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QCA ANALYSIS OF FACTORS CONTRIBUTING TO POOR POLICING ACTIVITIES IN MINING AND QUARRYING IN INDONESIA

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ABSTRACT

The paradox of natural resource management is the finding that is the basis for this study. The paradox shows that areas that depend on natural resource management, such as mining and quarrying, have lower scores in supervision, partnerships, and law enforcement scores than areas with no income from mining and quarrying activities. The Qualitative, quantitative comparative analysis (QCA) method is used to find the pathway that causes the paradox in each research area; QCA will provide a general pathway as to why an area has different characteristics from other regions even though they have identical scores and indicators in statistical measurements. As the result, The qualitative comparative analysis (QCA) shows that regional areas with a high composite index score have certain pathway characteristics, such as the high integrity of public employees and the low level of corrupt behavior in the area.

KEYWORDS *Mining, composite index, Qualitative - Quantitative Comparative analysis, Policing*

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INTRODUCTION

In the preparation of the composite index of policing in mining and quarrying activities, a paradox was found, where regions that have low index values are precisely the regions that get the highest share of GRDP from mining in other regions. (Mukhopadhyay et al., 2023) The composite index of policing in mining and quarrying activities is a composite index consisting of three dimensions, namely the dimensions of supervision, partnership and law enforcement. The low value of the composite index indicates weaknesses in these three aspects in the mining sector in each region. (Meutia et al., 2023; San Cristóbal & Biezma, 2006; Squillace, 2021)

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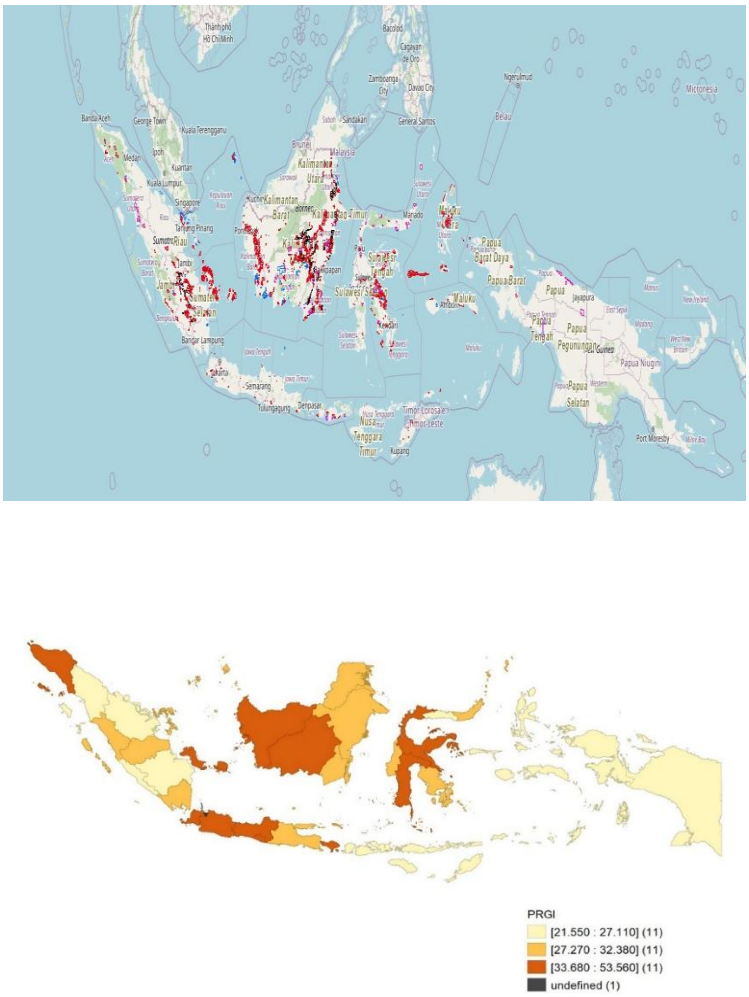


Figure 1 Distribution of composite index scores vs. mining concession map of the ministry of energy and mineral resources

Figure 1 is a comparative picture of areas with high mining and quarrying activity, characterized by the number of mining concessions, compared to the composite index score of policing activities in mining and quarrying. Ideally, high mining activity should be matched by good supervision and control management, (Bloodworth et al., 2009; Hammond, 1988; Leonard, 2019; Meutia et al., 2023; San Cristóbal & Biezma, 2006; Squillace, 2021; Yahman, 2013) but comparison on the spatial map above shows otherwise (Meutia et al., 2023; Musviyanti et al., 2022).

As can be seen in the figure above, one of the regions, East Kalimantan, has high mining and quarrying activities but a low composite index score. This is consistent with the lawlessness and disregard for regulations related to mining activities in the area. One of the facts is as reported by the UN Working group which states that human rights violations have occurred in mining areas, where this is done by transnational companies in the mining and quarrying sector in East Kalimantan.

The report also states that these companies ignore accidents that cause deaths at mine sites (Toumbourou et al., 2020).

In relation to the above findings, it is necessary to determine the pathways or variables that cause different scores, especially if there is a contradiction between the data and the real conditions in the field. Despite having the same index score, a region does not necessarily have the same problems, especially in terms of regional characteristics that form variables that cause problems as revealed in the formation of the composite index above.

Weak supervision, or lack of law enforcement performance in a region can occur due to a general problem or causality or called a *necessary condition* or there are other factors that cause the phenomenon to occur (*sufficient condition*) (Paulus et al., 2023; Thomann & Maggetti, 2020) . Some paradoxes, such as low index values in areas with large mining concessions, as shown in Figure 1, cannot be explained in a general statement that there is high surveillance or low law enforcement, but need to be investigated in more specific causality.

The Qualitative-quantitative Comparative Analysis (QCA) method is a method of analyzing social phenomena in order to broaden perceptions of some data that become causal conditions and *outcomes* as forming a certain condition. The conditions studied can be conditions according to a particular case, or can be taken through certain causal conditions so that qualitative research supported by data will be more comprehensive and provide a separate perspective on a fact that exists in the field based on data (Thomann and Maggetti, 2020). This method will be used in further analysis of the causal conditions in each region that lead to low levels of policing activities in mining areas.

RESEARCH METHOD

To determine the pathway related to the paradox of the results of the policing index in mining areas with intensity in mining areas, the QCA (*qualitative comparative analysis*) method is used, using the Tosmana (Tool for Small-N analysis) software version 1.54. Data categories that form the *outcome in* the form of a composite index, are based on the theory of sociology of law by (Soekanto, 1986) related to factors that affect law enforcement and the concept of sustainable mining management, namely norms, institutions and actors (Bansard & Schöder, 2021)

The above theory is used as the basis for determining casual conditions whose data are obtained from primary data sources that have been processed for the purpose of the intended research, namely (1) the police governance index (ITK) per province which represents the institutional dimension of the police. This governance index represents institutional variables consisting of human resources including integrity and knowledge as well as infrastructure for the implementation

of police duties, given that this index has indicators including transparency, fairness, effectiveness, accountability, and behavior compiled in the provincial police index. (Hodgkinson et al., 2019; Madsen & Kammersgaard, 2022; Young, 2022)

(2) causal conditions that represent norms, especially legal culture and compliance are crime rates, especially fraud embezzlement and corruption (TIPUKOR) in each province which are closely related to integrity issues. The data used in this norm dimension is expected to describe the ESTOM (emotions, attitudes, behaviors, opinions and motivations) of the people in the area towards crimes that have a connection with mining activities, such as corruption and economic crimes such as fraud and embezzlement.

(3) the actor dimension, then data is used in the form of the existence of informal fees to the police (PUNGLI) integrity assessment index (IPP), areas conducted by the KPK and the number of open and closed unemployment (PENGTER) per province. This data is used to illustrate the existence of *police corruption* and the existence of *transaction costs* in the licensing process and mining-related activities. The primary data used in this process is secondary data in the form of processed statistical data, with the following operational definitions:

Table 1 QCA operational definitions

no	dimensions	causal conditions	operational definition	data source
1	institutional	ITK	police governance index which is composed of several indicators, namely transparency, fairness, effectiveness and behavior related to police performance per police force (%)	Police
2	Norma	TIPUKOR	the number of embezzlement, fraud and corruption crimes committed in each province divided by the total number of crimes in the region.	BPS / processed
3	actor	PUNGLI	is a transaction fee paid informally to unscrupulous officials in order to obtain protection and guarantees.	KPPOD /processed
		UNEMPLOYMENT OPEN (PENGTER)	Ratio of the number of open and closed unemployed in each province compared to the total workforce	BPS/ processed
		INTEGRITY PUBLIC SERVANT (IPP)	regional integrity assessment index conducted by KPK per province	KPK

The statistical data as defined above were then calibrated (Ferreira & Dionísio, 2019) using *setters* in the tosmana ver 1.54 software, except for the *outcome*, the composite index, which was calibrated with the median value of all data with the aim of producing mid-upper and lower data. For data management, the QCA cripset methodology is used. According to Fauzi (2019), the calibration carried out in the QCA cripset methodology aims to determine the "presence" category with a bolean notation of 1, and the "absence" category with a bolean notation of 0. (Paulus et al., 2023)

The calibration results carried out with the tosmana ver 1.54 software on the statistical data referred to then produce the following bolean notation results:

Table 2 QCA cs calibration results

Province	ITK [4.9]	TIPUKOR [13.3]	PUNGLI [92.37]	INTEGRITY EMPLOYEES PUBLIC [65.97]	UNEMPLOYMENT OPEN [70.22]	PRGI [29.44]
Aceh	1	0	0	1	0	1
North Sumatra	0	1	1	0	1	0
West Sumatra	0	1	1	0	1	0
Riau	0	1	1	0	1	0
Jambi	1	0	0	1	0	1
South Sumatra	0	1	1	0	1	0
Bengkulu	0	1	1	0	1	0
Lampung	0	1	1	0	1	0
Kep Bangka Belitung	1	0	0	1	0	1
Islands Riau	1	0	0	1	0	1
West Java	1	0	0	1	0	1
Central Java	1	0	0	1	0	1
DI Yogyakarta	1	0	0	1	0	1
East Java	0	0	0	0	0	0
Banten	1	0	0	1	0	1
Bali	1	0	0	1	0	1
Nusa Southeast West	0	1	1	0	1	0
Nusa Southeast East	0	1	1	0	1	0
Kalimantan West	1	0	0	1	0	1
Kalimantan Middle	1	0	0	1	0	1

Kalimantan South	0	1	1	0	1	0
Kalimantan East	0	1	1	0	1	0
Kalimantan North	1	0	0	1	0	1
Sulawesi North	1	0	0	1	0	1
Sulawesi Middle	1	0	0	1	0	1
Sulawesi South	1	0	0	1	0	1
Sulawesi Southeast	1	0	0	1	0	1
Gorontalo	0	1	1	0	1	0
Sulawesi West	0	1	1	0	1	0
Maluku	1	1	1	1	0	0
Maluku North	0	1	1	0	1	0
Papua West	0	1	1	0	1	0
Papua	0	1	1	0	1	0

Then, to be able to provide analysis related to data sets that are used as causal conditions, tosmana software will interpret the data in the form of bolean algebra. Tosmana will generate a truth table analysis, in order to interpret the pattern or pathway, for example Condition A + Condition B * ~ Condition C → Result can be interpreted as a combination of Condition A or Condition B, and the absence of Condition C is sufficient to produce the result. The plus sign (+) indicates "or," the asterisk (*) indicates "and," the tilde (~) indicates the absence of a condition (in the example above, it is the absence of condition C), and the arrow (→) the result or *outcome.* (Legewie, 2013)

RESULT AND DISCUSSION

Results

From the interpretation through Bolean algebra of the data above, there are causal conditions that can be analyzed further, namely one causal condition that has a positive result, with the following *pathway*: ITK{1} * TIPUKOR{0} * PUNGLI{0} * PUBLIC EMPLOYEE INTEGRITY{1} * OPEN

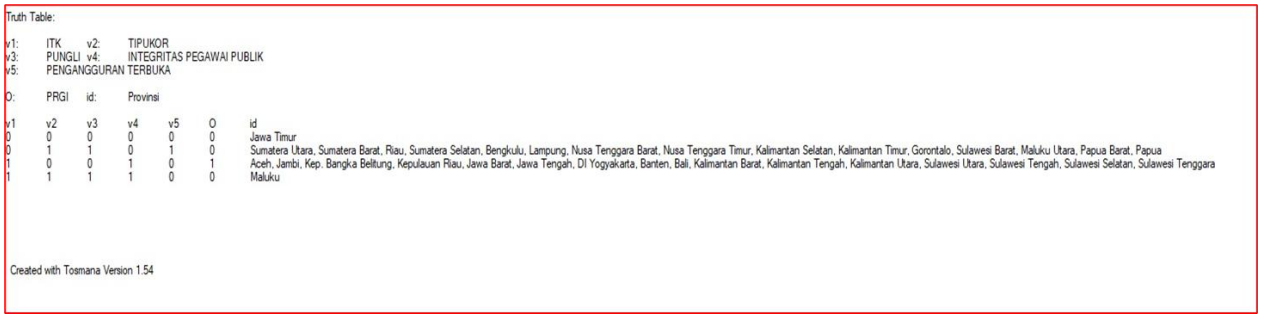
UNEMPLOYMENT{0} PRGI, which can be interpreted that, a positive outcome in the form of the existence of causal conditions for the composite index of natural resource management policing comes from the existence of causal conditions for the police governance index, and the existence of causal conditions for the integrity value of public employees, and the absence of causal conditions for informal levies by law enforcement, fraud and embezzlement cases and open unemployment.

The absence of some causal conditions does not mean that the above conditions do not exist, but from the data set calibrated by the setter software tosmana version 1.54 the absence of causal conditions in some case descriptors in the form of provinces is lower than other regions, so it is considered by the setter as an absence condition (0).

In this study, there are three pathways that produce negative outcomes or *absence*, namely :

1. ITK{0} * TIPUKOR{1} * PUNGLI{1} * PUBLIC EMPLOYEE INTEGRITY{0} * OPEN UNEMPLOYMENT{1}
2. ITK{0} * TIPUKOR{0} * PUNGLI{0} * PUBLIC EMPLOYEE INTEGRITY{0} * OPEN UNEMPLOYMENT{0}
3. ITK{1} * TIPUKOR{1} * PUNGLI{1} * PUBLIC EMPLOYEE INTEGRITY{1} * OPEN UNEMPLOYMENT{0}

From the three pathways, we can see a pattern that the absence outcome is shaped by the absence of governance and the lack of integrity of public employees, or it can be shaped by the prevalence of fraud and corruption and informal deposits to officers.



Truth Table:

v1: ITK v2: TIPUKOR
v3: PUNGLI v4: INTEGRITAS PEGAWAI PUBLIK
v5: PENGANGGURAN TERBUKA

O: PRGI id: Provinsi

v1	v2	v3	v4	v5	O	id
0	0	0	0	0	0	Jawa Timur
0	1	1	0	1	0	Sumatera Utara, Sumatera Barat, Riau, Sumatera Selatan, Bengkulu, Lampung, Nusa Tenggara Barat, Nusa Tenggara Timur, Kalimantan Selatan, Kalimantan Timur, Gorontalo, Sulawesi Barat, Maluku Utara, Papua Barat, Papua
1	0	0	1	0	1	Aceh, Jambi, Kep. Bangka Belitung, Kepulauan Riau, Jawa Barat, Jawa Tengah, DI Yogyakarta, Banten, Bali, Kalimantan Barat, Kalimantan Tengah, Kalimantan Utara, Sulawesi Utara, Sulawesi Tengah, Sulawesi Selatan, Sulawesi Tenggara
1	1	1	1	0	0	Maluku

Created with Tosmana Version 1.54

Case descriptor group and outcome

1. (Aceh,Jambi,Kep. Bangka Belitung,Riau Islands,West Java,Central Java,DI Yogyakarta,Banten,Bali,West Kalimantan,Central Kalimantan,North Kalimantan,North Sulawesi,Central Sulawesi,South Sulawesi,Southeast Sulawesi) - presence
2. (North Sumatra, West Sumatra, Riau, South Sumatra, Bengkulu, Lampung, West Nusa Tenggara, East Nusa Tenggara, South Kalimantan,

East Kalimantan, Gorontalo, West Sulawesi, North Maluku, West Papua, Papua) - Absence.

3. (East Java) - absence
4. (Maluku) - absence

Figure 2 results of calculating bolean algebra in tosmana software in the form of truth table and pathway

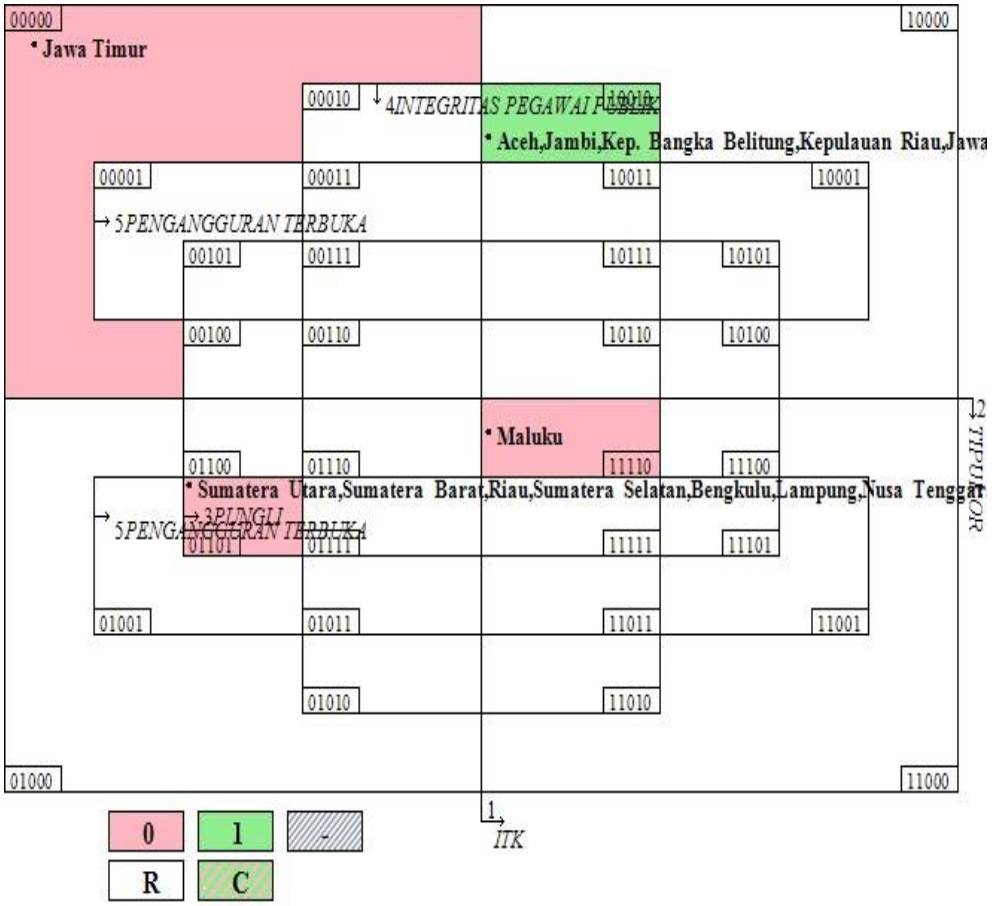


Figure 3 Ven diagram

The ven diagram above illustrates the results of the bolean algebraic analysis conducted on the basis of QCA programming, where green color indicates positive outcomes and light color indicates negative outcomes. The only pathway with a positive outcome is written in the bolean notation 10010 where the vertical line that coincides with the notation is the presence of the police governance index which coincides with the horizontal line of the existence of public employee integrity which makes these two things an absolute condition that must exist (*necessary condition*).

Negative *outcomes* can be seen in the ven diagram above as having three sufficien conditions, namely the existence of informal levies from officials in the

area, the prevalence of fraud and corruption crimes, and or the absence of police governance and public employee integrity. These three sufficien conditions affect the negative outcome of the unit of analysis, so that it can be seen in one region, namely Maluku, even though the region has a police governance index value and public employee integrity of 1, but when the problem of informal levies, and fraud and corruption crimes 1, the resulting outcome is still a negative outcome (*absence*).

Discussion

The results of data processing using the Cripset QCA method, which was generated with tosmana software version 1.54, showed the consistency of several causal conditions in a region with the results of the composite index of mining and quarrying management policing that had been studied previously. The low level of supervision, law enforcement and partnership in a mining area indicates a serious institutional problem, either from the point of view of the formal completeness of the institution such as rules that are not synchronized with the existing problems, or the lack of supervisory personnel in a mining and quarrying area. And from the data using the QCA cripset method, the *root cause* can be known in more depth.

From the data processing above, it can be seen that there are both internal institutional problems and external problems that must be managed in order to produce good mining management and provide economic benefits. The first problem is performance problems, and the low integrity of government officials, as well as corruption problems in the form of informal levies in the licensing process. The above is also supported by the permissive behavior of the community towards fraud and corruption crimes. This has led to systematic institutional corruption in mining management. (Letki et al., 2023; Moisé, 2020; Su et al., 2023; Tegnan et al., 2021) Institutional corruption itself is a form of corruption that is very difficult to eradicate, because it is rooted in the culture and work culture of an institution. Klitgaard(2000) explains that institutional corruption can only be eradicated with a *behavioral* approach, the stages of which start from the selection of government officials from upstream who are clean, dedicated and selected through an easy process but produce dedicated recruitment quality. Then there is the provision of information both education and doctrine related to work methods and ethics in performance, the distribution and decentralization of authority that allows mutual control between institutions (Klitgaard, 2000) .

The police governance index (ITK) per province which represents the institutional variable where this causal condition consists of human resources including integrity, knowledge, infrastructure for the implementation of police duties and transparency, fairness, effectiveness, accountability, and behavior is one of the necessary conditions that produce positive outcomes. This proves the hypothesis that good institutions will be formed if systems and norms that are free

from corruption have been implemented in management activities, including in mining governance.

While the *sufficient condition* in the data processing above comes from the absence of fraud, embezzlement, corruption and extortion crimes in each province, this shows that *transaction costs* and *police corruption* in the mining management process have a huge impact on mining governance in a region where this will always affect the utilization of natural resources in the form of mining and quarrying for economic progress.

CONCLUSION

From the *Qualitative comparative* analysis (QCA), it can be seen that regions that have a high composite index score have a characteristic pathway, namely the presence of causal conditions (1) the high value of the police governance index and (2) the high integrity of public employees. Meanwhile, regions that have a low composite index score have three pathways that can be classified into two groups of causal conditions, namely, (1) high fraud and corruption and high informal costs / extortion in the area (2) low police governance index and low integrity of public employees.

Analysis using the QCA method shows that there are performance problems and low integrity of government officials in the management of mining and quarrying in Indonesia. In addition, there are internal problems, namely the existence of corrupt behavior such as illegal levies in the licensing process, this is also supported by the permissive behavior of the community towards fraud and corruption crimes.

Pathways that appear in the QCA analysis of research data indicate the existence of institutional corruption in mining management. Institutional corruption can only be eradicated with a behavioral approach whose stages begin with the selection of government officials from upstream who are clean, dedicated and selected through an easy process but produce dedicated recruitment quality. Then there is the provision of information both education and doctrine related to work methods and ethics in performance, the distribution and decentralization of authority that allows mutual control between institutions.

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