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Original Article

Impact of Industrial Development on the Lives of People in the Ethnic Minority and Mountainous Areas in the North of Vietnam

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Abstract *- Industrial development brings many benefits to economic development, improves cultural and social life. However, it also causes many other negative impacts on the environment and cultural life of the people. Ethnic minority and mountainous regions in the North of Vietnam have great potential for industrial development. However, the massive development of industries has caused serious impacts on the natural environment and life of people in these areas. This article aims to analyze the impacts of industrial development on the lives of people in ethnic minority and mountainous areas in the north of Vietnam, basing on summarizing previous researches and empirical research through interviews with people in these areas.*

Keywords *- Ethnic minority and Mountainous areas, impact, Industrial development; Life condition.*

I. INTRODUCTION

Although ethnic minorities and mountainous areas, especially in developing countries, have quite a lot of mineral resources, forest resources; these areas also have to face other problems that certainly contribute to making difficulties in developing economies in general and industry in special, such as harsh climates, difficult and inaccessible terrain, combined with political and social marginality. Meanwhile, with a lot of potential natural resources to develop industries such as minerals, industrial crops, hydropower, wood... the massive development of industries has caused serious impacts on the natural environment and life of people in mountainous areas (most of which are ethnic minority groups in countries). This situation is happening in many developing countries that have large ethnic minorities and mountainous areas.

Ethnic minority and mountainous region in the North of Vietnam include 14 provinces of the Northern Midlands and Mountains: Ha Giang, Cao Bang, Lao Cai, Bac Kan, Lang Son, Tuyen Quang, Yen Bai, Thai Nguyen, Phu Tho, Bac Giang, Lai Chau, Dien Bien, Son La, Hoa Binh.

Although it is an area with great potential for industrial development, such as having the richest mineral reserves in the country and having a high rate of forest cover, sloping terrain, and large water reserves suitable for hydropower development, in fact, in the past time, industrial development in this area still has many limitations: economic restructuring of industry and services is still slow; the investment environment in some localities is not favorable to attract domestic and foreign investment; the economy's small size leads to lower per capita income than the national average.

This article aims to analyze the impacts of industrial development on the lives of people in ethnic minority and mountainous areas in the north of Vietnam, basing on summarizing previous researches and empirical research through interviews with people in these areas.

II. LITERATURE REVIEW

A. Industrial development in ethnic minority and mountainous areas

There are many opportunities for sustainable mountain development, especially the abundance of natural resources that can be harnessed in a sustainable manner for the overall industrial development of the mountainous region: (i)Mountains are also rich in minerals as well as metals, including gold, copper, iron, silver, and zinc. Owing to increasing demand, mines are now being opened even in remote mountain areas, particularly in the developing countries; (ii) A large variety of forest produce, medicinal plants, natural dyers, and natural fiber plants are plentiful; these resources could be harnessed advantageously to produce useful, and high-value items; (iii) Water resources in the form of hydroelectricity generation and water supply for drinking and irrigation purposes will surely lead to the sustainable development of the region; (iv) High biodiversity makes these areas immense opportunities for developing Agro and Food Processing Industries; (Rio 2012; Vishwambhar Prasad Sati, 2014).

However, industrialization and large-scale production system are severely limited in hilly and mountainous areas because of a number of factors—such as the availability

situation of limited environmentally sensitive resource bases and the spread of usable resources across different and inaccessible areas of markets/modern inputs/technology, deficient infrastructure and high transport costs are also leading to non-competitiveness of products (Mehta 1996).

Therefore, many studies on industrial development in the mountains of countries have shown that: up to now, industry in most of the mountainous areas of the countries, especially developing countries, has focused on 3 industry groups: Mining, processing agroforestry products, electricity (thermal power from coal and hydropower from rivers with high water flow and slope).

The extensive exploitation of resources, the large number of traditional industries, and the backward production methods lead to the waste of land resources and serious environmental pollution, and a sharp decline in the service functions of mountain ecosystems.

On the Rio+ 20 report, when analyzed the situation of the green economy in mountainous areas, the report also recommends solutions for three main green sub-industries in (i) Government brings stakeholders together with encourage policies and strict management mechanisms with green and sustainable orientations and helps the mining companies fulfill their sustainability objectives in an efficient, effective, and equitable manner; (ii) Community-based forestry and selective logging practices introduced by large companies have demonstrated benefits both to conservation and economic development; (iii) Allow for hydropower scalability based on multiple partnerships, including the private sector.

B. Impact of industrial development on the lives of people in the ethnic minority and mountainous areas

Mountains are home to about 13 percent of the world's population. Many mountain inhabitants belong to ethnic minorities, 90 percent live in developing countries, and an estimated one-third live in urban areas. Livelihoods in the mountains, especially in rural areas, strongly depend on the use of scarce natural resources. Mountain people face limited options, alternatives, and access to services; they also have to contend with the outmigration of the young generation and an increased risk of natural hazards (Wymann von Dach et al., 2016).

Industrial development changes mountain people's life greatly, bring not only large benefits but also causes many problems to the environment and socio-culture.

Impacts on environment

Extractive industries such as mining and timber and massive hydropower projects often damage ecosystems and drain resources from mountains while providing few benefits to upland dwellers. Without the stewardship of natural resources provided by these mountain communities, both they and the billions of downstream users who depend on mountain resources cannot achieve sustainability. Clear-cutting of timber led to landslides, loss of soil, erosion, and flooding in areas as disparate as Indonesia and Alaska. Large-scale mines were – and many remain – infamous for the devastation they have caused to local communities, ecosystems, and cultures. Even so-called "artisanal" mining caused disease and permanent damage to water sources from unregulated storage and use of heavy metals such as cyanide, arsenic, and mercury (Rio, 2012).

Vishwambhar Prasad Sati (2014) studied sustainable livelihoods and ecosystems in mountain regions in the Himalaya mountain system, pointed out the impacts of some traditional industries in mountainous areas on the lives of mountainous people. Commercial agriculture, logging, mining, and tourism enterprises put additional dangerous pressure on fragile ecosystems in mountainous areas; dams and roads can be hazardous if they are not properly constructed and managed. The author also showed that mining could be devastating to fragile mountain ecosystems and local cultures, destroying the livelihood base of mountain communities: Massive quantities of waste, surface dumps and slag heaps; atmospheric pollution and the loss of biodiversity and vegetative cover, which in turn destabilize mountain slopes; Water contamination lead to short of fresh drinking/irrigation water and diseases.

Nodar Elizbarashvili et al. (2018), when research on sustainable development in mountainous regions, especially shown they are analyzing the effects of economic development in general on the environment and people's lives in mountainous areas, in which, the authors pointed out: The impacts of the industry on the natural environment and life of indigenous peoples are extremely strong. These objects exert such impacts as gaseous airs and solid and liquid waste, environmental problems, the impact, influences on the economic efficiency and social stability. Authors also indicated that The open-pit mining of various ore deposits (ferrous and non-ferrous metals, manganese, etc.) totally devastated the natural environment: depletion and waste of mineral resources; the ore waste freely dissipates in the environment and pollutes surface waters and atmosphere, the devastation and degradation of the forests and then followed by the activation of geodynamic processes (mudflow currents, landslides, snow avalanches, erosion, etc.), reduction of the water resources, increase in the amount of dust and sooth in the atmospheric air, etc. And construction of reservoirs for the development of hydropower in mountainous areas contributed to increasing seismic pressure, flooding the riverside terraces, forests, and meadows, which are of a particular significance for the mountain dwellers, changes in the microclimate, underground water level, generic structure of the wildlife and their migration routes, etc.

Ding Y. and Peng J. (2018), when analyzes the impact of human activities on mountain resources and the environment from the three aspects of urbanization, land use, and ecological carrying capacity, also shows that, .with the industrial development and the continuous expansion of urban in mountainous areas, the resources and environment

per capita will grow, resulting in the increasingly prominent scarcity of land resources. The spatial expansion of built-up land will have a profound impact on the evolution of the ecological environment and living conditions of indigenous people, especially indigenous ethnic minorities in these mountainous areas. On the other hand, the resource-based economy has a high dependence on the mining and processing industry, and the area of fossil energy land increases accordingly.

The exploitation of forest areas in mountainous areas for industrial development without planning has resulted in serious deterioration of the quality of rich forests: deforestation for construction of hydroelectric power planning zones, illegal logging in the old forest, over-exploitation, and illegal exploitation of forest resources for the dramatic increase in the demand for wood and forest products (Peter et al., Rio 2012).

Impacts on socio-culture

Developing industry provides jobs and access ability to education (market-oriented vocational training – preconditions for gainful employment) is essential to fostering sustainable social development. Nonetheless, in many other cases, developing industry has shown disastrous effects on mountain communities and livelihoods, especially in preserving cultural identity and ancestral lands.

Vishwambhar Prasad Sati (2014) showed that the construction of infrastructure and resettlements in unsuitable areas turn into disasters causing damage, destruction of the environment. The most obvious consequence is erosion, and floods lead to the injury and death of many mountainous people every year. Population growth, the expansion of commercial agriculture, industrial areas and settlements, and increasing urbanization have reduced the availability of arable land, which makes a lot of changes in lives.

Nodar Elizbarashvili et al. (2018) also shown that the migration of the people of the mountainous regions because of developing industrial zone and clusters, irrational and rapacious use of the natural resources also caused degradation of cultural and ethnic values, different kinds of conflicts, and level of poverty of the mountain dwellers will intensify further.

C. Solutions for sustainable industrial development in the ethnic minority and mountainous areas

Co-operation between organizations to promote sustainable development in ethnic minority and mountain regions: Because of the importance of mountainous areas to the global economy, from local levels to global levels, many stakeholders are involved in sustainable mountain development: Government, international treaties, networks of non-governmental organizations, municipalities, and researchers, farmer cooperatives, resource user groups, and tourism operators.

Kohler T. et al. (Rio, 2012) named many institutions from the global level, regional level, national level, and local level and their roles in developing mountainous areas. Reports also presented that, since the early 1990s, global and transnational initiatives have greatly influenced state action in managing mountainous areas. Accordingly, institutional frameworks for sustainable development strategies in the mountains and beyond are increasingly organized in complex and multilevel arrangements. However, States still are the most important institutions creating and enforcing rules and regulations for the use and the management of mountain regions. While few states have specific legal instruments or administrative units for mountains, their wide-ranging sectoral policies have tremendous impacts in mountain regions. Trade liberalization, privatization, agriculture and forest policies, energy development, cultural minority policies, tourism development, and many other specific policies have various consequences in mountain areas and for the people who live there.

Developing multi-industry industries, connecting traditional manufacturing industries with modern technology based on efficient use of resources and investment in improving infrastructure. Zhang, Y. et al. (2011), basing on the long term researches on valley economy in Beijing's mountainous areas, have shown that one of the core targets of the valley economic developmental model is to establish an industrial valley belt which has a fairly large extent with diversified contents, various forms, multi-industrial types, and distinct characteristics; The key issues to develop valley industries are: i) Rationalize the structure of industries according to the superior resource conditions of different sections, to realize the complementarity of the advantages in various sections of the whole valley; ii) develop by integrating the resources, such as the construction to improve conditions of water, electricity, and roads. Such actions can be helpful to the development of the regional characterized products and the improvement of the comprehensive competition capability of the valley economy.

The promotion of mountain products has been successful in many countries, especially when retailers and supermarkets are engaged. For example, COOP, one of the large retailers in Switzerland, has launched a product line called Pro Montagna ("for the mountains"). The line, initiated in 2007 and then in 2012, includes more than 120 mountain products, mostly in its food segment. Mountain regions benefit in three ways from the sale: i) The raw material must originate from the mountains, which brings income to mountain producers; ii) Processing and production must take place in the mountains so as to retain value-added in the mountains; iii) A small share of the sales price declared on the package flows back to mountain regions in support of concrete local development projects.

III. METHODOLOGY

A. Data and collecting methods

Desk research referring to secondary data is used to synthesize, analyze, compare and evaluate contents and

experiences of developing industry in ethnic minority and mountainous areas. The data is collected from 1. Reports of the national and international organization, government on related problems in developing industry in ethnic minority and mountainous areas; 2. Results of project-related problems in developing industry in ethnic minority and mountainous areas; 3. Previous theoretical and empirical researches, articles in developing industry in ethnic minority and mountainous areas.

Primary data is collected by survey with people in ethnic minority and mountainous areas in the north of Vietnam in 3 three provinces: Thainguyen (TN), BacKan (BK), Hoa Binh (HB).

Sample respondents: People who live around industrial zones and clusters in 3 three provinces: Thainguyen, BacKan, and Hoa Binh.

Sample size: 290 respondents are chosen through the introduction of each local government. The people in the survey group are divided into 3 groups (Ethnic Minority Workers, Non-Ethnic Minority Workers; and Ethnic Minority do other works); The proportion of ethnic minorities in response is selected based on the percentage of local ethnic minorities

B. Sample characteristics

Table 1. Sample characteristics

Legal status		TN	BK	HB
Total	Person	290	290	290
% ethnic minorities	*%*	48%	65%	74%
Number of members in the family	Person	4.09	3.98	3,81
The average income of surveyed households	*1000 VND*	3.350	2.750	2.900
The average income of surveyed ethnic minority households	*1000 VND*	3.050	2.350	2.750
The average income in the province	*1000 VND*	5.650	2.300	3.350

Source: Research Result

`The income per capita in ethnic minority households tends to be lower than the average income of other households in the survey group in all surveyed provinces; the average difference is about 200,000 VND to 500,000 VND. This level of income also tends to be lower than the per capita income of the provinces, indicating the difficulty in the life of people in ethnic minority and mountainous areas compared to other areas.

IV. RESULTS AND DISCUSSIONS

A. Industrial development in Ethnic minority and mountainous region in the North of Vietnam

Although the Vietnamese government has many policies to support economic development in general and industry in particular in ethnic minority and mountainous areas, however, as well as mountainous areas in many developing countries, due to the difficulties in infrastructure conditions, the mountainous areas in Vietnam, especially the ethnic minority and mountainous areas in the North, are still the poorest areas in the country.

Most of the provinces in the region have a relatively low or unstable industrial growth index compared to the whole country, except for the provinces: Thai Nguyen, Lao Cai, Bac Giang, and Phu Tho (Table 2), which have good infrastructure conditions, especially better transportation system.

Table 2. Industrial production index by province

	2015	2016	2017	2018	2019
Vietnam	109,8	107,4	111,3	110,1	109,1
Ha Giang	101,2	109,4	121,1	112,8	107,4
Cao Bang	43,3	122,7	138,9	126,3	108,5
Bac Kan	100,8	100,1	100,8	113,8	118
Tuyenquang	99,9	83,8	109,4	108,2	107
Lao Cai	112,1	123,3	117,1	114,4	118,8
Yen Bai	103,7	105,3	106,9	104,3	110,9
Thainguyen	176	123,7	118,3	112,1	111,1
Lang Son	111,6	107,7	105,1	106,5	109,5
Bac Giang	116,8	120,3	129,3	129,7	130,1
Phu Tho	116,6	109,5	108,1	108,3	112
Dien Bien	108,1	109	114,5	110,6	98,4
Lai Chau	100,2	278,2	129,8	107,1	89,8
Son La	102,7	102,2	121,8	103	73,1
Hoa Binh	103,3	104,8	113,8	103,6	86,6

Source: Vietnam General Statistics Office of Viet Nam

The four provinces: Thai Nguyen, Lao Cai, Bac Giang, and Phu Tho, also have more Industrial zone and clusters in the area with more capital for industrial development than other provinces (Table 3).

Investment projects of four provinces are mainly concentrated in the following industries: Processing and assembling electronic components; mechanical engineering; solar energy, garment, agricultural product processing… while other provinces are mainly concentrated in the following industries: mining and mineral processing, forest and agricultural product processing.

Table 3. Industrial zone (IZ)and Industrial cluster (IC) in the area

Province	Established IZ		Active IZ		State planned IC		Established IC	
	No	Area (ha)	No	Area (ha)	No	Area (ha)	No	Area (ha)
Total	**30**	**6591**	**25**	**5591**	**199**	**6.585**	**108**	**3.268**
Ha Giang	1	250	1	250	11	265	1	35
Cao Bang	1	80	0	0	11	95	1	86
Bac Kan	1	80	1	62	5	400	1	100
Tuyen Quang	2	320	1	170	11	342	8	347
Lao Cai	4	1467	3	1285	3	830	4	74
Yen Bai	3	632	2	512	19	1.101	8	351
Thai Nguyen	4	511	4	511	27	561	12	272
Lang Son	1	162	1	162	3	190	2	132
Bac Giang	5	936	5	936	46	390	30	355
Phu Tho	4	1469	3	1019	20	1.218	16	843
Dien Bien	0	0	0	0	9	245	2	45
Lai Chau	0	0	0	0	7	235	2	45
Son La	1	150	1	150	8	145	4	75
Hoa Binh	3	534	3	534	19	568	17	508

Source: Research result

B. Impact of industrial development on the lives of people

The impact of industrial development on the lives of people in ethnic minority and mountainous areas is assessed through the assessment of people in industrial zone and clusters. People were asked about the impact of 8 aspects of life: Land and housing; Other valuable property; Work and income; Medical Education; Electricity, water, network; Traffic; and Environment according to the 7-point Likert scale (From 1: completely negative influence to 7: completely positive influence).

Results from Table 4 shows that the majority of people in ethnic minority areas are only satisfied with their living conditions at an average level and quite satisfied (rating scores from 3.57 to 4.43 are common). This reflects that the ethnic minority people are not really satisfied with their living conditions and the environment because their lives are still inadequate and unresolved. Satisfaction levels about working and income conditions, medical conditions, electricity and water, and networks tend to be higher than other conditions. This may be the result of the local government's policy of investing in infrastructure and taking care of the lives of ethnic minorities and ethnic minority people in recent times.

However, the environment is still the factor rated the lowest level of satisfaction, showing that the industrial development process in ethnic minority and mountainous areas has negatively affected people's lives. Since the income level has improved compared to before but is still lower than the general level of the province in most of the survey sites, the accumulation of valuable assets is still small, causing people to rate this criterion at quite low.

People in Backan province have a higher level of satisfaction with their land and housing than people in the other provinces because the province's industrial development is still quite limited and has not had much impact on people's land and houses. Due to the less-developed industry, the impact on employment and income, education, and transport in the province are also less active than in other provinces. People in Backan province rated the impact of industry on the environment as quite negative (lowest average score of all factors) because the production technology of enterprises in the province is mainly outdated and average industrial technology, creating a lot of emissions and waste greatly affecting the environment.

People in Thainguyen province have a higher level of satisfaction with their living conditions than people in the other provinces, that may be because better infrastructure and better strategies and policies help local government attracts more capital to developing industry, especially using more modern technology system, less impact on the environment. The midland area of Thainguyen province, focusing on developing the electronics industry, also contributes to helping the province have more budget for supporting the mountainous areas of the province to invest in developing light industries, supporting industries of the electronics production. However, ethnic minority people, both workers, and people who do other works, have less income (table 1) and less satisfaction with their lives than other people (table 4).

Table 4. Impact of industrial development on the lives of people

Life condition	Thainguyen				Backan				Hoabinh			
	N-EW	EW	EP	GEN	N-EW	EW	EP	GEN	N-EW	EW	EP	GEN
Land and housing	3,89	3,72	3,78	3,82	4,12	4,29	4,00	4,17	4,12	3,97	4,03	4,05
Other valuable property	4,26	4,19	3,90	4,16	4,42	4,37	3,65	4,24	4,31	4,08	3,95	4,16
Work and income	4,62	4,34	4,10	4,43	4,44	4,19	3,53	4,01	4,38	4,11	3,90	4,14
Medical	4,43	4,51	4,15	4,39	4,12	4,13	4,15	4,13	4,80	4,25	3,88	4,44
Education	4,55	4,64	4,10	4,48	3,86	4,02	4,25	4,02	4,30	4,20	4,43	4,29
Electricity, water, network	4,55	4,62	4,13	4,48	4,32	4,45	4,58	4,43	4,43	4,25	4,73	4,44
Traffic	4,57	4,32	4,33	4,45	3,82	3,98	4,15	3,96	4,35	4,20	4,55	4,35
Environment	4,31	4,15	4,18	4,25	3,74	3,98	3,98	3,89	4,16	3,95	4,00	4,06

Note: N-EW: None Ethic Minority Worker; EW: Ethic Minority Worker; EP: Ethic Minority People; GEN: General
Source: Research result

C. Solutions for sustainable industrial development associated with environmental protection and improving people's quality of life

Mountain-specific disaster risk management and developing a green economy: Mountains areas are particularly vulnerable to the effects of natural disasters, with consequences far beyond other regions. Therefore, when planning the industrial development in these areas, governments have to prepare mountain-specific disaster risk management plans, which integrate risk assessment, prevention, response, and recovery. These plans could contain elements of a green economy such as sustainable forestry.

Co-operation between locals in ethnic minority and mountainous areas: Increasing economic interdependencies between rural and urban areas within mountains, as well as between mountains and lowland cities and metropolitan regions, also provide opportunities for partnership and collaboration.

Promoting mountain products in a supply chain with retailers and supermarkets are engaged.

Key investing in the development of infrastructure, especially the transport system, in order to attract investment to promote industrial development.

Developing multi-industry industries: In parallel with the development of traditional industries using natural resources effectively, gradually transforming the development of light industries using low-skilled labor and actively training human resources towards the development. develop high-tech industries from available resources (high-tech agricultural and forest products processing; pharmaceutical materials,...)

V. CONCLUSION

Mountains areas hold specific challenges and opportunities for global sustainable development relating to green economy and institutions. But mountains areas frequently also lag behind in development for many reasons beyond their control. Balancing conservation and development is thus important; therefore, governments need to analyze the sound local and regional characteristics then plan targeted investment to achieve this aim.

To improve the negative impacts of industrial development on the lives of people in the ethnic minority and mountainous areas in the North of Vietnam, local authorities need to focus on three main groups of solutions: Planning industrial zones and clusters simultaneously with planning residential areas in accordance with state regulations; To ensure that policies on poverty reduction, vocational training, job creation, social security and policies towards people with meritorious services are fully and effectively implemented; Control the production process of industrial enterprises to limit environmental pollution (emissions, waste, noise, ...); Promoting of mountain products in an industrial supply chain.

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