STRATEGIC MODEL OF TIN MINING INDUSTRY IN INDONESIA (CASE STUDY OF BANGKA BELITUNG PROVINCE)

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ABSTRACT: *Indonesia Has Abundance Of Natural Resources Such As Oil, Gas And Minerals. Bangka Belitung Province Has Tin Mineral Abundant And Had Been Mining Since 1668. Beside, Tin Mining Industry Has Some Problem Continues In Bangka Belitung Province. Some Of Tin Mining Industry Issues Are Struggling Of People Interest To Utilize The Mineral Area And Degradation From Mining Activities (Casper 2007), Illegal Tin Mining (Elfida 2007; Inonu 2010), Lack Of Coordination Between The Local Government And Central Government In Regulation And Licensing For Mines (Purba 2007; Hayati 2011), Socio-Economic Conflicts (Aziz, Salim 2005; Resosudarmo, Subiman 2010; Erman 2013), Poverty Issue (Eir 2003; Jatam 2005), Political Power And Structures Issue (Erman 2007; Resourdarmo Et Al 2009; Hendra 2012). The Aim Of Our Study Was To Make Strategic Model Of Tin Mining Industry (Case Study Bangka Belitung Province). Strategic Model Of Tin Mining Industry Can Be Used As A Solution To; Avoid Conflicts Between Stakeholders, Economic Improvement, Increasing Regional Revenue And Competitiveness Of Tin Industries. Our Methodologies Conducted By Structured-In Depth Interviews And Questioner. Expert Respondents Were Selected By Purposive Sampling. Respondents Were Selected By Non-Probability Sampling Technique. Furthermore, The Study Employed Analysis Tool Of Analytical Network Process (Anp) To Make Strategic Model For Tin Mining Industry. Framework Model Has Been Confirmed By Expert In Tin Mining Industry. Anp Framework Consists Of 6 Cluster Include; Strategic Model, Macro-Environment Strategic, Key Stakeholder, Activities, Industry Issue And Strategic. Macro-Environment Strategic Priority Should Be Concerned Are; Politic And Law (28.91%), Economic And Business (28.9%). Key Stakeholder Priorities Are; Local Government (26.65%), Then Central Government As Second Priority (24.36%). Key Activity Priorities Are; Regulation And License (38.71%), Audited And Supervision (35.73%). Industry Issues Are; Finishing Of Monitoring And Enforcement (21.49%), Coordination & Policy (20.97%). Strategic Which Should Be Implemented Are Audit And Supervision (31.05%), And Then Standardization (22.19%). The Research Showed The Need Of Improvement For Government, Law Enforcement And Regulatory*.

KEYWORDS: Strategic, Tin Mining Industry, Analytical Network Process

INTRODUCTION

In the Master plan of Acceleration and Expansion of Indonesian Economic Development (MP3EI) year of 2011-2025, mineral goods which become the pledge are tin, nickel and bauxite, expected to boost up economic development in Indonesia (Kemenko 2011). With those mineral goods be abundance, promising next year to be able to process them locally according to the law (UU) No.4 year of 2009 about Minerals mining and Coal for prosperity and welfare of the Indonesian citizen.

One abundance of mineral goods is tin mineral ore in Bangka Belitung Province. According to US Geological Survey's report (USGS) in 2011, assumed the amount of tin deposit in the world's was 7.4 million ton with the largest deposit in China 3.5 million ton, South America 2 million ton, Peru a million ton and 900,000 ton in Indonesia. In Indonesia, the deposit of tin predicted to run out in 2020 but only if the productivity of Indonesia's tin mining at least 60.000 ton per year. Widyatmiko (2012) suggested optimization of tin mining production should be reduced to around 32,000 ton per year, so the presence of tin mining could be survive until 2033. Otherwise, the other tin producer's countries will still be operating because they have sufficient tin supplies and the production level far below Indonesia's.

Indonesia's tin production which large enough has not be balanced yet with the ability to process the tin to be more valuable such as; tin solder, tin chemical, tin plate and tin alloy. Tin production in Indonesia only has the form of tin ingot, not much processed to become finish products. Ironically, Indonesia has been importing tin's finish product from non-producer of tin such as Japan, Singapore, Malaysia and Korea Republic (Comtrade UN 2012).

Indonesia's disability to process and manage their abundance of natural resources could be seen in the report of *World Economic Forum*. Inside of The Global Competitiveness Report in 2013, Indonesia's position of competitiveness exist in ranking 38, below other ASEAN countries such as Singapore (2), Malaysia (24), Brunei (26) and Thailand (37) out of 148 countries. The ranking of competitiveness provides information for industries in Indonesia to get continuous improvement to developing strategic model which available with pillars' condition of the competitiveness in Indonesia that has not developed well to be adequate to face the business world which is very complex, rapidly changes and full of uncertainty.

Another problem in tin mining industries in Indonesia is also linked to the lack of synchronization between the local government stakeholders and central government regarding to legal matters and licensing of tin mining. In the implementation of the field led to many erroneous interpretations and difference, so the rules of the products are not synchrony with various levels and sectors (Hayati, 2011).

Another problem experienced by the local community stakeholders is social problem. The results of the evaluation from World Bank team found mining activities insufficient to give contribution to alleviating poverty of local communities (EIR 2003). Furthermore, mining activities at various places not only suspected of not contributing in promoting local community, but also trigger a variety of socio-economic conflicts (Resosudarmo and Subiman 2010).

Those various issues need to be overcome to develop suitable strategic model, the industries should pay attention to the various stakeholders which affect business sustainability. Develop a strategic models is important for the sustainability of the tin mining industries in Bangka Belitung.

Research Problem

Based on above background, there are some problems faced by the tin mining industry in Indonesia, include downstream industries were not growing (Widyatmoko 2012), environmental damage (Sapanli 2009; Inonu 2010) wild unconventional mining (Elfida 2007;

Sapanli 2010), overlapping of law and permission for tin mining industry (Purba 2007; Haryati 2011), social problems (Aziz and Salim 2005; Erman 2007; Resosudarmo and Subiman 2010) and other problems.

Management questions in this paper is how about strategic model for tin mining industries in Indonesia? The benefits of strategic model could be resolving problems which exist in the tin mining industries, economic improvement, increasing sales, reducing risk of a sizeable industry, increasing potential profits and the growth of the industry with the suitable strategic model.

Research Purpose

Based on research issues, the purpose of this study is to design a strategic model for tin mining industries in Indonesia to avoid conflicts between stakeholders, providing advice in tin mining settlement issues, economic improvement, increasing sales, and reducing risk in industries.

LITERATURE REVIEW

Designing of tin mining industrial strategy model with the use of Analytical Network Process (ANP). ANP method employed to look at the relationship between the key stakeholders in formulating strategic model which have been obtained in-depth interview with expert stakeholders. As previous assessments associated with the ANP were summarized in Table 1. The study provided information related to the use of ANP in previous research.

The table describes the various applicative use of ANP in research starting from the election or selection of encountered cases to the application for development of clusters or models. Various information about the use of ANP as references in application of ANP utilized both in domestically and abroad research. The use of ANP not only competent to search priorities scale but also can be applicative to BOCR (Benefit Cost and Risk Opportunities) model or other models. ANP has a variety of uses in a more qualitative assessment by opinion of the expert respondents.

Table 1. Previous research with using ANP

Author	Tittle	Method
Chen KY and Wu WT (2011)	Selection of logistics service providers, industry case study of investment in Southeast Asia	Combination of *Delphi method* and ANP
Momeni M *et al.* (2011)	Dissertation supervisor selection process in Iran	ANP.
Shabandarzadeh H and Ghorbanpour A (2011)	Selection of the health center location	Combination of interpretive structural modeling (ISM) method and fuzzy analytic network process (FANP)
Zaim S *et al.* (2012)	The selection of the maintenance strategy on newspaper companies in Turkey	Using AHP and ANP

Vinodh S, *et al.* (2012)	Evaluation of sustainability in organizations of manufacture in India	ANP
Amiri MP *et al.* (2012)	Banking performance evaluation using the Balanced Scorecard	ANP
Shojaei M *et al* (2013)	Priority strategy of SWOT matrix case studies Neda Samak Ashena company	ANP
Gheitnai A (2013)	Estimation of HRM practices on employee performance in the public sector of Iran	ANP
Fachrodji A (2010)	Gondurekem Competitiveness in International Markets Model and Implications of Gondurekem Industry Development in Indonesia	ANP
Suswono (2010)	Increasing Sustainable Competitiveness of National Food Logistics Organization Strategy: Case Studies Bulog	BSC and ANP
Pahan I (2011)	Palm Oil Industrial Cluster Development in Indonesia	ANP

The various studies above indicate that the use of ANP can be utilize to formulate suitable strategic model for tin mining industries in Bangka Belitung. Using ANP has advantages especially for observing the relationship between clusters in the established model.

METHOD

Place and Time
This research has been conducted in Bangka Belitung province as tin producer and Jakarta. Time frame for collecting the data was over five months from December 2013 - April 2014. During this period literature study conducted to strengthen obtained analytical results.

Data and Sampling Technique
The research design was a case study designed specifically for in-depth research for a case of tin mining industries in the Bangka Belitung. According to Creswell (1998) the case study focused to the case specification in an event either includes both individual, a group or an event. In the study, primary data sampling has been done by in-depth interviews and structured questionnaires. Respondents were selected intentionally (purposive sampling) by determining of first responders experts who will be interviewed. Respondents have been chosen of non-probability sampling technique with sampling convince. The expert respondents as shown in Table 2.

Technique and Data Analysis
Strategic model framework for tin mining industry in Indonesia (Bangka Belitung Province case study) made by ANP then confirmed by the expert respondents. Once the framework has reconfirmed to various experts respondents and have not changed, then composed a questionnaire and the relationship between cluster and nodes within the framework of the

ANP. ANP model framework then conducted pairwise comparisons to nodes that have been made. The analysis of pairwise comparisons was using the software superdecisions. There are several advantages of using ANP. One of the advantages is a comprehensive technique allows to input all of the relevant criteria and allow more complex relationships between levels and attributes (Fachrodji 2010). In addition to using the ANP, the description of data and information from expert respondents used to strengthen the research analysis.

Table 2. Expert Respondents

No.	Name	Institution/Position
1	Ir. Wahid Usman, MBA	Former President Director of PT. Timah Tbk / Chairman of SC INATIN-BKDI
2	Dr. Ir. Bambang Setiawan	Former of Dirjen Minerba ESDM/ Commissioner of PT. Kideco Jaya Agung other mining company.
3	Petrus Chandra, MBA	Director of PT. Refined Bangka Tin
4	Dr. Erwiza Erman, MA	Researcher of LIPI
5	Ir. Surawadi Nazar, M.Sc	Former Operational Director of PT. Timah Tbk / Former Vice President PT. Mitra Stania Prima
6	Ir. Sutriono Edi, MBA	Head of BAPPEBTI
7	Hudarni Rani, SH	Former Governor of Bangka Belitung / Commissioner of PT. Timah Tbk
8	Ir. Suryadi Saman	Former Vice Governor of Bangka Belitung / Former Commisioner of PT. Timah Tbk
9	Marwan Batubara, M.Sc	Director IRESS (Indonesian Resources Studies)
10	H. Erzaldi Rosman, SE, MSi	Regent of Central Bangka
11	Ir. Sukrisno	Vice President of PT. Timah Tbk.
12	Irjen Pol (Purn) Drs. Iskandar Hasan	Former Head of Bangka Belitung Regional Police

RESULT AND DISCUSSION

Strategic Model Framework

This research used a model of ANP as former strategic of tin mining industries in Indonesia (Bangka Belitung Province case study). The model is divided into six strategic cluster interrelated and affected: (a) strategic model consists of a single node; (b) the strategic environment cluster consists of seven nodes; (c) the main stakeholder cluster consists of seven nodes; (d) cluster main activities consists of four nodes; (e) cluster issues in tin mining industry consists of eight nodes and (f) strategic industries cluster consists of five knots. Each node and cluster are related and connected to each other as shown in figure 1. Framework strategic model of ANP has been confirmed and tested to the experts prior to the pairwise comparison to determine the priority of each existing cluster.

The framework then weighted with multiple partners from the tin expert respondents opinion into the superdecisions software. The sequence of priority results obtained from the software for each cluster or node. Based on the sequence of priority cluster results, obtained that major stakeholders be the first priority with a value of (22.69%), the second priority is the main activity of (21.51%), the third priority is the value proposition of (20.17%), tin issues (16.81%), strategies of tin (15.46%), and the last priority is strategic environment (3.36%).
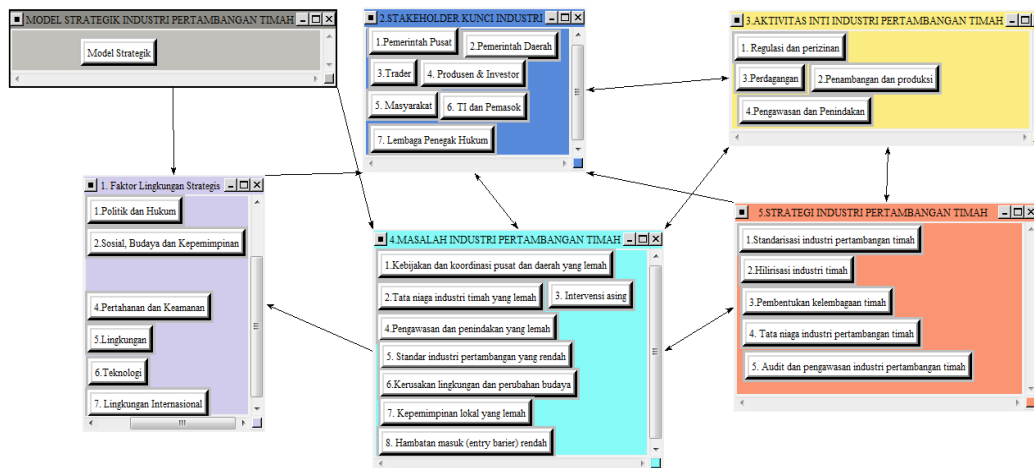
Picture 1. Strategic model framework for tin mining industry in ANP

Macro-Environment
The results of the geometric mean of experts on environment cluster which are affecting strategic of top priority for strategic models is related to politics and law (28.91%) and (28.91%) of economics and business then the last priority on defense and security (2.01%). Agreement rate of the experts or the value of Kendall concordance (W = 0.80) and inconsistencies value below 10%. The sequences of strategic environment priorities as shown in table 3.

Table 3. Macro-strategic environment priorities

Strategic Environment	Super-matric cluster value	Priority
Politics and Law	0.28908	1*
Economic and Business	0.28908	1*
Social, Culture and Leadership	0.19246	3
Environment	0.07298	4
Technology	0.07296	5
International Environment	0.06330	6
Defense and Security	0.02013	7

Note: * Super-matric value of politics and law was as same as Economic and Business.

The reform era has changed the strategic environment of political and legal conditions in the tin mining industries from monopoly to be free. Regional autonomy (Law No. 22 year of 1999), tin was removed from strategic goods and supervised (Decree No. Menperindag. 146/MPP/Kep/4/1999) as well as the issuance of a business license for smelter in Bangka (Bangka Regulation 6 / 2001) followed by other districts has became strong enough to affect the existing strategic environment. According to Erman (2010) the existence of political inaction and political reciprocation to entrepreneurs was one that occurred in the tin mining also tin mining's weak licensing laws (Hayati 2011). Besides the formation of a local shadow state with the tin trade deregulation (Erman 2007).

Key Stakeholder
Stakeholder is an institution, group or individual who can affect the organization (Freman 1984). The existence of stakeholders in Table 4 have power and interest which different to the sustainability of the industry. The stakeholders were influencing and maintaining the interest of each other. The results of the study indicate priority on local government

stakeholders are (26.66%), the central government (24.36%), and law enforcement agencies (16.65%) recognized a significant influence in the formation of strategic models. The value of the expert's agreement (W = 0.61) and below 10% inconsistencies.

Table 4. Key stakeholder priorities

Key stakeholder	Super-matric cluster value	Priority
Local Government	0.26657	1
Central Government	0.24364	2
Law Enforcement Agency	0.16649	3
Trader	0.09165	4
Society	0.08614	5
Producer and investor	0.08672	6
TI and Supplier	0.05878	7

According to Hendra (2012) the actor contestation fight for tin resources and decentralization /regional autonomy gives space to the actor of Local Government (LG) both at the provincial and district / city, the investor / private and the public to get involved in the fight over the resources of tin (Hendra 2012) makes the role of the central government becomes unproductive (Erman 2007). It was seen from the local government area worked to improve PAD (the original income) with releasing many of mining permits without regard to the sustainability (Erman 2007; Batubara 2009). Thus strategic model needs to pay attention to the main stakeholders with a focus on existing priorities.

Main Activities
Main activity in tin mining industry which become top priority according to the expert is regulations and licensing (38.71%) and then monitoring and enforcement (35.73%). The results of rate of agreement obtained 52%, below 10% inconsistencies. Table 5 shows priority of main activity in the tin mining industries. Regulation and licensing need to be clarified so there is no difference of interpretation of law, which is still going on in the mining of tin (Hayati 2011), moreover need to eliminate the overlapping of laws. When the regulation and license are sufficient, supervision and enforcement need to be sthrengthened. Based on the interviews with the experts, stated that supervision and enforcement were weak, easily influenced and even participated in the tin mines. According to McCarthy JF (2011) required a combination of the participated local model and accountability with the capacity of the central government to implement the level of supervision, monitoring required, and appropriate sanctions.

Table 5. Main activities industry priorities

Main Activities	Super-matric cluster value	Priority
Regulation and licensing	0.38710	1
Supervision and enforcement	0.35734	2
Mining and Production	0.14130	3
Trading	0.11426	4

Issues and Strategic Industries
On the issue of industrial cluster contained eight nodes which consist of (a) policy and central coordination and weak areas, (b) weak of tin industry trade system, (c) foreign intervention, (d) lack of monitoring and enforcement, (e) lack of standard mining industry, (f) damage of the environment and cultural changes, (g) lack of local leadership and (h) weak of entry

barriers. The nodes explain many problems in tin mining industry are very complex, and interrelated with various existing stakeholders. Thus industrial issues subsequently analysis by ANP and obtained top priority of the sequence is lack of monitoring and enforcement (21.49%) and the second priority is policy and central coordination and weak areas (20.97%). The results of expert agreement analysis level obtained value of 53% and inconsistencies below 10%.

The Industrial issues used to formulate suitable strategies for the tin mining industries. Summarize into five implemented alternative strategies as shown in Table 6. The using of superdecisions software obtained the first sequence of priority was auditing and monitoring tin mining industry (31.05%), and the second priority was tin mining industry standardization (22.19%). The analysis results of the Kendall's concordance was 21% and below 10% inconsistencies. The low of agreement level has provided necessary information to implement a mixed strategy in designing of strategic models for tin mining industry in Bangka Belitung. Furthermore, a fairly low level of agreement was due to vary of stakeholders or experts from different institutions or backgrounds (local government, central government, businesses, law enforcement and researchers) to obtain vary of viewpoints to overcome the tin complex issues.

Table 5. Strategic Industries Priorities

Strategic Industries	Super-matrices cluster value	Priority
Auditing and supervising of the tin mining industry	0.3105	1
Standardization of the tin mining industry strategy	0.2219	2
Tin mining industry trade system strategy	0.1737	3
Establishment of tin institutional strategy	0.1473	4
Downstream tin industry strategy	0.1467	5

The results of the supermatrix limiting data in the picture 2 of whole cluster, show priority pattern can be used to form a strategic industries model of tin mining industry. The results of the strategic model were formed on priorities and licensing regulations (9.68%) and supervision and enforcement (8.93%) need to be supported by local governments (7.11%), central government (6.50%) and law enforcement agencies (4.44%) by strengthening policy and central coordination and weak areas (5.60%) also tin audit and supervision (4.80%). The strategic model needs to be strengthened with clear and unequivocal politics and law (1.93%)
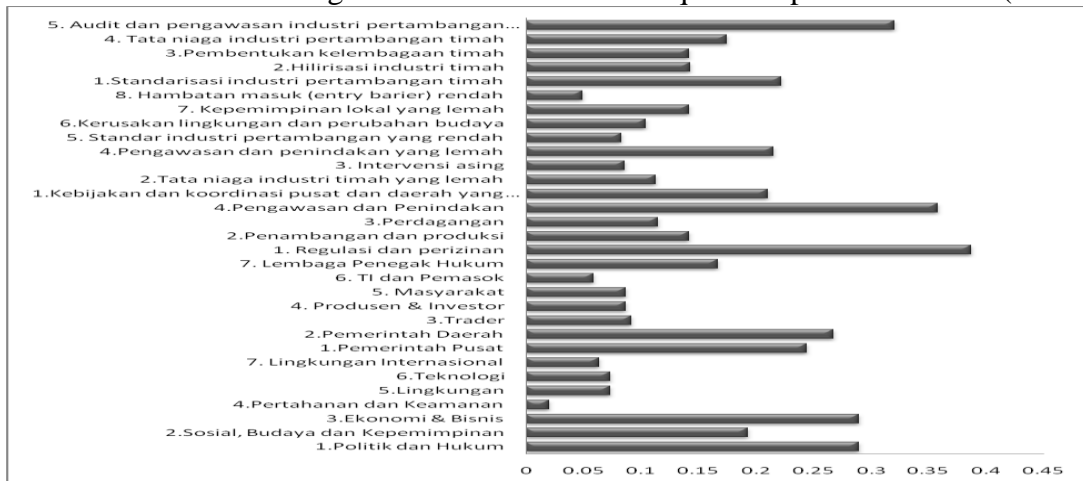
Picture 2. *Limiting Super matrix* ANP

Managerial Implications

The research results showed the significant effect of regulatory and licensing to the tin mining industry, accordingly the industry need to consider the long-term plan for Bangka Belitung province. Moreover, the stakeholders involved in the tin mining industry with vary of interests should be implementing stakeholder management to find the meeting point among the various interests, especially in local government, central government and law enforcement. The industry also needs to pay attention to the political and strategic environment especially law which occurred in the Bangka Belitung.

CONCLUSION AND RECOMMENDATIONS

Strategic environment, political & law also economics business play an important role in the development of the industry. Industry needs to pay attention to the main activities include current regulations and licensing, also monitoring and enforcement. Stakeholders which play a significant role are the local government and the central government as well as law enforcement agencies. Industry issues that need to be resolved is the policy and coordination of central and regional along with improved supervision. Mixed strategy which need to be immediately implement are auditing and monitoring strategy, standardization of industrial strategy, institutional formation, tradeing system strategy and downstream strategy. Strategic models can be obtained from the sequence of priority of the entire cluster ANP result.

Advice from this research are (a) the need of efforts to establish common ground interests in order to avoid the greater uneven development and conflicts of interest among stakeholders, (b) the need to establish a master plan for tin mining industry, (c) the need of incentives cooperation between agencies / institutions at the central, regional and law enforcement, and (d) the need of monitoring systems to be integrated between agencies / institutions involved in tin mining industry. As for suggestions for future research are (a) the need to examine the relationship of actors and linkages which is influencing the tin mining industry, (b) the need to assess the existing effectiveness of the regulation, licensing and supervision in the tin mining industry and (c) the need to assess political economy in the tin mining industry.

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