ANALYZING THE AFFECTION OF INDUSTRIAL ZONE DEVELOPMENT TO PEOPLE’S INCOME BY USING DATA ENVELOPMENT ANALYSIS TO EVALUATE THE INDUSTRY REGION DEVELOPMENT EFFECTION: CASE STUDY IN THAI NGUYEN, VIETNAM

Le Thi Yen
Thai Nguyen University of Economics
Business Administration, Viet Nam

Do Trong Nghia
PhD candidate at School of Economic Trade, Human University, Changsha, China

Abstract- This research analyzes the affection of industrial area to income of household by calculating the affection in developing this area (using Total economic effect (TE)). Another hand, this study will evaluate the different about TE to compare the unlike of two household group living round industrial regions. Data used in this research was gotten from 196 househole (included recoverd land households and unrecovered land household by industry development). Base on this result, author propose some contributed idea to improve the affection of developing industrial zones, according that can sanitating the income of these household. Key words: Effection, Data envelopment analysis, Industrial area, income, industrial zone development

1. RATIONABLE
Learning the experience of development countries, Vietnam have built and developed industrial zones to impress the targets of socio-economic of this country. Infact, developing industrial regions created soar variations in localities by different affection channel. To be specific, when the industrial area have been built, areas of household’s land will recovered, these household will get back amount of money, it will be a mean for them to change their livelihoods strategies, thus industrial area development have affected to household livelihoods. If people adapt well to the changes caused by industrial development and use effective compensation from land acquisition, they will have good new livelihood strategies, from which the income of them will change in positive way in the long run. In contrast, if if people do not have a new livelihood strategy effectively, perhaps they will have an increase income over a certain period of time, when spend out all of that compensation, people will face disadvantages due to have no production material, no adaptation to new living conditions. In addition, developing industrial zones will create job opportunities for people who lived around this areas, for example, alot of working that they can reach if they were applied, which have positive affection to livelihoods of people (specific in income of those), but, if cannot adapt with the variations by developing industrial areas, resident will face the risk of jobless (by loss their material to produce), this will
make negative effect to livelihood of them. Thus, this research was performed to analyze the affection of developing industrial zones in people’s livelihoods by using DEA methodology to calculate the effect of that. And, in this research will compare group of losted land household with householde unlost land by constructing industrial zones, from that, author will have a multi-dimensional view to analyze the effect of developing industrial regions to people’s livelihood, proposing the suggestion that should or should not continue to develope industrial zone in research place of author.

2. LITTERATURE REVIEW

The industrial park has received not only the attention of policymakers but also of the researchers with different approaches as well as different orientations with different approaches. A number of studies have been conducted to assess the impact of industrial zones on the country's socio-economic development, such as the study by Damborsky et al (2013), Benacek (1999), Blomstrom et al (1998), Le Xuan Ba (2007). These studies have provided policy suggestions to promote the attracting capital of foreign direct investment in industrial parks in particular as well as in that country in general. In the context of the agricultural land lost increasingly due to urbanization and industrialization in many suburbs of big cities, Vietnamese researchers have been trying to find an answer to lost agricultural land. How does household income affect rural areas? Nguyen, T. McGrath and W. Pamela (2006). Meanwhile, Nguyen Van Suu (2009) found that many households benefited from their proximity to universities and urban centers. Income from renting student accommodation and migrant workers has emerged as the most important source of income for the majority of households. However, some other households face a life of insecurity because they have no room for rent and many landless farmers have become unemployed, especially the elderly and the less well-off farmers. good education. Many researchers including Tran Quang Tuyen (2013), Doan Thi Binh (2011), Nguyen Quoc Nghi (2012), Le Du Phong (2007), etc, have studied the livelihood planning for the land loss people in the process of urbanization and construction of industrial zones. This study has determined the status of households’ incomes after land loss, people’s employment, and analyzed the factors affecting the livelihoods of landless people. The selected factors for analysis share considerable similarities among studies, such as education level, number of employees, gender of household head, agricultural land area, participation in social organizations of members in the household, access to credit sources, etc. The researcher Le Du Phong (2007) has drawn, in his findings, statistical conclusions from all localities in Vietnam about the change of incomes, jobs, the ways people utilize the compensation due to their land loss for the construction of industrial zones, or urbanization. However, those studies have not quantified the relationship between factors affecting people’s incomes. The author Tran Quang Tuyen (2013) in his study has quantified the relationship between factors affecting the incomes of the people. The data were collected from 447 land loss households in the outskirts of Hanoi. Simultaneously, the author divided household incomes into agricultural earnings,
business income, income from paying jobs requiring low qualifications, low skills, income from jobs requiring high skill level, and non-labor income. Factors affecting the income of the people are the area of their land, the number of members in the household, gender of household head, household head's age, the average age of the labor force in the family, the average education level of the family members. With regard to another impact of the loss on the livelihoods of people living around industrial areas, Saumik Paul et. al (2013) in their study considered people’s satisfaction with the infrastructure of industrial parks, and the impact of infrastructure development on the lives of the people in India. The least squares method was used to evaluate the impact of factors on the livelihoods of land loss people. The data collected from interviewing 1017 households uncovered that 462 households were affected by the construction of industrial parks and displaced; 168 families gave up their farmland to make way for resettlement of land loss people; and 387 households were not affected by land loss for industrial construction. The study results showed that people had a good review on the infrastructure system after the construction of industrial parks; they had better access to roads, electricity, and clean water. However, one conflict in the outcome of this study is that better infrastructure made people's incomes lower. This result is contrary to other authors’ findings such as Nguyen Thi Hong Hanh, et al (2013), Nguyen Quoc Nhi (2012). Explaining the results, the authors pointed out that it was the specific area. Before the industrial zone was built and put into operation, people mainly lived on delivering goods by waterway transport. After the construction, people’s income from transporting goods decreased. Besides, the authors used variables of distance, education, work experience, etc. as explanatory variables for income variable (dependent variable) in research model. The approach uses the livelihood vulnerability index to determine the characteristics of a person or group of people and their livelihoods have affected to their ability to cope, recover and recover from the impact of a hazard (Adger et al, 2006; Adger et al., 2001) also used to calculate the adaptability of people by the impact of industrial development on people's livelihoods (Le Thi Yen, Pham Van Hung, 2015). Vulnerability consists of three main components: expressiveness, sensitivity, and capacity to respond to hazards. When study about the vulnerability using a sustainable livelihood analysis framework to establish adaptive capacity indicators under the influence of external factors. These indicators include the expression or impact and sensitivity of households living around industrial zones - affected by industrial zones (Vo Hong Tu et al, 2012; Tu et al, 2015).

3. RESEARCH METHODS
3.1. Sampling methodology
On the basis of the General Statistics Office questionnaires in 2006 (GSO, 2006), the researcher has designed household questionnaires to collect quantitative data for the study. In addition, the researchers adapted Tran Quang Tuyen’s questionnaire (2013) to design a new one for this study. After the questionnaire was built, the authors asked experts from the Ministry of Planning and Investment for advices to examine the
appropriateness of the questionnaire research, then the authors has carried out adjustments and work with people.

- Determining the sample size

In the process of studying socio-economic issues, determining representative samples and large enough is very important. The factors that need to be considered to determine the exact sample size for a study are: accuracy, quality of data, cost and time for data collection etc. To obtain a statistically significant result and to avoid unfortunate errors in sampling, the sample was selected based on the sample size determination formula of Tabachnick and Fidell (1996):

\[ n = 8 \times m + 50 \]

requirement about minimum observation to statistic.

3.2. Method of analyzing data

Using Data Envelopmet Analysis (DEA) methodology to evaluate the Total econo In this formula: \( n \): sample size \( m \): quantity of independent factors Thus, the minimum number of observations for this study was 114 observations.

- Sampling methodology

District/ Town: Author chose three particular districts about industrial development: Phu Binh, Pho Yen, Song Cong, these are both local had industrial zone which are attracting capital and ones are stable operation.

Wards: The wards which place have industrial area and place have no of that were chosen in this research are: Diem Thuy (Phu Binh district); Dong Tien, Ba Hang, Hong Tien (Pho Yen district); Song Cong Town, these are wards where landloss by founding industrial areas and Tan Duc, Xuan Phuong, Thuan Thanh, Trung Thanh, Hop Thanh, where have no industrial region reared. Each wards, author chose 40 household to interview, these household were equal in quantity of landloss househalde and others one who have no lost their land to buiding industrial area. Author used directly survey method to collect information and data about household in income, employment of the households lived in surveyed wards, and data of industrial zone for taking this research. With 400 survey questionaires, author recorded 235 of those. After import data into excel sorftware, author rejected 39 survey questionaires which have not met the requirement about collect full information. Author used remaining questionaires with 79 land unrecovered observations and 117 observation of land recovered), these quantity responded mic efficiency (TE) indicator with input and output factor with minimum input cost and maximum output target.

4. RESEARCH FINDINGS

There are six industrial zones which have been being built in Thai Nguyen porovince: Song Cong I, Song Cong II, Diem Thuy, Quyet Thang, Tay Pho Yen, and Nam Pho Yen. The information about each is shown as follows:

Table 1: Common information about industrial zones in Thai Nguyen province

<table>
<thead>
<tr>
<th>Unit: ha</th>
</tr>
</thead>
</table>
Building and developing industrial zones recovered approximately 1420 ha of land of people who live around these areas, this make the impact on the life of them, especially with those lost their land. Inherited from studies of Tran Quang Tuyen (2013), Tran Quang Tuyen et al (2014), Nguyen Quoc Nghi (2012), Saumik Paul et al (2013), etc, this research analyzed the effect of developing industrial zone by using DEA with maximum output in condition that effect change when changing scale (VRS) with input sources: Age of household head, number of labour in household, area recovered by developing industrial zone, nonagricultural investment, living cost, nonagricultural area and four output result are average income of household, the compensation from land lost, the number of job were created by developing industrial zone per household, the quantity of unemployment from developing industrial area. Two indicator used were maximum output and minimum input base on analyzing DEA model for two group, results were followed:

Table 2: Total efficiency follow results of DEA model

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Location</th>
<th>Total Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Song Cong I</td>
<td>Song Cong town (Tan Quang commune)</td>
<td>220</td>
</tr>
<tr>
<td>2</td>
<td>Song Cong II</td>
<td>Song Cong town (Tan Quang commune)</td>
<td>250</td>
</tr>
<tr>
<td>3</td>
<td>Nam Pho Yen</td>
<td>Pho Yen district</td>
<td>200</td>
</tr>
<tr>
<td>4</td>
<td>Tay Pho Yen</td>
<td>Pho Yen district</td>
<td>200</td>
</tr>
<tr>
<td>5</td>
<td>Quyet Thang</td>
<td>Thai Nguyen city</td>
<td>200</td>
</tr>
<tr>
<td>6</td>
<td>Diem Thuy</td>
<td>Phu Binh district</td>
<td>350</td>
</tr>
</tbody>
</table>

Source: The Management Board of Thai Nguyen industrial zones

According to table 2 base on using DEA for two group which one who were recovered land and which one who were not recovered their land from building and developing industrial zone, which, shown that with maximum output target in case of changing scale (VRS) both of two groups were gotten effect in when developing industrial zone in high level. Specifically, the former got average economic effect at 0.89, while that of the latter was 0.93. With the former, the amplitude fluctuations was wide (min = 0.257 and max = 1), this result was proper because of total economic efficiency are high, the potential risk are high respectively. Proof for that are when householde were recovered their land, they will get one compensation, if use it effectively, the income will increase, economic efficiency is high. However, a lot of difficulties will appear after using all of this compensation if using it uneffectively, like: unemployment, low income... thus efficiency was low. This research was use T-test to testing the different about economic efficiency of
two group which were recovered land and were not land lost:

<table>
<thead>
<tr>
<th>Table 3: Group Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Table 4: Independent Samples Test

Levene's Test has Sig.=0.110 > 0.05 this mean that the variance between two group of recovered land and unrecovered land have no different. Using the result of T-test in Equal variances assumed. It shown Sig. =0.014 <0.05, proofing that has different about average total economic efficiency between these two group. The figure of Mean Difference = 0.0456 proofing that the former got economic efficiency higher than the latter by the gap at 0.0456 ( with reliability 95%).

5. CONCLUSION

From the research results, the researchers have proposed some recommendations in order to enhance the positive effects and limit the negative impacts of developing industrial parks on people’s income, as follows:

Generating stable jobs and job transformation into other services for land loss people due to the investment in developing industrial parks is to fulfill the needs of the labor force in the area. The investment in the development of industrial zones has made many people landless. In other words, those people lose their means of production, their jobs on agricultural land. On the other hand, when the construction of those industrial zones is finished, there will be a large number of employees from other areas coming to live and to work in the local area. Thereby, the demand for essential goods and services of daily life will rapidly increase. To create stable jobs and incomes for the local people, it is necessary to take the following specific measures: Improving the quality of human resources and labor discipline for the land loss people due to the construction of industrial zones. The main reason is that the majority of those people do not have education level; their working competence and sense of discipline should normally not meet the requirements of the industrial production. Even though some enterprises may easily recruit those land loss people, the possibility of stable jobs and incomes is another problem. The employees, therefore, have to improve their profession and skills so that they can adjust themselves to the new environment. For workers who cannot transform their jobs after land loss, the local government needs to have specific plans to support the livelihoods of this group. A land area near industrial zones should be scheduled so that people can resettle down and run...
other services such as building guesthouses, opening service shops, grocery stores, garage, etc, catering for the workers in industrial zones. This type of transformation is being implemented quite effectively because it not only creates jobs for local people, but also transforms the livelihood strategies for households. In addition, it provides services that meet the needs of employees work in the industrial zones. There needs to be financial support policies for land loss household so that they can transform their jobs, increase their incomes and settle down in their new life.

**For the households:** The capital contribution of people into factories, and businesses has positive effects on both people themselves and enterprises. These sectors will attract more capital for their business, which helps them expand the scale of production and, in turn, generate more jobs for people.

**For the enterprises:** Encouraging people to make financial contribution via their rights of land use will facilitate businesses in the land clearance process, shorten the construction time period, and quickly put those projects into operation, avoiding deadlock due to the failure in reaching agreement on the land clearance with the people whose land is recovered. Financial contribution will become another capital mobilization channel for business production. This will help enterprises quickly finish their projects and avoid deadlock.

**REFERENCES**


Doan Thi Binh, “Đánh giá việc thực hiện chính sách hỗ trợ chuyển đổi nghề và tạo việc làm khi thu hồi đất nông nghiệp ở huyện Tư Liêm, thành phố Hà Nội”, National University, Hanoi, Vietnam, 2011

DFID, Sustainable livelihood guidance sheets Hall-International, Inc, 1999


Le Du Phong, Thu nhập, đời sống, việc làm của người dân có đất bị thu hồi để xây dựng các khu công nghiệp, khu đô thị kết cấu hạ tầng kinh tế- xã hội các công trình phúc vụ lợi ích quốc gia, NXB Chính trị quốc gia, Hà Nội, 2007

Le Xuan Thai, “Các yếu tố ảnh hưởng thu nhập của nông hộ trong các mô hình sản xuất trên đất lúa tại tỉnh Vinh Long”, Tập chí khoa học- ĐH Cần Thơ số 35, 2014
Le Thi Yen, Pham Van Hung, “The vulnerability of the residents’ livelihood surrounding the industrial park in the North Midland and Mountainous region of Viet Nam”, Proceedings of the international conference on livelihood development and sustainable environmental management in the context of climate change, Agriculture publishing house, 2015

Huynh Thi Dan Xuan et al, “Phân tích các yếu tố ảnh hưởng đến thu nhập của hộ chăn nuôi gia cầm ở Đồng bằng sông cửu long”, tap chí khoa học- Đại học Cần Thơ, 2011


Nguyen Thi Hong Hanh et al, “Ảnh hưởng của việc thu hồi đất nông nghiệp đến đời sống việc làm của nông dân huyện Văn Lâm, tỉnh Hưng Yên”, tap chí khoa học và phát triển số 1 tập 11, 2013