Analysis of Public Interest and Industry Satisfaction In Houses on Stilts of Woloan Tomohon Indonesia

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Abstract: *The aim of this study is to analyze the interest rate and satisfaction of community toward houses on stilts industry of Woloan Tomohon Indonesia. This study used an analysis tool of Importance Performance Analysis (IPA), which measured the satisfaction and importance of the houses on stilts industrial community and people who live surround the Woloan Tomohon. The results is Concentrate Here, it means concentration of attention is needed to improve the quality of such attributes (top priority), i.e. the arrangement condition of the industrial area, the availability of drainage network, water conditions of drainage network, maintenance of drainage systems, waste treatment, industrial wastewater treatment, condition and availability of communications networks, commercial facilities availability, and water resource utilization in industrial area scale. Otherwise, for community surround houses on stilts industry, matter that should be improved are drainage condition, trash placement and management of local industry, waste management, air pollution in industrial areas, pollutants handling on company, company's contribution for social corporate, community's social legitimacy towards exploitation of natural resources in local area, the agreements of local residents' welfare, company's consultation process for local community, responses and follow-up on public comments and complaints, influence of local company's development on public health, the progess of disease vector due to company's construction, project procedure to prevent and overcome work accidents.*
Keywords: *Importance Performance Analysis, Clean production, Houses on Stilts of Woloan Tomohon, Wood waste*

I. Introduction

One of the forest benefits is as timber producer that is used to fullfil the community needs for construction, raw materials (wooding) and as non-oil export commodities which are quite strategic for additional foreign exchange for Indonesia. Utilization of forest products (such as timber) has been granted by the government in the form concessions permission for logging companies HPH, HPHTI, IPK and BUMN to exploit and professionally manage while maintaining the balance of the forest itself (Mulyanto, 2013).

The recent existence and role of forest product industry, especially timber, in Indonesia is to serve substantial challenges related to the imbalance between raw industrial demand and sustainable timber production. Facing current natural forests condition which has declined in quality and area indicates deteriorating condition of the forest and wood raw material scarcity. Fundamental changes are crucial in determining policy on various aspects challenges such as environment, ecolabel, and carbon trading. By promoting the role of more pro-industry technology innovation, especially small industry, improving the proces efficiency and maximizing the utilization of forest products and waste wood biomass that leads to zero waste (Noelaka, 2008).

Forest exploitation increases the volume of wood waste. Timber waste of forest exploitation occurs at the cutting site, along the transport path, at the collection point and in the log pond (dump) and estimated 30% of the total harvested timber (Ward, 2004). Otherwise, waste from the furniture industry such as shavings, wood chops, defective parts and sawdust. Observations on potential waste wood industry are based on a comparison of output, input and reference to the Bogor research Center for Forest Products Research and Development. The comparison demonstrate the potential of plywood industry waste that reached 60% while in the sawmill industry ranges from 50.2% of the processed raw materials. The potential of wood waste and only partial wood (35-49%) have been exploited and utilized. However, the rest is still in the form of wood waste. Without optimal utilization, industrial waste can contribute environmental pollution.

The emergence of sustainable economic concept or sustainable development based on the various impacts that occurs in the environment due to various human activities including industrial development of houses on stilts in Woloan, Tomohon. Industrial development of houses on stilts in Woloan, Tomohon, North Sulawesi still have not been able to optimally utilize industrial waste, it just simply burned or thrown away. It causes the accumulation of

waste forest product due to continuously home industry activities, whereas this could be valuable if they could utilize the waste product well.

Waste wood could be processed into aroma therapy briquettes which do not require high technology during the manufacturing process and the expected marketing for both local and export will gain a lot of revenue. These incomes are economic source and promised job opportunities for present and future. By utilizing the industrial wood waste, environment become safer from careless burning which can harm people health.

Clean production is an environment management model that implemented by industry to reduce industrial waste. This give advantages for industry in reducing production cost, retrenchment, thus made more effective environmental performance (Purwanto, 2005).

UNEP explained the clean production strategy as the way to prevent environment side effects for human and environment it self from continuous process, products, and services (UNEP, 2000). Bishop (2001), Van Berkel (2001), Ma'ruf *et al.* (2006), and Indrasti *et al.* (2009) also explained this strategy as a preventive way which is implemented from up to down stream of industial process in exploring natural resources, prevents environmental pollution and reduces the formation of waste on its source to minimize health risk and environmental damage.

This trategy is not only implemented by industry for efficiency and profitable purposes but also still considering environmental sustainability aspect. Nontheless clean production at the household scale industry such as industry of houses on stilts in Woloan, Tomohon also needs further studied. It is intended to obtain ideal clean production application if this business grown and expanded, so that the negative effects of the presence efforts can be minimized.

The purposes of this study are to analyze level of industry importance and satisfaction of houses on stilts in Woloan, Tomohon. We also aimed to assess the clean production that applied in the houses on stilts construction activities that is expected to be more effective in cost, time and effort as well as friendly to the environment.

Clean Production

Clean production is concept of holistic production process that not only involved production process, but also management of the entire production cycle: procurement of raw material and subsidiary, processes and operations, product and waste, distribution and consumption. It includes the issues that concerning the mindset, attitudes and behavior (government, citizens, and businesses). Application of this concept continuously is an environment preventive act of integrated business strategies to obtain resources, processes, products and services with a high level of efficiency as a goal to increase profits and decrease environment risks (Lowe, 2001; Purwanto, 2004).

Some of the clean production strategies are needed for production process. Production process needed to reduce the use of toxic and hazardous chemicals, water, energy and other recources. Clean production also attempts to decrease the quantity and toxic level for all industrial emission and waste. These elements are also intended to raise the level of benefit, especially for production cost incurred by non clean production technologies. Clean production is focused for reducing the environmental impacts of product life-cycle, from raw materials extraction to the final disposal. The service aspect has to include environmental aspects during the plan and delivery of services. This is including packaging design, transporting and products recycling (Purwanto, 2005; Mamoune *et al.*, 2011).

There are basic essentials that must be held in the concept and implementation of clean production. Clean production is the principles of prevention, reduction and removal of waste form the source. Fundamental change in the attitude of the management is a commitment that must be made by all parties of industry. Pollution prevention should be implemented as early as possible, at every stage of activities ranging from the manufacture of regulations, policies, project implementation, production processes and product design. Moreover, it should be carried out continuously and in line with the progression of science and technology (Salvasen, 1996; Côté *et al.*, 1997; Schlarb, 2001; Lowitt, 2012).

II. Materials and Methods

This study uses analysis of importance and satisfaction level of community toward houses on stilts Woloan, Tomohon industry by using a quantitative approach of IPA (Important Performance Analysis) on the level of community interest and satisfaction. This is conducted by placing a line of intersection quadrant on the average value of the observations at the axis level of satisfaction and handling to the priority axis. It was aimed to find out the specification of each factor that lies in a particular quadrant (Bacon, 2003). Period of this study is four months (May-September 2013), involving 2 assisstance person for respondent's interview.

Study Site

Site of this study selected by criterion-based method, which is based on the selection criteria specified background and certain events to achieve complete information (Kanto, 2003). Site consideration that the place is a wooden houses on stilts craftsman of iron wood which became a favorite investment products for North Sulawesi province goverment (Fig. 1).

Data Collection

Data collected from 61 respondents who live in the study site with questionnaires. Respondents were divided into two categories, community surround the houses on stilts of Woloan Tomohon and wooden house industry in Woloan Tomohon.

Figure 1. Study Site

Importance Performance Analysis

The procedure of Importance Performance Analysis (IPA) are: 1) determine the factors that will be analyzed; 2) survey through questionnaires and interviews, 3) calculate the average value of the interest rate and customer satisfaction, 4) create an IPA graph, 5) evaluation of each quadrants' factors.

Analysis on the level of importance and satisfaction were measured by Likert scale to produce a meaningful response, from strongly disagree to strongly agree-range of values 1 to 5 (Sumarwan, 2002). Likert scale measured all variables as indicator of variables. Then the indicator variable is used as a starting point to construct the indicator instrument of questions or statements. Each answer of the variables using a Likert scale has gradations answer from very positive to very negative, then converted to scores (Table 1).

Table1. Score of Importance and Satisfaction Level

Score	Importance Level	Satisfaction Level
5	Very important	Very Good
4	Important	Good
3	Neutral	Neutral
2	Not important	Not good
1	Very unimportant	Worst

Rationalization of the IPA can be understood easily by conducting a survey to obtain information of importance and performance. This makes it possible to calculate the average assessment of the importance and performance attributes and the *grand mean*. Grand means can realize an alternative system shown as a *crosshair* (Fig. 2). Data of importance and performance should be put on a two dimensional grid with importance on the y-axis and performance on the x-axis. Then the data mapped into four quadrants (Slack, 1991; Barsky, 1995; Athiyaman, 1997; Bourner, 1998; Sampson *et al.*, 1999; Bacon, 2003):

1. First Quadrant (Q1): the average score of importance is 3.00 to 5.00 and the performance is 1.00-2.99. It shows high importance but low in performance. This quadrant is labeled as "*Concentrate Here*" that needs focus on improving the attributes' quality (top priority). This quadrant also indicates that the element or attribute services of importance above average, but less attention and marketing side, where the level of performance below average, led to less satisfactory for the community.

2. Second Quadrant (Q2): the average of importance score is 3.00 to 5.00, similar to the performance, which means both importance and performance is high. It indicates the existing system has to be maintained. This category is labeled as "*Keep up the good work*". Level of importance and performance is considered important in fulfilling good quality standards (continued achievement). The community perceived the element or attribute is above average quality and well-executed, so that the community satisfied on the level of performance.

3. Third quadrant (Q3): In contrast, the category of importance is low (1.00-2.99) and similar to the low interest 1.00-2.99. It labeled as "*Low Priority*". This means that the importance and the performance did not meet the quality standards (low priority). This quadrant shows that these elements were made conventional, less concern marketing and not considered essential for community.

4. Fourth Quadrant (Q4): the average score of importance is 1.00-2.99 and performance of 3.00-5.00. It represents low importance and high performance (excessive quality). The mapping of importance-performance includes the addition of a dent > 45° line, highlighted the different priority areas. It is also known as iso-appraisal or iso-priority line, with performance equal to importance. Attributes below the line should be prioritized, while the attributes above the line suggests otherwise. This quadrant also shows the elements that are not deemed important by community, very well executed by marketing as something that may be very exaggregate.
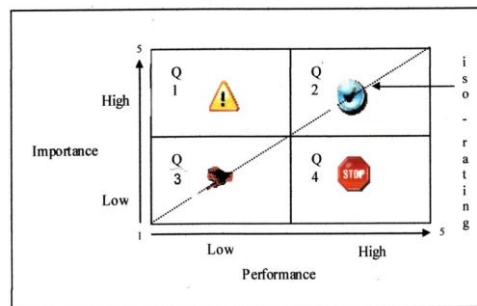
5.

Figure 2. Importance-Performance Matrix

The steps of this Importance Performance Analysis are expalined as follows.
- Weighting /assessment, carried out by making a five-point scale for physical data, adapted to the social scale using a Likert scale with five response categories.
- Calculating level of suitability, which is a comparing step between service's performance score and score of interest. The level of suitability will determine the priority order of importance-performance.
- The calculation of community satisfaction level can be used in determining the priority to improve the performance of the company over the attributes that affect people's satisfaction. Against all the attributes that affect the satisfaction expressed by the following formula:

$$\overline{\overline{x}} = \sum_{i=1}^{n} \overline{x_i}/k \quad \text{and} \quad \overline{\overline{Y}} = \sum_{i=1}^{n} \overline{y_i}/k$$

Description:
k = number of respondences
X = score of Importance
Y = score of hope

- Create Cartesian diagram (as shown in Figure 2), a shape that consists of four sections bounded by two perpendicular lines intersect at the point (average X and Y). Where x is the average score of existing performance level on all variables, while Y is the average scores of importance.

III. Result and Discussion
Importance and Performance of Houses on Stilts Industry
        The Interests of the industry is measured wiyh 31 questions on the IPA of houses on stilts industry (Table 2). Figure 3 shows seven different variables of first quadrant (Q1), 24 variables in second quadrant (Q2), and no variables neither for quadrant 3 nor quadrant 4.

Quadrant 1 (Q1)
        Importance rates score is 3.00-5.00 and performance score is 1.00-2.99, which mean high importance level but low performance level (2), availability of drainage network (9), condition of water drainage (10), maintainance of drainage network (11), waste treatment (20) industrial waste management (21), condition and availability of communicating network (24), availability of commercial facilities (27), and utilization of water resources in industrial scale (30).
        These seven indicators (point 2, 9, 10, 11, 20, 21, 24, 27, and 30) are categorized into hight importance and low performance in Quadrant IV. This quadrant known as "*Concentrate Here*" which means focusing on improving the quality attributes (top priority). Based on IPA matrix on interest and satisfaction of public and industry, the indicators must be synchronizes with the industry consideration (Tsang *et al.*, 2000; Antony *et al.*, 2004; Lau *et al.*, 2005). IPA has been developed as analysis tool to facilitatting setting priorities for improvement and resource placement. Three factor of satisfaction theory of customer show non linear relation between satisfaction and interest involved the interest changing (Salvasen, 1996; Schlarb, 2001; Matzler *et al.*, 2003). Seen from interest rate of industry, average scoring for level of interest from high to low is described below (Fig. 4).

Table 2. Importance Performance Analysis of Houses on Stilts Industry

No	Indicator	Performance	Importance	Quadrant
1	Industrial hygiene condition	3.34	4.69	Q2
2	Spatial condition of industrial system	2.69	4.62	Q1
3	The distance of industrial area to residence	3.95	4.77	Q2
4	The distance between industrial area and down town	3.82	4.75	Q2
5	The pattern of road network (easy access)	4.21	4.74	Q2
6	Pavement condition	4.48	4.74	Q2
7	Road width (dimension)	4.13	4.39	Q2

| 8 | Completeness of the road supporting facilities | 3.16 | 4.43 | Q2 |
9	Availability of drainage network	2.98	4.34	Q1
10	Water conditions of drainage network	2.80	4.49	Q1
11	Maintenance of drainage network	2.49	4.26	Q1
12	Conditions of clean water	3.62	4.30	Q2
13	Availability of clean water network	3.62	4.36	Q2
14	Clean water network	3.66	4.30	Q2
15	The availability of clean water network facilities	3.75	4.20	Q2
16	The availability of clean water facilities	3.67	4.16	Q2
17	Waste placement	3.79	4.80	Q2
18	Waste transport	3.16	4.39	Q2
19	Availability and condition of municipal waste	3.00	4.41	Q2
20	Waste treatment	1.92	4.74	Q1
21	Wastewater treatment in industrial area	2.03	4.23	Q1
22	Electrical network availability	4.39	4.30	Q2
23	Conditions and availability of electricity infrastructure	3.67	4.70	Q2
24	Conditions and availability of communications networks	2.79	4.36	Q1
25	Topography/elevation	3.72	4.72	Q2
26	Labour availability	3.95	4.74	Q2
27	The availability of commercial facilities	2.23	4.23	Q1
28	Suitability of work safety regulations	3.05	4.25	Q2
29	Utilization of industrial scale energy	3.25	4.46	Q2
30	Utilization of water resources at industrial area	2.74	4.39	Q1
31	Integration with society	4.59	4.39	Q2
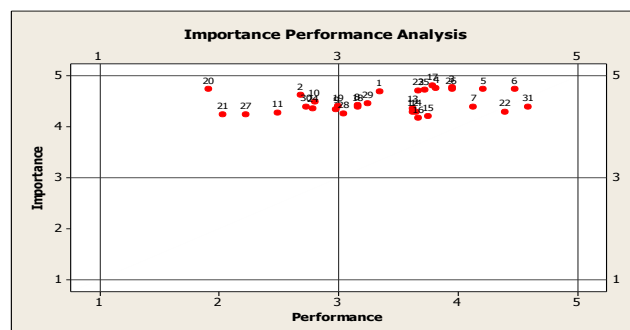
Figure 3. Importance-Performance Matrix of Houses on Stilts Industry
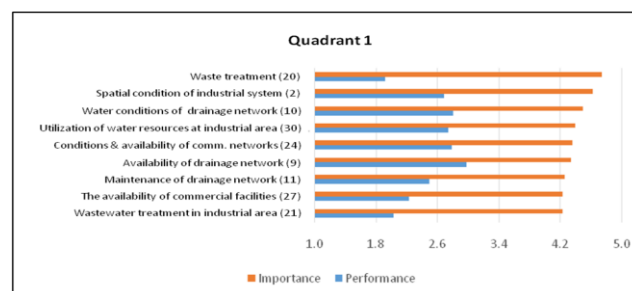

Figure 4. Level of Industrial Interest Rate

Waste management is the compulsory main step for industry. To reach industry satisfaction in waste management, it also need to concern the availability of commercial facility and drainage network, management of drainage network, availability of communication network, water resource utilization at industrial area, water conditions of drainage network and condition of the spatial arrangement in the industrial area.

It is essential to utilize sawdust waste to provide economical value for the industry. It is difficult to reduce the main waste wood industry, such as wood chops and sawdust, unless it made into valuable furniture. Some industrial waste from furnituring process also "costing" and reduce impact to environment (Pari, 2002; Rustini, 2004; Haris, 2005). This result is similar to Pari (2002) that explained mostly industrial waste thrown to the river and cause narrowing and shallowing of rivers and water pollution. Some even directly burned and contribute emissions of carbon gases in the atmosphere.

The amount of waste that generated from a business activity indicates the low efficiency and performance of the business management, which is also closely related to environmental performance. So far, employers have a misperception about the efforts of pollution control because they prefers a reactive approach to managing waste only

after the waste is overcrossed the quality standard that has been set by the government. That's led to the perception that environmental issues are burden and costs. Increasing environmental concerns and the relationship pattern between the industries entered the execution stage of industrial activity. It is not only suppressed to lower production costs, but furthermore encouraged to avoid the waste of natural resources and overlooked the potential utilization of byproducts and raw materials for other industrial activities (Johansson, 1992; Nemerow, 1995; Randall, 2001).

Quadrant 2 (Q2)

The second quadrant (Q2) of IPA included 24 variables (Fig. 5). Either the average of importance score or the performance score is 3.00 to 5.00, which indicates high importance and performance. It is included the industrial hygiene condition (1), the distance between industrial area and residence (3), the distance of industrial area to down town (4), road network pattern (easy access) (5), pavement condition (6), road width (dimension) (7), road supporting facilities (8), conditions of clean water (12), availability of clean water network (13), clean water network (14), the availability of clean water network facilities (15), the condition of clean water facilities (16), waste placement (17), waste transport (18) the availability and condition of municipal waste (19), electrical network availability (22), condition and availability of electrical infrastructure (23), topography/elevation (25), labor availability (26), suitability of work safety regulations (28), utilization industrial scale energy (29), and integration with society (31).

The 24 indicator included in the same category of high importance and performance, which indicates that the existing system is valued high and should be maintained. This category is labeled as "*Keep up the good work*'' by means that interest and performance is considered as crucial to meet the best standards (continued achievement). This quadrant also shows well-executed element or attribute that is perceived by the people as above average. As consequence, when the level of performance is reaching above average, industrial actor will be satisfied.

Integration with the society is felt as the most satisfied variables by businesses actor in the industrial of houses on stilts. On the other hand, business actors perceived trash placement as the highest interest rate factor. Houses on stilts industry is originally done by native people of Woloan Tomohon. Thus the intregation with the society of Woloan Tomohon is highly dynamic.
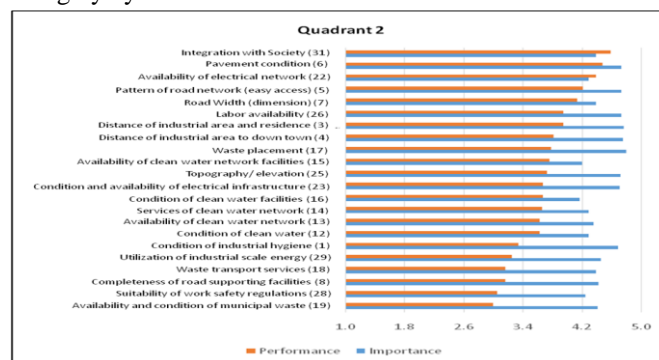

Figure 5. Satisfaction Rate of Industrial Actor

Quadrant 3 and 4 (Q3 and Q4)

Important performance analysis shows none of the indicator located neither in quadrant 3 nor quadrant 4. It means that none of the indicator categorized in low priority (not first priority) and excessive quality (low interest and high performance).

Interest and Satisfaction on Houses on Stilts Industry

Level of satisfaction and industrial interests of the community around the houses on stilts is measured by 24 questions. Table 3 shows the Importance Performance Analysis on community around Industry of houses on stilts, while Figure 6 described the average rate of public interest around houses on stilts industry in the form of quadrant graphic.

Table 3. Importance Performance Analysis on Community Surround Houses on Stilts Industry

No	Indicator	Performance	Importance	Quadrant
1	Pavement in industrial area	4.14	4.74	Q2
2	Completeness of road supporting facilities	3.61	4.46	Q2
3	Convenience of transportation facilities	3.58	4.34	Q2
4	Safety of transport infrastructure	3.45	4.17	Q2
5	Condition of transportation infrastructure facilities	3.47	4.50	Q2
6	Condition of clean water	3.69	4.40	Q2
7	Drainage condition	2.56	4.16	Q1
8	Waste placement of local industry	2.60	4.75	Q1
9	Waste management of local industry	2.41	4.82	Q1
10	Waste management	2.49	4.85	Q1
11	Availability of electricity infrastructure	3.34	4.30	Q2

| 12	Air pollution in industrial area	2.35	3.38	Q1
13	Pollutant handling by company	2.42	4.51	Q1
14	Company's contribution for social corporate	2.82	3.91	Q1
15	Company's influence on the local labor recruitment	3.58	4.18	Q2
16	Social legitimacy on exploitation of local natural resources	2.73	3.93	Q1
17	Related parties agreements on the welfare of local residents	2.89	4.14	Q1
18	Company's consultation process towards local community	2.82	4.00	Q1
19	The company's efforts for development to prevent conflicts between local communities	3.30	4.14	Q2
20	Response and follow-up on public's comments and complaints	2.87	4.10	Q1
21	The company's efforts to make the project not to ruin the social integrity of community	3.15	4.11	Q2
22	Influence d of the company to the local public health	2.87	3.42	Q1
23	Vectors of disease progression due to company's development	2.71	3.38	Q1
24	Project procedure to prevent and overcome accidents	2.82	4.51	Q1
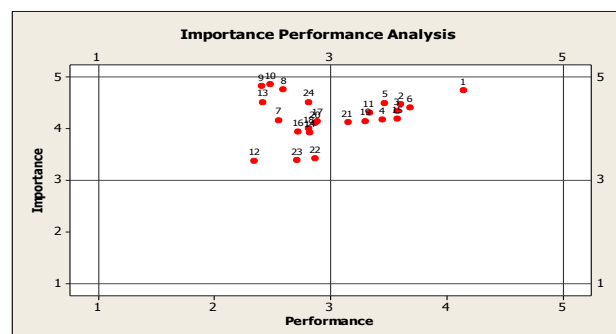
Figure 6. Importance-Performance Matrix of Community around Houses on Stilts Industry

Quadrant 1 (Q1)

We found 14 indicators located on first quadran (Q1), by high importance score (3.00-5.00) and low performance score (1.00-2.99). The indicators in Q1 are drainage condition (7), waste placement of local industry (8), waste management of local industry (9), waste management (10), air pollution in industial area (12), pollutant handling by company (13), company's contribution for social corporate (14), social legitimacy on exploitation of local natural resources (16), related parties agreements on the welfare of local residents (17), company's consultation process towards local community (18), response and follow-up on public's comments and complaints (20), influence of local company to the local public health (22), vectors of disease progression due to company's development (23), project procedure to prevent and overcome accidents (24).

These 14 items categorized as high interest but low performance or ''*Concentrate Here*'', which means it is necessary for focusing on improvement of the quality attributes (top priority). It shows the existing system require immediate corrective actions and should be highly prioritized (Fig. 7).
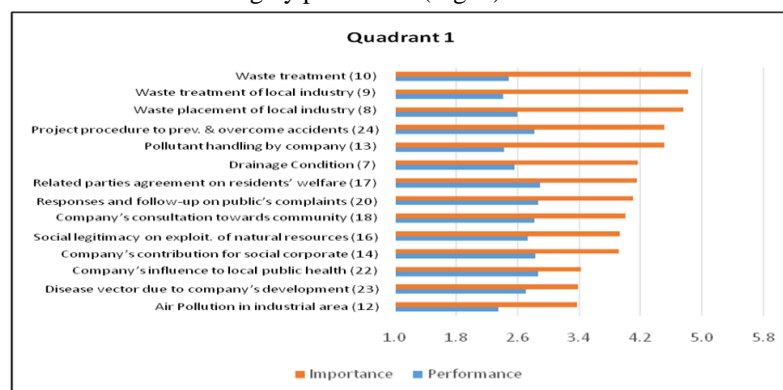

Figure 7. Average Rate of Public Interest around Houses on Stilts Industry

Waste management is the first indicator that must be improved by industries, according to the perception of the local community. It implied that waste management is crucial for local community, and surrounding communities are not satisfied with the existing waste management. Communities around the houses on stilts industry felt inconvenience by the wood waste, because it is usually ignored or burned. Clean production aims to control the aspects of resources, which attempt to reduce the amount of hazardous substances, wasted pollutants or contaminants through sewage or released to the environment (including the volatile emissions) before recycled, treated or disposed. Clean production is an integrative and preventive strategy for environmental management which need sustainable application on production process and product life cycle. Clean production is aimed for reducing both for human and environment. The implementation of clean production is a holistic concept on how the product is designed and consumed wisely without causing damage to environment (Thorpe, 1999; Deutz *et al.*, 2004; Gibbs *et al.*, 2008).

Local industry's waste management also needs to consider waste placement from the local industry, the company's handling on pollutants, the project procedure to prevent and overcome accidents, drainage conditions, the agreements related to the local residents welfare, response and follow-up comments and complaints against society.

Quadrant 2 (Q2)

IPA result shows 10 indicators are categorized in the second quadrant (Q2), with a same high average of importance and performance score of 3.00 - 5.00. The indicators are pavement in industrial area (1), completeness of road supporting facilities (2), convenience of transportation facilities (3), Safety of transport infrastructure (4), condition of transportation infrastructure facilities (5), conditions of clean water (6), availability of electricity infrastructure (11), Company's influence on local labor recruitment (15), the company's efforts to prevent conflicts between local communities (19), the company's efforts to maintain social integrity (21).

Ten items that mentioned previously are categorized into high interest and performance. It shows that the existing system should be maintained and labeled as "*Keep up the good work*". It implied that the indicator is well-executed and public is satisfied with it (Fig. 8). Local community is most satisfied and the highest interest on pavement in industrial area indicator.
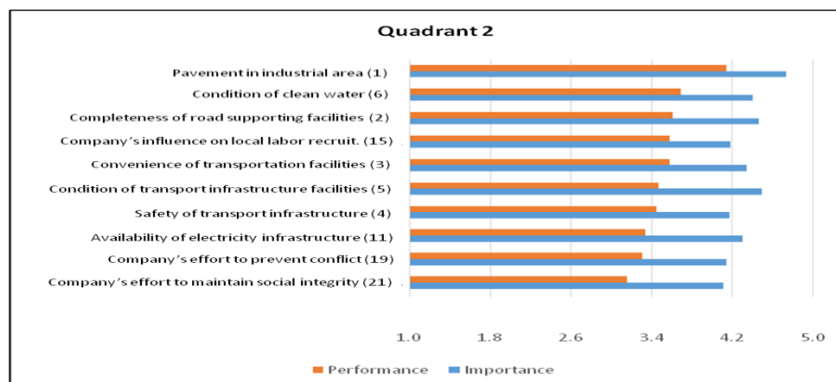

Figure 8. Public Satisfaction on Houses on Stilts Industry

Quadrant 3 and Quadrant 4 (Q3 and Q4)

The results of IPA on interest and satisfaction showed none of the indicators located in quadrant 3 or 4, which means that no indicators that low priority or excessive quality.

IV. Conclusion

We concluded that IPA analysis for entrepreneurs consisted of seven indicators for high interest rate but low level of satisfaction which indicate the compulsory improvement. Aspects that need to be improved are spatial conditions of the industrial area, availability of drainage network, water conditions of drainage network, maintenance of drainage network, waste treatment, industrial waste treatment, conditions and availability of communications networks, availability of commercial facilities, and utilization of water resources in industrial scale.

Surrounding community showed fourteen indicators that should be improved due to its low level of satisfaction although interest level is high. The indicators are drainage condition, waste placement, waste management, air pollution, handling of pollutants, company's contribution to social corporate, social legitimacy to exploitation of local natural resources, agreements on residents' welfare, the company responsibilty for local community and follow-up responses to the public comments and complaints, influence of company development to public health, disease vector progression due to development of the company, the project procedure to prevent and overcome accidents.

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