for structured analysis of oss of Causation Model’ as potential direct and basic tions. The SCAT method organization lacks control

Buddha’s teaching, given a ds (CAN) from SCAT are a). These identifying risk ha's teachings as a strategy

Fig 1. A vertical root cause analysis of the Systematic Cause Analysis Technique (SCAT) (<http://www.cgerisk.com>).

3. Results and Discussion

From all sources of data collecting, there are 10 major accidents happening including:

Strucking against (Running or Bumping)

Strucking by (Hitting by moving object)

Falling to elevation on lower level

Falling on the same level (Slipping and falling, Tripping over)

Catching in (Pinching and nipping points)

Catching on (Snagging or Hanging)

Catching between (Crushing or Amputating)

Contacting with electric, heat, cold, radiation, caustics, toxics, biology and noise

Overstress, Overexertion, Overload, Overexposure and Ergonomics

Other (Pawananunt, S., 2008)

Four of these occurrences are non-fatal accidents which are strucking against, strucking by, catching in and catching between. These non-fatal accidents were analyzed applying the Hoshin Kanri and the four noble truths. The results show four figures of analysis in each case. For example, Fig. 2. shows the risk management guideline applying the Buddha’s teaching for a case of strucking against. The explanation of this non-fatal case is provided in Table 2. below.

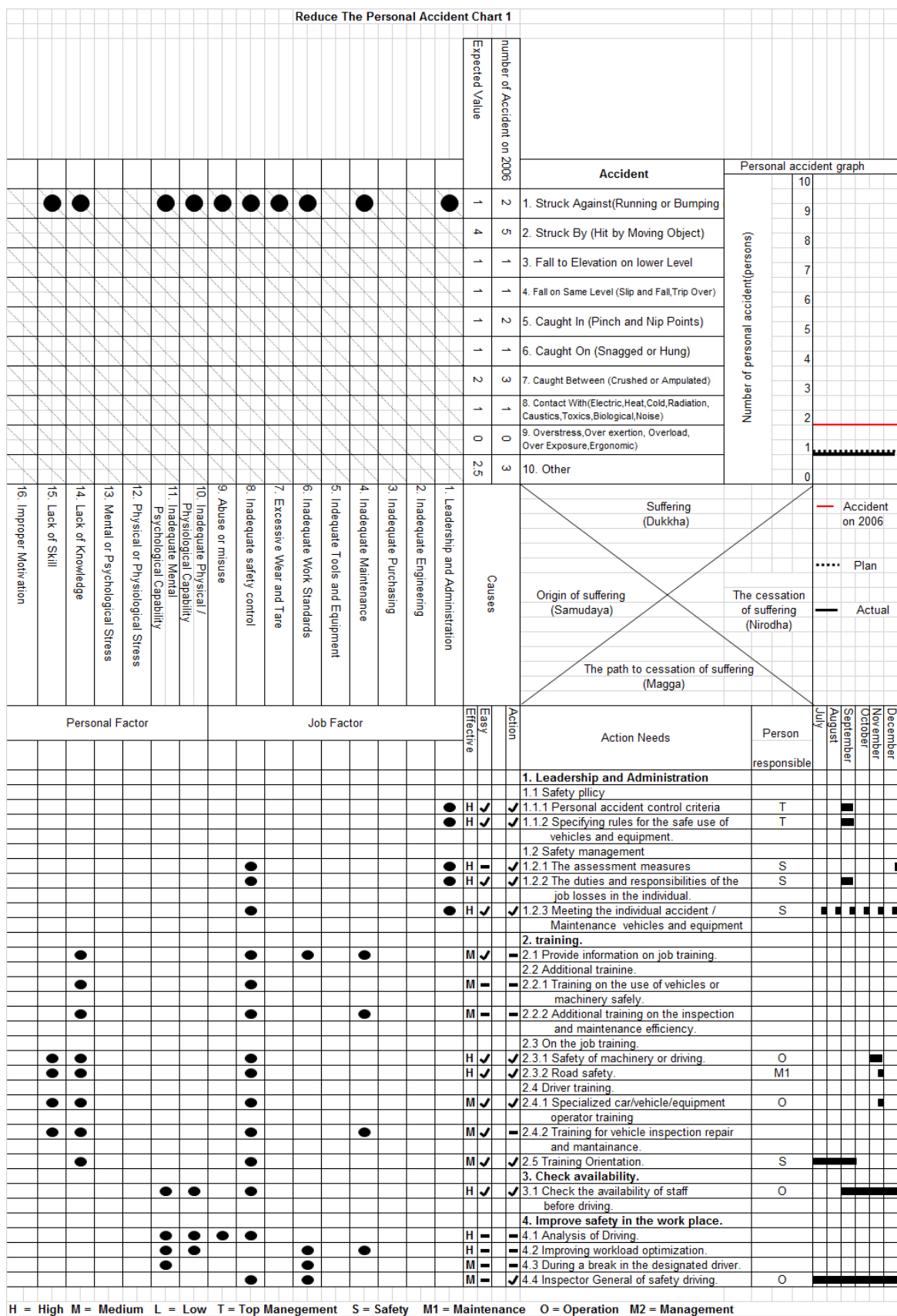
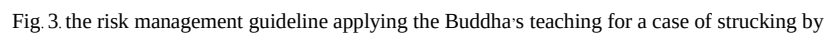


Fig. 2. the risk management guideline applying the Buddha's teaching for a case of striking against

Table 2. The explanation of safety management in a case of striking against

General risk assessment and control	Evaluating risk	Identifying risk		Controlling risk		Eliminating risk
Four noble truths	Suffering (Dukkha)	Origin of suffering (Samudaya)		Path to cessation of suffering (Magga)		Cessation of suffering (Nirodha)
Struck again		Job factors	Leadership and administration Inadequate maintenance, work standard and safety control Excessive wear and tare Abuse or Misuse	Leadership and administration	Personal accident control criteria Specifying rules for the safe use of vehicles and equipment Assessment measures Duties and responsibilities of job losses individually Meeting the individual accident/ vehicles and equipment maintenance	A number of accidents reduce and happened according to the expectation.
			Inadequate physical/ physiological capability, mental/ psychological capability Lack of knowledge and skills		Provide information Training on the use of vehicles or machinery safely Additional training	
		Personal factors		Training	Check availability of staff before driving	
				Checking availability		
				Improving safety	Analysis of driving Improve workload optimization Provide general inspector of safety driving	



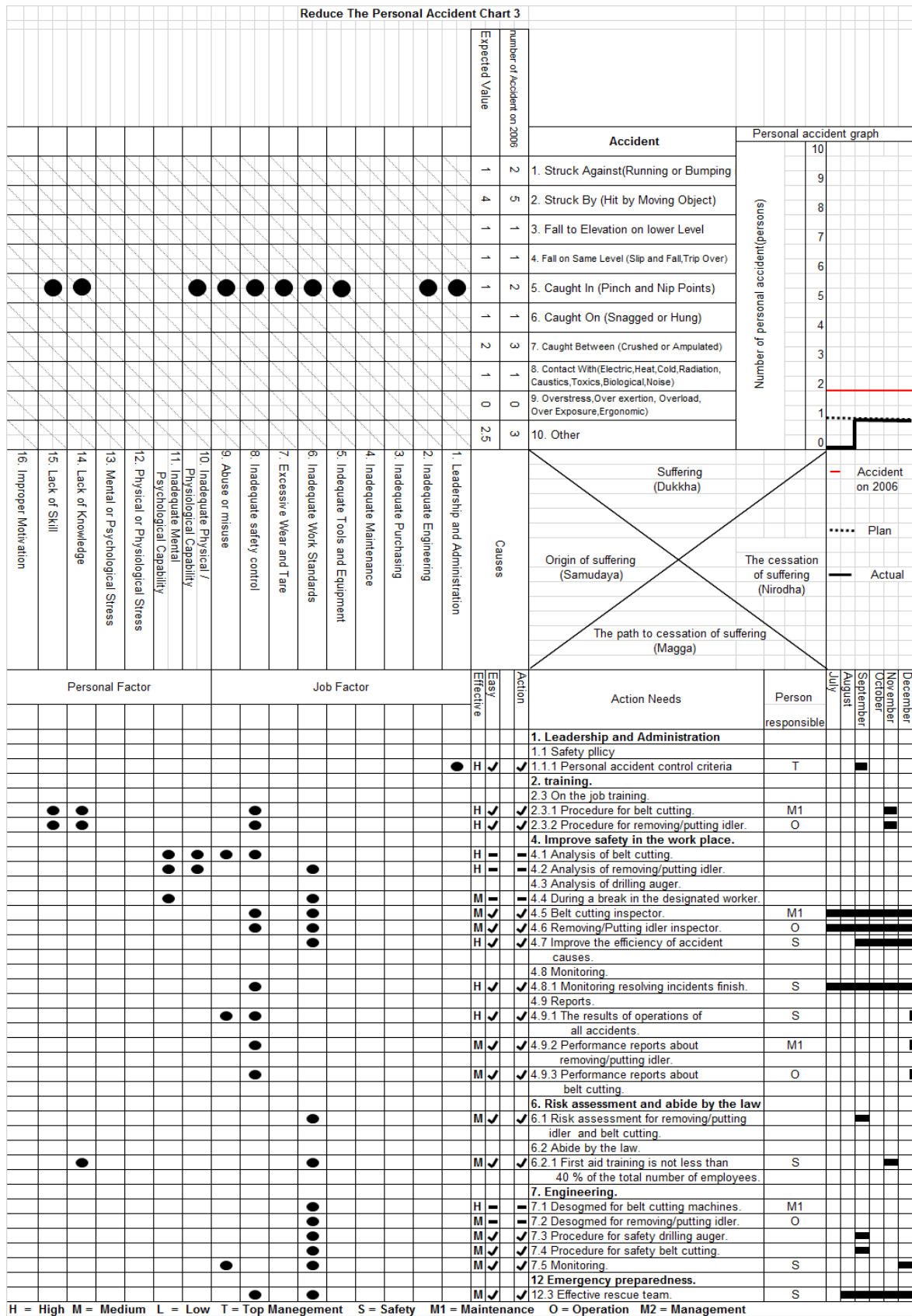


Fig. 4. the risk management guideline applying the Buddha's teaching for a case of catching in

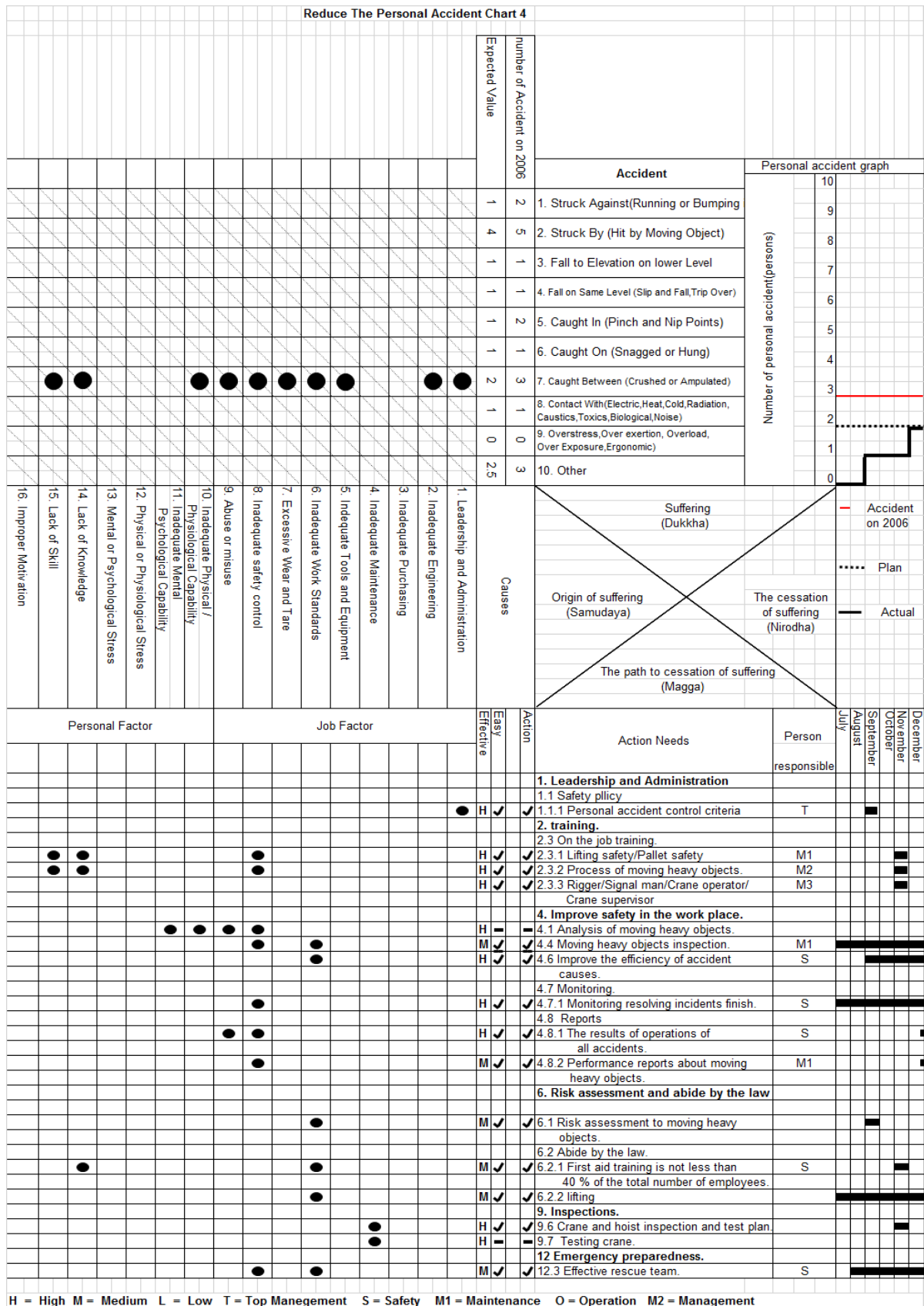


Fig. 5. the risk management guideline applying the Buddha's teaching for a case of catching between

Advantages of applying the Hoshin Kanri and the four noble truths to the general risk assessment and control

Even though the result shows that the Hoshin Kanri and the four noble truths apply efficiently well with the risk management, there are still some weak point in action of workers. The benefits of the Buddha's teachings adaptation are the accident data was categorized, leading to easily determine the cause and more specific

prevention or solution for each accidental case. Moreover, workers will know the specific risks in their tasks and try to avoid them which can reduce the unexpected situation until reaching zero accident. In contrast, there is no action for accidental prevention in some case. It is better to act according to the risk management plan.

4. Conclusion

The risk management guideline applying the Hoshin Kanri and the four noble truths to mine activities is highly efficient. The results show that a number of non-fatal accidents are reduced and happened less than expectation which is 26% significantly dropped during 2007 to 2015 (EGAT, 2006,2007a). Therefore, the main application of Hoshin Kanri and the teachings of Buddhism to create a risk management matrix, finding solutions to reduce the accidents in mine activities, are consistent and appropriate.

Acknowledgements

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International Conference on Economic Management in Mineral Activities (EMMA)

Risk management in the execution of an EPCI oil and gas field development project in Vietnam

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Abstract

Every day, in life and in working and business activities, risks are most certainly to be encountered. Risk is like a condiment, sometimes bitter, sometimes sweet but always adding flavor to life and business situations. Risks can occur anywhere, anytime and at times that no one could have imagined. Therefore, risk management is an indispensable activity an enterprise in general and for an investment in the project development business in particular. When investing in activities of construction, good risk management will help guide investors to make good decisions whether or not to invest, and if investors do, then what precautions are required to ensure and promote the highest economic efficiency of the capital investment in the project. Risk management in petroleum activities generally begins in the implementation of EPCI contract to develop the Oil and Gas Facilities and interest in this. In particular is increasingly becoming focused. The EPCI contract for development of Oil and Gas projects in the continental shelf of Vietnam usually includes the main components of the Engineering, Procurement, Construction and Installation (EPCI), of facilities and includes the major drilling equipment, substructure, the oil and gas processing topsides facilities and export pipeline to existing infrastructure and/or offshore liquids storage in the form of FSO. These items account for a large share of total development investment. Analysis and identification of associated risks and methods to provide solutions to control and mitigate these risks in the implementation of the EPCI contract for the development not only requires use of effective, reputable contractors but also improves economic efficiency for all working aspects of the development. Risk management is increasingly being implemented and focused success of projects in the control of cost, schedule and quality of the project. Historically, people have often said that investment in the Oil and Gas industry (exploration and development) has been risky since there are always potential risks with a high level in all phases of exploration, appraisal, development and production. Oil companies are vitally interested in eliminating or minimizing risks during all phases. In the development phase, a major risk related to the design, manufacture, procurement and installation of oil and gas projects.

Keywords: EPCI, Risk management

1. Problem Statement

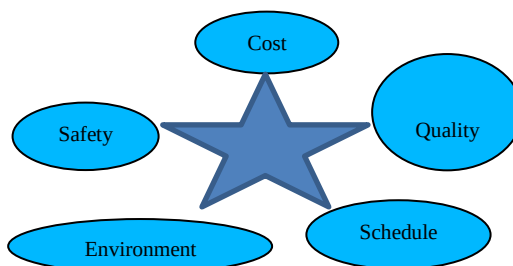


Fig. 1. 5 Project objectives

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1.1. Causes related to Quality Management

Currently the contractors rather Vietnamese Operators are applying Quality Management standards such as ISO... These standards have helped smooth process management, capacity management and have accelerated project development. But the quality control has not been thorough, especially in the fabrication shop and management of equipment suppliers leading to poor-quality equipment, providing slow deliveries and affecting the overall progress of the project. No processes have been implemented to assess the capability of the contractor and the contractor classified according to the quality of services they provide to the works. No contractors have eliminated poor service and poor quality. Their lack of experience and no database on the applicable contractors providing services at home and abroad have led to poor judgment when assembling contractor lists for a broad selection of contractors.

1.2. Causes related to Cost Management

Almost all projects have cost overruns because cost control if not carefully planned in advance and implemented progressively becomes a difficult issue when managing projects during the execution phase. The integral cost management process becomes difficult and the calculation and allocation of contingency costs are often overlooked and may be subject to lack of available funding to implement and the construction of items and projects will be delayed, uncontrolled large expenditure items have a dominant influence on the cost of the entire project. When purchasing key equipment, lack of a market price survey in the region will lead to cost increase due to need to purchase more expensive equipment for implied quality and schedule expectations.

1.3. Causes related to Schedule.

If the Project Management schedule is not complete and contractor ability risks are not reviewed and assessed, less available free float, progress is not tracked accurately, than the complex relationships between activities (because of the large-scale of the projects with large number of work fronts, it is difficult to control the progress and costs)

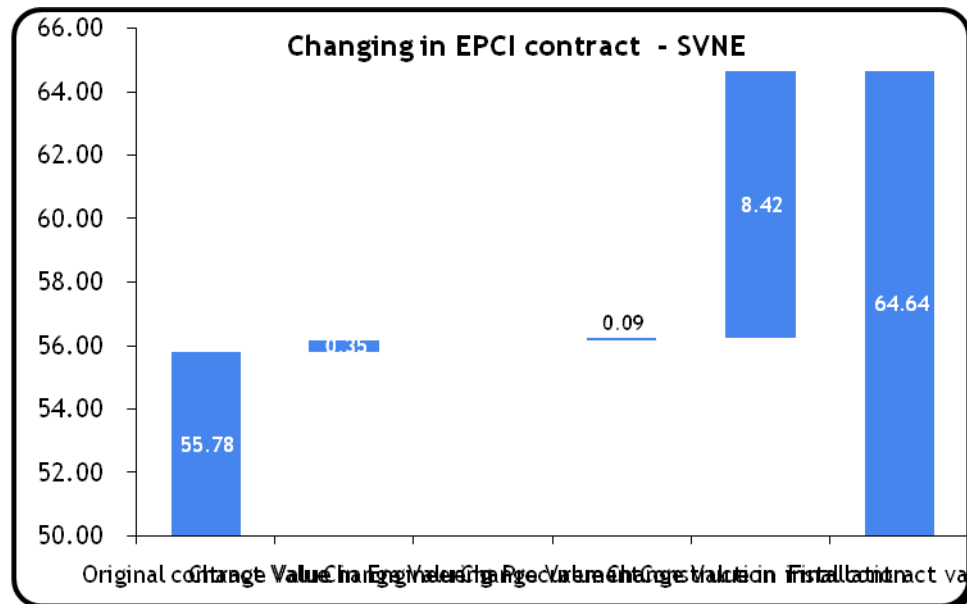


Fig. 2. Cost overrun EPCI Progress (unit: million USD)
Highest cost Impact in installation phase due weather standby (Impact 8.82 million USD)

2. Research methodology

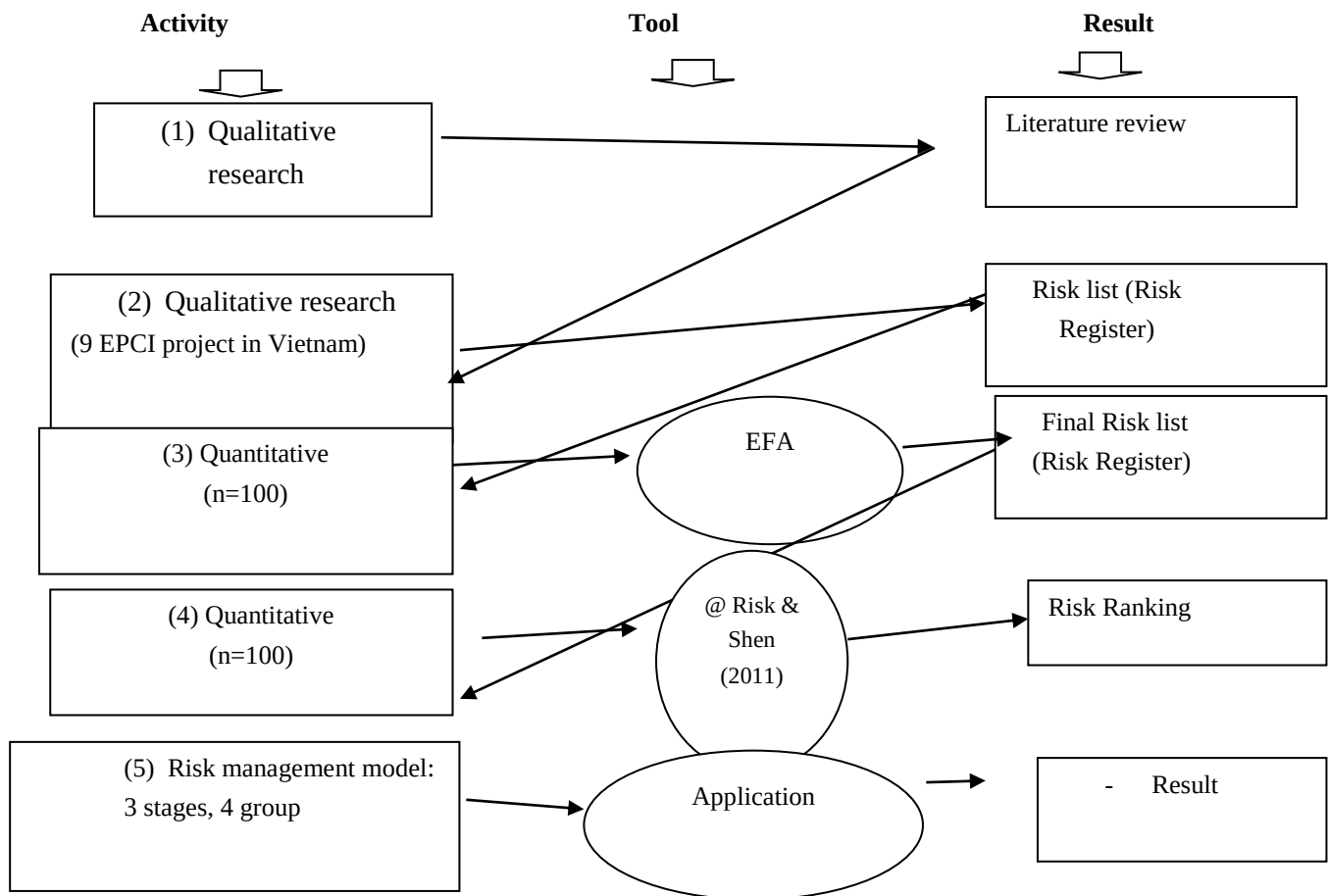


Fig. 3. Research methodology process

3. Risk management process :

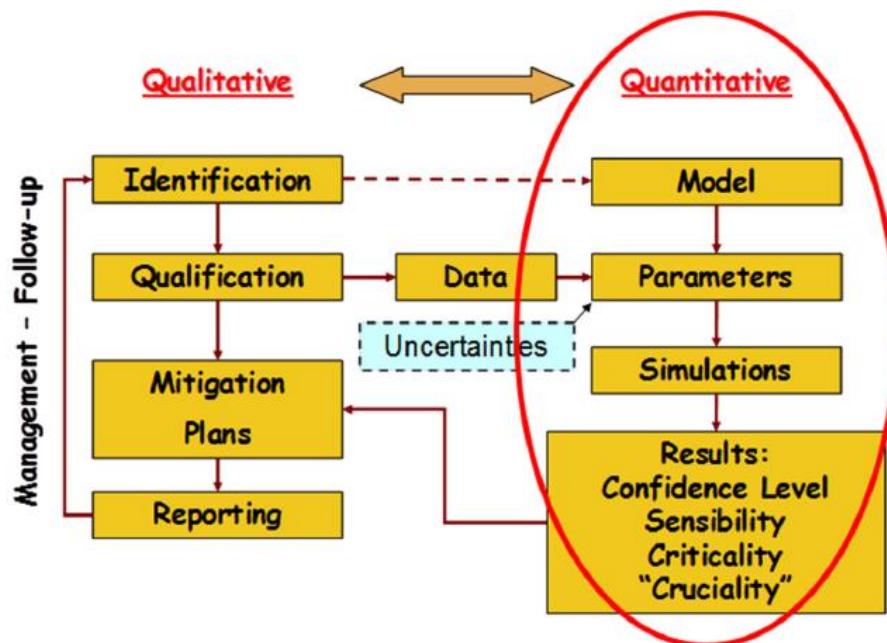


Fig. 4. Risk management model

- Plan for Risk Management (Risk Management Planning) - Giving methodology and detailed work plan for the management of project risks.
- Identify risks (Risk Identification) - Identify all the elements that are capable, potentially will affect the project.
- Assessment of Risk (Qualitative Risk Analysis & Quantitative Risk Analysis / Risk Evaluation).
- Planning remedy, mitigate risks (Risk Response Planning / Risk Mitigation Planning) - Establishment of

procedures and measures to strengthen measures aimed at mitigating risks of risk.

- Monitoring and controlling risks (Risk Monitoring, Controlling & Reporting) Subscribe recovery plan risks, identify new risks, conducting risk mitigation measures, periodic assessment of the risks old and new for the duration of the project

4. Risk identification

The main risk often encountered in the majority of EPCI contracts are:

- Cost over run
- Schedule over run.
- Quality of the works don't meet specifications and standards

Contributors to these are:

- Risks in Design
- Risks in Construction
- Risks in Procurement

The EPC / EPCI phase is an important step in the overall development process. Research to investigate, identify and manage the risks within these contracts will help implement robust EPC contracts ensuring the success of the project as well as effective economic governance of the contractor.

- 71 Risks were collected from previous research and Literature review (initiating risk factors list)
- Apply EFA tool to eliminate 3 risks out of risk register and remain 68 risks

5. Risk Evaluation

By using @risk and Shen (2001)

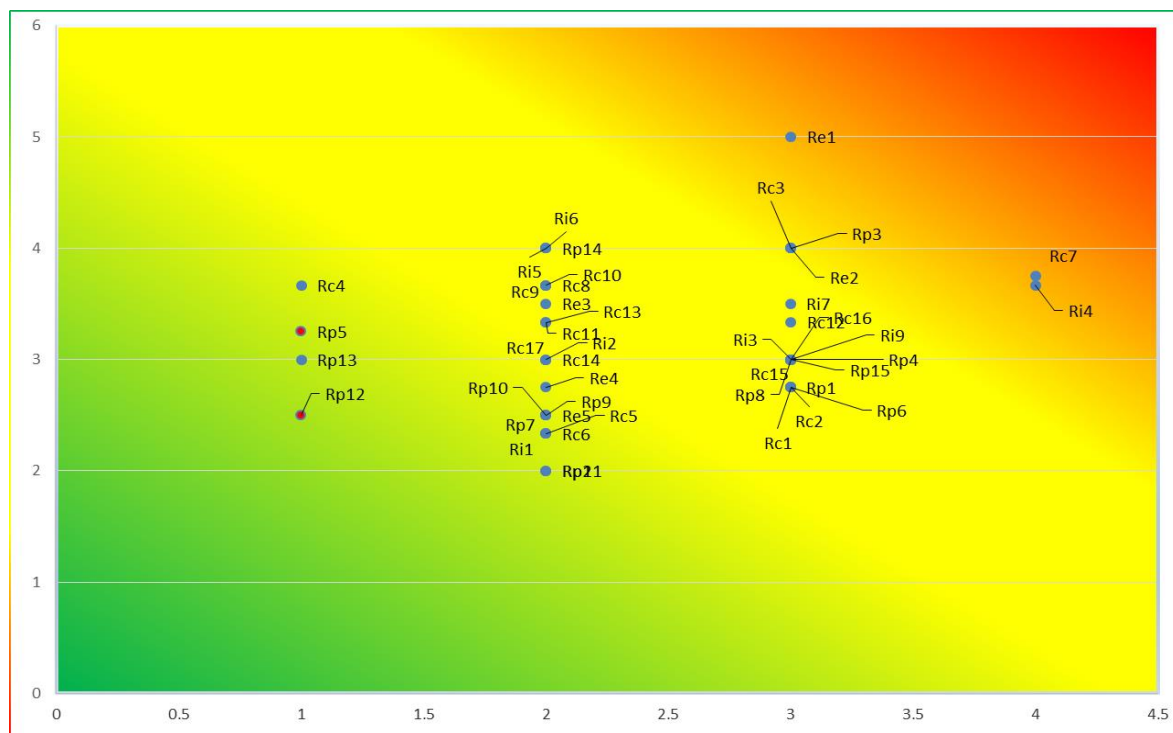


Fig. 5. Result of risk Evaluation

List of highest risk included:

Re1: G&G evaluation, input data.

Re2: Changes design.

Rp3: Subcontractor- the poor quality, slow progress after the award of contract services

Rc3: Risks resulting from the delay in delivery for the important packages- Long lead Item.

Rc7: Risks in construction, particularly in times of high workload;

Ri4: Weather standby.

With this result, Management team can apply and pay attention on the highest impact risk. It could be supported to project manager to make decision quickly to mitigate risk .

6. Conclusions

In this paper, based on previous research about risk management and EPCI project in Vietnam Identification 68 risks almost happen in Vietnam oil and gas development projects and also ranking the 6th highest risks. This research use reliable tool to evaluate such as EFA , @Risk ..and help EPCI contractor to manage project run smoothly without project delayed, cost overrun , below quality , HSE problem to commit all condition in EPCI contract. References

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Financial risks in coal mining companies under Viet Nam National Coal-Mineral Industries Holding Corporation Limited (Vinacomin) – the risk of losing financial safety

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Abstract

Recently there have been many studies and articles referring to financial risk that can happen to any kinds of business. However, there are not many research which dig deep into the financial risk factors in the coal mining enterprises under Vietnam National Coal-minerals Industries Holding Corporation Limited (Vinacomin). As the matter of fact, nowadays, financial risks in companies of Vinacomin often occur. And it is essential that financial risks in these firms should be taken care of properly. Since the global crisis in 2008, there have been many challenges for businesses in Vietnam, especially in the coal mining. The coal mining businesses have been making many efforts to deal with difficulties, which include fluctuations in interest rates and exchange rates; large trading deficit, the volatility of business environment, etc. This increases the probability of financial risks. As a result, over the past few years, the coal industry has experienced downsizing production capacity, the shrinking of consumer market and the decline in profit.

Keywords: Financial risk; financial safety;

1. Introduction

When it comes to financial risks, many think that these risks are related to the changes of market factors such as interest rates and exchange rates, commodity prices and the ability to recover the debts. But it always happens with a negative scenario, which makes negative impacts on company's financial status. Through the surveys conducted in a number of privatized coal mining companies of Vinacomin, as well as through the financial statements, the financial prospectus audited in 2015 and relating documents, the research shows that the real financial risks situation of these companies is alarming. Moreover, these companies are not paying enough attention to the management of financial risks. This article evaluates the financial risks of these businesses based on some indicators as following: the solvency, the financial leverage, the capital turnover. The efficiency of financial investments, the impact of interest rates, the foreign exchange rates, and the market prices.

2. Concept and types of financial risks in the company

2.1. The concept of financial risk

There are many different notions about the financial risks of the business, however, according to the scope of this article, the financial risks of the company in general and mining business in particular are understood as *the risk of losing the ability to pay mature debts due to using financial leverage referred as borrowed capital in doing business of a company.*

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2.2. Common financial risks that coal mining firms often face.

- Market Risk
- The re-investment possibility risk
- The liquidity risk
- The interest risk
- The risk of exchange rate
- Financial leverage risk

3. The evaluation of some certain financial risk types in coal mining companies

3.1. The solvency

To evaluate this content through indicators of solvency, the author selected a number of privatized coal mining firms, which are divided into underground mining and open pit mining as two examples in this article. Through general assessments about the solvency of these companies conducted in 2015, the current solvency ratio generally fluctuated from 0.4 to 0.8. Exceptionally, Vang Danh company had this ratio at 1.35 and acid - test ratio between 0.2 and 0.6. Although these coal mining business companies always have a low current solvency rate (less than 0.9), the inventory of these businesses accounted for nearly 40%. Reserve for quick solvency is slightly over 60%. With that solvency ratio, it will be a great difficulty for companies to solve the capital shortage problem in production and business, and the ability of accessing to loan because common current ratio, often accepted by creditors, minimally is 2.0.

Table 1. The average solvency indicators of some coal mining firms of Vinacomin in 2015

No	Companies	Solvency index	
		Current ratio	Quick ratio
1	Vinacomin Nui Beo coal joint stock company	0.82	0.58
2	Vinacomin Deo Nai coal joint stock company	0.69	0.23
3	Vinacomin Coc Sau coal joint stock company	0.66	0.20
4	Vinacomin Cao Son coal joint stock company	0.56	0.22
5	Vinacomin Ha Lam coal joint stock company	0.47	0.26
6	Vinacomin Vang Danh coal joint stock company	1.35	0.62
7	Vinacomin Mong Duong coal joint stock company	0.79	0.65

Source: Author's calculations based on the financial statements of Companies in 2015

3.2. The using of financial leverage

Business activities of companies in general and the coal mining companies mainly relies on a healthy financial leverage. In recent years, the financial structure of coal mining companies is generally vulnerable due to low average equity. Though the fluctuation of Debt-to-equity ratio of these companies is still an upward trend over the years and currently remaining at a high level, the heavy reliance on financial leverage makes businesses vulnerable and easily affected when there are negative fluctuations in interest rates, exchange rates, or credit policies in financial market. (Fig 1 and Table 1).

For example, in 2014, the lending rate for production was 6.3% per year. However, in 2016, the lending rate is about 5 to 6% per year which has pushed up the commodity price and production and business cost, causing difficulties for these firms to maintain and develop the business. In addition, the volatility of exchange rate, the under – expected credit flows in manufacturing sector, the low liquidity of financial market all put these firms into lack of capitals. Many businesses have made a loss leading to downsizing their scale of operation or being merged with other businesses.

In 2015, the coal mining companies raised equity by keeping a part of retained profit but at a small proportion. Because of the impacts of inflation and depreciation, along with heavy reliance on loans from credit institutions, these companies could not successfully deal with these financial difficulties. The ratio of debt to equity of these companies, which was analyzed, tends to increase over the years. High debt-to-equity ratio with slow capital turnover increased the possibilities of financial risks in operation of these companies. Because of borne interest for overdue debts, and downgrade in credit trust ranking, it is much more difficult for these companies to get next loans, which means the risk of financial safety from the perspective of lenders.

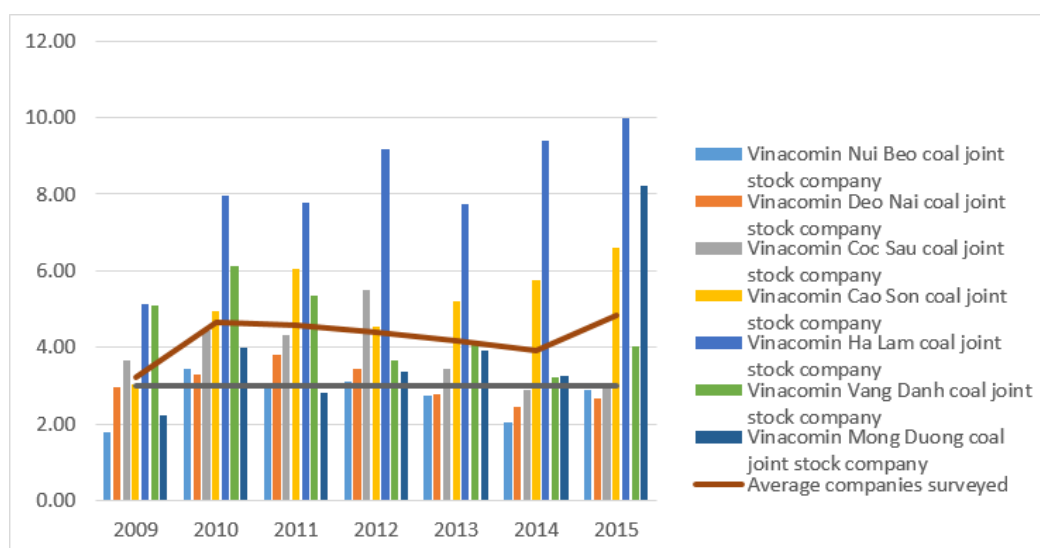


Fig. 1. The debt on average equity of coal mining companies period 2009 - 2015

Source: Author's calculations based on the financial statements of the Companies

Table 2. The evaluation criteria of financial leverage ratio and the potential loss of financial safety of coal mining companies

No	Indicators	2014	2015
1	Debt on total assets	0.79	0.87
2	Debt on equity	4.35	4.97

Source: Author's calculations based on the financial statements of companies

3.3. The rotation and turnover of capital

Results from calculation of the capital turnover and assets rotation of companies of Vinacomin shows that the rotation of total assets (in 2014 were 1.89 times, 1.93 times 2015), Round rotary current assets (3.28 times in 2014, 2.93 times in 2015), inventory turnover (respectively 16.15 times in 2014, 18.56 times in 2015) follows an upwards trend. This demonstrated that difficulties in consumer market of businesses in recent years has exacerbated the financial issues.

Table 3. Status of revolving funds and assets of the company

No	Indicators	2014	2015
1	Total assets turnover	1.89	1.93
2	Current assets turnover	3.28	2.93
3	Fixed assets turnover	4.98	5.24
4	Receivables turnover	11.86	13.75
5	Payables turnover	3.78	4.27
6	Inventory turnover	16.15	18.56

Source: Author's calculations based on the financial statements of Companies

3.4. Investment efficiency of coal mining companies

In facts, there has been a downward trend in business performance, and profit in almost every economic sector and coal mining companies are not among the exceptions. By studying a number of coal mining companies, the results showed that there was a dramatically decline in profit made in 2015. Both ROA and ROE ratios decreased compared to 2014. Thus, the growth mainly based on borrowed capitals has revealed its limitations, as the more market lending rates increase, the more apparent the risks of loss is.

In the financial structure of the company, internal financial resources account for a small proportion, thus business results depend heavily on lending rates of financial institutions. That coal mining companies often have low ROE ratio is one of the causes of making losses. Low business efficiency while having high debt rate makes the financial risks of those firms more serious.

Table 4. Indicators assessing the profitability of coal mining companies

No	Indicators	2014	2015
1	Return on revenue (%)	4.66	4.38
2	ROE (%)	33.11	30.68
3	ROA (%)	12.62	11.98
4	Earnings per share (EPS) (vnd/share)	3,235.64	3,523.09

Source: Author's calculations based on the financial statements of Companies

Through researching the real investment situation of coal mining companies, author studied that one of the causes that reduced company's profitability is its inefficient financial activities might find that a cause of reduced profitability of the business is the financial activities. Most of the coal mining companies recorded losses from these activities on their financial statements. Due to large financial expenses (interest expense) while financial income is low, it comes to the fact that some firms still do not have financial income.

3.5. The impacts of interest rate volatility on financial situation of companies

If viewed from the impact of interest rate fluctuations on the financial status and business results of the coal mining companies through borrowing relationships, it can be seen how these volatilities make influences on financial situation and profitability of companies.

Table 5. Scale credit debt balance of companies

Unit: million VND					
No	Subsidiaries of Vinacomin	Short-term loans and debts		Long-term loans and debts	
		2014	2015	2014	2015
1	Nui Beo coal joint stock company	104,445	18,904	312,445	377,519
2	Deo Nai coal joint stock company	123,028	153,121	403,965	451,510
3	Coc Sau coal joint stock company	302,427	106,364	453,687	342,611
4	Cao Son coal joint stock company	226,146	392,107	510,389	447,925
5	Ha Lam coal joint stock company	255,968	256,374	798,409	1,139,609
6	Vang Danh coal joint stock company	0	0	967,857	990,857
7	Mong Duong coal joint stock company	148,837	201,501	289,533	281,131

Source: Author's calculations based on the financial statements of Companies

From the table, both long and short term loans and debts of these coal mining companies increased through years of study. The reasons for this trend is due to the volatility of market interest rates and the excessive investment on machinery, equipment, production and business activity of these companies. Despite the ups and downs of credit scale balance, the coal mining companies still have to pay extra interest expense due to the volatility of interest rates, which means that the profit of the business reduced corresponding to the cost of borrowing.

Table 6. Interest expense of businesses

Unit: million VND					
No	Subsidiaries of Vinacomin	Annually interest expenses		Comparison	
		2014	2015	+/-	%
1	Nui Beo coal joint stock company	47,563	46,720	-843	98.23
2	Deo Nai coal joint stock company	91,058	93,746	2,688	102.95
3	Coc Sau coal joint stock company	107,016	112,364	5,348	105.00
4	Cao Son coal joint stock company	105,756	112,829	7,073	106.69
5	Ha Lam coal joint stock company	62,944	125,860	62,916	199.96
6	Vang Danh coal joint stock company	125,042	128,962	3,920	103.13
7	Mong Duong coal joint stock company	28,977	29,870	893	103.08

Source: Author's calculations based on the financial statements of Companies

For these companies with increasing loan balance, increasing interest expenses is unavoidable, including notably the Ha Lam Coal Company with outstanding loan amount increasing by 99.96%. Because of the increase in long-term debt, that led to the growth interest expenses. This comes to conclusion that coal mining businesses are heavily influenced by borrowing interest rates.

3.6. The effects of exchange rate fluctuations on the financial status of companies

Because process of production and business activities there are transactions, arising in the process of production and business activities, relating to foreign currencies. Considering the impacts of exchange rate fluctuations on the financial status of coal mining companies through foreign exchange spread and profit/loss shows these firms are basically not affected by these fluctuations, partly due to the management mechanism from Vinacomin. As a result, Vinacomin had to bear significant losses because of exchange rate fluctuations.

3.7. The influences of price elasticity to corporate finance

Because the increase in the cost of inputs leads to the increase in prices of commodity that makes the cost of goods sold take a high proportion in total sales. Meanwhile, due to the volatilities of the market, the reductions in consuming power along with the rise in inventory make storage expenses and inventory accounting go up. This adversely makes their financial situation even worse.

3.8. Effects of bad debts to financial situation of companies

From the process of production and business activities, deferred payments, late payments often arise; thereby trading credit relationships are formed with customers and partners to accelerate sales activities. The receivables, payables in the balance sheets of each business accounting are among the obvious indicators proving these relationships. As a rule, at the end of the accounting period, companies determine the level of risk against the revenue in order to make provision for bad debts, charging into management expenses during report period. When making a provision for receivables, it will increase the management costs. This means the profit of companies will decrease correspondingly to the amount of money of provision which has been made. However, through studying, there are companies making provision for bad debts and companies that not. The reason is because of Vinacomin management mechanism. Almost all of the consuming activities are carried out from Vinacomin, therefore it is Vinacomin which has to primarily incur receivables.

Table 7. Provision for bad debts of industrial firms

		Unit: million VND	
No	Subsidiaries of Vinacomin	2014	2015
1	Nui Beo coal joint stock company	0	8,968
2	Deo Nai coal joint stock company	0	809
3	Coc Sau coal joint stock company	0	20,187
4	Cao Son coal joint stock company	0	165
5	Ha Lam coal joint stock company	0	0
6	Vang Danh coal joint stock company	0	0
7	Mong Duong coal joint stock company	0	0

Source: Author's calculations based on the financial statements of Companies

4. Conclusion

Through demonstrative figures above, it can be seen that most of the coal mining companies are facing with the financial risks. During the recession of economy and global financial crisis as well as the difficulties within the country, the probability of financial risks for businesses in our country is growing not only in affected zone but in speed as well.

Financial risks in the company do not only damage the business itself, but also cause damage to businesses, individuals and organizations involving such as reducing the ability to repay bank loans, declining revenues of state budget. Thus, along with the development of business, every institution should always focuses on the management of financial risks. The survey showed that most of these coal mining companies are mainly interested in managing business risks as risks of contract performance, supply of raw materials, product sales, goods transportation and risk of property. It is rather than pay right attention to financial risks. There seems hardly no official financial risk management in a formal way. It seems that they are adopting advices from finance and accounting department not all the time but often.

Currently in the world, there have been major shifts from the role of a purely accountant to the role of the financial strategy management of every business. However, there is almost no expression of this shift in Viet Nam. Because of the shortage in financial experiences of these chief accountants, businesses are often trying to avoid these risks, even ignore them in case there is no mandatory legal mechanism. For a good example, our

regime of financial management and accounting system demand that at the end of each accounting period, every company must make provision for devaluation of stocks, bad debts, financial status. Nevertheless, there are rarely businesses using market methods and instruments such as market risk diversification, financial derivative instruments like forwards contract, future contracts. It is also because of lacking proper concerns about financial risk management, in a volatile market conditions like these days, businesses are vulnerable, easily insolvent, or easily to lose financial safety, even worse go bankrupt.

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International Conference on Economic Management in Mineral Activities (EMMA)

Mine Closure -We Need To Do It Better

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Abstract

Mine closure is a process and should begin in the exploitation stage. Through leading practices of mine closure, environmental issues still require long-term monitor and report. Challenges for the mines of the future can be mine wastes, water, climate change, cumulative impact, innovation in post-closure options and cost effectiveness, affecting the reaction of community to the mining industry. Overcoming these challenges help and support the mining industry to gain the trust of the community. Thus, the better we do for the mine closure, the better we have community support.

Keywords: Mine closure, post-closure, Challenges for the mines

1. Introduction

The overall objective of mine closure and relinquishment is to prevent or minimise adverse long-term environmental, physical, social and economic impacts, and to create a stable landform suitable for some agreed subsequent land use (DIIS 2016).

All mines will eventually close as any mineral resource is finite. But mining companies extract reserves, not resources, and reserves are dynamic and dependent on a number of factors including the current and projected commodity price. At the time of writing (2016), the mining industry is in a severe downturn with commodity prices in both the metalliferous and coal sectors in decline. Companies have had to reassess their reserves and in many cases, mines have been forced to close prematurely. From a sustainable development point of view, these unplanned mine closures are far from ideal and can result in adverse impacts to the environment, the community and the industry itself. It has been shown that most of the closures in recent years, have been unplanned (Laurence 2006). Low commodity prices and increasing costs are common causes of premature closures but there are many others including geological, geotechnical, regulatory, environmental and metallurgical factors.

1.1. The Stakeholders

In an ideal world, all mines would close when their reserves are exhausted and mine management has been able to put in place a systematic plan to replace the depleted mineral assets with sustainable benefits for all stakeholders, while minimising any adverse impact or risks from a safety and environmental perspective. In a planned closure, there is time for the community and government and other stakeholders to prepare for the post mining reality. The involvement of stakeholders or “communities of interest” is critical to the success of the mine closure process. But who are the stakeholders and what are they expecting when a mine closes? The stakeholder cohort will vary from site to site, country to country, but generally will consist of at least local community, various government entities and the affected mine workforce as illustrated below.

Table 1. Major Stakeholder Groups and their Expectations

An example of a column heading	Expectation
Local community	Sustainable businesses to replace the reliance on the local mine; access to infrastructure; maintenance of health and education facilities that may have been supported by the mine; mine site fully rehabilitated
Government	Mine site fully rehabilitated avoiding cost to the taxpayer; development of alternative revenue streams to replace royalties and taxes from the mine
Mine employees	Redeployment in other mines or assistance in finding suitable employment outside the mining industry; payment of outstanding wages and benefits

1.2. Examples of leading practice in mine closure

The concept of ‘leading practice’ exemplifies excellent approaches to mine closure. As new challenges emerge and new solutions are developed, or better solutions are devised for existing issues, it is important that leading practice be flexible and innovative in developing solutions that match site-specific requirements. Although there are underpinning principles, leading practice is as much about approach and attitude as it is about a fixed set of practices or a particular technology (DIIS).

Despite considerable advances in the knowledge base and technology relating to mine rehabilitation and closure over the past 30 years, and where leading practice has been demonstrated, there are few examples of outstanding and successful mine closures where it can be genuinely claimed that the principles of sustainable development have been applied. That is, there are no ongoing environmental or safety and health issues, the community has benefited and continues to benefit from the legacy of the mining operation, and that the resource has been optimally utilised. Importantly, it can be argued that the final measure of success is where governments have released the mine operator from any further work or liability relating to closure.

Examples of successfully closed mines incorporating leading practice include:

- Misima mine, PNG
 - open pit gold; fully rehabilitated pits and dumps; sustainable opportunities for local stakeholders post-mining
- Woodlawn mine, New South Wales Australia
 - base metal open cut and underground mine; pit filled with domestic waste; bioreactor and windfarm
- Kelian mine, Indonesia
 - open pit gold; excellent closure planning taking account of stakeholders including small-scale miners
- Mineral sand mining, NSW Australia
 - cutting-edge techniques developed to reclaim sensitive sand dune ecosystems
- Nabarlek mine, Northern Territory, Australia
 - uranium mine within a world Heritage area; tailings deposited into the pit; re-establishment of “Bush Tucker” (food source) for the local indigenous population.
- Woodcutter’s mine, Northern Territory Australia
 - base metals, open pit followed by underground mining; waste dumps and tailings deposited back in the pit
- Elliot Lake mine, Ontario, Canada
 - uranium mining, historical workings, tailings; remarkable success in treating water, suitable for recreation and prime waterfront real estate
- Sullivan mine, BC, Canada
 - base metals, 90 years of underground mining with significant waste dumps, tailings storage facilities and acid rock drainage potential

Despite demonstrating leading practice in rehabilitating and closing these mines, in most of these cases the respective governments have not released the mining companies from their environmental responsibilities. For example, in 2006, a senior company official said “Sullivan is not a walk-away mine. We have to collect, treat, monitor, and report indefinitely” (CIM 2006). A similar story applies at Elliot Lake where the tailings are on long-term care and maintenance and will continue to be into the future.

1.3. The concept of life of mine closure planning and integrated mine closure

In the last 30 or so years, there has been a paradigm shift in the way the mining industry thought about, planned and funded mine closures. In the 70s and even the 80s, in many cases mine closure was an afterthought or not even thought about by mine management until far too late. The mines were left in an unsafe condition with significant environmental legacies and with little regard for those communities in which the mines operated. Governments were left to clean up the mess and generally there were few funds available to complete the job. The concept of security deposits or bonding was in its early stages. Governments, such as those in Australia, had to seek special funding to rehabilitate the worst sites particularly where these presented a hazard to the community.

The concept of life of mine closure planning is now embedded throughout the mining industry. The term “mining for closure” describes in a nutshell the desired outcome. Ideally, planning for closure should begin in the exploration stage. The closure plan will become more detailed and comprehensive throughout the following stages of feasibility, development and operations through to the closure stage and post closure management (ICMM). As governments become more risk averse and more reluctant to accept responsibility for mine sites, post-closure management is the final and necessary stage before a company can finally “walk away” from the site, having been absolved of any future legal or financial responsibility.

1.4. The Challenges for the Mines of the Future

As community expectations for sustainable benefits from mining operations increase, and as environmental standards and practices continue to be lifted, successfully closing a mine will become more challenging. There are a number of areas in which the mining industry needs to both improve its performance and, importantly, demonstrate to the community that mining is indeed a temporary land-use and that the land affected by mining can be rehabilitated to a suitable, alternative land use. Specific challenges that need to be addressed include:

- Community support
 - The power of communities to reject proposed mines or influence governments to shut down mines is growing. This is a global phenomenon in both developing and developed economies and the industry is losing the debate, which is often fought in the media. The rise of social media is enhancing the ability of activists and others in the community to oppose mines. Unless the industry can demonstrate through more successful examples that mines can operate and can be closed with a net benefit rather than a cost to the community, there may be no more mines of the future.
- Mine wastes
 - In recent times, there have been a number of incidents involving tailings storage facilities causing significant human and environmental loss. An example is the 2015 tailings dam failure in Brazil that resulted in the deaths of 17 people. Furthermore, as stripping ratios continue to increase, the environmental footprint of waste dumps will continue to grow and with that the commensurate risk of acid rock drainage and other environmental issues also increases.
- Water
 - The preservation of a clean water supply to the local community has been a focal point of opposition to new, operating and closed mines. Whether it is in well-established mining fields such as the Hunter Valley or in any proposed new mine at a remote mountain in the Andes, protecting the water resource is often the most important environmental and social consideration. The industry needs to better demonstrate that it can protect the quality and quantity of water to satisfy the future needs and concerns of the community.
- Climate change
 - Mines close for the long-term and therefore industry needs to be cognisant that closure strategies including revegetation and drainage may be affected by changes in the local environment including more severe summers and more intense storm events. Ignoring these risks may jeopardise very expensive rehabilitation works thereby further delaying the ability of the company to “walk away” from the site.
- Cumulative impact
 - Community opposition to new mines where there is intense mining activity such as the Hunter Valley of New South Wales is due in part to the cumulative impacts of many mines on air quality, water, noise, blasting, transport and other issues. Where one mine maybe acceptable, the community believes that 30 mines are not.
- Innovation in post-closure options
 - With the variety of mining operations that will close in the future, there will be opportunities to be innovative in choosing a suitable final land-use. In the past, there have been some excellent examples of transforming former mines into recreational areas, industrial estates, golf courses, tourist and heritage sites as well as the mainstream agricultural and forestry uses. Tailings storage facilities for example in some areas provide large areas of flat land that could be used for renewable energy projects including biomass, wind and/or solar farms. It is important for the industry to work with stakeholders to turn potential liabilities into community assets. The design skills of a landscape architect may also be of value in some situations where the community sees an opportunity to fuse human systems with the natural in the final land-use scenario (Buchko and Hitch, 2010). All options should be assessed in a risk based process.
- Cost effectiveness
 - The costs of closing mines continue to increase to the stage where there is doubt about the wisdom of opening them in the first place. Rehabilitation programs are now costed in the hundreds of millions of dollars. The question needs to be asked “is this expense justified?”. Governments often use a common set of standards for all mines, known as “completion criteria.” It can be argued that one size does not fit all therefore the completion criteria should be flexible. For example, should the same environmental standards apply to a small open pit gold mine in a remote unsettled site in a desert compared with a coal mine in a densely populated area compared with a uranium mine in a World Heritage Site in the tropics? Another issue is a requirement to remove all infrastructure when closing a mine, assets which might be of significant benefit to the next land user. Furthermore, there is some justification for keeping examples of current mining technology and equipment for future generations to view.

2. Conclusion

Mine closure is a process with a long life cycle. Planning for closure should begin at the earliest possible stage in a mine’s life and will need to be considered for possibly decades after production has ceased. Mine

closure is complex and costly and planning and performance need to be reviewed continually. The importance of gaining community support for the final land-use is essential. The mining industry needs to demonstrate that mines can be rehabilitated and closed successfully if it is to survive into the future. There are numerous challenges for the industry to address to enable it to gain the trust of the community in order for it to maintain its “social license to operate” and to continue to produce the minerals that society needs.

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International Conference on Economic Management in Mineral Activities (EMMA)

Sustainable development indicators for mining industry

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Abstract

Mining has been playing an important role in the development of the world for a long time by providing basic minerals and fuels necessary for all economic sectors from agriculture to hi-tech industries. The enormous growth of demand for mining products worldwide has been driven by fast economic growth especially in China and India. Besides bringing about new business opportunities like large investment in mining companies and more jobs in mining industry, the recent boom in mining also raises concerns. While worry about running out of natural resources like minerals have been released by the introduction of advanced technology and new resource discoveries, promoting sustainable development in mining industry emerges as the main challenge nowadays. This paper discusses about sustainable development (SD) in mining industry and indicators for the establishment, measurement and assessment of SD in this primary economic activity.

Keywords: mining; sustainable development; indicators

1. Sustainable development in mining industry

Sustainable development has become a burning issue in all countries around the world since its first introduction in Our Common Future, also known as the Brundtland Report, of the United Nations World Commission on Environment and Development in 1987. SD is defined as “*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*” (UN WCED, 1987). The definition contains within it two key concepts:

- The concept of needs, in particular the essential needs of the world’s poor, to which overriding priority should be given; and
- The idea of limitations imposed by the state of technology and social organization on the environment’s ability to meet present and future needs.

In 1992, world leaders presented the principles of SD at the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil. During that conference it was agreed that SD consists of three elements: economic development, social development and environmental protection (Fig. 1)

There is argument that mining is fundamentally incompatible with SD because it involves the exploration for and extraction of non-renewable resources. From this view, the best that the industry can hope to do is to minimize its “footprint” and improve resource efficiency. In 2002, the World Summit on Sustainable Development also called for actions “*to address the environmental, economic, health and social impacts and benefits of mining*”. Twenty years later, during the Rio+20 summit, it was concluded that “*minerals and metals make a major contribution to the world economy and modern society*” and acknowledged that “*mining activities should maximize social and economic benefits, as well as effectively address negative environmental and social impacts... Governments need strong capacity to develop, manage and regulate their mining industries, in the interest of sustainable development*” (UN CSD, 2012).

Over the past decade, the mining industry has increasingly focused on sustainably extracting and processing industrial minerals. Ten SD principles in mining, first drafted by the International Council on Mining and Metals

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(ICMM) in 2003 and revised in 2015, insure that SD concepts are applied equally across the industry while setting a clear performance standard and benchmark against which to evaluate success.

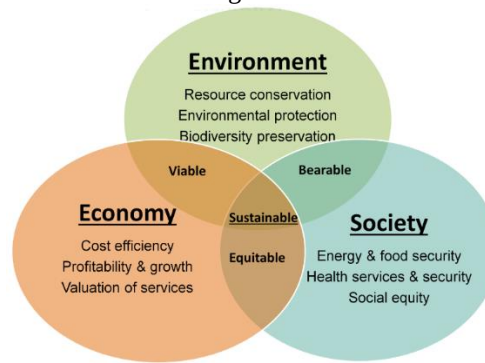


Fig. 1. Model of sustainable development

The ten principles (ICMM, 2016) include:

1. Apply ethical business practices and sound systems of corporate governance and transparency to support sustainable development;
2. Integrate sustainable development in corporate strategy and decision-making processes;
3. Respect human rights and the interests, cultures, customs and values of employees and communities affected by our activities;
4. Implement effective risk-management strategies and systems based on sound science and which account for stakeholder perceptions of risks;
5. Pursue continual improvement in health and safety performance with the ultimate goal of zero harm;
6. Pursue continual improvement in environmental performance issues, such as water stewardship, energy use and climate change;
7. Contribute to the conservation of biodiversity and integrated approaches to land-use planning;
8. Facilitate and support the knowledge-base and systems for responsible design, use, re-use, recycling and disposal of products containing metals and minerals;
9. Pursue continual improvement in social performance and contribute to the social, economic and institutional development of host countries and communities;
10. Proactively engage key stakeholders on sustainable development challenges and opportunities in an open and transparent manner. Effectively report and independently verify progress and performance.

Many mining companies around the world have embraced SD principles and the major companies publish annual reports on their SD activities. Many financial institutions require plans for SD before financing new mining projects.

2. Key sustainable issues in mining industry

2.1. Economic issues

There have been claims that mining companies do not operate in ways that will provide them with long-term economic sustainability. For example, by operating irresponsibly in the social and environmental spheres, mining companies can undermine trust in their organizations. This mistrust diminishes investors' trust in companies, damages their reputations and therefore harms their investment potential.

To maintain economic sustainability, various factors must be taken into consideration. They include not only net sales, payments and debts but also investment in public sector, payment made to the government, contribution to the sustainable growth of the communities in which mining companies operate.

2.2. Social issues

In the social sphere, the industry is seeking to meet challenges regarding worker and community safety, policies for the life cycles of mining operations and human rights. The health and safety of workers is a major challenge to mining companies. Thus, safety standards, occupational safety training, protecting gear and healthcare are important. Mining companies are challenged to make workplace safer and more worker-friendly; to communicate more productively with workers and their representatives and unions.

Many companies are seeking ways to develop the communities that surround their operations, largely in response to claims that extractive industries have deleterious effects on communities. Some companies implemented plans for generating community incomes, improvement of community access to services, social infrastructure and capital. Some provide education and training service to local employees, some facilitate access to education and skills training in the communities where they work. Some also pay attention to

remediation of the surrounding economy after mine closure by restoring mine sites to their previous states or to create sustainable employment for the surrounding communities.

2.3. Environmental issues

Mining have a wide range of environmental impacts such as air pollution due to dust, greenhouse gases, water pollution like acid mine drainage, solid waste especially from open pit operation, tailings. Some potential environmental impacts of mining are listed in table 1.

Table 1 - Some potential environmental impacts of mining

Environmental Impacts	Pollution Impacts	Occupational Health Impacts
◆ Destruction of natural habitat at the mining site and at waste disposal sites ◆ Destruction of adjacent habitats as a result of emissions and discharges ◆ Destruction of adjacent habitats arising from influx of settlers ◆ Changes in river regime and ecology due to siltation and flow modification ◆ Alteration in water-tables ◆ Change in landform ◆ Land degradation due to inadequate rehabilitation after closure ◆ Land instability ◆ Danger from failure of structures and dams ◆ Abandoned equipment, plant and buildings	◆ Drainage from mining sites, incl. Acid mine drainage and pumped mine water ◆ Sediment run-off from mining sites ◆ Pollution from mining operations in riverbeds ◆ Effluent from minerals processing operations ◆ Sewage effluent from the site ◆ Oil and fuel spills ◆ Soil contamination from treatment residues and spillage of chemicals ◆ Leaching of pollutants from tailings and disposal areas and contaminated soils ◆ Air emissions from minerals processing operations ◆ Dust emissions from sites close to living areas or habitats ◆ Release of methane from mines	◆ Handling of chemicals, residues and products ◆ Dust inhalation ◆ Fugitive emissions within the plant ◆ Air emissions in confined spaces from transport, blasting, combustion ◆ Exposure to asbestos, cyanide, mercury or other toxic materials used on-site ◆ Exposure to heat, noise, vibration ◆ Physical risks at the plant or at the site ◆ Unsanitary living conditions

Source: UNEP, 2000

3. Sustainable development indicator for mining industry

The concept of SD is useful to highlight the service that mining industry provide to society and national development. It also provides a useful approach to improve the environmental performance and enhance the competitive advantage of mining industry. The efforts of the industry can then be communicated to the government and the public through the use of indicators.

Indicators are parameters or value derived from parameters, which provide information and describe the state of a phenomenon or area, with a significance extending beyond that directly associated with the parameter value (OECD, 1993). There are basically two defining characteristics of indicators: ability to quantify information and make its significance more apparent, and capacity to simplify information about a complex phenomenon so that it can be communicated more easily to all the parties involved. Indicators have many purposes depending on the objectives for which they have been developed, and the functions range from decision-making to public awareness. The government can use indicators to inform the public about the actions that have been taken to address environmental problems and promote SD. Indicators can also be used by industry to inform the public and the government regarding their environmental performance and progress towards SD.

Monitoring indicator that maybe used to observe whether the principles of SD are being observed in mining industry include:

Table 2 – Sustainable development indicators for mining industry

Economic Contributions	Social Benefits & Impacts	Environmental Protection
- performance of shares - net earnings - percent return on capital investment - amount of mineral produced - number of jobs created - taxes and royalties created - capital expenditures	- lost time injury frequency - injuries requiring medical treatment - risk-related educational programs - regular medical surveillance of employees - lifestyle seminars and family assistance - ranking of company as desirable place to work - employee perceptions about the company - percent employee turnover - workforce and training - wages - long-term incentive plan for employees - number of local residents employed - diversity of workers - donations to charities - work employee volunteers for community	- control harmful emissions from equipment - minimize deforestation for new mines - control use of ozone creating gases & sprays - use low sulfur diesel & fuels - treat emissions to minimize nitrogen oxides - minimize use of benzene and volatiles - reduce flaring of natural gas (DOI rules) - minimize methane releases into the air - eliminating spills of hazardous substances - minimizing water used - restrict disturbance of new lands - reclaiming disturbed land - managing waste creation - recycle products and waste - reduce power usage - regulatory compliance

Source: Fytas, 2003

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International Conference on Economic Management in Mineral Activities (EMMA)

Environmental impact assessment in Thailand Mining Industry and lessons for Viet Nam

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Abstract

The paper focuses on environmental impact assessment (EIA) system in the mining industry of Thailand. Since then it proposes the applicable lessons for Viet Nam mining industry during the phrase of national development, especially when environmental issues are significantly considerable. The solutions and recommendations should be flexibly applied in the context of Viet Nam.

Keywords: environmental impact assessment, mining industry, social sustainable development

1. Introduction

Environmental Impact Assessment (EIA) is known in some countries or institutions with other names: Environmental Assessment (EA) or Environmental Impact Statement (EIS), but the objectives, process and outputs are essentially similar or the same. It is known that a final outcome of process from identification, analysis, assessment, forecasts of social and environmental impacts (both positive and negative effects) during project-specific stages, the purpose are to improve decision-making process and to ensure that the project options under consideration are social, and environmentally sustainable. EIA not only determines the potential environmental, social and health effects of a proposed project but encourages also consideration of the environment in planning and decision-making and ultimately arrive at development actions which are more environmentally compatible. In other words, EIA can overcome these earlier deficiencies and achieve new objectives in the context of sustainable development. Therefore, EIA has become more significant in recent years, especially in developing countries such as Thailand and Viet Nam. A study of EIA in Thailand mining industry is necessary to find advantages in the implementation.

2. Environmental impact assessment in Thailand mining industry

As a result of increasing environmental problems, the EIA process has been applied in Thailand as a tool for environmental planning and management on the economic development projects screening approach since 1981. The EIA has been used to identify impacts of the projects, as well as to establish the appropriate mitigation measures so that the natural resources will be efficiently used for the economic development of Thailand.

According to the Enhancement and Conservation of National Environmental Quality Act 1992 of Thailand, EIA, EHIA and IEE are defined as followed:

- EIA is the study for forecasting the environmental impacts, both negative and positive impacts from development projects or significant activities. EIA has been used to establish the appropriate mitigation measures for preventing and mitigating environmental impacts for these projects or activities.
- EHIA is the study for forecasting the environmental impacts for projects or activities which may seriously affect community. EHIA differs from consideration of the report of general projects or activities and whereas it is necessary to fulfill the requirements of section 67 of the Constitution of the Kingdom of Thailand.

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- IEE is the initial study for forecasting the environmental impacts. IEE normally uses primary data or available data. In Thailand, IEE has been used for the small projects or the projects that have less impacts.
- With the purpose of the improvement of the quantity of EIA report, the government of Thailand divides projects to four different types with dissimilar procedures of requiring EIA report; as followings:
 1. Types and sizes of projects or activities requiring EIA and EHIA report. There are 34 Types of projects requiring EIA report and 11 Types of projects requiring EHIA report, and with mining conducted both EIA and EHIA report because of its adverse effects on the environment and human health;
 2. Types and sizes of projects or activities followed by the Notification of Environmentally Protected Area;
 3. Types and sizes of projects or activities in Forest Conservation Area;
 4. Types and sizes of projects or activities which may effect to ecosystem of the wetland of international and national importance.

Therefore, if a mining project affects Notification of Environmentally Protected Area, Forest Conservation Area and ecosystem of the wetland of international and national importance, it must have EIA, EHIA report with other procedures.

The process of EIA in the mining industry of Thailand

All of mining projects including private sectors, government agencies, state companies, and the joint project between a government agency and private sector must employ the consultant firms registered with the ONEP (Office of Natural Resources and Environmental Policy and Planning) to prepare the EIA report.

The process of EIA in Thailand's mining industry illustrates three main steps including Preparation, Processing and Approval stage. Generally speaking, this process is very logical and clear. To indicate:

1. Preparation Stage

In the stage, some tasks are prepared by Project Proponent as:

- 1) Project Proponent employs a consultant firm which is registered by ONEP to prepare the EIA report.
- 2) Screening: Project Proponent and consultant firm (proponent) must check their project belonging to the list of projects or activities requiring EIA, which has been used as a screening tool. This is the determination of whether an EIA is needed. Screening should be based on magnitude of possible impacts which may arise from development projects or activities.
- 3) Proponent conducts an EIA report. Its contents will be composed by 5 parts:
 - Part 1: Project description such as location, engineering design and etc;
 - Part 2: Existing data of the environment in the project area and its vicinity;
 - Part 3: Environmental Impact Evaluation of the Project;
 - Part 4: Mitigation measure of the project which may be additional activities to prevent or minimize environmental damage caused by the project.
 - Part 5: The Monitoring program such as program for air, water etc.
- 4) Proponent prepares to submit an EIA report to the ONEP and Permitting Agency with related documents.

2. Submission and Processing Stage

- 1) No sooner completely preparing the report than the applicant must submit it to the ONEP for review. Meanwhile, both copies of the summarized and final report must be submitted to the DPIM (Department of Primary Industries and Mines) as an evidence for Prathanabat application.

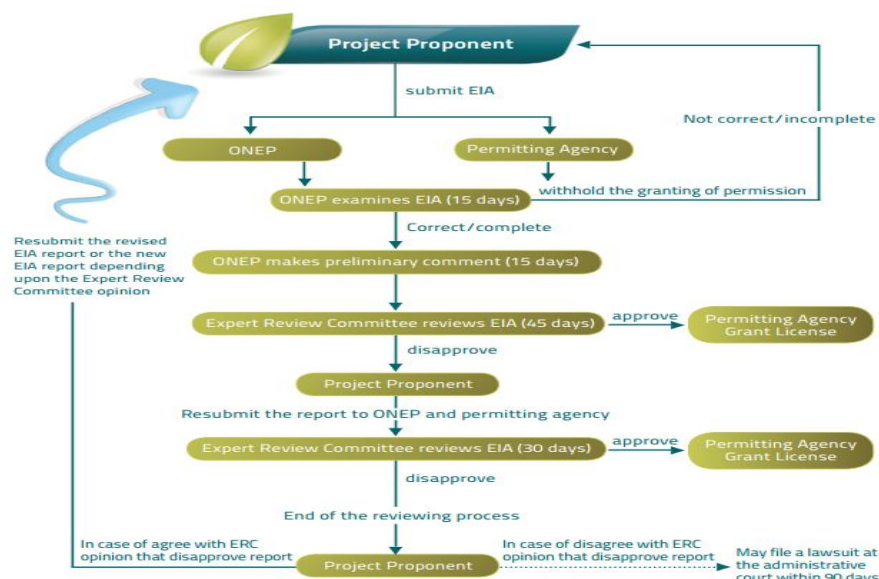


Fig. 1. The process of EIA in the mining industry of Thailand

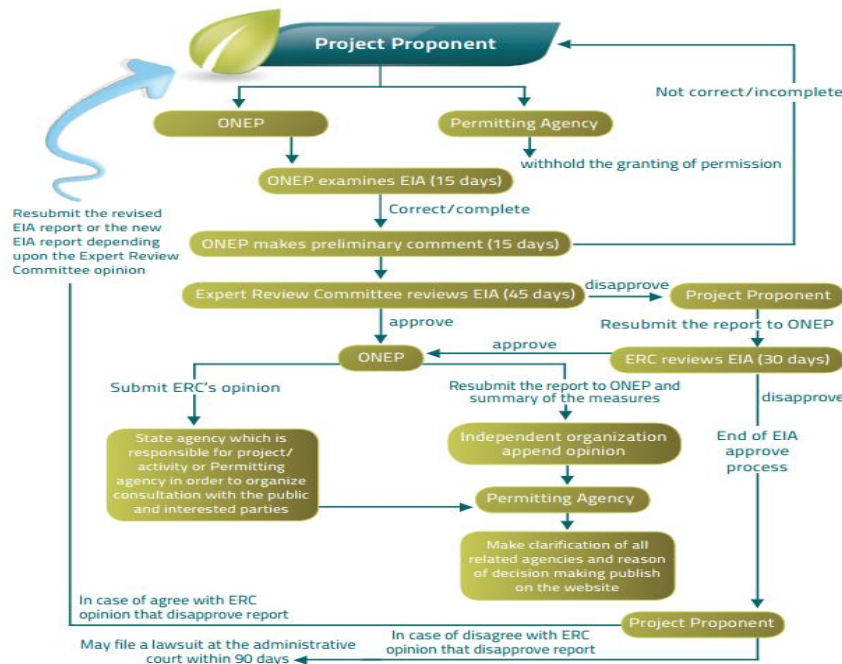


Fig. 2. The process of EIA in the mining industry of Thailand which may seriously affect community

2) ONEP examines the EIA report and preliminary comments within 30 days.

- In case that the report is not correct or incomplete, ONEP sends the report back to the proponent within 15 days.
- In case that the report is correct or complete, ONEP makes preliminary comment on EIA report within 30 days.

3) After that, EIA report will be proposed to get an approval of the Expert Review Committee who will consider the report within 45 days. (Figure 1).

- The committee is formed up by mining experts, and a representative from the DPIM authorized to grant the Prathanabat in accordance with the Minerals Act B.E. 2510 and other related agencies.

4) In the case other projects which may seriously affect community respecting to the Environment, Natural Resources and Health require permission by law and projects or activities, but do not require the approval of the cabinet.

After the report approval by the committee, ONEP will conduct ongoing procedures, as followings:

- Submitting the ERC's result to the state agency which is responsible for project/activities or permitting agency in order to organize consultation with the public and relevant parties in accordance with the consultation procedure in the Notification of Ministry of Natural Resources and Environment announcement;
- Submitting approved report, opinions of the committee and summary to the independent organization who appends opinions before the permission agency grants permission. (Figure 2)

3. Approval Stage

1) When the EIA report is approved by Expert Review Committee and the organized consultancy, the permitting agency shall grant permission to the projects/activities with condition of mitigation measures and monitoring program. But if the report is not approved, the proponent has to resubmit the revised reports to the committee. The committee will review the revised report within 30 days after receiving it.

2) In the case an applicant disagrees with ERC (Expert Review Committee) opinion that disapprove the report, they may file a lawsuit at the administrative court within 90 days from the date of receiving announcement.

Notes:

For a mining project belonging to a government agency, state company, or the joint venture of these agencies and private sectors, an EIA report has to be arranged and submitted to the National Environmental Board (NEB) at feasibility stage. The ONEP acting as a secretary of the NEB will summarize comments to the cabinet for consideration. Upon Consideration, the cabinet can request to obtain additional comments from individual or institutional experts. There is no time limit on reviewing process of the government agency's project.

Besides, applicants also prepare related documents namely: consent of the Local Administrative Office, a license for use and residence in the reserved forest or on the public domain or reserved land of the state.

Conclusion, to get an approval of an EIA report in Thailand' mining industry, Stockholder (Project Proponent, ONEP, NGOs etc.) has to process a number of steps with other procedures within 3 months.

In Thailand, the Minister of Natural Resources and Environment with the approval of National Environment Board (NEB) has the power to notify the type and size of projects or activities requiring EIA. However, for large scale projects which will cause significant impacts, the EIA reports must be submitted to the ONEP to be considered and give recommendations to permitting agencies or cabinet. EIA reports have to be prepared by a consulting firm which is registered by ONEP.

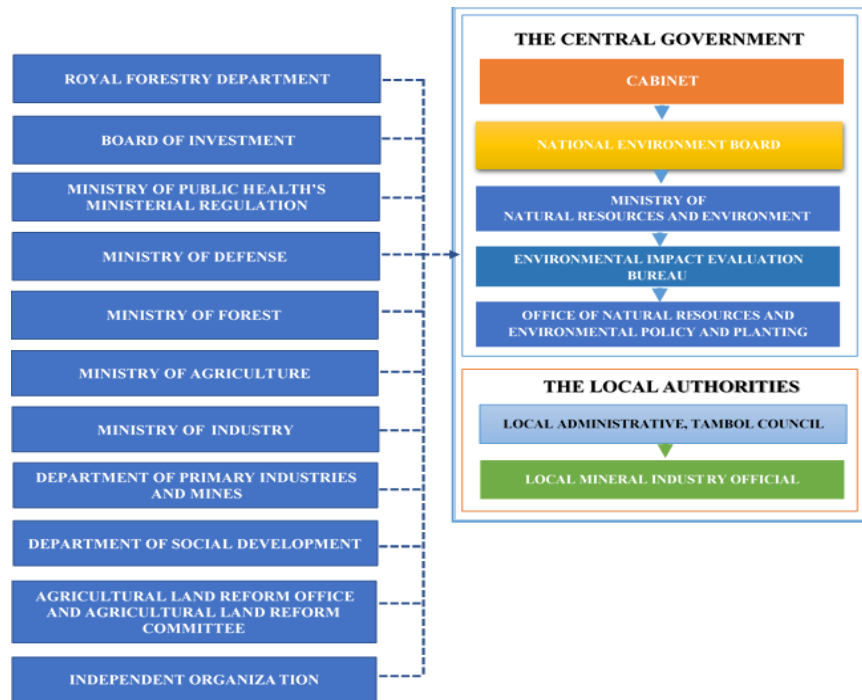


Figure 3. The Governmental bodies can get involve in EIA process

That mean, there are various government bodies which may take part in EIA process, and this depends on the different types of projects. Government bodies, which summarized at figure 3.

- On the right side of the above diagram it illustrates agencies which directly participate in EIA report with function of The Permitting Agency;
- On the left side of the above diagram it illustrates agencies which indirectly take part in EIA or consultation agencies and coordination agencies to the implementation of EIA process.

EIA process and Project Cycle
Making EIA more efficient and effective timing to prepare EIA is very vital. It should be prepared as soon as possible in the project cycle, which is preferable at the same time as those of feasibility study (FS) of the project in order to integrate all environmental mitigation measures in evaluating the project.

A generalized project cycle can be described in terms of six main stages:

- 1) Project concept;
- 2) Pre-feasibility;
- 3) Feasibility;
- 4) Design and engineering;
- 5) Implementation; and
- 6) Monitoring and evaluation.

The figure 2.4 shows that most of EIA activities take place during the pre-feasibility, feasibility stages with less effort allocated to implementation, monitoring, and evaluation stages. In addition, throughout its process, Public, Non-Governmental Organizations (NGOs) and relevant agencies that would be potentially affected by the projects/agencies to render their comments and/or experiences which will be duly considered in project

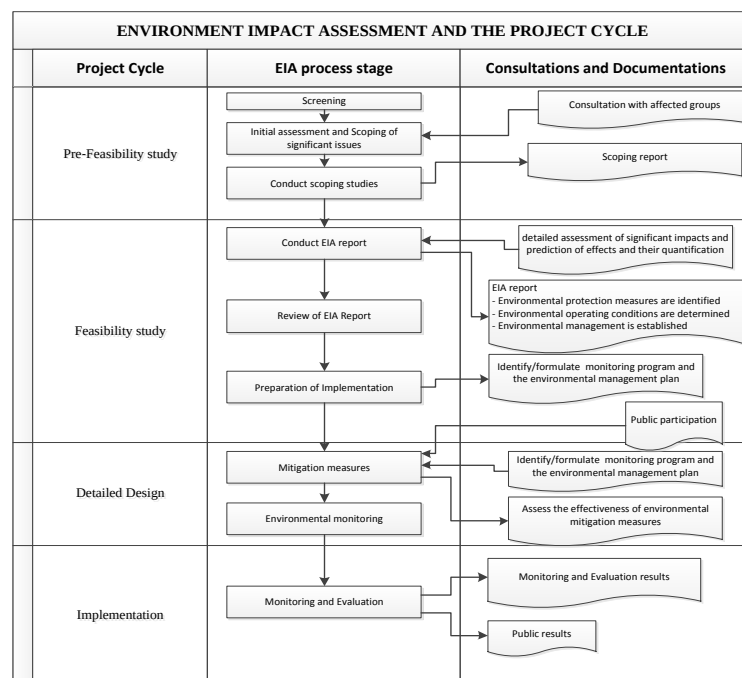


Fig. 4. EIA process stages and the Project Cycle in the mining industry of

development and evaluation. They can share their comments or experiences which will be taken into account in project development and assessment.

Besides, monitoring plan plays a crucial role in the effectiveness of EIA process. Monitoring plan aims to measure the environmental impacts from project construction through to project operation. The plan includes description of monitoring site, parameters, frequency, environmental standard and measuring method, and period of reporting.

3. Lessons for Viet Nam and discussions

i, Scoping stage: Environmental and social impact assessment has to be based on scoping stage. Thanks to doing, the important information about the environment, society, people's health will be identified. Subsequently, this information is based on the demarcation mining concession area. Besides, it also minimizes the cost of EIA for project proponents in case the EIA report is not approved.

ii, Public consultation: It is obviously that the success of EIA and sustainable development can be reached only when public participation has several important requirements to improve efficiency of EIA. Firstly, the public should have easy access to all project-related information. Secondly, the community is allowed to involve in the decision-making process as they should. Thirdly, the information provided by the citizens should come from the desires and needs of community.

iii, Transparency: Transparency is considered as a misinformation often or even when the withholding of information is not practiced deliberately. And thus, transparency has shown that stakeholders must have easy access to all project-related information. However, the barriers of transparency come from:

- Unequal levels of education and knowledge about EIA, as well as public participation in decision-making process is still not effective;
- The ineffectiveness of Independent Organizations' and NGOs' participation;
- Privilege of Permitting Agencies are high without good control of violations mechanism.
- And thus, the more public, independent organizations' and NGOs' participation in decision-making process effectively improve with good control of violations mechanism, the better the transparency is.

iv, other lessons for Viet Nam:

+ EHIA is a new study for Viet Nam, it should apply for projects which seriously affect the environment and people's health;

+ EIA reports are able to eliminate indirect and long-term impacts by applying new methods, quantitative analysis, mathematic models;

+ The coordination between investors and consultant firms are close along to EIA process.

+ Improving the qualification and knowledge of the expert council.

4. Conclusion

EIA plays an active role in decision-making of a mining project in common framework for SD. Key solutions are suitable for developing countries like Thailand. It should be flexibly applied in the context of national conditions. Besides, the discussion issues namely: Scoping, Public participation, Transparency, etc.

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Upgrading the value chain of Viet Nam coal mining industry towards sustainable development

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Abstract

After a long unsustainable development period, people have been facing with many serious issues such as resources depletion and environmental pollution. Therefore, sustainable development becomes an important goal of almost all developed and developing countries in the world. To create more added values - an important prerequisite of economic efficiency, also one of factors that ensure sustainable development, establishing an appropriate value chain for an economy is substantial. This becomes more important in the coal mining industry which uses non-renewable resources to provide mineral materials for the national economy. Establishing an apposite value chain for the industry not only helps to create more added value, but also contributes to economical and effective use of non-renewable resources - another goal of sustainable development. This article uses many different research methods such as theoretical analysis method, field surveys, and expert method to identify the current value chain of the coal mining industry; to analyze and evaluate that chain to suggest several solutions to upgrade the value chain of coal mining industry Viet Nam towards sustainable development.

Keywords: Upgrade; value chain; sustainable development; Viet Nam coal mining industry.

1. Introduction

A value chain is a set of activities that a firm operating in a specific industry performs in order to deliver a valuable product or service for the market. These activities are connected together from the supply of inputs, production, gathering, processing and selling to the final consumer. Identifying and analyzing value chain of an industry build a foundation to improve its added value as well as enhance effectiveness and performance of the industry's companies.

Mining industry in general and the coal mining industry in particular is one of the key industries of Viet Nam which provides mineral raw materials for many other industries in the national economy such as electric power, cement, and fertilizer industries. Besides, as its products are exploited from non-renewable resources, the sustainable development of this industry is crucial in the implementation of sustainable development goals of the entire economy. Establishing a proper value chain for the industry not only helps to create more added value, but also contributes to economical and effective use of non-renewable resources - an important basis for sustainable development.

Moreover, after a period of implementing diversification strategy, Viet Nam National Coal – Mineral Industries Holding Corporation Limited (Vinacomin) - the principal component of Viet Nam coal mining industry have been coping with many difficulties in managing as well as ensuring economic efficiency. Therefore, determining the appropriate value chain will be a substantial basis for planning and implementing the restructuring measures in order to efficiently use resources towards sustainable development of the Group.

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2. Identifying the value chain of Viet Nam coal mining industry

2.1. Purpose of identifying and analyzing the chain value

Identifying and analyzing the value chain of Viet Nam coal mining industry are essential to the sustainable development of this industry in particular and national economy in general.

- Help to identify activities which create more added values for the industry. Identifying value chain lay a foundation for expansion and development of stages in the chain in order to take advantage of market opportunities. This also can help create more added value for the industry and the business sectors.

- Contribute to save and rationally use non-renewable resources. As coal is known as a non-renewable resource and the quality of coal mainly depends on natural conditions, companies can take the most advantage of non-renewable resources in suitable industries and activities when being more involved in the phases of chain. This is an important contribution to resources rational use and saving.

- Set the stage for implementing business restructuring solutions. After a period of pursuing diversification strategy, many state owned economic groups, including Vinacomin have been experiencing inefficient business situation. Identifying and analyzing the value chain enables state administrators as well as business administrators review their operation and give out solutions to sustainable development of the business.

2.2. The current value chain of Viet Nam coal mining industry

Coal mining industry is composed of businesses implementing various stages related to mining, processing and other services. These businesses come from many different economic sectors, from state companies, private companies, foreign invested companies, the central companies, local companies, and most of them are members of Vinacomin.

The value chain is constituted of many stages from input to output of the operation, these stages are closely related to each other. The value chain of Viet Nam coal mining industry is shown on the chart below:

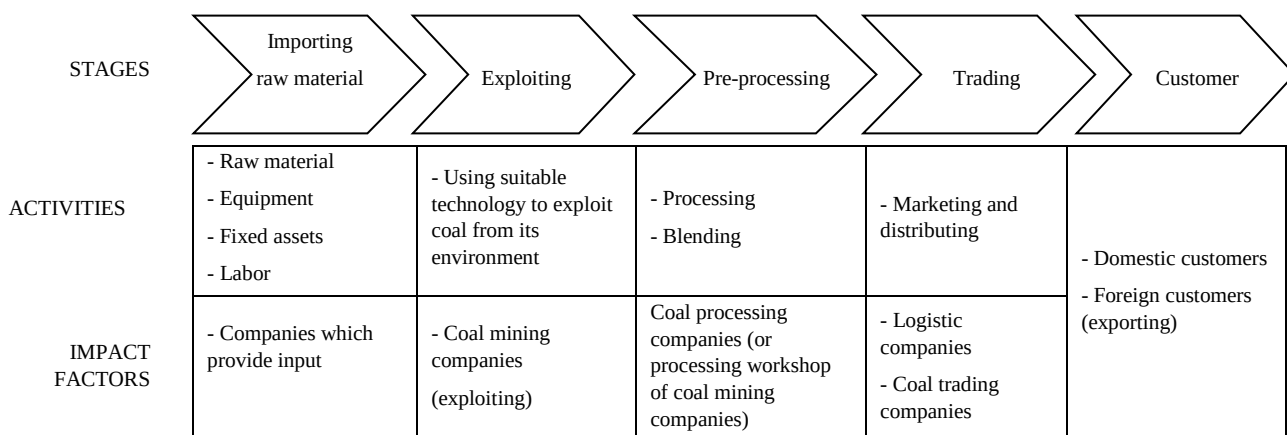


Fig. 1. The value chain model of Viet Nam coal mining industry

chemicals; miner training...) to output consumption industries such as electric power industry; cement and thermoelectricity manufacturing....

- Most of the companies are specialized and controlled by the State Authorities and the Parent companies such as Vinacomin; Dong Bac Corporation (Ministry of National Defense) which are all state-owned companies.

- This industry's products are provided for many different industries, such as electric power industry; steel industry; fertilizer, cement r production that contributes to develop domestic economy. Export of other products is one of sources of foreign currency of the nation. However, in recent years, according to the guidelines of the State, coal exports have been decreased and eventually coal will be no longer exported.

- Pursue diversification strategy, many companies in the industry have expanded their operation, involved in many industries related or not related to coal production activities such as cement, thermal power, finance, tourism industries, etc in order to look for new market opportunities.

2.3. Evaluating the current value chain of Viet Nam coal mining industry

After identifying and analyzing the current value chain of Viet Nam coal mining industry, we can evaluate the advantages and disadvantages of this value chain as following:

* *Advantages:*

- The businesses of this industry have taken part in most of the stages in the value chain. This not only helps to create more added value, but also exploit more market opportunities.
- Horizontal integration (among businesses of the industry operating in the same stage) occurred in technology exchange and management experience.
- Vertical integration among the stages in the industry is very tight. This creates strategic relationship and enhance proactive in business among companies within the industry.

** Disadvantages*

- Although activities of this industry have been involved in almost operation stages of the value chain, they still mainly concentrate on some basic activities such as input supply, exploitation, processing and consumption.
- Regarding exploitation, the quality of resources utilization is not high.
- The utilization of by-products in the production process such as coal, peat, coal is still limited.
- During the high speed implementation of diversification, companies of this industry have been involved in unrelated industries such as tourism, insurance, finance. This exceeds the capabilities of the company management and lead to business losses in recent years.

3. Solutions

Purposes of upgrading value chain are to implement solutions to solve difficulties in the value chain and ensure that the products can meet market demand as well as to create added value for the industry and develop a sustainable chain. Based on identifying and analyzing the value chain of Viet Nam coal mining industry, the article proposes some solutions to promote the value chain of this industry. The solutions work towards improving the operational efficiency of the stages, developing many new activities to increase the operational efficiency of the industry and implementing the sustainable development goal of the industry and the national economy. Particularly, the solutions are listed as following:

Firstly, strengthening horizontal integration

Horizontal integration is the association and co-operation of influencers (companies) in the same operation stage. It is essential to strengthen horizontal integration in the coal mining industry because of the following reasons:

- In the same operation, there are many companies in different areas with different operation conditions.
- After Dong Bac Corporation left Vinacomin, its exploitation and business activities made differences which lead to necessary competition. However, since coal is non-renewable resources, this competition cannot happen in normal market. It needs the association between these businesses to perform the national strategy on natural resources in general and coal in particular.

The particular solutions:

- Strengthen co-operation, exchange technology, management experience among the companies in the same operation stage.
 - Develop detailed strategies and schemes so that businesses can co-ordinate efficiently.
- The horizontal integration in the coal mining industry helps:*
- Co-ordinate companies in the same operation to enhance exchange, co-operation and experience sharing about technology and management.
 - Co-ordinate to do the national strategies about mineral resources in general and coal in particular.
 - Reduce the conflict among the companies in the same operation stage.

Secondly, extending vertical integration

Vertical integration is the association, co-operation among companies in the different operation stage of the value chain. This integration is extremely important because it contributes to create more added value for the industry. Besides, the expansion of vertical integration also helps create reactivity in implementing business activities and exploiting attractive market opportunities. There are actions required below:

- Review every stage of the operation; evaluate business activities in each stage to find out the problems and strategic relationship among the stages of the chain.
- Consider the capability of participation of incompetent stages to increase the industry value chain.

Thirdly, strengthening supportive activities for the industry

Supportive activities help enable and empower production activities. Developing supporting industries plays an important role in industry production especially when there is more reduction in the division of labor in society. The supportive activities in the coal mining industry include processing parts of machine and equipment; repairing. These activities can create more added value for the industry.

Fourthly, taking advantages of resources to develop new operations and activities

It is the fact that there are still many unexploited resources in the industry. If these resources can be made use of, we can avoid wasting, protect the environment and also create more added value. Some particular solutions:

- Use spoil of mining industry, slag ash of power industry to make construction materials.
- Increase mix coal products (mix rock coal with coal products to produce coal products with lower quality) to take advantage of carbon dioxide as well as meet the needs of low qualified coal to market.

Finally, evaluating effectiveness of the sectors which are unable to have long term management

After implementing diversity program, many activities (especially some activities which are not related to the main activities of the industry) operated inefficiently. Therefore, it is necessary to continue reviewing the operation of the companies to have divestment plan, concentrate on developing the main business of the industry. Currently, companies should only maintain operations in the stages of the value chain and participate in some related industries which have strategic relation with input supply industry and product consumption industry. This helps to make use of the advantages, increase added value, and ensure that the resources and management capabilities are not be dispersed.

4. Conclusion and recommendations***4.1. Conclusion***

In the article, the authors generalize theory related to value chain and sustainable development. They also generalize the value chain of Viet Nam coal mining industry; offer some evaluation and five solutions. In the framework of this article, these solutions are only suggestive and they will be researched more in the future.

4.2. Recommendations

- Strategic plans for the industry to implement the management solutions in both macro and micro level should be developed and completed.
- It is necessary to establish specific policies from exploration, exploitation permit issue to market and price policies in order to coordinate businesses in the industry

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International Conference on Economic Management in Mineral Activities (EMMA)

Investigation into sustainable development criteria of coal production and trading operations in Quang Ninh province

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Abstract

The paper studies sustainable development criteria of coal production and trading operations in Quang Ninh province with some following contents: Conception and objectives of development, sustainable development criteria and indicators of coal production and trading operations in Quang Ninh province include 07 sustainable development criteria, 08 indicators of production and trading sustainable development, 10 indicators of socio-economic sustainable development, 08 indicators of environmental sustainable development.

Keywords: criteria, indicators, sustainable development, coal production and trading operations, Quang Ninh province

1. Introduction

Sustainable development is a concept that refers to the development of all aspects in the present society while sustaining the development in the future. Sustainable development is the targeted goal of many countries in the world, each country would base on its own economic, social, political, geographic, cultural, environmental characteristics to develop the most appropriate strategic plan.

Quang Ninh is one of the largest industrial centers of coal mining, thermal power, and building materials in Viet Nam. In the mining industry, Quang Ninh has about 140 mines such as limestone, kaolin, clay, glass, etc. As for coal, the coal reserves in Quang Ninh accounts for nearly 90% existing coal reserves in Viet Nam. Quang Ninh has many advantages in forests, islands, scenic – historic interest areas. These key advantages have helped Quang Ninh province achieve high economic growth rate in recent years, with an annual growth rate of over 10%. However, that the economic development of Quang Ninh recently has depends largely on the coal industry brings about many socio-economic benefits as well as has significantly negative impacts on society and environment.

Therefore, the study of sustainable development criteria of coal production and trading operations in Quang Ninh province is to have orientations to develop coal production and trading operations in line with sustainable development objectives.

2. Conception and objectives of development

2.1. Conception of development

Sustainable development of coal production and trading operations is constantly increasing coal output to meet the highest possible demands of the economy on the basis of ensuring maximum mining, rational and effective use of resources, being in harmony with socio-economic development, being environmentally friendly and significantly improving the material and spiritual well-being of workers.

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2.2. Objectives of development

- Overall objectives:

Sustainable development of coal production and trading operations become a modern, synchronized and efficient economic-technical activity, developing in harmony with the community and being environmentally friendly on the basis of enhancing the deep processing of coal, coal-based products and replacement-for-coal, promoting technological innovation and modernization, developing human resources, ensuring occupational/ labor safety and environmental protection.

- Specific objectives:

To develop coal production and trading operations : To enhance searching and exploration of coal resources and reserves on the basis of maximum mobilization of all resources in order to compensate for not only the current mining reserves , but also supplement/ prepare reliable resources for sustainable development in the future; To accelerate research and implementation of coal processing projects towards product diversification, creating clean and environmentally-friendly products; To continuously improve business efficiency and labor productivity through innovation , technological modernization and widespread application of technical advances.

To develop the coal industry in harmony with the community: to make contributions to socio-economic development, to maintain and strengthen national defense and security, social order and safety in localities; to improve the material, cultural and spiritual lives of staff and workers; to broaden democracy within companies; to constantly improve professional competence and skills of the staff and workers.

Labor safety and environmental protection: To strive to achieve the goal of zero accidents; to implement strategies of protecting a “green, clean, and beautiful environment”, to stop environment degradation in mining areas, to basically improve some important indicators of environment in mines and mining sites.

3. The criteria and indicators of sustainable development

3.1. Sustainable development criteria

- To achieve stable, constant, long-term, harmonious and friendly development on the basis of continuously improving economic efficiency;
- To achieve development that meets the needs of the present without compromising the ability of future generations to meet their own needs, ie. in the development process, people must be responsible for the future generations in the spirit of :
 - Leaving newly explored coal deposits, continuing to explore in order to increase reserves.
 - Reducing losses and increasing recovery factors of coal reserves in all stages of exploitation, transportation, processing and use of coal so as to increase the amount of available reserves, extending the life of mines and improve present production capacity.
 - Exploiting rationally and using the country's coal resources effectively and economically.
 - Creating new resources (including new resources, new production capacities, new opportunities to directly or indirectly produce new coal products and alternatives);
- To develop the coal industry in close combination with strengthening responsibility towards society and the environment, to adapt to climate change, to ensure labor safety, ie. to develop in close combination with protecting the environment, making contribution to innovation and ensuring social justice, and in harmony with the community in coal regions, which means to achieve three pillars of sustainability: economic development, social development and environmental protection;
- To develop mutually beneficial relationships with partners and customers;
- To constantly develop human resources and improve the living standards of workers;
- To development so as to create new capacities and opportunities, especially new forms of energy for future generations;
- To develop in line with the characteristics of the coal mining operations;

3.2. Sustainable development indicators of coal production and trading operations

3.2.1. Indicators of production and trading sustainable development

In order to make the evaluation criteria of sustainable development of coal production and trading operations, it is necessary to develop coal production and trading operations in a sustainable way:

- Coal production and trading operations towards sustainable development: 03 processes
 - The first process: the process of producing coal from the resources: coal reserves are constantly supplemented through searching and exploration;
 - The second process: the process of processing coal into coal products in order to diversify products and improve value-added (to create value-added chain on coal-base products) is the internal development

process of coal sector. This process will decrease in line with the depletion of coal reserves and resources;

- The third process: the process of producing alternative products and / or completely new products which replace coal or coal products is a widespread process will increasingly develop in order to constantly meet the demand of production and social life when coal reserves are exhausted.
- Indicators of production and trading sustainable development: 08 indicators
 - Indicator of additional reserves (additional exploration): compared to the coal output exploited annually (or in a period), in which it should clarify domestic and foreign part. This indicator reflects the level of additional coal reserves. If it is higher than the exploited reserves, the resources are still abundant. If it is as high as the exploited one, it is the sign of depletion period, if the indicator is less than the exploited reserves, that is the depletion period;
 - Indicator of resource loss reduction during mineral exploitation and processing, measured by the ratio of resource loss over the total exploited reserves. If this index gradually decreases, it proves that mining technologies applied is appropriate. If it increases, the technologies is not applied rationally;
 - The growth rate of coal output, %/ year. This indicator continuously increases proves steady increase of the coal output, otherwise, if it gradually decreases, the production is approaching its limit. If it is negative, the coal industry is entering a recession;
 - The growth rate of value added and profit (%/ year). If this index is higher than the growth rate of coal output, there is an increase in the amount of processing technology, otherwise, the coal industry is only developed in quantity and the coal quality is gradually decreasing.
 - Indicator of innovation and diversification of coal products (revenue ratio/ or production value of new products/ total revenue/ or the total value of coal production,%). If this index tends to rise, the product innovation trend is increasing. If it stays the same, the speed of product innovation has been slowed down. If it reduces, the product innovation is declining;
 - The rate of output or sales or production value of deeply-processed products/ total output or total revenue or production value of mineral products, %. This index has the same meaning as growth rate of value added and profit, but it is based on the total turnover, ie. production value of processed products/ total sales;
 - The level of participation in the product value chain of coal-based products is determined by the percentage of the total value of products within the scope of the coal industry / coal business management/ the total value of the product or the total revenue of all kinds of products in the value chain of coal-based products. This index rises proves that scale and level of participation in the value chain is increasing, otherwise, the scale and level of participation in the value chain is declining;
 - The speed of increasing production capacity and value of alternatives/ replacement-for coal products, %/ year and percentage of value of alternatives/ total value of products (coal and alternatives). This indicator indicates the level of production of alternatives. If it increases, the tendency to generate/ create alternatives is increasing. In principle, this rate is higher and higher in line the depletion of coal resources, reaching the maximum value of 1 (or 100 %);

3.2.2. Indicators of socio-economic sustainable development: 10 indicators

- The extent of meeting the domestic demands for coal, %. This indicator shows the ability of increasing production capacity so as to meet coal demands for economic and social development. The higher the % is, the better it is; the highest indicator is 100 %;
- The growth rate of contribution to the state budget, %/ year. This indicator shows the financial contribution of the coal industry to the state budget, if this indicator increases, the contribution to the state budget is more and more;
- Indicator of contribution to local budget, %/ year. The calculation and meaning of this indicator is similar to those of growth rate of contribution to the state budget;
- Indicator of contribution to economic structure transformation of the region. This indicator can be measured by the ratio of the GDP of the local coal industry over the total GDP of the locality or the annual GDP growth of the local coal industry, % / year. In addition, it can be measured by the ratio of the new product value of local coal industry over the total value of new products in the locality;
- The net new jobs annually and annual growth rate, %/ year. This indicator represents the ability of new job creation. If it increases, there are more and more of jobs created, which attracts much social concern;
- The rate of new jobs created in coal industry for local labor (%) and annual growth rate, %/ year. This indicator represents the contribution to job creation for local people;
- Contribution to local workforce training and education and annual growth rate, %/ year. This indicator is measured by the total amount of money or the number of people getting training assistance funds annually. If it increases, the contribution of coal industry is on the increase. In addition, it can be measured by ratio of the funds allocated by coal industry over the total training funds of the locality annually;

- The contribution to infrastructure development and annual growth rate, % / year. The measurement and meaning of this indicator is similar to those of the net new jobs annually and annual growth rate, but in infrastructure sector;
- The contribution to local culture maintenance and development and the annual growth rate, % / year. The measurement and meaning of this indicator is similar to those of the net new jobs annually and annual growth rate, but in cultural sector;
- The contribution to hunger elimination and poverty reduction as well as healthcare development, etc. in locality. The measurement and meaning of this indicator is similar to those of the 3 indicators of the net new jobs annually and annual growth rate, the rate of new jobs in coal industry for local labor and annual growth rate, and contribution to local workforce training and education. These indicators can be considered as a part of widespread developmental process of the coal industry, but in social and economic aspects.

3.2.3. *Indicators of environmental sustainable development: 08 indicators*

- The decrease of occupational accident rate, especially severe occupational accidents/ injuries, %/ year. This indicator represents the improvement in occupational safety. If it reduces, there is an improvement in occupational safety and conditions;
- Waste reduction rate (including solid waste, emission, and wastewater/ sewage; in which reducing hazardous waste rate is clearly clarified), % / year. This indicator represents the level of waste reduction (reduction of one or some kinds of waste) of manufacturing process;
- The ratio of waste recycled/ recovered over the total waste and annual growth rate, %/ year. This indicator reflects the level of implementation of cleaner production, the higher the indicator is, the better it is;
- The improvement of environmental parameters in mine sites and surrounding areas, %/ year. This indicator reflects the level of improvement of environmental quality, and is measured in two ways: (1) the rate of the number of environmental parameters; (2) the improvement trend of environmental parameters, especially the main parameters. With regard to (2), the standard environmental parameters do not increase or are still low, but each parameter itself (although not standard) still have some improvement.
- The ratio of clean product value and scale of applying cleaner production, % over the total value of products or total production capacity. This indicator reflects the expansion of implementing cleaner production;
- The number and proportion of companies who have Certification of Environmental Standards Compliance/ or the apply ISO 14000 Standards, % over the total number of companies. This indicator reflects the improvement in the quality of environmental management;
- The number and proportion of employees working in hazardous or dangerous environment or condition, % over the total number of employees. The lower this indicator is, the better it is;
- The number and proportion of people suffering from occupational diseases, % over the total number of employees. The lower this indicator is, the better it is.
- Coal production and trading operations in Quang Ninh province is an important activity which makes contribution to national energy security and socio-economic development, as well as has adverse effects/ negative impacts on the eco-environment. Currently, coal production and trading operations in Quang Ninh province is inadequate, only coal production and trading are focused to serve immediate economic benefits, meanwhile long-term benefits, especially environmental and social benefits as well as future generations are neglected. Therefore, in order to achieve sustainable development in coal production and trading operations in Quang Ninh province, along with innovating and improving equipment and technology, increasing investment in quality, applying scientific and technological solutions, the study of the criteria and indicators to ensure sustainable development of coal production and trading production is not only a prerequisite of Viet Nam's coal industry, but also an important strategic goal which the Party, Government and people of Viet Nam determine to achieve.

4. Conclusion

Coal production and trading operations in Quang Ninh province is an important activity which makes contribution to national energy security and socio-economic development, as well as has adverse effects/ negative impacts on the eco-environment. Currently, coal production and trading operations in Quang Ninh province is inadequate, only coal production and trading are focused to serve immediate economic benefits, meanwhile long-term benefits, especially environmental and social benefits as well as future generations are neglected. Therefore, in order to achieve sustainable development in coal production and trading operations in Quang Ninh province, along with innovating and improving equipment and technology, increasing investment in quality, applying scientific and technological solutions, the study of the criteria and indicators to ensure sustainable development of coal production and trading production is not only a prerequisite of Viet Nam's coal industry, but also an important strategic goals, which the Party, Government and people of Viet Nam determine to achieve.

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International Conference on Economic Management in Mineral Activities (EMMA)

Solutions to promote management and usage of mineral resources and environmental protection in mineral mining activities in Nghe An province

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Abstract

The Agenda 21 figures out targets on sustainable development in mining technology from the current situation of the management target and usage of mineral resources and environmental protection. This paper provides solutions to promote management of this task such as administrative reform, training and allocating of staff, completing mineral planning in the province, setting up Evaluation Council of reserves, promoting inspection, disseminating and propagating law on minerals, etc. consistent with the current conditions of the province.

Keywords: environmental protection, mineral resources management

1. Introduction

Mineral resources are important inputs for the country's socio-economic development which are non-renewable resources and they need to be managed with strategic development, preservation and appreciate utilization of mining. Mineral mining brings great benefit to society but it also causes complex consequences for the ecological environment. Beside of investigating the correct assessment of the scale, quality, mining conditions, the excavation technology, etc, the State's policies on management of these mineral resources will be important determinants to the sustainable development of the mining industry. The profit from the mining industry is not only for the country but also for each locality that occupies mineral activities, including Nghe An province, one of the province that has many kinds of minerals and other mineral mining activities.

2. Solutions for Nghe An province in promoting management and usage of mineral resource and environmental protection

2.1. The goals of solutions to enhance the management and usage of mineral resources

The general goal of solutions is to protect, exploit and use mineral resources rationally, efficiently and economically, meeting the requirements of sustainable development of mining industry in Agenda 21 on sustainable development of the province: "... The exploitation, processing and usage of minerals have to ensure safety, and occupational hygiene; closely combine with environmental protection, the other resources, natural landscapes and historical – cultural relics; applying suitably advanced mining and processing technologies in order to maximize mineral recovery factor and the value of processed products; improve the efficiency, quality and competitiveness of the mineral products".

This general goal is subdivided into several detailed ones:

- To attract and train management staff from provincial level to district one and the other mineral activity units, meeting the development needs of the province's mining industry.

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- To establish a clear legal framework for mineral activities from the planning and defending stage to the exploration, mining and processing mineral resources.
- To enhance the responsibility and coordination between state management agencies in mineral activities.
- To combine with the Ministry of Natural Resources and Environment, Ministry of Industry and the Ministry of Construction with the purpose of building the plan of exploration, exploitation, processing and usage of minerals in the province of Nghe An in order to guide mining operations, mineral processing in the next time.

2.2. Some solutions to enhance the management and use of mineral resources

- Regarding administrative reforms in the management of mineral activities
 - To be pursuant to the relevant legislation on the environment, construction, investment and other regulatory documents of the ministries, branches and provincial People's Committee to promulgate the regulations on mineral activities in the province. Besides, regulations on coordination need to be established among state management agencies (Department of Natural Resources and Environment, Department of Construction, Department of Industry, Department of Planning and Investment, Department of Culture, Department of Agriculture and Rural Development, Provincial Team, etc.) in mineral activities. To enhance the sense of responsibility, working ethics reforms, implement regulations on democracy, good performance of the one-door mechanism grants in granting mineral licenses.
 - To promote the administrative reform in investment licensing, creating a favourable and open environment in order to attract potential investors for mineral mining and processing activities.
- Regarding training and attracting qualified staff and students

Additional policies should be offered to develop human resources of Mine – Geology branch, training professionally and recruiting minerals management staff in the district. These policies require annually coordinating with the leading experts on minerals, labor safety, environment, etc. as well as open training courses for mineral enterprises.
- Regarding the state management of mineral activities
 - To speed up the progress of minerals planning in order to be adapted by People's Council as a basis for licensing of mineral activities. After the Provincial People's Council approves mineral planning, the next stage is to rectify immediately the wrong licensing regulations.
 - To establish Evaluation Council of Mineral Reserves (minerals used as building materials and peat under the jurisdiction of Provincial People's Committee licensed the exploitation) including: Chairman of Provincial People's Committee - Chairman of the Council, Department of Natural Resources and Environment - Vice Chairman and Secretary of the Council, Departments: Industry, Construction, Science and Technology, Planning and Investment, Finance - Commissioners, inviting Department of Geology and Mineral, some experts in the province to be commissioners or consultants.
 - To resolutely handle and withdraw licenses for mineral activities for organizations violating, not fully implementing the provisions of the Law on Mineral and the Law amending and supplementing some articles of the Law on Minerals, Law on Land, Law on Environmental Protection and other relevant legal documents to be in effect. To review procedures and regulations required for enterprises in mineral operation with the purpose of detecting shortcomings and require enterprises to add and complete in order to gradually handle the existing problems in the exploitation license.
 - Not to issue licenses for mineral activities for organizations with insufficient finance capacity and regulations under Law on Minerals (for example: operating without a mining executive director); Priority for closed investment companies from the exploitation to processing of minerals. To implement well mineral protection at unexploited areas.
 - To instruct organizations of mineral operation to implement regulations on land leasing, environmental escrow, tax payment and other expenses according to regulations of the Law.
 - To disseminate and propagate law on the minerals for organizations of mineral operation and people to be in areas having mineral resources.
 - Inspection of mineral activities: to establish interdisciplinary inspection team. To conduct periodic inspections of mineral enterprises including: exploiting and processing minerals. At least one time per year, the team conducts to inspect at every mineral enterprise in the province.
- Regarding environmental management in mineral operation
 - To implement efficiently environmental protection in mineral exploitation and processing of the province in particular, need to take some solutions as follows:
 - For companies: to disseminate widely, raise awareness for companies to understand clearly the organizations of individuals and obligations in environmental protection, must complete the procedures and regulations of the Law from environmental impact assessment, procedures for land and mine allocation of mineral exploitation prescribed by the current State.
 - For State management agencies and local authorities: To strengthen state management on environmental protection for facilities exploiting and processing minerals in the province and districts having mines. To disseminate and educate everyone to understand clearly the organizations of individuals and obligations in environmental protection in general and in field of exploitation and processing mineral in particular. To

- promote inspection and control environmental pollution; To inspect and review facilities during the process of implementing environmental legislation; To organize trainings of Environmental Law for enterprises, to disseminate and propagate law on environment for residential community.
- Solutions for attracting investment, improving the processing sector, increasing product value, ensuring stable development and increasing state budget
 - To adjust and supplement the industrial development planning of processing and exploiting the minerals and construction materials in which, to concentrate on the advantageous minerals such as white stone, granite, ceramics, iron, etc.
 - To complete the project of mineral resource exploration and evaluation of Nghe An as the basis of investment attraction into Nghe An, first of all is to focus on the minerals such as limestone, white stone, granite, iron ore, etc.
 - To strongly apply the science-technology activities into the processing in order to decrease the consumption of fuels and materials and to increase the products values.
 - To develop the human resource for industry: To train the technicians' team, to recruit the staff with qualification and specialization of technique serving for the factories of processing and exploiting materials and fuel.
 - Strengthening state management for the industry
 - To manage firmly the mineral processing with the assurance of savings, maximum product recovery, to create favourable conditions for companies to exploit in industrial scale, to prioritize the companies having the combination between exploiting and processing especially deep-processing products. To limit and terminate the situation of exporting the raw materials out of the area (tin, white stone).
 - To improve the quality of planning and evaluating projects. The new projects must have the modern technology and equipment and to prioritize to the domestic equipment with equivalent technology for reducing the investment.

3. Conclusion

In recent years, the state management of mineral activities in Nghe An province has not been in balance with the duty; there have been many deficiencies in the sectors of issuing mineral operating license; the mineral activities management in some areas has not been good; the promulgation of legal documents for mineral activities has not been timely; therefore, it is really necessary to have the timely solutions in the next time for putting the mineral activities into order and under law.

Based on the current situation of mineral activities, state management of mineral activities in recent years in the province of Nghe An, the article came up with several opinions about solutions of increasing management and using mineral resources in order to adjust the mineral activities and environment protection. These solutions can be reference for the Provincial People's Committee, mining and mineral sectors, People's Committee of district to have strictly command in the adjustment of the discipline of exploiting and processing mineral activities.

Except for these above solutions, the article also suggests the Government to have detailed rules about minerals export in the province of Nghe An, to pay attention to refined minerals processing work, limit and not export the raw minerals for increasing the state budget for the province.

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Some issues about social responsibility of coal mining companies in Viet Nam

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Abstract

In recent years, social responsibilities of Vietnamese business are concerned by government, companies, social organizations, and employees. Social responsibility brings great benefits to every company, and it is also beneficial for the whole society. Coal mining companies in Viet Nam National Coal-minerals Industries Holding Corporation Limited (Vinacomin) are also particularly interested in issues of social responsibility such as: preservation and development of organizational culture, protecting the rights of workers, environmental protection and community benefit, etc. This article reflects implementation of social responsibilities of mining companies in current period; offering recommendations to improve the social responsibility of mining companies in Viet Nam.

Keywords: Social responsibility, mining companies

1. Introduction

In developing countries in the world, social responsibility is the commitment of company to business ethics and contributes to sustainable economic development, improving the quality of life of workers and their families, local communities and society in general. Social responsibility is considered to be an important factor as the traditional factors such as cost and quality. It is a part of development strategy of the company and gradually become a prerequisite for companies to survive and grow. However, knowledge of social responsibility is quite new for businesses in Viet Nam in general and the coal mining companies of Vinacomin in particular today. They only reach part of the contents of social responsibility. From this reality, recommendations to enhance social responsibility in the coal mining companies of Vinacomin should be offered.

2. The implementation of the social responsibility of the coal mining companies in current period

To evaluate the implementation of social responsibility in the coal mining business in Viet Nam in the current period, aspects such as: environmental protection situation, relationships with employees and contributions to the community are taken into analysis.

2.1. Environmental protection situation

Based on Environmental Protection law of the Socialist Republic of Viet Nam in 2014, environmental protection activities are understood as activities to preserve, prevent, and limit negative environmental impact, environmental emergency response, pollution and degradation remedy, improve and restore the environment; exploit and rational use natural resources in order to keep the environment healthy, improving the environment, reducing pollution impacts; constructing environmental protection and the prevent incidents is the primary task of companies in process of developing, recognizing the importance of protecting environment in mining

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process, leaders of Vinacomin has carried over to Environment Limited Company - Vinacomin performing tasks as an investor, construction, operation mining and construction environment projects which contribute to improve and protect environment in mining production of Vinacomin. More than 1,000 staff and workers in charge of managing, construction areas and environment projects work in most of Quang Ninh coal areas and in many localities of Viet Nam. Recent years, the company has successfully completed its task, has contributed to handle and overcome the impact of coal mining on the environment, revert and renovate environmental landscape to serve society. To reduce to the risk of environmental pollution caused by coal mining activities, the company has been implementing several mine wastewater treatment projects with modern technologies. The Environment Limited Company has built over 30 mining waste water treatment stations. Since these stations come into operation, all mining waste water from tank inputs are processed through multiple levels to ensure the standard type B (workers can bathe, wash), while protecting spring water sources around areas from contaminated. The company has always defined environmental reformation and restoration mission as key task, especially mining waste water treatment; and construction quality is the most important factor. Many environmental projects implemented by the company has clearly effective improvements on environment such as: levelling, renovating, recovering coal mining waste dumps; reforming, dredging Noi Hoang, Khe Uon, Cau Cuon lake areas to provide water for agricultural production of Dong Trieu district; building dam protection against erosion for waste dumps of Deo Nai Coal Company; dredging and embankment Mong Duong river; operating industrial hazardous waste treatment factory at Duong Huy village – Cam Pha city which worth VND 173 billion investment according to European standards with functionality to handle all types of hazardous industrial wastes such as waste oil, tires, batteries, oil drums containing, to meet environmental requirements in production of Vinacomin as well as protecting the environment of Quang Ninh province. In addition, coal mining companies in Vinacomin have aware of the importance of environmental protection in production, they have to draw up, under construction and operating projects protecting the environment where the companies operate, typically Mao Khe coal company, Coc Sau joint stock company, Deo Nai joint stock company. Recognizing investment, implementation of the companies through the following table.

Table 1. Environmental protection works of some companies of Vinacomin in 2016

Subsidiaries of Vinacomin	Capital Investment	Works
Mao khe coal company	- According to the plan in 2016, it spent nearly VND 20 billion - From 1/1/2016 to 1/5/2016 spent VND 4.5 billion	- Water spray against dust on internal concrete routes through residential areas and road transportation of coal. - Restoration concrete route from national railway to port of Non Dong Pagoda - Planting trees for environmental landscaping in the area of industrial courtyard at +17 - Management and supervision 2 underground wastewater treatment plants and 1 sewage treatment plant
Coc Sau joint stock company	- According to the plan in 2016, it spent more than VND 20 billion - From 1/1/2016 to 1/5/2016 spent more than VND 5 billion	- Reforming waste floor and planting trees in 817 ha Khe Re disposal site - Dredge planning the drainage system of upstream area weighing 8,625 m³ to storm prevention for residential areas. - Construction of repairing drainage system and lattices surrounding residential areas. - Planting trees creating dust shielding belt from construction area border with Ward 4 of Cam Phu district. - Collaborate with Cam Pha City held a launching starting year ceremony tree planting with more than 3,300 trees.
Deo Nai joint stock company	- According to the plan in 2016, it spent more than VND 18 billion - From 1/1/2016 to 1/5/2016 spent nearly VND 7 billion	- Investment in high pressure pumping pipelines to create artificial rain overhead along the roads in and out workshop area of sorting and coal processing. - Building bulkheads or concrete drainage ditch of some critical sections on mining and waste dumps in order to prevent sliding when floods. - Tree planting on landfill Nam Deo Nai, Cao Son and bordering residential areas in the region.

Besides the bright spots in environmental protection activities that Vinacomin in general and coal mining companies in particular have done, it still has some problems. In exploitation process, the air environment of mining areas and nearby regularly polluted by dust, explosive gases and noise arise in almost every aspect of production. Because the impact of coal mining process, Cam Pha, Uong Bi, Mao Khe regions are living with dust, the largest source of dust arising from coal clinical stages, processing and transportation. Besides, according to the Department of Natural Resources and Environment, in Quang Ninh coal mining area, mining waste water is about 25-30 million m³ per year. Mining waste water has degraded water quality of rivers and

streams system, lakes, and coastal areas. According to the test results of Department of Natural Resources and Environment, some companies have not declared and paid environmental protection charges for industrial waste water, not strictly implemented the environmental protection report and periodic management hazardous waste.

2.2. Relationships with employees

Social responsibility in relation to the employee can understand that businesses care about their employees not only physically but also mentally. Recognizing the important role of workers in coal mining activities, in recent years Vinacomin has always directed the company to really care about the employees the right way, helping them work easily. Union department of companies under Vinacomin has cooperated closely with professional division to take care for workers both financial and spiritual aspects, improve working conditions and ensure regimes fully and timely, such as:

- Companies under Vinacomin applied regime of personal protection equipment for employees by Decision 68/2008/QĐ-MOLISA dated 29/12/2008 issued by the Ministry of Labor - Invalids and Social Affairs.
- Employees working in companies are entitled eating mid-shift meals and jobs special regime as prescribed. Eating level of companies are specified in mid-shift meals policy and timely adjustment according to market prices and regulations of the State, to ensure nutritious and health protection for workers. For employees working in heavy, toxic and dangerous environments; Companies pay allowances items with fostering level prescribed for each carrier.
- Maintaining regular periodic health examinations for workers to timely detection of occupational diseases to medical treatment at the medical facilities of the coal industry. Besides, companies also organized for laborers to restore health at nursing facilities of Vinacomin.
- The company has built and put into use housing workers for labors. According to statistic of Vinacomin, about 20 units of the coal industry has invested nearly 80 worker housing areas corresponding to nearly 5,000 apartments, meeting accommodation for more than 17,000 people. Vinacomin has developed scheme submitting to the Government on building houses for workers until 2020 with the prospect to 2030. Vinacomin proposed approval of Quang Ninh province to convert purposes of some redundant land at factories to residential land to build housing for employees.
- Holding regular dialogue between leaders of Vinacomin, leaders of companies, workers to strengthen and stabilize spirit of workers in manufacturing process, answer questions employees.
- Creating useful playgrounds for employees after hours of hard work with cultural, arts, sports activities

Although companies under Vinacomin have had many efforts caring for the lives of officers and employees, but current reality is that employees no longer interested in the mining industry. From now, lack of miners are unsolvable problem, especially to attract young beginners. Policy of attracting young workers choosing mine career have been applied by Vinacomin with several priority policies right from the training at vocational schools such as the cost of tuition, meals, housing, working right after school with very high salaries compared to the standard 3/7: from 9-10 million VND per person per month. Despite this, recruitment target is still not reached, employment rate kept lower each year. The main reason that young people turn away from mine job because they are aware of this extremely heavy, hazardous and dangerous job, also far away from urban areas. In recent years, labor deadly accidents in coal industry constantly happen by technical problems in the underground mines. Information reflected by the mass media has made a lot of the employees concerned when to choose their career fields.

2.3. Contributions to the community

Social responsibility for the community is that businesses set aside part of their profits to contribute to activities supporting community. For community and share the burden with the community is an objective which businesses with socially responsible aiming beside its profits. It can be said that activities for community were traditional of Vinacomin in general and of each company under Vinacomin in particular, all companies are ready participating in practical operations significant to the community. The authors have statistics for the contribution to community of some companies of Vinacomin in the first months of 2016 as follows:

Table 2. Contributions to the community of several companies under Vinacomin in 2016

Subsidiaries	Contents
Vinacomin	Companies under Vinacomin strictly implemented charges payment for environmental protection under Decree No. 12/2016/ND-CP issued on February 19, 2016 of the Government.
Coal – Mineral Hospital	Visited and donated 1,280 kgs of rice (equivalent to almost VND 13 million) for 256 households with handicapped leprosy patients of Quy Hoa national Leprosy

	Dermatology hospital.
Vinacomin - Mining Chemical Industry Holding Corporation Limited	Visited and donated VND 200 million for mental care and rehabilitation center of Thai Binh province.
Viet Nam National Coal – Mineral Industries Holding Corporation Limited (Vinacomin)	Donated medical equipment to Health Officer Protection Committee of Quang Ninh province totaling VND 630.5 million.
Ho Chi Minh Communist Youth Union of Quang Ninh coal	Awarded 10 gifts worth VND 15 million for 10 households in difficult circumstances of Cao Tri Commune – Ba Be - Bac Kan building new local rural
Nam Mau Coal Company	Investment upgrading Cultural and center of Uong Bi City totaling over VND 5 billion, upgrading auto Lan Thap – Mieu Bong route times totaling VND 21 billion, contributing to improve regional traffic conditions and living conditions for people living two sides the route.

Coal mining companies are having seen more and more contributions, but remaining some limitations such as: way of organizing, inefficient activities, sometimes many activities causing psychological suspicion for social community.

3. Recommendations to enhance social responsibility of coal mining companies in Vinacomin

From the implementation of the social responsibility in reality of companies in Vinacomin, the authors offer some recommendations as follows:

For environmental protection issue: Vinacomin must establish regularly monitoring the corporation for environmental protection activities companies; strictly penalty cases of deliberate activities causing environmental pollution; penalty companies have not declared and paid environmental protection charge for industrial wastewater, companies have not seriously completed environmental protection work report periodically. Besides, Vinacomin needs to promote education for employees understanding the impotence of environmental sanitation in workplace.

For relationships with employees: working environment at mines must be invested mechanization tendency, safety is the priority of the production process. Regular training safety for workers, reducing labor accidents, help workers not turning against mining job.

For contributions to the community: Careful study before implementing to effective community-based activities. Besides, organizing contests and timely reward on contributions to community between companies under Vinacomin.

4. Conclusion

Social responsibility issues of coal mining companies in recent years began to be widely appreciated and have efficient activities, practical and significant impacts on environment, workers and community. However, there are still some disadvantages due to both subjective and objective reasons that companies under Vinacomin need to consider to take timely solutions to further enhances social responsibility of companies.

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The conflict between residents and businesses in mining operations - Situations and solutions

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Abstract

Mineral extraction has specific impacts on natural environment. It can break geological structures, landscapes, and creates waste dumps or reservoirs in a large area. Once the mining operations terminate, the environmental impacts of mining still continue due to the landslide of waste dumps and ground subsidence carrying pollutants into the environment. The local community in the mining area is seriously affected, particularly the quality of the living environment such as habitat, livelihood and health. Generally speaking, the companies usually pursue with the profit purposes and ignore the environmental issues. On the other hand, a number of people, who pursue temporary benefits for the stable goals of life, also neglect the outcomes of the mining operations. With the same trends as local residents, the local authorities, who hope the stability in the community, also resolve conflicts in a quick manner in order to avoid any chaos in the community. The consequences of the neglecting lead to the conflicts in mining operations in an increasing and wide-spreading way. This paper presents a reality of the conflict that generates in practice between the local people and businesses in the activities of mineral extraction. From the analysis of the conflict realities, the solutions are proposed to address the harmony benefits of both sides in the conflict.

Keywords: conflict; residents; businesses; environment; regulation

1. Introduction

Viet Nam is a country with mineral potential with approximately 5,000 mines and 60 different types of minerals, in which there are several kinds of minerals with a large reserve including bauxite, titanium, rare earth, coal, oil, and uranium. The businesses involved in mining operations in the local areas have been licensed by the state since 2005 and the enactment has an immediate effect at the same time. Until now, the thousands of licenses have been granted for companies that engaged in mining operations at many local areas across the country. The economic benefits, achieved from mining operations, are undeniable. However, the negative sides of the permissions, which are uncontrolled seriously or not addressed with respect to the capacity of the business, have led to a serious degradation on natural environment and had a considerable effect on living conditions at many neighborhoods.

Mining operations have many specific impacts on natural environment. Unlike the different branches of industries, these operations can break the geological structures and landscapes to create waste dumps or reservoirs with a large area. On the other hand, mineral extraction is also a cause for the landslides of waste dumps, ground subsidence and dust pollution. These issues have a direct impact on the living conditions of the local community. One of the other issues is that mining operation of the companies indicates a lack of responsibility with respect to the environment and the local residents. This can lead to a significant implication for the life of the local community as well as the environmental degradation at the local areas. From there causes, the conflict between the local people and mining companies occurs in society and needs to be resolved.

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Therefore, the study of the situation is urgent and has a practical meaning to find solutions to prevent, overcome conflicts, and limit the negative impacts to the environment of the mining operations.

2. Situation in environmental conflict in mineral mining operations

Environmental conflict is a process for forming and developing the conflict on interests in the mining operations, in the use of natural resources, and in the environmental components in different purposes with respect to the related objects.

The parties involved in the environmental conflicts may include: (i) Environmental conflicts within local communities (among the residents); (ii) Environmental conflicts between residents and companies; (iii) Environmental conflicts between residents and state authorities; (iv) Environmental conflicts between companies and production facilities; (v) environmental conflict between companies and state management agencies; (vi) Environmental conflicts among state management agencies.

The causes of the environmental conflicts can be analyzed basically as follows: the weakness of the state management on the environment; the lack of equal participation of related parties; the lack or omitting of the information on resources and environment; the lack of participation, contribution of related parties and human consciousness in the use of environmental resources; the synchronicity of policy mechanisms, the irrationality of the power allocation; different value systems of natural resources and environment; The resource scarcity and the limitation in loading capacity of the environment.

The impact of mining operation on the living conditions of the people is a main cause to lead to the conflict in mineral extracting activities. This conflict is getting more common and serious. Many incidents in which thousands of people gather to oppose to the mining operations have significantly affected the development policies in the society, the stability of the government and the local community. The situation of the environmental conflicts in mining extraction can be analyzed under the following aspects:

2.1. The conflict on dispute in land-use rights

The mineral mines are generally distributed and located in the remote and mountainous areas. These locations are usually inhabited by the minority of the ethnic community with relatively low economic and social conditions. The rate of poor households in the mining areas is high with a significant dependence on natural resources, especially the basic resources such as arable land and water. Thus, the conflict on the authority of resource use frequently occurs when companies are permitted to exploit and process minerals in the region.

In fact, many areas, having mineral distributions, are located on agricultural land or land of the local people. When mining companies take away or affect production land or land in the local people without adequate compensation or a detailed plan to ensure their livelihood. Then, the poverty situation will be more serious and is a basic cause for the conflicts. As an example, the conflict had occurred at the Tan Pheo commune, Da Bac district, Hoa Binh province in recent years. This project has taken 7 hectares of farmland and forest land from more than 40 households out of 118 households with compensation rates that are only from 1000 to 4000 VND/m². In the meantime, this company only recruits with 5 workers due to the fact that most people are unskilled and less educated and builds a house of culture with a value of 5 million VND. So far, the 40 households which are taken away from the farming land-use have no stable living condition and this not only affects directly to the life of farmers, but also to the residential community in neighborhood areas such as the Phon hamlet and the Lung Thung village. The farms and fields in these locations are also suffered by iron ore, polluted soil, waste rock that are delivered by water from mining areas. The main water source of the commune was also filled by drifting rocks, which make local streams to be shallow and narrow. This leads to a significant potential for floods during the heavy rain. According to the local authorities and communities within and beyond the region of the Tan Pheo mine, the iron ore mining operations make living conditions and environment in the region to go down seriously. The degradation of the roads is one of the easily recognizable things and the poverty rate of the Tan Pheo commune also increases significantly after the mining project is implemented here.

According to the statistics of the Mineral Association, the land area for mining operations in overall country is 41,000 ha at the enactment date of mineral law in 2005. In particular, this area is 3,191 ha in Thai Nguyen, accounting for about 1% of the natural land area of the province. With the same situation, the area of the open-pit mines in operation is up to 5,700 ha in Quang Ninh.

2.2. Conflict in disputes over the use of water sources

The mineral extraction and processing require the use of a significant amount of water, especially the mining and processing operations of tin, chromium, gold, titanium, iron, sand and gravel. Nowadays, the surface and ground water sources may be used easily and freely without charge by many companies in the mining operations. Then, the wastewater in mining activity is poured directly into the rivers and streams in the region without being processed. By doing so, the volume and quality of surface and groundwater sources rapidly declines. This will negatively affect to the production, life, and health of the local people.

2.3. Conflict due to environmental incidents

In fact, the development related to the land-use area and sizes for mining operations is proportional to the environmental pollution. On the other hand, the waste generation is inversely proportional to the poverty and unemployment. Mining operations creates about 4.6 billion cubic meters of wastes into natural environment every year. During these activities, the apatite mining operation in Lao Cai creates about 3 million cubic meters of soil, rock... and the bauxite mining operation in Tan Rai creates about 11 million cubic meters of red mud. This is alarming to the natural hazard on the local environment in mining operations.

A specific example at iron mines in Trai Cau (Thai Nguyen), where there are 21 licensed mines for mining operations, mainly open-pit ore mines with Chinese mining technology. This mining processes are implemented in the following orders: drilling, blasting, unloading, and transporting to the factory for washing process. With this mining technology, natural environment will be seriously polluted. According to a review with a resident, who is living at civil group 14, Trai Cau town, Dong Hi, Thai Nguyen, in an urgent, the local residents, whether they are old or young, are living with pollution, which includes dust, and noise during the last 10 years. Debris, created from the rock extraction operation by using the blasting technology, sometimes make the local people injured. Although there have been many reactions from the households, the explanation of the companies is that they are following standard regulations, in which blasting areas are far from the residential areas. But he suspects that statements on environmental impacts are incorrect and a more important thing is the risk of ground subsidence due to the impact of mining, especially in the rainy season. This effect makes local resident to worry about the quality of living conditions. According to the Chairman of Trai Cau town's people committee, the mineral mining activities provide a high revenue for the state budgets, but the environmental implications are very enormous such as increment in groundwater level, dust, subsidence, landslides, road systems, damaged by heavy-duty trucks. There are about 200 households in particularly dangerous areas in Trai Cau town, where ground subsidence can occur anytime. The local authorities who are responsible for handling the situation still ignores and have no further action.

Most recently, the alkali pumping process in the area, where contains the alkaline liquid, was implemented at around 8:14 am on July 23, 2016 at the Nhan Co aluminum factory (Dak Nong) for test run. This process ruptures the neck of the outlet tube and lead to the leak of the alkaline liquid (NaOH from 44.5 to 49%). The problem has been fixed within a day, however the 9.58 m³ alkaline liquid had been leaked to the natural environment. A small part of the leak permeates into porous grounds (600 m² of adjacent areas) and the remaining, combined with raining water, outflows and flows into the Dak Yao stream through flushing gate No.3. After this incident, many dead fishes are found in Dak Yao stream and some symptoms such as redness, itchy skin occur for the local people who waded the stream to collect dead fishes.

2.4. Conflict due to the lack of transparency

To ensure benefits of the local residents in mining areas, both Mineral Law and Decree 12 on charges in mining operations for the environmental protection have priority terms for the local government and the local populations, where land-use area are occupied. In terms of this policy, the local residents and governments are supported for investments in infrastructures, public welfare projects, compensation for resettlement, and career transition. However, the local people and government have never achieved any benefit from the policy.

A survey by the Mineral Association in 30 communes with mining operation showed that only six communes have received financial allocations from mining. The information about the financial allocations for twelve other communes is not available. There are 21 communes without any precedent environmental protection projects and nine communes with single investment in clean water projects. However, funding for this water project is from the national program such as 135 and 925 program. There was a distribution of the revenues from environmental fee, this source was used for the wrong purposes such as spending on staff salaries and other activities.

The above reality shows that the occurrence of conflict between companies and people, sometimes the government, is due to the lack of transparency in policy implementation, lack of information and lack of community supervision. In fact, the environmental protection fee was used for the wrong purposes causing injustice in the production and use of natural resources leading to prolonged suits.

3. Solutions to the environmental conflicts in mining activities

From the above analysis on the current situation, it can be showed that the cause of the environmental conflicts is:

- There are a lot of shortcomings and weaknesses in environmental management policy for mining activities in Viet Nam. This can be shown through land compensation policies, policies for regional development and planning of mining, conflict in policy, and unreasonable distribution of power.
- There is a lack of equality in mining activities as shown by the fact that many local communities do not know and participate in supervision and contribution of ideas in the mining projects in their area.

- There is also lack of transparency in mining activities as can be seen through the fact that local communities in mining areas were unaware of the benefits and obligations of the mining companies and how they contribute to the community, tax obligations, and environmental protection?

Therefore, the authors propose a number of policy solutions in order to overcome the above problems:

3.1. Completion of the policy system for mining activities

In recent years, the policy system for mining activities in Viet Nam has been gradually improved, particularly the 2010 Mineral Law had replaced the 2005 Mineral Law. However, the policy system in the mining activities still has several shortcomings. These shortcomings are also the reason for the environmental conflict as analyzed above. Therefore, further improvement of the Mineral Law should make it more specific and more detailed to clarify the role of companies and local governments in the management of mineral exploitation activities. This will avoid any overlaps, misleading and conflicts among companies, local government and local people in mining areas.

3.2. Implementation of transparency in mining activities

"Transparency implementation" policy was documented the Ninth Congress Report and implemented in a number of laws such as the Anti-Corruption Law, Corporate Law, Environmental Protection Law. So, this transparency should also be implemented in the Mineral Law.

Specifically, we should publicize information about the environment under Articles 104, 105 of the Law on Environmental Protection. It should also be publicly transparent in collection and use of the environmental protection fees and environmental restoration fund of the companies and the government at all levels. At the same time, organizations and individuals affected may request for explanations and dialogue if the related parties do not implement the collection and use of environmental protection fees.

The information on mineral activities, especially publicize the prescribed revenues from mineral activities such as resource tax, land tax and fees should be transparent. We should publicly collect a portion of the revenue from mining activities and use this revenue to support social and economic development of people living in areas where minerals are exploited.

Participating in Extractive Industries Transparency Initiative: Transparency Initiative mining industry (EITI) was first introduced by former British Prime Minister Tony Blair at the World Summit on Sustainable Development, Johannesburg (South Africa) in 2002. EITI is a coalition of governments, companies and social organizations with the goal to manage and use natural resources efficiently for the benefit of everyone. Currently, there are 51 countries implementing EITI, with 305 EITI national reports were published with the total value of the cash flow up to 1,900 billion US dollars. In the Asian region, many countries also participated in such as Indonesia, Myanmar, the Philippines, East Timor. Although Viet Nam will gain a lot of benefits by being a member, Viet Nam has not been a member over the last 10 years. There are many benefits of being a member of EITI. First, EITI provides effective input for creation and completion of the Mineral Law. This is especially important when multiple reports of international organizations show that the Viet Nam Mineral Law still has concerned deficiencies. Second, EITI helps nations to better control their mining activities, thereby reducing the loss and waste of the resources and increasing budget revenues. Nigeria's experience shows that this country has avoided the losses of about 1 billion dollars per year by implementing EITI. Third, EITI helps national agencies more proactive in enforcing the law, especially against illegal mineral exports. Currently, statistics on exports from Viet Nam to China have a differential of almost 5 billion dollars. According to some experts, illegal mineral exports accounted for a considerable portion of that difference. Fourth, EITI creates a forum for transparency and mutual trust between the government agencies, companies and people in mining areas. Hence, it reduces the social conflicts, strengthens the security and increases the confidence on the leadership of the party and state. Fifth, EITI helps companies to reduce risk in mining activities and unofficial costs. This enhances the reputation and position of Viet Nam companies in the international market and helps businesses to easily access the markets of the developed countries and to participate more into the global value chain.

3.3 Enhancing the participation of people in mining activities

Considering the whole picture of mining activities, local people should be given the highest priority. Through the generations, they preserve the forest and mineral resources, but these indigenous people are less likely to benefit from the resources. They were even turned into pitiful victims.

There is a fact that in many mining projects and mineral processing in small and medium companies, local communities in mining areas have a little opportunity to contribute their voices to represent their views and protect their rights.

According to the survey results of the of the Mineral Association, in mining areas in Tan Pheo commune, Da Bac district, Hoa Binh, the majority of households is not provided any accurate information on mining projects as well as the impact of these projects. They were not consulted when the mineral processing companies expanded production area and the installation of new production lines. For over 90% of respondents in Phon neighborhood, the existence of mining activities in their area is none necessary. The lack of transparency and adequate information when announcing the mining operations of the companies as well as local governments also take away the opportunity to comment and supervise mining projects.

To prevent and resolve the conflicts and reduce the paradoxes in the mining sector, there is a lot of work to be processed simultaneously. It is very important to have the opinion of local people before implementing mineral processing and mining projects in their area including small-scale mining projects licensed by the local province. When people understand their rights and responsibilities and they agree with the implementation of the project, the environmental conflicts will be resolved.

3.4. Stepping up communication and conflict resolution education by mediation

The communication of guidelines, resolutions, policies, and laws on natural resources and the environment should be continuously strengthened further.

There should be close coordination between the natural resource managing and environment agencies at all levels, local government, and media agencies to provide information, feedback, evaluation, and commendation for media agencies writing about mineral resources and environment. The Ministry of Natural Resources and Environment, as well as the Department of Natural Resources and Environment should establish, assign and, provide information and communication on these issues. The content of the natural resources protection and environmental protection movements like building cultural life in residential areas, communities and workplaces should be integrated in the review and recommendation for evaluation and promotion in the party and state. Natural resource and environment protection should be socialized towards promoting strength and creativity of political and social organizations, each family and each citizen. It is necessary to clarify the duties of state management, social organizations, and communities. When environment- conflicts occur, it should definitely have resolved by reconciliation between the related parties.

4. Conclusion

It can be concluded that exploitation of mineral resources brings the economic benefits for companies and nation. However, it was trade off with the destruction of the ecological environment, other resources such as tourism, aquaculture, agriculture, forestry, and the environmental conflict of mining regions. Therefore, it should be done simultaneously with multiple solutions to minimize environmental conflicts in mining activities to strengthen the law and strengthen the confidence of people on the leadership of the party and state.

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Systematization of damages natural ecosystems applied in mining companies

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Abstract

The conservation of natural ecosystems and biodiversity are essential for sustainable development of human society. Of course, the mining industry is one of the most polluting industries in different parts of the world. Address issues of environmental preservation, involvement in this process on equal basis not only of representatives of the mining companies themselves, but also of the authorities is one of the ways of solving problems. Analysis of biodiversity indicators, the analysis of the impact factors of the mining industry on them and their correlation, allow proposing a mechanism for selecting actions to reduce the negative impact of industry on the environment.

Keywords: ecosystems, biodiversity, sustainable development, green technology, economics, management.

1. Introduction

To determine the damage inflicted mining enterprises of natural ecosystems, it is necessary to explore the various elements of the damage, allowing in the future offering tools containing a series of dependency on the basis of which it is possible to calculate the potential damage.

Almost any form of economic activity, implemented mining companies arise noticeable damage to the environment. However, the impact businesses open pit and underground coal mining has big difference from each other. In Russia, at the moment there are a number of legal and regulatory acts and procedures allowing calculating the damage caused to biodiversity targets different kinds of economic activities.

However, a general analysis of the current industry regulations shows that the existing system of assessment of environmental damage natural ecosystems and biodiversity is very incomplete and has significant problems in its methodical, organizational and law support. That is, in the assessment of damages are subject to different methodological approaches, current methods are not perfect, a number of harmful effects on the individual components of nature are not estimated. These components collection procedures and compensation for environmental damage are not defined and are not established by any regulations. Accordingly, the damage is not compensated, and company has not stimulation to reduce the natural ecosystems of biodiversity loss and the degradation of the conduct of its business activities.

Estimates of the damage, calculated in accordance with approved methods and other normative documents, is not always possible to obtain objective cost parameters. In assessing the numbers of components of the natural environment and the effects of adverse impacts on them have to be used or unsuitable for this purpose procedural document or even abandon the valuation of environmental damage caused by the data of biota components.

That means that an effective instrument of economic mechanism of conservation of biodiversity and natural ecosystems as a whole, as the assessment of and compensation for damage caused by the destruction of the biological nature of the components, is ineffective due to lack of its proper methodical, organizational and legal support and requires the most careful elaboration.

It is therefore proposed to hold a series of system definitions and distinctions constitute damage to natural ecosystems and biodiversity from mining industry.

2. Type of exposure

There can be two types of impacts to the natural environment.

- The impact of open pit coal mines;
- The impact of underground enterprises.

It is no secret that the various types of production completely different impact on the various elements of the natural environment. A significant change in water regime, transformation of mineral resources and the impact on the territory of storable accompanying elements are the main impacts from the mine. The impact on the air mass, the transformation of landscapes and many other significant violations are the typical impact of open pits. That's different impacts entail possible rating, and the categories of damages.

3. Categories of damages

- area total loss;
- area of direct influence;
- indirect impact zone.

The zone is a total loss of land, which completely loses its properties habitat at the time of construction and operation of any mining company. Zone of direct influence on the territory of which can clearly be seen the influence of disturbance, where the presence of large numbers of people, laundry service technology and other factors are forcing the animals to leave the traditional habitats and ecosystems. The zone of indirect impact area where human influences is expressed considerably weaker, but still can be traced and proved.

4. Types of damages

- damage to habitats and ecosystems;
- damage to objects of fauna;
- damage to biological resources in economic turnover.

This separation by type of damage is necessary on the one hand with their ecological and biological component, on the other hand in terms of the economic aspects of the definition of damage. The easiest way, based on existing methods, is possible to calculate the damage, used in household types (timber, fish, berries, etc.) and ecosystems (agricultural areas, national parks, etc.). And it proposed a number of methods for the calculation and other types of damage, but they are far from perfect.

5. Composes damages

- damage caused by the destruction of habitats;
- damage caused by habitat transformation;
- damage caused by soil degradation and land;
- biosphere damage to objects of fauna;
- damage to the concrete species during migration;
- damage to the concrete species, calculated on the territory of exposure;
- damage to rare and endangered species;
- damage to all objects of fauna on the territory of the impact of the impact period;
- damages for a fixed period of negative influence.
- economic damage specific species;
- prevent damage to biological resources as a result of environmental protection measures.

The above-mentioned types of damage can be expressed more widely in several components, describe the various damages. Particular attention should be given consideration on the natural ecosystems themselves individually as sets of habitats and species existing, taking into account all the possible ecosystem functions, and a particular kind of damage dealing in ecosystems completely different place in the hierarchy.

6. Consideration factors

- Kb - factor of rarity status of species;
- Kv - factor of economic value;
- Kf - correction factor for the genetic significance;
- Ke - correction factor ecological importance;
- KG - correction factor representation in the form of global and local fauna;

- KQ - correction factor dwelling species in a protected area;
- KR - environmental factor situations territory;
- Kd - factor of soil degradation and land;
- Ke - factor of ecological significance areas;
- Kv - factor (degree) exposure;
- Key - factor utilization rate (utilization of this biotype);
- Kl - factor of time lag (the recovery time);
- KC -biotype status factor.
- Krest - response factor in this biotype of exposure;
- Kr - regional factor of biodiversity.

Registration and use of factors in determining damages natural ecosystems, allow to unify the different types of exposure, rather, damages arising from them, and cause the calculations to a single component.

All five components of the calculation of damage to natural ecosystems by operation of mining enterprises, necessary for an adequate and more complete definition of the size of the negative impact.



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Measuring mining impacts on biodiversity at the preliminary stage: The case of potash mine in Thailand

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Abstract

Mining is an important activity that can contribute to socio-economic development. However, the development of a mining project can also bring about negative impacts, particularly on the environment, and these need to be considered along with the benefits from the project. Biodiversity is one of the major issues to be emphasized because biodiversity is the basis of environmental services and mining can weaken these services through environmental pressure and biodiversity losses throughout the project lifetime. Government plays a significant role in regulating mining activities and balancing benefits and losses from such development. Mining concession is an important mechanism applied at the early stage of mining development. Information concerning gains and losses caused by the mining project is an essential component that allows efficient decision-making but is difficult to fully obtain due to data unavailability. Indicators that allow decision-makers to make use of limited data and provide supporting information for go or no-go decision should be helpful and could lead to better management of natural resources.

This paper aims to develop a framework for preliminarily identifying the degree that a new mining project impacts biodiversity. A generic framework for assessing impact level, consisting of structure, components, and rating criteria, is developed to allow the understanding of the overview of impacts on biodiversity and the ranking of project development priority. The assessment framework is then applied to the case of potash mining project in Thailand. The result showed that the indicator could provide meaningful information to decision-makers and can be a useful reference in combination with other information.

Keywords: Mining; Biodiversity; Impact Rating; Potash; Thailand

1. Introduction

Biodiversity is an important issue in sustainable development. The term biodiversity or biological diversity is defined as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (United Nations, 1992).” Biodiversity is valuable because biological products and processes serve as the basis of economy, diversity allows robust ecological functioning and protection of plants and animals against evolving pathogens, and diversity holds aesthetic value and rights in itself (Blench, 2001). The loss of biodiversity can affect human well-beings, particularly of the poor who are reliant on local ecosystem and vulnerable to its changes, by the decrease in the ecosystem services provided to human such as food and medicines, freshwater, fuel, physical conditions, and cultural services. There have been efforts and movement of the international communities to create improvements on biodiversity issues. Unfortunately, recent assessments showed that global biodiversity trend has been declining either at the level of populations, species, or ecosystems. (Agard et al., 2012)

Human activities can induce biodiversity loss. The direct forms of these losses mainly include or loss of habitats from land conversion, degradation, and fragmentation; overexploitation of natural resources; air and water pollution; invasion of alien species; and climate change. (Slingenberg et al., 2009; Armsworth et al., 2004)

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Mining is also an anthropological activity; it can affect biodiversity both directly and indirectly (International Council on Mining and Metals, n.d.). Thus, it is necessary to take the biodiversity aspect into account when considering mining development.

Governmental agencies play an important role in steering and regulating the mining industry through policy-making and legal enforcement. Mining concession is an important mechanism applied at the early stage of mining development. Including the biodiversity issue into the consideration should allow the government to have a more thorough and comprehensive view and be able to better balance benefits and losses from the development. Information is an essential element for this purpose. However, there are limited data availability as well as uncertainties at the early stage of project development. This might hinder the governmental consideration and decrease decision performance. Concrete assessment process and indicator should be helpful tools that allow decision-makers to make use of limited data and compile it into the easy-to-understand form so as to support the go or no-go decision as well as the identification of preventive measures and the communication with stakeholders further on.

The objective of this paper is to develop a framework for identifying the level of mining impacts on biodiversity at the preliminary stage. The indicator as well as its evaluation method should provide an overview of how much a mining project tends to influence the key threats to biodiversity. This paper is presented in 4 sections. The first section introduces briefly how mining is related to biodiversity. The second and the third sections explain the framework for evaluating the impacts of mining on biodiversity and the application to a potash mining project in Thailand, respectively. Then, conclusions and suggestions for future research are given in the last section of this paper.

2. Mining and biodiversity

Mining can threaten biodiversity along the project lifetime, which includes exploration, development, operation and mine closure, and post-closure stages. The impacts can be direct or indirect. (International Council on Mining and Metals, n.d.) Exploration can lead to biodiversity loss mainly by the removal of land cover and ground disturbance at the site as well as water and air pollution. Likewise, the loss of diversity during the development results principally from large-scale land clearing. The loss can also be derived from other effects, for example, spread of weeds and pests, alteration of hydrological regime, hindering of the movement of local creatures, and environmental disturbance from increasing human populations and activities within the area. (Lloyd et al., 2002)

During the operation phase, biodiversity loss can result from the removal of land cover, the change of soil profiles and landscape, the change of hydrological paths, erosion and elevating sediment load in the watercourses, as well as soil compaction which influences infiltration rate and the amount of run-off. Moreover, the degradation of water quality such as pH, electrical conductivity, total dissolved solids, eutrophication, hydrogen sulfide generation, and accumulation of heavy metals in sediments can disturb biodiversity. (Lloyd et al., 2002; Palmer et al., 2010) Terrestrial and aquatic organisms can be negatively affected by, for instance, disturbed water and ion balance in organisms, interrupted spawning and development of fish eggs and larvae, less photosynthesis, bioaccumulation of toxic chemicals, and toxic condition to the creatures. (Slingenberg et al., 2009) The operation of mine and mineral processing plant also generates air, noise, vibration, and light pollutions and can involve the uses of harmful chemicals, heat, fossil fuels, and a substantial amount of water, all of which can influence the living conditions of flora and fauna. Furthermore, waste materials, which might contain harmful substances, can be generated in a huge amount. The handling and storage of these wastes imply the risks of chemical contamination in environmental media from seepage or leakage of substances. Moreover, it is evident from the past history that accidents and mismanagement of waste storage facilities such as tailing pond failure are responsible for critical water pollution. (Lloyd et al., 2002)

At the end of operation, infrastructures are to be decommissioned and dismantled, and the area is to be reclaimed and/or rehabilitate to maintain safety of the living-beings and return mine site to a stable natural ecosystem as well as to allow further land use according to its potentials. This phase can contribute not only to the remediation of biodiversity loss but also to create the gain. Appropriate mine closure through reclamation and rehabilitation can help restore the capability of the land to retain fundamental resources. The loss and the gain at this phase is important because post-mining period is boundless compared to the period of development and operation, which lasts between a few years and more than a century (International Council on Mining and Metals, 2014).

3. Defining the assessment framework

In this paper, an assessment framework for quantifying the degree of mining impacts on biodiversity at the local level is developed. The framework is structured by the major threats that contributing to negative impacts on biodiversity. The positive impacts are not included as part of the consideration. The assessment is

characterized by three main threats, which are closely related to mining activities, including terrestrial habitat change, aquatic habitat change, and pollution.

The method for quantifying the impact level of mining project is based on the risk concept. According to the ISO 31000:2009 standard, risk is defined as “effect of uncertainty on objectives.” The magnitude of risk can be identified by the combination of consequences (i.e. the outcome of an event which affects objectives) and likelihood (i.e. chance of something happening). (International Standard Organization, 2009) Both the consequence and the likelihood are classified into at least 3 different levels. The risk is then rated into three or more levels, from low to high. Insignificant or low risk refers to the risk that do not require or require minor actions to improve the likelihood or consequence conditions. Medium risk is the risk that might be tolerable in the short term but efforts to mitigate the risk are required. High risk represents the level of risk that mitigation measures are required before activities start. If the mitigation of risk is not achievable, the activities should not be carried out. Fig. 1 shows the risk matrix and its components.

Consequence Likelihood	Slightly harmful	Harmful	Very harmful
Least likely	Low risk	Low risk	Medium risk
Likely	Low risk	Medium risk	High risk
Most likely	Medium risk	High risk	High risk

Fig. 1. Risk matrix

In this framework, the assessment components are structured in a hierarchy to facilitate the quantification and aggregation. They are scored by specified criteria and aggregated up the hierarchy. The three threats equally contribute to the overall impact level. Each issue is considered separately. The impact rating of each issue is determined by likelihood and consequence, both of which are derived from the scoring of related parameters, especially design and operation factors as well as site-specific characteristics. The components at the same rank in the hierarchy are given equal weight.

3.1. Habitat changes

The likelihood of terrestrial habitat loss is characterized by the changes of land cover and the effect of ground subsidence. Since the removal of land cover causes an immediate damage to the habitat and the effect from subsidence is relatively less critical in terms of land cover removal and habitat damages, the assessment applies different weights to both issues. The weights of 75% and 25% are used on the land cover loss and the subsidence issues, respectively. The consequence of terrestrial habitat loss is represented by site characteristics, determined by the characteristics of the ecosystem present in the project area.

Similar to terrestrial habitat loss, the likelihood of aquatic habitat loss is characterized by the loss of aquatic area, determined by the period and the area of loss. The consequence score is estimated from type of water bodies and the presence of threatened species.

3.2. Pollution

Pollution is divided into 3 groups, namely, air, water, and soil. The impact level of these pollution are derived from likelihood and consequence. Likelihood is determined by the release of harmful pollutants and dispersion potentials. Consequence is determined by site characteristics that reflect the presence of organisms and their sensitivity to changes. The site characteristics comprise the characteristics of present ecosystem and the presence of threatened species. In case of water pollution, additional criterion is applied to correspond with the risks of undesired discharge from 3 main events, namely, mine drainage contamination, seepage and leakage from storage facilities, and failure of waste storage facilities. The level of impact of each event is determined separately using the same principle, i.e. risk calculated from likelihood and consequence scores. The weights of the impacts caused by planned discharge and undesired release are set to be 75% and 25%, respectively. This is because planned discharge represents actual release of pollutants while the undesired discharge represents the risk of release when specific events happen.

The final result is derived from the aggregated scores of sub-components, which are graded between 0 (no impact) or 1 (low impact) to 3 (high impact), and is presented as a single value indicator, stating the level of overall impact on biodiversity. The value is classified into 3 classes - low, medium, and high impacts. Low impact class indicates that the project being considered tends not to cause severe losses to biodiversity. Medium

impact class shows that the project can cause significant impacts on biodiversity in certain aspects, and attention might be required for prevention or improvement in those issues. High impact class reflects that the project tends to strongly affect the biodiversity state. The development of a mining project of this class should be done with elaborate consideration of gain-loss balance as well as the measures for preventing, controlling, and mitigating impacts.

Fig. 2 shows the structure of components and calculation weights in this assessment, and the criteria for score rating are summarized in Table 1.

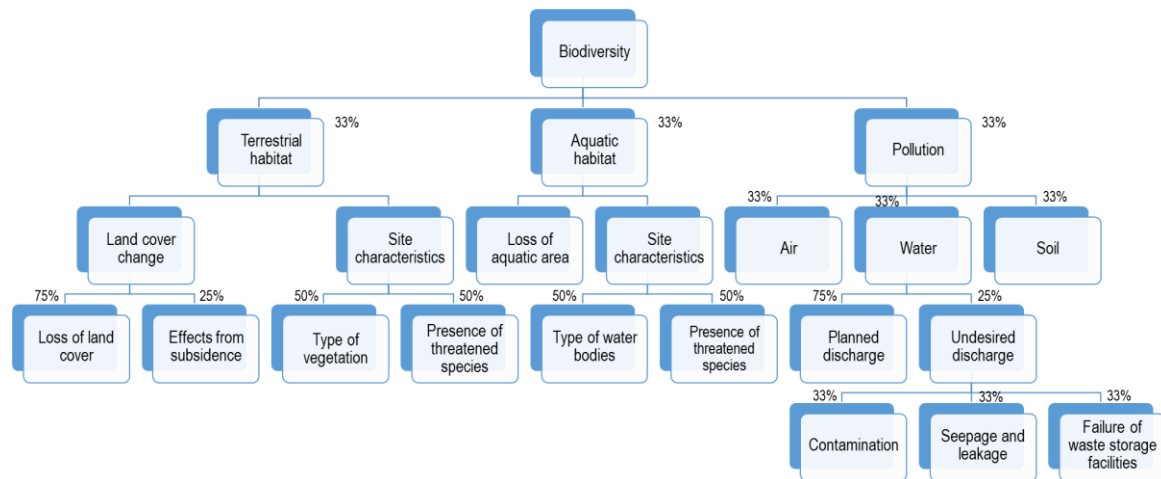


Fig. 2. Structure of components in the assessment of mining impacts on biodiversity

Table 1. Assessment criteria for mining impact on biodiversity

No.	Components	Rating Criteria				
		0	1	2	3	4
1.	Terrestrial habitat	0	1-3	4-6	7-9	
	1.1 x 1.2					
1.1	Land cover change (1.1.1 x 75%) + (1.1.2 x 25%)	0	1-2	3-4	5-6	
1.1.1	Loss of land cover Sum (1.1.1(1) x 1.1.1(2))	0-7	8-15	16-23	24-30	
(1)	Type of land cover loss		Area without or with land cover removal of ≤1 year	Area with land cover removal of >1 year but ≤3 years	Area with land cover removal of >3 years but ≤10 years	Area with land cover removal of >10 years
(2)	Size of land cover loss	0	>0-<10 hectares	10-30 hectares	>30 hectares	--
1.1.2	Effects from subsidence Sum (1.1.2(1) x 1.1.2(2))	0-7	8-15	16-23	24-30	
(1)	Degree of subsidence		Area unaffected or affected by subsidence ≤10 cm	Area affected by subsidence >10 but ≤30 cm	Area affected by subsidence >30 but ≤100 cm	Area affected by subsidence >100 cm
(2)	Size of subsidence area	0	>0-<10 hectares	10-30 hectares	>30 hectares	--
1.2	Site characteristics					
1.2.1	Type of land cover (original state) Weighted average of (a) by area		1-2	>2-3	>3-4	
(a)	Land cover type		Artificial surfaces or bare areas	Arable cultivated land or permanent meadows and pastures	Permanent crop cultivated land or cultivated aquatic or regularly	Forest or natural wetland or natural water bodies

No.	Components	Rating Criteria				
		0	1	2	3	4
					flooded areas	
1.2.2	Presence of threatened species		1-36	37-72	73-108	
	Sum (1.2.2(1) x 1.2.2(2))					
(1)	Level of vulnerability		Unthreatened species	Potentially threatened species	Threatened species	
(2)	Population density					
	-Unthreatened species		1-20	21-40	>40	
	-Potentially threatened species		1-10	11-20	>20	
	-Threatened species		1-5	6-10	>10	
2.	Aquatic habitat					
2.1	Loss of aquatic area	0	>0-7	>7-14	>14-21	
	Sum (2.1(1) x 2.1(2))					
(1)	Type of lost aquatic area		Aquatic area removal of ≤1 year	Aquatic area removal >1 year but ≤3 years	Aquatic area removal >3 year but ≤10 years	Aquatic area removal >10 years
(2)	Size of lost aquatic area	0	<2	2-5	>5	
2.2	Site characteristics					
(1)	Type of water bodies (original state) Weighted average of score by area		artificial water bodies	cultivated aquatic or regularly flooded areas	natural or semi-natural water bodies	
(2)	Presence of threatened species	See 1.2.2				
3	Pollution					
	Average of 3.1-3.3					
3.1	Air					
3.1.1	Presence of pollutant	0	1-8	9-16	17-24	
	Average of 3.1.1(1)					
(1)	Concentration / RELs ¹	0	>0-<0.5	0.5-1.0	>1.0	
3.1.2	Dispersion potential		1-3	4-6	7-9	
	Sum 3.1.2(1) to 3.1.2(3)					
(1)	Wind speed		<1 m/s	1-5 m/s	>5 m/s	
(2)	Geography		Valley	Flat terrain	Others	
(3)	Average rainfall day per year		>150	100-150	<100	
3.1.3	Site characteristics					
(1)	Type of land cover		1-2	>2-3	>3-4	
	Weighted average of (a) by area					
(a)	Land cover type (original state)		Artificial surfaces or bare areas	Arable cultivated land or permanent meadows and pastures	Permanent crop cultivated land or cultivated aquatic or regularly flooded areas	Forest or natural wetland or natural water bodies
(2)	Presence of threatened species	See 1.2.2				
3.2	Water					
3.2.1	Planned discharge	0	1-3	4-6	7-9	
	3.2.1.1 x 3.2.2.2					
3.2.1.1	Amount of pollutant release	0	1-3	4-6	7-9	
	3.2.1.1(1) x 3.2.1.1(2)					
(1)	Effluent discharge amount	0-5 m ³ /day	>5-50 m ³ /day	>50-150 m ³ /day	>150 m ³ /day	
(2)	Presence of pollutant	0	>0-1	>1-2	>2-3	
	Average of (a)					
(a)	Concentration / RELs (Suspended solid, temperature,	0	>0-<0.5	0.5-1.0	>1.0	

No.	Components	Rating Criteria				
		0	1	2	3	4
	alkalinity, salinity, heavy metals, and free cyanide)					
3.2.1.2	Site characteristics	0	1-3	4-6	7-9	
	Sum 3.2.1.2(1) to 3.2.1.2(3)					
(1)	Type of surface water being discharged	unrelated	stream or shallow lake (<30 m)	river	deep lake (>30 m)	
(2)	Type of underground water being discharged	unrelated	bank filtration	karstic or alluvial aquifer	sedimentary or deep aquifer	
(3)	Presence of threatened species	See 1.2.2				
3.2.2	Undesired discharge					
3.2.2.1	Leaching and contamination from mine drainage					
(1)	Likelihood of pollutant release					
(1.1)	Presence of pollutant (Acid generation substances, heavy metals, and salt components)	0	1-3	4-6	7-9	
(1.2)	Presence of water (a) + (b)	0	1-2	3-4	5-6	
(a)	Amount of rainfall	0	>0-1,000 mm/year	>1,000-2,000 mm/year	>2,000 mm/year	
(b)	Groundwater velocity	>0-0.01 m/day	>0.01-0.1 m/day	>0.1-1 m/day	>1 m/day	
(2)	Site characteristics	0	1-3	4-6	7-9	
	Sum (2.1) to (2.3)					
(2.1)	Type of surface water	See 3.2.1.2(1)				
(2.2)	Type of underground water	See 3.2.1.2(2)				
(2.3)	Presence of threatened species	See 1.2.2				
3.2.2.2	Seepage and leakage in waste facilities					
(1)	Likelihood of pollutant release	0	1-7	8-14	15-21	
	Sum (1.1) to (1.7)					
(1.1)	Presence of pollutant	0	1-3	4-6	7-9	
	Average of (a) to (c)					
(a)	pH	6-8	4-5.5 or 8.5-10	2-3.5 or 10.5-12	0-1.5 or 12.5-14	
(b)	Salt components	no salt component	salt as trace elements	salt as a minor component in waste	salt as the main component in waste	
(c)	Heavy metals	See 3.2.1.1(2)				
(1.2)	Capacity of storage facilities	0	>0-0.1 m ³	>0.1-0.5 m ³	>0.5 m ³	
(1.3)	Liquid content of waste materials					
	-Tailing	none	dry	paste	slurry or liquid	
	-Waste	0-5%	>5-15%	>15-30%	>30%	
(1.4)	Prevention measures	liner with filter or drainage, closed system	liner without filter or drainage or clay with filter or drainage	clay without filter or drainage or compressed ground with filter or drainage	compressed ground without filter or drainage	
(1.5)	Waste management after closure	no waste storage	backfilled or encapsulated with drainage and rehabilitation	backfilled or encapsulated with drainage or rehabilitation	open storage or other forms of storage that are prone to erosion or leaching	

No.	Components	Rating Criteria				
		0	1	2	3	4
(1.6)	Amount of rainfall	0 mm/year	>0-1,000 mm/year	>1,000-2,000 mm/year	>2,000 mm/year	
(1.7)	Depth of groundwater table	0	>0-<50 m	50-150 m	>150 m	
(2)	Site characteristics					
(2.1)	Presence of surface water bodies	none	>3 km	>1 but ≤3 km	within 1 km	
(2.2)	Presence of threatened species	See 1.2.2				
3.2.2.3	Failure of waste storage facilities	0	1-3	4-6	7-9	
(1)	Likelihood of pollutant release Average of (1.1) and (1.2)					
(1.1)	Waste dump Sum (1.1.1) to (1.1.6)	0	1-6	7-12	13-18	
(1.1.1)	Presence of pollutant	See 3.2.2.2(1.1)				
(1.1.2)	Type of waste material	solidifiable material	sandy gravel, gravel	sandy clay, sand	clay, loam, silt	
(1.1.3)	Height of waste pile	0	>0-10 m	>10-30 m	>30 m	
(1.1.4)	Pile slope	0-15°	>15-30°	>30-45°	>45°	
(1.1.5)	Seismic factor (Seismic zone according to DMR ²)	0	1	2A	2B	
(1.1.6)	Amount of rainfall	0	>0-1,000 mm/year	>1,000-2,000 mm/year	>2,000 mm/year	
(1.2)	Tailing storage facility Sum (1.2.1) to (1.2.6)	0	1-8	9-16	17-24	
(1.2.1)	Presence of pollutant	See 3.2.2.2(1.1)				
(1.2.2)	Type of dam	-	water retention	downstream or centerline	upstream	
(1.2.3)	Height of dam	0	>0-10	>10-30	>30	
(1.2.4)	Dam slope	0-15	>15-30	>30-45	>45	
(1.2.5)	Seismic factor (Seismic zone according to DMR ²)	0	1	2A	2B	
(1.2.6)	Amount of rainfall	0	>0-1,000 mm/year	>1,000-2,000 mm/year	>2,000 mm/year	
(1.2.7)	Foundation conditions	massive ground	massive ground with few discontinuities, weak plane, soft material (clay), or high moisture content	loose or massive ground with moderate discontinuities, weak plane, soft material (clay), or high moisture content	loose or massive ground with a number of discontinuities, weak plane, soft material (clay), or high moisture content	
(1.2.8)	Liquid content of tailing	None	dry stack	paste	slurry or liquid	
(2)	Site characteristics	0	1-4	5-8	9-12	
(2.1)	Presence of surface water bodies	None	>3 km	>1 but ≤3 km	within 1 km	
(2.2)	Type of land cover	See 3.1.3(1)				
(2.3)	Type of water body	See 2.2(1)				
(2.4)	Presence of threatened species	See 1.2.2				
3.3	Soil					
3.3.1	Presence of pollution (Heavy metals and radioactive compounds)	See 3.2.2.2(1.1)				
3.3.2	Site characteristics Sum 3.3.2(1) to 3.3.2(3)	0	1-3	4-6	7-9	
(1)	Type of land cover	See 3.1.3(1)				
(2)	Type of surface water body	See 3.2.1.2(1)				
(3)	Presence of threatened species	See 1.2.2				

Remarks: ¹RELs = Recommended exposure limits; ²DMR = Department of Mineral Resources

4. Defining the assessment framework

This section presents the use of the assessment framework mentioned above. The data of an underground potash mining project was applied to the framework. A brief overview of the project used in this study and its assessment results are presented below.

4.1. Project overview

The mining project in this study is an underground potash mine of ASEAN Potash Chaiphum Public Company Limited in Chaiphum province, Northeastern Thailand. The project is located on a carnallite deposit, which lies at the depth of between 80-300 meters. At the cut-off grade of 10% KCl and 0.5 meters ore thickness, the indicated resource within the mining lease area was estimated at 67.7 million tonnes KCl (potassium chloride) at an average grade of 15.78% and 211.95 million tonnes NaCl (sodium chloride) at an average grade of 43.78%.

The mining lease covers an area of around 3,800 acres, most of which are agricultural area. However, the surface area required for mine access and facilities is approximately 132 acres. An additional area of 1,098 acres is needed for waste storage facilities. The extraction is planned to take place at the depth between 100 and 300 meters from surface. Two vertical shafts with a diameter of 8 meters will be sunk by rock freezing technique to create the main mine access. Carnallite is to be extracted using a room and pillar method and drilling and blasting techniques. The full production should yield around 7.8 million tonnes of carnallite (average grade 14.78%) and 3.1 million tonnes of NaCl each year and whole production period should last 23 years. Underground void will be backfilled with tailing materials consisting of NaCl and MgCl₂ slurry to prevent ground subsidence.

Run-off mine is processed by hot crystallization, which should recover more than 90% of KCl. The plant capacity is 1.1 million tonnes of 95% KCl. Together, sodium chloride (NaCl) and magnesium chloride (MgCl₂) by-products will be generated at the rate of 3.3 million tonnes and 2.0 million cubic meters annually. Part of the NaCl will be sold but the remaining will be stored in the waste storage facilities.

The study in environmental impact assessment indicated that 141 types of animal species, 229 types of plant species, and 83 types of insects were found in the mining and processing plant area. Among all types of animal, 5 species of birds, 1 of reptile, and 1 of amphibian were classified as near-threatened species. Two species of reptile were classified as vulnerable species. The rest were non-protected species. (ASEAN Potash Mining, 2014)

4.2. Assessment results and discussion

Based on the project information, the assessment and rating of project's impacts on biodiversity is carried out, applying the framework mentioned in the previous section. In this assessment, the time boundary is set to cover the project lifetime and, if related, the post-closure period of 25 years. Spatial boundary covers the concession area and the surrounding area within 5 kilometers radius.

The scores of the key components of the framework are shown in Table 2. The total score of mining impact on biodiversity is 1, which is classified as low impact. The first issue, terrestrial habitat change, obtained a score of 2 (medium impact). The second issue, aquatic habitat change, obtained a score of 0 (not related). The last issue, pollution, had a score of 1 (low impact).

The scores of the sub-topics indicate the key issues of impacts on biodiversity. Terrestrial habitat tends to be moderately affected as the land cover will be influenced by both direct removal and disturbance from subsidence. However, the project area is mostly agricultural area and contains low diversity of species. As a result, the total score of terrestrial habitat change is considered low.

Aquatic habitat change is considered not related because there is no plan to directly remove the aquatic area despite the presence of water bodies in the proximate area as well as flora and fauna.

Table 2. Assessment results of the Bamnet Narong potash mine

Components	Score	Components	Score
1. Terrestrial habitat (Weight: 33.3%)	2	3.2.2.2 Seepage and leakage in waste facilities	2
1.1 Land cover change	2	-Likelihood	2
-Loss of land cover	1	--Presence of pollutant ³	1/2 ¹
-Effects from subsidence	1	--Capacity of storage facilities	3/3
1.2 Site characteristics	2	--Liquid content of waste materials	3/1

-Type of land cover	2	--Prevention measures	0/0
-Presence of threatened species	1	--Waste management after closure	1/1
2. Aquatic habitat (Weight: 33.3%)	0	--Amount of rainfall	2/2
2.1 Loss of aquatic area	0	--Depth of groundwater table	1/1
2.2 Site characteristics	2	-Site characteristics	2
-Type of water bodies	3	--Presence of surface water bodies	3
-Presence of threatened species	1	--Presence of threatened species	1
3 Pollution (Weight: 33.3%)	1	3.2.2.3 Failure of waste storage facilities	2
3.1 Air (Weight: 11.1%)	2	-Waste dump	2
-Dispersion likelihood		--Presence of pollutant3	3
--Amount of pollutant release1	1	--Type of waste material	2
--Dispersion potential	2	--Height of waste pile	2
---Wind speed	1	--Pile slope	2
---Geography	2	--Seismic factor	0
---Average rainfall day per year	2	--Amount of rainfall	2
-Site characteristics	2	-Tailing storage facility	2
--Type of land cover	2	--Presence of pollutant3	2
--Presence of threatened species	1	--Type of dam	1
3.2 Water (Weight: 11.1%)	1	--Height of dam	2
3.2.1 Planned discharge	0	--Dam slope	1
-Amount of pollutant release	0	--Seismic factor	0
-Site characteristics	1	--Amount of rainfall	2
--Type of surface water being discharged	0	--Foundation conditions	1
--Type of underground water being discharged	0	--Liquid content of tailing	3
--Presence of threatened species	1	-Site characteristics	2
3.2.2 Undesired discharge	2	--Presence of surface water bodies	2
3.2.2.1 Leaching and contamination from mine drainage	1	--Type of land cover	1
-Likelihood	2	--Type of water body	1
--Presence of pollutant2	1	--Presence of threatened species	1
--Presence of water	3	3.3 Soil (Weight: 11.1%)	0
---Amount of rainfall	2	-Presence of pollutant	0
---Groundwater velocity	3	-Site characteristics	1
-Site characteristics	1	--Type of land cover	1
--Type of surface water	1	--Type of surface water body	1
--Type of underground water	0	--Presence of threatened species	1
--Presence of threatened species	1	Overall score	1

Remarks: ¹ Tailing storage facility / waste dump

The overall score of pollution caused by the project indicates a low level of impact on biodiversity. Looking at the number closely, we find that air pollution tends to pose more significant impacts on biodiversity due to the low-to-moderate amount of planned pollutant release, dispersion potential, and the characteristics of flora and fauna found in the site neighborhood. The impact score of water pollution is classified as low partly because there is no planned discharge of water to external area. However, the risk of undesired discharge exists. Its score is considered moderate mainly because of the presence of salt components as potential pollutants and the presence of waste storage facilities, which result in potential discharges from mine drainage, leakage, and structural failure of the facilities.

The assessment framework has assumptions and limitations that users have to be aware of. First, the data required for score calculation are based on specific models and estimation. Emissions, in particular, are calculated based on the emission factors derived from empirical data of comparable activities. Therefore, the information contains uncertainty and is based on a number of assumptions. The value can provide a rough idea about the impacts at the early stage, in which data availability is limited; it should not be used as a sole indicator.

Second, the aggregation of scores is mostly carried out by score addition and weighted average method. The possibilities and criticalities are determined by the presence of key parameters with least acknowledging the relations among parameters. Moreover, it applies a preliminary set of weighting (equally weighting in this case), implying the assumption that different issues are equally important, which might not always be the case. The

weight is adjustable, depending on the purpose of assessment and priority at certain time. The variation of weighting should be, however, kept in mind as it influences the comparability of the results. Adjusting the scoring and weighting system by taking empirical values of different cases into account can be an important part of future research.

Third, the issues included as components are limited to key topics, which might neglect specific issues and be insufficient for some cases. The issues of concerns specified by environmental impact assessment must be closely considered together with this assessment structure. Likewise, the pollutants that are taken into account are limited to a shortlist of substances and gases rather than considering all substances identified as hazardous. Besides, the impacts at development and construction stage, which covers a short period and involves temporary activities, is not included. As a result, the impact scores from this study represent a certain scope of information, which users need to be aware of. An adjustment of the structure might be required to ensure the completion and meaningfulness of the results. This indicates a gap for improvements in future studies.

The assessment result provides concrete and easy-to-understand information for mineral resource management to policy-makers. It can be useful to the decision makers by not only helping them to understand key issues caused by the project but also providing a basis for control and management such as fund allocation, impact monitoring, or the identification of compensation measures. In fact, these are intended application of the evaluation result rather than the use of value as a sole reference to the decision.

5. 4. Conclusion and Recommendation

In this paper, a framework for quantifying the degree of impacts of a new mining project on biodiversity was developed based on the risk concept. The level of impact is determined by 3 main issues, including terrestrial habitat loss, aquatic habitat loss, and pollution. Each issue is rated by design and operation factors and characteristics of the site that contribute to the likelihood and consequences of habitat disturbance. The assessment result is classified into 3 impact levels: low, medium, and high. It implies different levels of attention and efforts required for preventing, controlling and mitigating impacts.

The developed framework is applied to the case of Bamnet Narong potash mining project. The results show that the overall impact on biodiversity of the project is classified as 'low', which is derived from medium terrestrial habitat loss and low pollution. This reflects the needs for increasing attention and strategies on land cover loss, ground subsidence, and pollution control issues.

These developed framework are the beginning step to the assessment and identification of the level of mining impacts on biodiversity. This generic framework can be applied to other mining projects that are to be approved and developed. Though they can provide a preliminary value of impact, they contain limitations and assumptions, which users need to be aware of. Possible improvements include the extension of parameters and calculation criteria to cover the positive contribution of mining and the variation of weighting to find the values that can best represent users' priority and objectives. The framework can also be a basis for further improvement such as the adjustment to allow the assessment of brown-field and ongoing projects. The framework can also be extended to consider impacts on other issues such as health and safety or social development to provide a more comprehensive tool for decision-makers.

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Maximum exploitation of Viet Nam coal potential use

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Abstract

Coal is a fossil fuel made up of high percentages of carbon and other elements. Although the reserve of coal is higher than those of other fuels like oil or gas, coal is non-renewable resource. Scientific research has shown that coal is not only used in traditional way (burned) to meet energy demand but also has many other applications, such as creating coal liquefaction (ICTL), coal gasification, coal gas and many other uses. So far in Viet Nam, coal is often only used for producing high temperature thermal energy for manufacturing applications such as in the thermal power plants, metallurgic furnaces, kilns and steam locomotives where heat energy is required. Besides, the depletion of coal resources and mining scale reduction increasingly requires us to find out new ways to maximize the value of Viet Nam coal use. The article introduces products from coal and proposes solutions to improve the value of Viet Nam coal use in order to get the most benefit from the scarce resource and help protect the environment.

Keywords: maximum exploitation; coal use

1. Introduction

In recent years, along with the overall development of the country, mining activities in general and coal mining in particular has contributed greatly to national renovation, and plays an important role in the economy of Viet Nam. Mining operations and mineral coal business have contributed about 5.6% to the national GDP, created jobs for hundreds of thousands of workers and more other social activities, especially in ensuring national energy security. According to the report of Viet Nam National Coal – Mineral Industries Holding Corporation Limited (Vinacomin) at 2015 Review Conference, the total coal production in the period 2011-2015 reached 195.65 million tonnes (about 39.19 million tonnes per year), 192.3 million tonnes was for consumption (average 38.46 million tons per year), of which the supply for electricity production in 2015 amounted to 37 million tons.

Planning on development of Viet Nam coal industry through 2020 (Government's Decision No. 403 / QĐ-TTg of March 14, 2016) has decided to develop the coal industry on the basis of exploiting, processing and using the country's coal resources effectively and economically; saving coal resources of the country, actively contributing to ensuring national energy security. Accordingly, the annual volume of coal mining will not as much as that in previous years (approximately 48-50 million tonnes in 2025, equivalent to the amount of coal mined by 2012-2013), focusing mainly on meeting domestic coal demands to ensure national energy security. In the future, domestic coal demands will also increase (By 2020, 9 coal-fired power plants will be deployed, requiring a significant amount of coal). Besides that, the increasingly difficult condition for exploitation makes the cost of mining increase. Thus, both perspectives of exploitation and planning show that the decrease of non-renewable resource output requires us to exploit every aspect of coal use.

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460°C, hydrogen will react with coal and create "artificial petrol" and other compounds with low molecular weight. Using distillation measures, we can get the artificial gasoline, fuel oil and other fuels. To get the artificial gas, firstly turning coal into coal gas, then adding hydrogen into coal gas and controlling the rate of mono, carbon oxides: hydrogen is 1: 2. Under the catalytic effect of iron, cobalt or nickel at a temperature of 200°C, the two elements will combine to form new chemical compounds. The final product contains 83% gasoline, remaining is fuel and many other compounds. Because turning coal into coal gas is a familiar process, this gasoline modulation technique is made easily. Thanks to this process, it can eliminate most of the impurities that are harmful to the body and the environment. Since the transportation of coal is easier than that of oil, many countries seek to expand the scope of petroleum production plants using this technique. At the same time, scientists are also looking for ways to improve the productivity of the process for serving the interests of mankind.

2.3. Production of fuel from coal powder and algae

This product, researched by the team of Prof. Ben Zeelie, is a breakthrough in the production of clean-burning fuel as it uses coal powder, waste of mining process as main ingredients. The mining process causes not only environmental problems by releasing harmful chemicals into the soil for a long time, but also huge economic losses. Exploitation of coal powder to produce fuel helps to overcome these limitations. To produce the new fuel, the team cultivated algae in vast artificial lake, then collecting and mixing them with powdered coal. The final products made up in the form of coal blocks are dried. These briquettes can be heated without oxygen at temperature of about 450°C and burned without exhausting fumes to produce solid fuel, clean-burning fuels and high-quality crude oil. The product is used as coal to produce heat and power. The researchers said that if a large amount of coal powder in the world is used to produce Coalgae, this fuel will become popular worldwide.

2.4. Manufacture of chemicals and clean fuel from coal

According to the Viet Nam National Chemicals Group, since 2008, Accelerger, a leading company in alternative energy technology has launched program of coal liquefaction (ICTL) towards the production of chemicals and clean fuel from coal by combining new catalysts with the coal processing technology to produce biofuels, which use CO₂ as an ingredient for the traditional liquid fuels. Coal liquefaction technology can change the energy situation and ensure diversity in the supply of energy for many countries without increasing the amount of greenhouse gases. With 1 trillion tons of coal reserves globally, experts say that coal liquefaction fuels can be an important alternative resource in the future.

2.5. Increasing efficiency and emission treatment in using energy from coal

The greatest harm of using energy from coal that many scientific researchers concerned is the emission of too much CO₂. To increase the using efficiency of coal and reduce environmental impact, the scientists of the University of Queensland, Australia, had researched and successfully tested a new technology to deal with CO₂ emission from using coal energy. Its objective is to minimize the impact on the environment by separating CO₂ from emissions in coal combustion process and preventing freeing it to the atmosphere. This technological project is called Direct Carbon Fuel Cells (DCFC). Comparing with the current technology, the new technology will generate double energy while minimizing the extra emissions causing the greenhouse effect. Chemical experts said that high energy performance will halve the volume of coal required to generate electricity by using this technology. Thus, the industries especially heavy industry and processing industry will significantly save energy and costs, while the benefit of consumers has been enhanced. Together with energy efficiency and cost saving, DCFC technology will also provide cleaner energy. In DCFC, byproducts from burning coal, the CO₂ will be filtered, processed and stored safely. Currently, the engineers of the University of Queensland are among the leading engineers in clean coal technology development to provide renewable energy sources such as hydro, geothermal and solar energy.

2.6. Making sculpture and art painting

Carving products from coal: Coal carving is the handicraft with specific characteristics of Quang Ninh. The craftsman must choose the platform large size coal which is mined in nature. The art of coal carvings has brought into the land of coal mines since the early 20th century by the French. Before 1986, there used to be a cooperative named Hong Gai for craft artists who made paintings and other fine art works from anthracite coal. Currently, there are around seven households specializing in coal carvings in Quang Ninh.

Turning coal powder into art by form press technology: Thanks to the application of machine, mining technologies have been developed and raw materials for handiworks are increasingly scarce. In order to

diversify tourism products, since 2009, Quang Ninh Department of Science and Technology has advised the People's Committee to implement the theme: "Research Form Press Technology to turn coal powder into art". The host institution, cooperative union of non-state companies in Quang Ninh province would study and complete the technology. Researchers have successfully created needed products.

3. Potential of Viet Nam coal product exploitation

In our country, there are five main types of coal: anthracite; peat; bituminous, subbituminous, and lignite which are distributed widely and unevenly throughout the country. They are mainly concentrated in the Northeast (Quang Ninh, Lang Son). Until January 1, 2005, as a result of exploration, the total reserve of coal is estimated of about 6.14 billion tons.

Table 1. Coal reserves by the reserves level and types of coal

N°	Indicator	Verified reserves	Verified reserves divided by the reserves level (1000 Ton)				
			A+B+C	A+B	C1	C2	P
	Total reserves	6140683	5,629,252	356,789	2,264,480	3,007,983	511,431
3	Quang Ninh coal basin	4,121,745	4,121,745	301,335	1,508,643	2,311,767	0
	VINACOMIN's domestic coal basin	165,110	165,110	55,454	91,901	17,755	0
	Local coal basins	37,434	18,478	0	10,238	8,240	18,956
	Coal basin in Red River Delta	1,580,956	1,088,481	0	524,871	563,610	492,475
	Total of Anthracite and others	5,905,245	5,393,841	356,789	2,135,653	2,901,372	511,431
4	Peat	235,438	235,438	0	128,827	106,611	0

Source: Mining Industrial Consulting Centre-TVN, 2008. MPI, UNDP. *Research to decrease greenhouse gas emissions in the energy sector in Viet Nam, the period from 2013 to 2030. Supporting the development and implementation of the National Strategy for Green Growth. Issue registration numbers: 1287-2013 / CXB / 06-632 / BD*

With many types of coal and indicated potential reserves, it is important to study and apply new technology to improve the efficiency of coal use in Viet Nam. Some solutions are suggested as follows:

Firstly, according to studies and estimation of scientists, up to 30% of coal worldwide is lost in the form of powder during coal mining process. Each year about 50-60 million tons of coal is buried. In particular, in Viet Nam, when the technology has not yet been fully synchronized, coal powder which is lost during the exploitation process will not lower than this rate, and hence, every year the amount of coal powder lost will be tens of millions of tons. This is a concern because those resources will not be retrieved. The lost coal were buried or washed away. It is necessary to have research on using this source of coal powder fully in coal exploitation process. This material resource when using algae's technology applications will become a new alternative fuel.

Secondly, as stated above, the role of the coal sector is especially important in ensuring national energy security. The amount of coal supplied to thermal power plants is more than 80% of mining production each year. Improving process efficiency and reducing emissions from thermal power plants are the research themes that needed to be invested. Clean energy technologies - DCFC (University of Queensland, Australia) that will be transferred to Viet Nam in the future will bring benefit for the coal industry in particular and the country in general because it helps to save energy and clean the environment for Thermal power plants.

Thirdly, coal gasification in Viet Nam has now been applied commonly in some industries such as the production of brick, cement, and especially in thermal power plants using fluidized bed technology. However, coal is transported to factories to be treated by an inappropriate technology and has been badly affected. It requires a focus coal gasification production station (replacement for natural gas produced from petroleum). Thanks to that, the users are not only in industrial plants but also consumers in the general market.

4. 4. Some proposals on application of the products made from coal in Viet Nam

Mineral resources in general and coal resources in particular are not renewable. Therefore, research and diversification of coal products are required in order to contribute to the effective and sustainable exploitation and utilization of coal in Viet Nam. To get the appropriate product in the conditions of our country, some recommendations are essential today. They include:

- Deploy a comprehensive research about products used in some countries to have a preliminary assessment of the efficacy of some coal products that potentially replace current ones. This research is intended to provide

the basis for macroeconomic management and to adjust and re-plan production strategies in related manufacturing industries.

- Choose products that are feasible, practical, and in great demand to have focus in application investment and technology transfer to get new products soon. It is necessary to diversify current coal products and focus on the technologies which solve the urgent issues such as artisanal coal mining process, using clean energy technologies (DCFC) and so on.
- Have strong decisions and specific policies implemented by a leading agency to research and study several manufacturing technology of coal products to provide scientific and practical basis for effectively and sustainably mining and use of coal resources.

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Analysing and evaluating factors affecting the development of Viet Nam bio-fuel industry

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Abstract

The energy in general and fuels (used in transportation) in particular have an important role in the socio-economic development of each country. National security and economic development are always associated with energy security. Therefore, energy policy is prioritized in every country and contributing to sustainable economic development strategy. In Viet Nam, the development of the biofuel industry is still in the early stages after formation. The industry is not only receiving support but also facing difficulties and challenges that affect its growth. The article focuses on factors that impact the development of the biofuels industry in Viet Nam. Research, analyse and evaluate factors affecting the development of the biofuels industry in Viet Nam.

Keywords: biofuel, forecast, analyze, evaluate, factors affecting

1. The role of biological energy development for the economy in Viet Nam

The usage of biofuels is the inevitable trend of development of the world. In developed countries like the US, EU, development of biofuels is to diversify fuel sources to reduce dependence on fossil fuels and reduce environmental pollution. In developing countries such as Brazil, India, Indonesia and Malaysia, the development of biofuels and the purpose of developing biofuels is to develop economy. Specifically, creating jobs for farmers, promoting the advantages of natural conditions, abundant human resources to develop the production of raw materials for biofuels.

In Viet Nam, a lack of electricity and fuel price volatility has warned the risk of the occurrence of energy imbalance. Unstable energy industry will affect socio-economic growth and affect the goal of becoming an industrialized country of Viet Nam by 2020. Developing new energy such as biofuels does not only contribute to ensuring energy security but also promote social and economic development, which also reduces environmental pollution. Viet Nam is having big advantages of an agricultural country; therefore, developing biofuels will have natural conditions, and promote more strongly developed agriculture and other related fields.

Additionally, the development of biofuels is also contributing to the national industrialization and modernization of the country, making Viet Nam become a more competitive country.

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2. Analyze and forecast the impact of foreign factors to the development of biological energy industry in Viet Nam

2.1. The impact of economic integration

Like some other modern industries, biofuel industry requires large capital, modern technology and human resources with high qualifications. Therefore, the government has always had a policy of cooperation with foreign countries in order to take advantage of the resources mentioned above. Integration and cooperation policies with foreign countries are favorable factors to help investors to attract capital from outside partners. It also helps to transfer and apply technology in the field of materials development (new farming techniques, for example). In fact, the project of biofuels production in Viet Nam in recent years are using advanced technology. Some projects are involving capital contributed by foreign companies.

The impact of the world economic integration for the biofuel industry in Viet Nam brought many opportunities and challenges:

- Opportunities for the biofuel industry in Viet Nam

The cost of machinery, equipment, spare parts, raw materials is getting lower, especially when imported from ASEAN countries as well as countries joined the WTO. Cheaper input costs will reduce product cost, improve product competitiveness of biofuels in the domestic market as well as global market.

Better investment environment is attracting greater investment.

- The challenges for the biofuel industry in Viet Nam:

With the trend of globalization, the protectionist policies of the state, especially policies to ensure industry is protected by tariff barriers and quotas will be gradually abandoned, the market competition will be fierce than before. Biofuel industry at risk of competing sources of very high-price raw material input.

In addition, biofuel products are subject to competition from products imported from those countries have biofuel industry development in the region and the world (China, Thailand, the Philippines, and Brazil, etc.).

Thus, biofuel products and raw materials for biofuel production in Viet Nam will be subject to fierce competition with ASEAN countries as well as the member countries of the WTO.

Another reason that the biofuel products are less competitive and can completely replace traditional fuels is due to the oil price. Declining oil prices makes biodiesel uncompetitive when compared with mineral fuels. For example: E5 base price is determined by 95% the price of gasoline 92 RON (calculated on tariffs and exchange rates), plus 5% of fuel ethanol and other taxes such as excise tax, value added tax, the cost norms, petroleum stabilization fund, environmental protection tax, norm profit, business cost norms. The problem worth mentioning is that the ethanol price is significantly higher than imported gas prices. According to some oil trading hub, the price of ethanol is about 13,000 VND per liter, while the price of imported petroleum products on average just over 10,000 VND per liter. So although only 5% of the price of ethanol, which is included in the price of gasoline E5, also causes a considerable disparity in prices.

Opportunities and challenges in the period of economic integration in Viet Nam is huge. If businesses can grab opportunities and overcome challenges, the biofuel industry in will definitely develop faster and sustainably, providing economic resources, contribute effectively to ensure energy security, environmental protection, making Viet Nam soon become an industrialized and modernized country.

2.2. Developing trends of biofuels in the world

- Developing trend of raw materials

The trend in the world today is the usage of cheap raw materials, and having low impact on food security. Therefore, these materials of 2nd, 3rd generation (2nd raw material is biomass materials through fermentation and drying crushed into biofuels). The raw material is derived from agricultural waste, forest waste, municipal solid waste, by-products from food processing or fast-growing grasses such as straw, bagasse, rice husks, grass, cassava, etc. the 3rd generation materials are from microalgae in water, in soil moisture) are concerned by countries to research processing technology and gradually put into commercial production. Last year, the world recorded a series of research and testing to produce oil presses into feedstock for biodiesel production. Research trend focuses on various plant materials, particularly marine plants (algae, for instance). However, the source of this material is still a promising direction in the near future.

- The developing trend of production technology

The technology using traditional materials has increasingly been improved to optimize the production process, such as automation, metabolic efficiency, utilization of by-products and energy usage optimization.

To increase production efficiency, and maintain environmental safety, countries focus on researching, using chemical waste products and applying new fermentation technology. It also uses biotechnology and prepares enzyme in combination with nutrients to improve the efficiency of fermentation, improve alcohol degree, thereby improving production efficiency of biofuels, etc.

There are many different research projects on technology of biodiesel production. It has many applications to improve manufacturing processes and improve catalytic systems in order to increase the efficiency of processing biodiesel, reducing by-products (glycerine, fatty acids, etc.), or in order to recycle by-products into useful products such as fertilizer, etc. utilizing CO₂ emissions.

- Trends in engine development using biofuel

There are test results on the engines using gasohol at different volume, showing that using E10 gasoline does not affect the engine details. However, at the higher volume, there should be more studies to ensure that the engine will run at normal combustion mode.

There are also study offering appropriate improvements to engines and these improvements are being actively implemented by biofuels manufacturers in the past few years. Countries in the world also issue supporting policies for the engine manufacturer in accordance with the rate of phase: E100, B100 of the various original mineral petrol and diesel.

2.3. The impact of the policy on biofuels from countries around the world and in the regions

- Europe

EU economy is developing and having a huge impact on the global economy. In the context of integration and globalization today, the policies of the EU biofuels will impact (directly or indirectly) on the development policy of biofuels in many other countries, including Viet Nam. The countries in the EU participating in the treaty related to biofuels and environmental emissions to have adjust strategies and policies to develop its energy according to the conditions in the treaty. For example, treaty conditions relating to energy usage and climate change are being implemented by the EU. These have been adopted by the EU Council in June 2009 with objectives: Reducing greenhouse gases by 20% compared to 1990; by 2020, renewable energy will be accounted for 20% share of total energy use, of which a minimum of 10% renewable energy use for transportation. To meet the goal of replacing 10% of biofuel for transport, the use of biofuels can help reduce at least 35% of the emissions causing the greenhouse effect compared to fossil fuels, by 2017, it will be a 50% reduction.

For Viet Nam, in the early stage development of biofuels, the development policy of biofuels in European countries do not have much impact, but the experience and lessons are valuable for Viet Nam.

- China

Policy development of biofuels in China has flexible adjustments in each period. The first phase has mechanisms to encourage the development regarding priorities as a prerequisite for businesses with a foothold in the market. China is putting effort to stabilize production of bio-fuels, it issued policies such as consumption tax exemption for biodiesel produced from waste and cooking oil. China only imported alcohol fuel tax of 5% compared with 30% conventional alcohol. Ethanol import duty from ASEAN, Chile and Pakistan is 0%.

Developing policies towards biofuels in accordance with mandatory provisions is justified by the particular nature of the industry. It not only brings significant economic benefits but also offer significant social-environmental protection. Specially, China required 6 cities and 27 municipalities to use E10 biofuel.

Policies for developing biofuels China is mainly to meet the needs of domestic consumption on the basis of searching different sources of raw materials, including raw materials imported from neighboring countries including Viet Nam. This policy has an impact on the competitiveness of cassava materials that Viet Nam has impacted and required certain adjustment measures.

On the other hand, China's policies will be lessons for Viet Nam in devising its own appropriate policies.

- Thailand

Thailand is striving to reach the goal by 2021, that renewable energy will be accounted for 25%. Specifically: for ethanol, the expected increase in consumption of 9 thousand liters/day in 2021. Government subsidies using E20 with 3 baht per liter and support the vehicle manufacturers are capable of using E20 and E85. Besides, the Thai government supports research to increase the demand for ethanol, especially for motorbikes. With biodiesel: Thailand has a target of about 5.97 trillion B100 consumption liters per day in 2021.

Thailand's policy on the development of biofuels is to maximize the natural advantages. Therefore, multi-material processing instruction is recommended to be used by the company business. Therefore, companies can export biofuels depending on the circumstances. This policy may have an impact on the competitive market for biofuels in Viet Nam.

- Indonesia

The government has issued a number of regulations required to develop the biofuels market in the country, such as:

The retail business selling biofuels starting in May 2012. The issue of sanctions for non-compliance cases stipulated as censure; operating license suspended for 3 months and the worst is the business license withdrawn.

The mining company must use 2% of biofuels in total fuel demand for its use.

The priority is put in the domestic market, and the development policy of the Indonesian Biofuel has not much impact on Viet Nam. The policy encourages the development priorities as well as the sanctions mandatory

regulations to develop the market for biofuels will be lessons for Viet Nam to have policies in line with their actual conditions.

3. The domestic factors affecting the development of the biofuels industry in Viet Nam

3.1. Development orientation and the goals of biological energy industry

In decision 177/2007/GD-TTg, the Prime Minister approved the project "development of biofuels to 2015 and vision to 2025", according to which, clearly defined policy objectives and advantages incentives to develop sustainable production fields and use of biofuels are created. In addition, a number of preferential policies on taxes and regulations on technical standards of biofuel products were issued, creating favorable conditions for production and business development. However, the policy system is not fully developed and synchronized with the stages of development and specific provisions is just enough to create a legal framework for the production, business product consumption of biofuels.

By 2010, construction and development of production areas will be in trial mode; the production will produce biofuels of 100 thousand tons and 50 thousand tons of E5; B5 is 0.4% guaranteed to meet gasoline demand in one year of the country.

By 2015, construction and development of production facilities and use a biological energy on a national scale. By 2015, production of ethanol and vegetable oil will reach 250 thousand tons to meet the 1% petroleum demand in the country.

By 2025, production of ethanol and vegetable oil will reach 1.8 million tons, to meet the needs of about 5% of the country's gasoline.

The government issued 177 projects with policies and incentives to develop biofuels industry shows that there are many interests of the state on this field. This is a favorable factor for the biofuel industry to develop at stable and sustainable rate.

Up to now, after more than 5 years of development of biofuels, and implementation of Decision 177 of the Prime Minister, the country has 6 manufacturing standards for mixing ethanol biofuel (E5). However, the operation of this plant is very difficult, and is mostly in a state of moderate activity or has stopped working. The main reason for this is due to several reasons:

Demand for biofuel consumption market is very low, the development of the distribution network is slow and does not meet the pace of development of biological projects. It forces the plant to balance production to both serve the domestic market and expected export plan

The ethanol production plant in Viet Nam is investing quite modern technology but is not optimized. The ethanol plant in Quang Ngai is running with investment in APTI US technology, help split water to produce dry alcohol. The performance of the plant is dried cassava 2,28kg to 1 liter of anhydrous ethanol, but in China that ratio falls between 1.95 -2.05 kg input. This is one of the reasons the plant is having problems in exporting biofuels abroad especially to China market because if the plant export biofuels with low prices, it cannot offset production costs.

Another reason is that the production cost of ethanol production plants at high production rate does not bring economic efficiency. In addition, the material areas of Viet Nam are too far from biofuels manufacturers. Besides, the scale of material areas is not large enough. It leads to fragmented production at the household volume, the weather is not favorable for tumble drying materials. All of these have caused difficulties in the procurement, transportation of raw materials factory.

4. Guidelines and mechanisms, development of biological energy policy

Biofuel industry is in the early stages with a lot of difficulties and challenges. In this stage, there are needs for government to issue support policies to encourage the state to pave the way for the development. In recent years, Viet Nam government has a special focus on the development of ethanol sector in particular and bio-fuel sector in general. A series of policies, decrees, regulations is issued by the government to create a legal framework and favorable conditions to promote the development of the field of manufacturing and trading of biofuels.

So far, the government of Viet Nam has issued a series of important legal documents as basis for implementation in the field of biofuels, such as:

- Decision No 177/2007/QĐ-TTg dated 20 November, 2007 on approving the "Project for Biofuel Development and Vision to 2025".
- National Standard ISO 7716: 2007 regulation on denatured alcohol used for fuel blending into petrol used as motor fuel for ignition. National standard TCVN 8063: 2009: technical requirements phase of unleaded petrol 5% ethanol.

- National Technical Regulation on petrol and diesel fuels and biofuels QCVN 1: 2009 / BKHCN: Regulations on Technical indicators related to safety, health, environmental and requirements for quality management of all types of gasoline, diesel fuels and biofuels.
- Decision 53/2012 / QD-TTg of November 22, 2012 by the Prime Minister on the issuance of the roadmap applied rate of biofuels blended with conventional fuels;
- Circular No. 47/2012 / TT-BCT of the National Technical Regulation on equipment, accessories and vehicles used in the preparation, storage and transportation of ethanol, bio-gasoline (E5, E10) in petroleum storage.
- Circular No 48/2012 / TT-BCT of the National Technical Regulation on equipment and accessories used in the storage and distribution of bio-gasoline (E5, E10) at petrol stations
- Regarding regional development policy on raw materials, under decisions No. 124 / QD-TTg dated January 02, 2012 by the Prime Minister, which is approving the master plan on development of agricultural production by 2020 and vision to 2030, areas will be planted 450 thousand hectares of cassava and stable output of about 11 million tonnes. In addition, developing projects to plant *Jatropha* as a raw material for biodiesel production.

Other policies, such as tax incentives in Decree No 108/2006 / ND-CP of the Government in 2006 provide details and guidelines on the implementation of the Investment Law. The new energy projects (biofuels, renewable energy) will be on the list of special investment incentives. Thus, the biofuel project will be entitled to the following tax incentives:

- Offer reduced corporate income tax and reduced import tax;
- Tax incentives on land use, land use fees, land rent and water surface rent.

5. Overall Assessment

Biofuels industry in Viet Nam is in the early stages of formation and development; there are positive elements but also many difficulties and challenges.

In the trend of integration and globalization today, as well as many other industries, the biofuel industry has advantages: the ability to attract capital from foreign investors and to gain transferred technology and transferred experience from other countries. However, the trend of globalization also brings many challenges: binding international obligations and commitments to adhere to the product quality and the environment protection law and to compete with other manufacturers in the market.

Most countries have implemented a biofuel production planning to meet domestic demand, countries such as Brazil, the US, Thailand are having great potential for biofuels should be able to have an impact on the competitive market of several countries, including Viet Nam.

The target countries are based on the circumstances and conditions in order to set its own policies for biofuels development in a flexible way according to the different stages. Domestic policies focus on the initial support for all phases: production, distribution and try to encourage market development.

Overall policies regarding biofuel development of these countries do not have much impact on biofuels sector of Viet Nam. However, raw material policies of neighboring countries could create competition in the collection of domestic materials in Viet Nam. The policies of some countries with similar conditions will be lessons for Viet Nam to set appropriate policies of its own.

Besides the guidelines and policies on the development of biofuels is consistent and in line with the general trend of the world. This will be a favorable factor for investors to boost production and sales when consumption of clean energy sources is greater.

However, policies on biofuel development has not been fully developed and comprehensive. Policy and legal provisions is being issued slower than the development of production and businesses.

The government should issue more policies, mechanisms and specific regulations such as development planning for biofuel production. There should be more legal provisions for biofuel trading environment, more mechanisms of tax incentives and mechanisms to support manufacturer. There are demands for government to issue regulations on technical standards for biofuel producers.

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