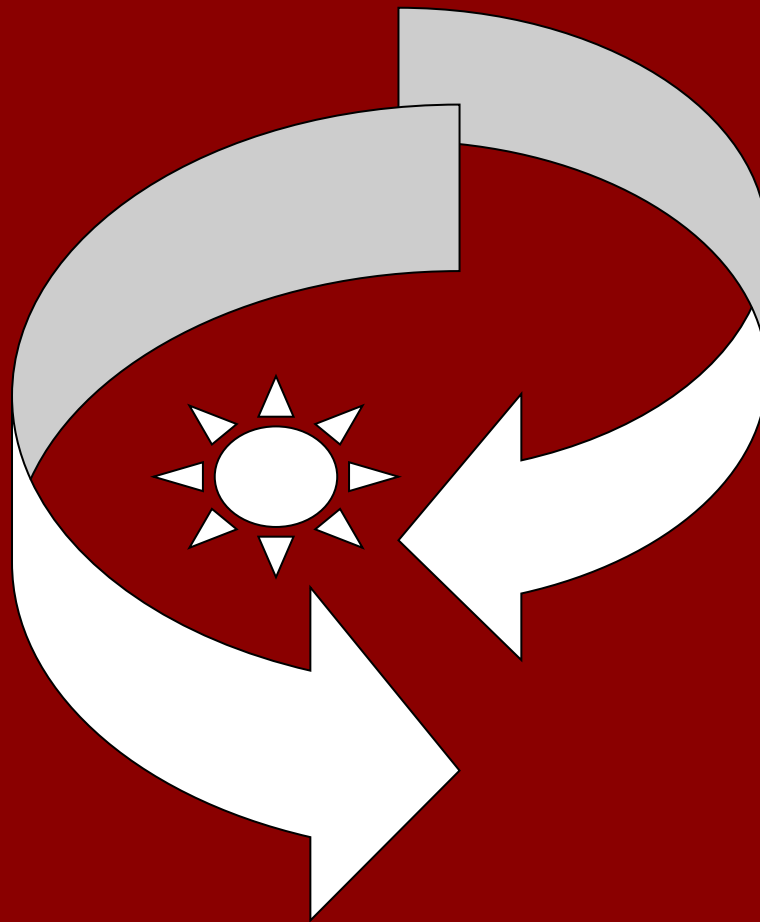# Jurnal Perspektif Pembiayaan dan Pembangunan Daerah

(Journal of Perspectives on Financing and Regional Development)

Master Program in Economics
Universitas Jambi

Jurnal
Perspektif Pembiayaan dan Pembangunan Daerah
(Journal of Perspectives of Financing and Regional Development)

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Editor's Note

Since Volume 6, Issues 2 (September – October 2018), the Journal of Perspectives on Financing and Regional Development has been nationally accredited with SINTA (Science and Technology Index) score of S2, based on the Decree of the Director General of Development and Research Enhancement, Ministry of Research, Technology & Higher Education of the Republic of Indonesia, Number 10/E/KTP/2019 concerning the Ranking of Scientific Journal.

In Volume 7 Issue 3, 2019 is presented five articles that come from Universitas Jambi (Indonesia), Universitas Mahasaraswati Denpasar (Indonesia), Universitas Sriwijaya (Indonesia), Central Bureau of Statistics, South Sumatera (Indonesia), Universitas Padjadjaran (Indonesia).

Hopefully in the next issue can be presented articles with issues and from more diverse circles.

Happy joy reading

Editorial

The role of e-government in reducing corruption: A systematic review

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Abstract
A number of studies state that e-government is a "powerful" anti-corruption tool but other researchers still have doubts about the role of e-government. In fact, other researchers claim that e-government is not only a powerful weapon against corruption but also has the potential to create corruption opportunities. Starting from this phenomenon, this study aims to synthesize research results regarding the role of e-government in reducing corruption. This research systematized the results of research over the past 19 years using a systematic review method. This method provides a comprehensive review so it is expected to reduce the bias of literature. This paper reviews 16 articles published in reputable peer-reviewed journals. Most articles use macro-comparative data in all countries, while other articles use surveys, case studies, and conceptual papers. In general, the systematic review result show that e-government can reduce corruption. However, the success of e-government is not universally applicable. There are internal and external organizational factors that influence the effectiveness of e-government functions to aga021nts corruption.

INTRODUCTION

Corruption is a major threat to economic development in many countries (Fisman & Svensson, 2007; Welsch, 2008). Corruption is not only increase inflation, growth volatility, and budget inefficiency (Evrensel, 2010; Krishnan, Teo, & Lim, 2013), but also distorts the public services. The results of a survey conducted by Global Corruption Barometer on 1,000 people in 107 countries show that more than 27% of respondents bribed public officials to get public services (Bhattacherjee & Shrivastava, 2018). Even, foreign investors who want to invest in a relatively corrupt country must spend around 20% an increase in business costs to corruption (UNODC, 2005). The rise of corrupt in the public sector makes this topic still relevant for further study.

The phenomenon of corruption always has great attention from academics, government, business people, and social activists. At least, more than 4,000 book titles and journal articles have been published with the main theme of corruption over past 10 years (Iqbal & Seo, 2008). Academics and policy makers have also proposed various solutions to prevent corruption (Misangyi, Weaver, & Elms, 2008; Siddiquee, 2010). The most common approach used to tackle the corruption is to reform government

administration (Klitgaard, 1988; Rose-Ackerman, 1999), one of them through e-government.

Electronic government, next referred to e-government, is defined as a process to connect people and government digitally. So, each people can access information and services offered by the government every time (Lau, Aboulhoson, Lin, & Atkin, 2008). Theoretically, e-government is a compatible factor when discussing the determinants of corruption (Shim & Eom, 2008), and is considered as more effective in reducing corruption than traditional anti-corruption strategies (Shim & Eom, 2009). However, some empirical research results sometimes show that e-government does not have a substantial effect on reducing corruption (Basyal, Poudyal, & Seo, 2018; Sheryazdanova & Butterfield, 2017). Ironically, this system can create new ways and opportunities for corruption (Heeks, 1998; Wescott, 2001). The inequality in technology literacy and limited ability to access technology between the managing bureaucrats and citizens becomes a new opportunity to continue corrupt behavior, maybe even more aggressive (Bhatnagar, 2003; Kim, 2014). This knowledge gap is the source of e-government failure in combating corruption.

Based on a theoretical perspective, e-government is a manifestation of information and communication technology used to control corruption (Lio, Liu, & Ou, 2011; Nam, 2018). Several previous studies also proved that e-government could be an effective tool for curb public corruption (Choi, 2014; Elbahnasawy, 2014; Kim, 2014; Park & Kim, 2019). However, other researchers still have doubts about e-government's ability to reduce corruption (Basyal, Poudyal & Seo, 2018; Kim, Kim, & Lee, 2009; Sheryazdanova & Butterfield, 2017), especially in developing countries (Mahmood, 2004). Indeed, most countries in the Americas, Asia, and Europe claim e-government's role in reducing corruption (Bhatnagar, 2003; Shim & Eom, 2008), but other studies show the failure rate of e-government programs in developing countries reached 85 percent (Heeks, 2003). In shortly, the successfull of e-government in controlling corruption does not apply universally in all countries (Basyal, Poudyal & Seo, 2018; Bertot, Jaeger, & Grimes, 2010). The gap between normative conditions and the phenomena occur motivates researchers to reexamine the role of e-government to against the corruption. Hence, the main research question:

RQ1: Can the e-government reduce corruption?

This study aims to examine the effect of e-government implementation on controlling corruption using a systematic review. Although many researchers have focused attention on the relationship between e-government and corruption, based on the results of scientific search, there has been no research that systematically explored the causality relationship between e-government and corruption using a systematic review approach. This method provides strong evidence to identify knowledge gaps or inconsistent findings (Denyer & Tranfield, 2009). By synthesizing relevant research results, the systematic review method will present more comprehensive and balanced information (Siswanto, 2010). These results contribute to the theory, which supports the theoretical concept that e-government is an effective tool for controlling corruption at all levels of government. This result also contributes to the practice, which enhances the insight of policymakers that e-government implementation not only reduces corruption but also increases transparency, accountability, and public participation, while on the other hand can reduce transaction costs and abuse of public authority. However, to get more effective results, e-government implementation should be accompanied by increasing the quality of supporting factors both from internal and external

organizations.

The remainder of this article is organized as follows. This paper outlines a literature review on corruption in the public sector and e-government implementation. In the second part, the paper presents a methodological approach using a systematic literature review to find, select, and evaluate relevant studies. Third, it presents a descriptive analysis of the literature. Fourth, discuss the synthesis of research results. Finally, this article summarizes the results of a systematic review, limitations of the study, and recommendations for further research.

LITERATURE REVIEW

Corruption in the public sector

Corruption has become a major issue being discussed in the social and economic sciences. In general, corruption is defined as an act of abuse of public and/or private power that aims to obtain personal benefits, both directly and indirectly (World Bank, 2017). Klitgaard (1988) uses the principal-agent-client model to define corruption in a simple equation, that is:

$$\textbf{Corruption = Monopoly + Discretion - Accountability}$$

This equation model uses the premise that corruption occurs when public officials have access to monopoly, have the flexibility to regulate, and low accountability. Starting from this premise, Klitgaard (1988) assumes the principal is a civil servant who oversees other civil servants (agents). In working, agents interact with several clients, such as private parties, business people, and the community. Due to time constraints, the principal cannot control the work of the agent. When information asymmetry occurs, agents can abuse their monopoly power to commit corruption. The situation becomes unmanageable when the benefits of corruption exceed the punishment given (Mahmood, 2004).

The principal-agent-client equation model illustrates that corruption tends to occur in the government sector. It cannot be denied that most corruption involves public officials and institutions, although corruption also exists in the private sector (Tanzi, 1998). Based on the level, corruption happen both macro and micro (Bardhan, 2006). At macro-level (grand corruption), corruption usually distorts the expenditure or resources allocation which arranged by politicians or governments who have a higher authority to gain personal benefits (Rose-Ackerman, 2002). At micro-level (bureaucratic corruption), corruption committed by lower governmental authorities which are responsible for serving the public (Shleifer & Vishny, 1994). Since the public officials have authority to accept or refuse to provide public services, they often abuse their authority. This situation makes it possible to take bribes from the public (Mahmood, 2004).

E-government implementation

The United Nations Division for Public Economics and Public Administration (UNPA) and the American Society for Public Administration (ASPA) defines e-government as an effort to utilizing the internet and world-wide-web for delivering government information and services to citizens (UNPA, 2001). Basically e-government is an attempt to transform the internal government work processes, as well as improve external relations with citizens (Shim & Eom, 2008). A number of studies have identified four relationship interactions in e-government (Danila & Abdullah, 2014; Guha & Chakrabarti, 2014; Huang & Benyoucef, 2014), such as:

1) *Government to Citizens* (G2C)

An online application that is designed to facilitate digital interaction between government and citizens or the government and consumers/customers of public services.

2) *Government to Business* (G2B)

It is an online application designed to provide information services to business people. The government utilizing this application to provide responses to business needs, or online transactions specifically intended for businesses.

3) *Government to Government* (G2G)

An online application that serves the exchange of information from government to government. This system allows the government to share and integrate resource data at various units, institutions, and levels of government (local, provincial, national), or intra-agency.

4) *Government to Employees* (G2E)

It is an online application that facilitates interaction between government and employees and focuses on increasing internal efficiency and effectiveness of government operations by reducing redundancy.

METHODS

Search method

This study uses a systematic review approach to answer research questions. A systematic review is a methodology that specifically identifies existing studies, selects and evaluates contributions, analyzes and synthesizes data, and reports results to draw conclusions (Denyer & Tranfield, 2009). Methodologically, a systematic review is almost similar with content analysis which aims to observe qualitative and quantitative problems (Brewerton & Millward, 2001). This method provides strong evidence to identify knowledge gaps or inconsistent findings (Denyer & Tranfield, 2009). Therefore, a systematic review is seen to provide a comprehensive review serves to explain phenomena holistically, as well as reduce the possibility of literary bias (Denyer & Tranfield, 2009; Durach, Kembro, & Wieland, 2017).

This study review research papers published in peer-reviewed journals. Article searches are performed on various popular digital databases, such as Science Direct, Emerald, Springer, Sage, Taylor and Francis, Wiley Online Library, JSTOR, and Google Scholar. Referring to the research topic, the researcher uses four phrases to trace the articles, such as "e-government and corruption", "electronic Government and corruption", "ICT and corruption", "e-Governance and corruption". Next, the researcher conducted a screening process using four inclusion criteria to obtain articles that were relevant to the research question. The screening process is carried out to produce high-quality synthesis, not garbage in garbage out (Siswanto, 2010). The inclusion criteria are described in Table 1, and the screening process presented in Figure 1.

Search outcomes

This study focuses on the relationship between e-government and corruption. Initial search results for articles published in the 2001-2019 period, there were 110 articles relevant to the research question. Next, the researcher selected the paper based on the title and abstract, as well as ensured that the article was published in a peer-reviewed journal. This review was excluded articles published in conference proceedings and book chapters to avoid the threat of validity due to bias in the selection

of paper. In the last, the researcher ensures that the selected articles are published in reputable journals (indexed by Scopus). After going through a rigorous selection process, this study documents 16 papers that will be analyzed systematically. A complete list of selected articles is presented in Table 3. Before conducting a systematic review, the researcher describes the studies based on the year of publication (in Figure 2), the statistic of journal publication (in Figure 3), research method (in Figure 4), as well as unit analysis and frequency of level (in Table 2).

Table 1. Inclusion criteria of e-government-corruption systematic review

Inclusion criteria	Reasoning
Articles published in the 2001-2019 period	2001 was the first year that the United Nation E-Government Development Index was published (Adjei-Bamfo, Maloreh-Nyamekye, & Ahenkan, 2019; Walker & Brammer, 2012).
Articles only discuss about "electronic government" and "corruption"	This helps to utilize relevant themes to build relationships between e-government and corruption.
Articles published on peer-reviewed journals	Articles published in peer-reviewed journals are of high quality than non-peer reviewed articles (Adjei-Bamfo, Maloreh-Nyamekye, & Ahenkan, 2019).
Articles published in Scopus indexed journals	Scopus is more desirable, as well as covers a superior number of journals and broader journal ranges (Chadegani et al., 2013; Vieira & Gomes, 2009).

Data extraction

Articles selected as samples will be extracted to answer research questions. In general, researchers present selected sample information, such as author, publication year, research objectives, methodology, unit of analysis, and main finding (see Table 3).

Data synthesis

Data synthesis aims to gather empirical evidence from selected articles to answer research questions. Indeed the evidence collected is only a piece and may have little evidence strength, but if the evidence is gathered in the aggregate it certainly has a strong power (Wahono, 2015). In this review, researchers extracted quantitative and qualitative data using narrative synthesis methods. Furthermore, the data is presented in form of flow diagrams, bar charts, pie charts, and tables.
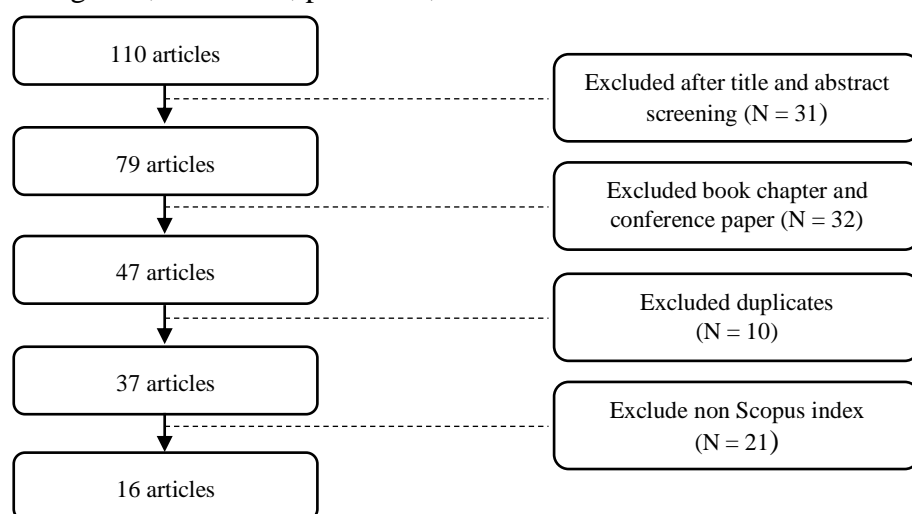
Figure 1. Flow diagram of screening process

DESCRIPTIVE ANALYSIS OF THE LITERATURE

Publication year

This review systematized the results of research on the role of e-government in reducing corruption during the last 19 years (2001-2019). The results of a systematic review indicate that there has been little research about the effects of e-government on corruption are 16 studies. Figure 2 shows the frequency of researchers' interest in this topic for 19 years.
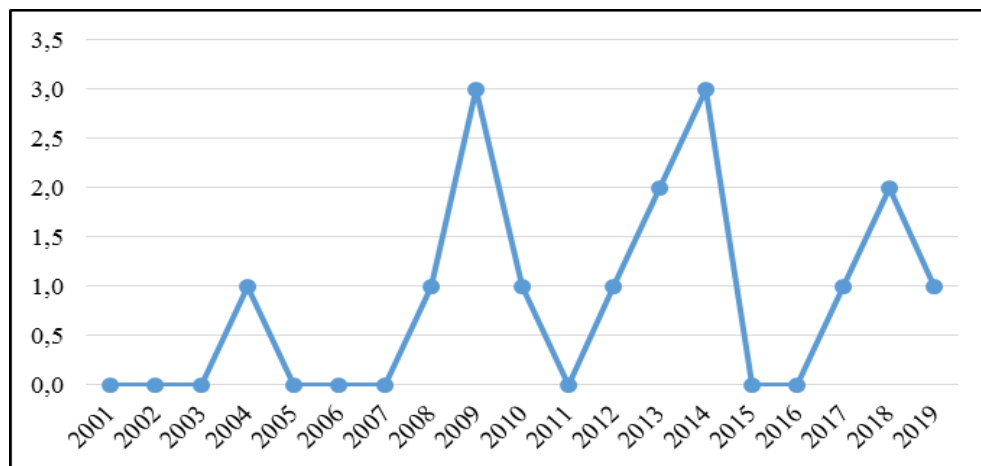
Figure 2. Publication year of synthesized articles based on focus from 2001 to 2019

Figure 1 shows that academic's interest to examine the role of e-government to reduce corruption is very volatile. Although e-government effectiveness has received great attention from academics and practitioners, there have been little researchers who are interested in examine e-government and corruption. This condition might be based on several reasons, as follows. First, corruption is illegal so it does not leave traces that can be found directly in document or computer records (Nam, 2018). Second, there are limitations to accessing or collecting information about corruption (Ades & Di Tella, 1999; Rajan & Wulf, 2006), Third, corruption is difficult to measure and difficult to develop an objective measure of corruption. There is no appropriate method to find out the amount of corruption's occurs (Nam, 2018). Empirical research often relies on perception data as indicators of corruption such as the Corruption Perception Index, as used the sample articles in this study (Basyal, Poudyal & Seo, 2018; Elbahnasawy, 2014; Kim, 2014; Shim & Eom, 2008, 2009). Although at the beginning of the research period there were still publication limitations, systematic review results showed the number of studies on this topic has increased since 2007. Thus, the relationship between e-government and corruption needs to be reviewed in the future.

Journal of the synthesis sample

After the screening process, there are 13 Scopus indexed journal names representing 16 articles selected for review. E-government can be seen as sitting at the cross-roads between a number of other research domains, such as information systems, business administration, political science, and economics. From 13 journal names, there are three journals that publish more than one article such as Government Information Quarterly, International Review of Administrative Sciences, and International Journal of Public Administration (in Figure 3).
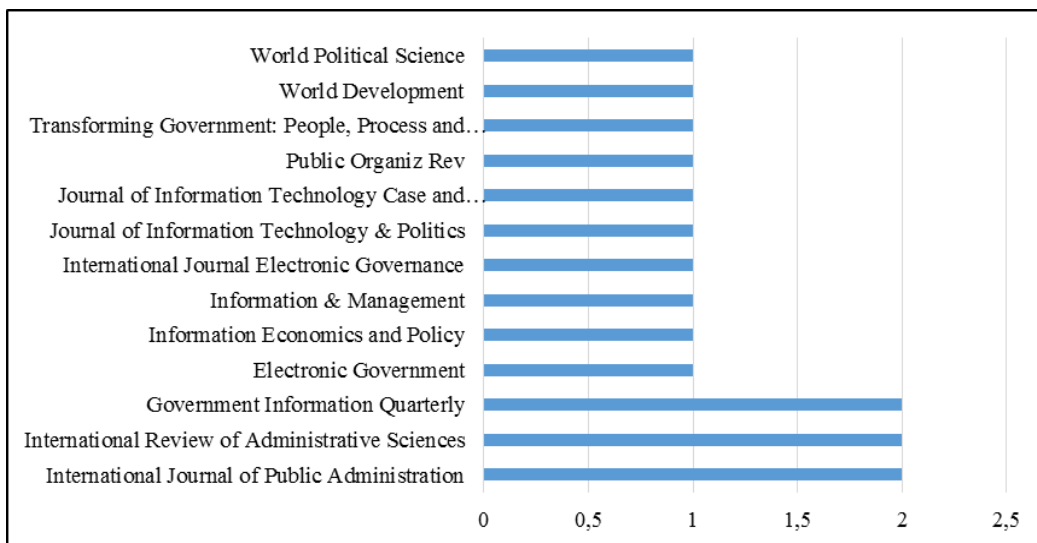
Figure 3. Statistic of journal publication

Research method

Based on the research method, most of the articles synthesized were archival research (62.50%). This study uses secondary data, namely analyzing panel data to compare e-government implementations and levels of corruption in several countries. In addition, there is around 18.75% of articles that use surveys to analyze the perceptions of government (public) officials, private officials, and citizens regarding the effectiveness of e-government in reducing corruption. Other articles use case studies (12.5%) and conceptual paper (6.25%) method.
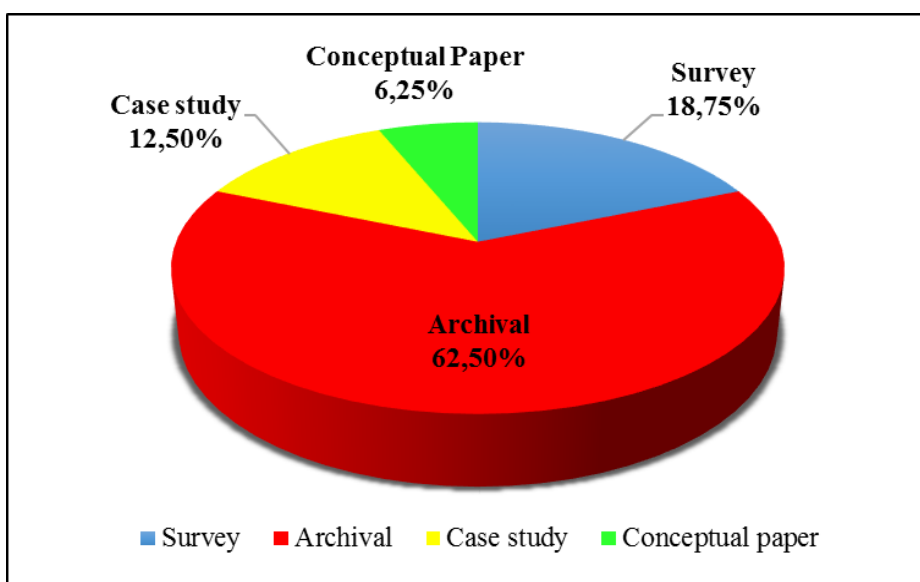
Figure 4. Proportion of methods used for e-government and corruption studies

Unit analysis and frequency of level

Table 2 shows the research analysis unit and the level of analysis, such as international, national, and local government levels. Based on the unit of analysis, the synthesis sample mostly analyzed macro panel data obtained from the organization's

website (62.50%), such as Transparency International (Basyal, Poudyal & Seo, 2018; Elbahnasawy, 2014; Kim, 2014; Shim & Eom, 2008, 2009) and World Governance Indicators (Krishnan, Teo & Lim, 2013; Nam, 2018; Park & Kim, 2019). There are 2 articles or 12.50% of the articles that analyze policies and practices. The remaining 4 articles analyze the perceptions and responses of citizens, public officials, and private officials selected for this study. In terms of frequency of level, most of the research is concentrated at the international level (62.50%), while other articles examine the national level (25%) and local government (12.5%).

Table 2. Unit analysis and level of analysis

Unit analysis	Quantity	Percentage (%)	Level of analysis	Quantity	Percentage (%)
Citizens	1	6.25	International	10	62.50
Public officials	1	6.25	National	4	25.00
Public and private officials	1	6.25	Local government	2	12.50
Citizens and public officials	1	6.25			
Policies and practices	2	12.50			
Websites	10	62.50			
Total	16	100.00	Total	16	100.00

Source: Data processed

RESULTS AND DISCUSSION

The role of e-government in reducing corruption

E-Government is a fundamental strategy that is widely used to modernize the public sector. The implementation of e-government is expected to help governments delivery services and transform relations with citizens, businesses and other arms of government (Guida & Crow, 2009). It is not less important that e-government is expected to reduce or eliminate the risk of corruption. To answer the research questions, Table 3 (in Appendix 1) presents the results of systematic reviews.

The role of e-government in reducing corruption has always been the focus attention of academic literature. Theoretically, e-government seems to be a useful tool for increasing efficiency, effectiveness, and transparency, which ultimately helps reduce corruption. However, the systematic review results in Table 3 show mixed findings. In many cases, e-government has indeed been able to eliminate or at least significantly reduce corruption (Abu–Shanab, Harb, & Al–Zoubi, 2013; Choi, 2014; Kim, Kim & Lee, 2009; Krishnan, Teo & Lim, 2013; Park & Kim, 2019; Shim & Eom, 2008, 2009) are even seen to have the same effectiveness as traditional anti-corruption strategies. However, some empirical research results have failed to prove e-government's "power" to against corruption (Basyal, Poudyal & Seo, 2018), especially in the state-owned business sector (Sheryazdanova & Butterfield, 2017). Thus, it should be noted that not all countries that adopt a digital government will successfully implement the system as an anti-corruption tool.

On the other hand, systematic review results show that some researchers still doubt the effectiveness of e-government in reducing corruption (Andersen, 2009; Cho & Choi, 2004; Hossan & Bartram, 2009; Ojha & Palvia, 2012). E-Government is seen as not yet fully able to carry out its main function as an anti-corruption strategy. This digital system can play a good role if it gets technical support, such as improving

telecommunications infrastructure, as well as the reach and quality of online services to public (Elbahnasawy, 2014), requires the rule of law supremacy (Kim, 2014), and increased political and economic capacity (Nam, 2018). This finding also confirms that e-government is not a single variable that determines the success of anti-corruption strategies. E-Government can be a "powerful" tool to curb corruption if there is good cooperation between the state and its government.

In order to understand the role of e-government in reducing corruption, the following is e-government roles discussion to improving the quality of public services, increasing transparency and accountability, reducing transaction costs, increasing citizen participation, reduced the abuse of public power, as well as improving law enforcement, which is explained as follows:

1. Increased public service quality

   In general, e-government is the utilizing of the internet and the world-wide-web to delivery information and services from the government to citizens. Indeed, the initial purpose of e-government implementation is to improve public service quality, not as an anti-corruption strategy as commonly found in developing countries (Mahmood, 2004). In this function, the government focuses on the administrative reformation to provide optimal services to citizens as the customer. To support this function, the government must provide standardized public services so that citizens gets the same quality of service. E-Government is considered to prevent corruption because of its success to eliminate decision making based on bureaucrats "wisdom" (Sheryazdanova & Butterfield, 2017; Shim & Eom, 2008). In addition, the digital government be able to increases service accuracy, reduces waiting times, and reduces citizens' dependence on government officials (Shim & Eom, 2008).

2. Increased transparency and accountability

   One of the main implications of implementing e-government is to create transparency in the administration of public services. It means that every citizen has access to public information, including budget data and government spending. Indirectly, e-government provides an opportunity for citizens to monitor the process of allocating public funds by politicians and government officials (Charoensukmongkol & Moqbel, 2014). Information technology allows every citizen to monitor the actions of government employees. As a result, corruption is the riskiest action because it is likely to be easily detected. Corruption opportunities are greater when public officials have the authority to conduct monopolies, have flexibility in managing public assets, and lack of accountability (Lio, Liu & Ou, 2011). Thus, transparency as a strong disinfectant to prevent corruption in government organizations (Cho & Choi, 2004).

3. Reduced transaction cost

   Interaction between officials and citizens is considered as one of the causes of corruption. When public service transactions are manual, personal interactions between government officials and citizens will create corruption opportunities. Personal contact allows citizens to offer bribes to government officials so they can ignore regulations or laws (Meon & Weill, 2010). For example, when applying for services, citizens can pay "express fee" or give gifts to speed up the service process and establish connections with public officials (Charoensukmongkol & Moqbel, 2014; Shim & Eom, 2008). Public officials will provide fast service to citizens who

pay "express fee" (Shim & Eom, 2008). The effectiveness of e-government will reduce operation cost, improved response time, quality and speed of service, and optimize public resources (Affisco & Soliman, 2006; Wong, Hideki, & George, 2011)

4. Increased citizen participation

   E-government provides opportunities for citizens to participate in the government system. In a traditional government system, citizen participation does not take place effectively because it requires a series of meetings, while public officials difficult to motivate the public to participate in the meeting. As a result, participatory processes require high commitment and extraordinary patience (Sandoval-Almazan & Gil-Garcia, 2012). In the digital government, technological sophistication will increase citizen involvement in government. Citizens have more opportunities to express their opinions through e-government websites, as well as get direct feedback from public officials as administrator. E-government can involve more participants because it requires lower coordination costs than traditional participation. The process of citizen engagement is also faster and simpler so that can voice their opinions at any time (Shim & Eom, 2008). Thus, citizen participation in the making process and policies implementation is expected to be a government partner in reducing corruption (Cho & Choi, 2004).

5. Reduced the abuse of public power

   The digitalization process is seen as being able to reduce the opportunities for bureaucrats to carry out arbitrary actions (Bhatnagar, 2003). Corrupt bureaucrats usually have discretionary power. This causes them unimpeded to accept or refuse to provide public services. Abuse of authority is their effort to accept bribes from citizens. In some cases, government officials deliberately extended transaction processing times so that citizens who needed services were willing to give bribes. Government officials will approach their citizens and negotiate to accept bribes (Kumar & Best, 2006), even asking for bribes directly and informing citizens of the nominal value of bribes needed to get a service (Charoensukmongkol & Moqbel, 2014). Therefore, e-government seeks to control corruption by reducing official opportunities to carry out arbitrary actions.

6. Improved law enforcement

   The digital government was able to strengthen the process of law enforcement to reduce the occurrence of corruption (Elbahnasawy, 2014). This system allows citizens to report corrupt activities anonymously. For example, government websites in India and China allow citizens to share their experiences anonymously when paying bribes to government officials. The authorities use this information to carry out legal proceedings and tighten law enforcement. Consistent law enforcement shows the government's seriousness in dealing with the problem of corruption (Charoensukmongkol & Moqbel, 2014; Sheryazdanova & Butterfield, 2017).

E-government challenges: e-government as corruption opportunity

Theoretically, the digital-government as a fundamental strategy to against corruption. Nevertheless, the results of a systematic review show that e-government was not always able to reduce corruption. In some cases, e-government as an effective tool to identify and reduce corruption, but on the other hand, it also creates new

opportunities for corruption (Heeks, 1998). Heeks & Bhatnagar (1999) state that the adoption of information, technology, and communication in developing countries shows the occurrence of "conception-reality gaps". As a result, e-government precisely creates new corruption opportunities. This study also outlines why the implementation of e-government can provide opportunities for public officials to commit corruption.

First, e-government creates a digital divide between bureaucrats themselves, or between bureaucrats and citizens. The problems that cause the digital divide such as: a) technology literacy, usability, accessibility, and functionality (Barzilai-Nahon, 2006; Bertot, 2003). The digital divide occurs when e-government implementation requires special knowledge of bureaucrats to operationalize this system. Competent bureaucrats can abuse their competence to deviant behavior. Inequality of literacy and access to technology enables corrupt bureaucrats to still continue corruption, or even take more aggressive actions (Bhatnagar, 2003). The citizen who has a better understanding of technology are also more likely to get better public services than those who do not understand technology at all. Therefore, digital divide creates new opportunities for corrupt bureaucrats to commit corruption.

Second, excessive investment in e-government infrastructure also provides opportunities for corruption. E-government implementation must to supported by adequate technological facilities and infrastructure. However, the bureaucrats often exploited this opportunity to mark-up budget allocation (Rustiarini, Sutrisno, Nurkholis, & Andayani, 2019), particularly for e-government projects. Previous research has shown that the relationship between infrastructure investment (technology) and corruption depicted using the letter U. This means that adequate investment in infrastructure provision can reduce corruption, but excessive investment actually increases the occurrence of corruption (Charoensukmongkol & Moqbel, 2014). Thus, excessive e-government investment actually thwarts the role of e-government in combating corruption.

Third, e-government does play a major role in controlling corruption but it is not the only effective strategy. Corruption is a multi-dimensional problem caused by various factors, such as political, social, institutional, and cultural (Bertot, John, Jaeger, & Grimes, 2010). The survey results conducted by Hossan & Bartram (2009) on government and private officials showed that respondents from private officials had positive perceptions and high expectations that e-government could reduce corruption. Private officials are more optimistic about the potential and role of e-government in realizing efficiency and reducing corruption, than government officials. Government officials consider corruption in government organizations to be endemic. The e-government initiative is only a small part of the government's efforts to reduce the possibility of corruption. The survey results also confirm previous findings that one of the most difficult challenges in implementing e-government is changing organizational culture, especially in the public sector (Al-Sebie & Irani, 2005).

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The potential of e-government to eradicate corruption is increasingly popular among academics and practitioners. This potential has been realized in various works of

literature and studies, as well as implemented in public policies. In fact, almost most public organizations encourage the application of e-government as an anti-corruption strategy. Therefore, research on the relationship between e-government and corruption is still relevant until now.

This study seeks to re-examine the relationship between e-government and corruption using a systematic review. This paper systematizes research published over the past 19 years to present a synthesis of research results about the role of e-government in reducing corruption. Generally, the systematic review results show that e-government as a "powerful" anti-corruption tool, but this result is not entirely consistent. Given the success of e-government is not universally nature, this result must be considered as a preliminary review, not a definitive result. The synthesis results also note that there are other factors that influence e-government and corruption relationship. Thus, these results are expected to motivate other researchers to reexamine this topic by considering the role of other potential variables.

Recommendations

This study has several limitations. First, this paper only documents 16 articles that are relevant to the research question. This is due to the limited number of research results published in peer-reviewed journals, particularly indexed by Scopus. Future research can add Web of Science (WoS) indexed journals to enrich the literature. Secondly, the systematic review results provide evidence that previous results have not been to fully prove the role of e-government in against corruption. Heeks (1998) and Kim, Kim & Lee (2009) states that organizations need a holistic strategy to support e-government initiative. The successful of e-government implementation is inseparable from internal organizational factors, such as leadership, bureaucratic professionalism, bureaucratic quality, and adequate law enforcement. These internal factors as an organization's social capital to create a culture of transparency in organizational governance. The effectiveness of e-government is also determined by external factors, such as politics, economics, and social culture. Shortly, each organization should collaborate on internal and external factors of the organization to increase the effectiveness of e-government in reducing corruption.

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Appendix

Tabel 3. Systematic review on e-government and corruption studies

Author (year)	Research purpose	Methodology	Main finding
Cho & Choi (2004)	Examine the effectiveness of OPEN system (Online Procedures ENhancement for civil applications) as e-government in controlling corruption.	Survey	The survey results are not entirely consistent but in general, it can be concluded that the OPEN system is effective in reducing corruption.
Shim & Eom (2008)	Assess the impact of e-government on corruption.	Archival	E-Government had a consistently positive impact on reducing corruption.
Andersen (2009)	Assess the impact of e-government on control of corruption.	Archival	E-Government is a useful tool in reducing corruption.
Kim, Kim & Lee, (2009)	Evaluating the development of an OPEN system to reduce corruption.	Case study	The OPEN system has a direct effect on reducing the level of corruption.
Shim & Eom (2009)	Examine the effectiveness of Information Communication and Technology (ICT) in reducing corruption.	Archival	ICT (measured by e-government readiness) is an effective tool for reducing corruption.
Hossan & Bartram (2009)	Analyzing the perception of government and private officials regarding the potential and benefits of e-government to reduce corruption.	Survey	Private officials have a positive perception and higher expectations that e-government can reduce corruption, but it is different with government official responses.
Ojha & Palvia (2012)	Analyze five cases of corruption that implement e-government, and develop a conceptual model related to the impact of e-government on corruption.	Conceptual paper	The implementation of e-government does not fully reduce corruption. There are three clear successes, one partial success, and one failure in reducing corruption.
Abu–Shanab, Harb, & Al–Zoubi (2013)	Investigate public perceptions regarding the effectiveness of e-government in reducing corruption.	Survey	E-government has an effective role in reducing corruption. As e-government matures, level of corruption in a country decreases.
Krishnan, Teo & Lim (2013)	Explore the relationship between e-government maturity and the level of	Archival	E-government maturity has a negative effect on

Author (year)	Research purpose	Methodology	Main finding
	corruption.		the level of corruption.
Choi (2014)	Examine the effect of e-government on corruption.	Archival	E-government has a positive influence on reducing corruption.
Elbahnasawy (2014)	Investigate the impact of e-government and internet adoption on corruption eradication.	Archival	E-government as an a powerful tool in reducing corruption via telecommunication infrastructure and the scope and quality of online services.
Kim (2014)	Examine linkages of anti-corruption initiatives, especially e-government and anti-corruption	Archival	E-government could be an effective tool to curb corruption in government, but the rule of law is the most powerful predictor of anti-corruption.
Sheryazdanova & Butterfield (2017)	Analyze Kazakhstan's efforts in developing e-government capacity, and investigate of its effectiveness in reducing corruption.	Case study	E-government is not a "panacea" to reduce corruption. This strategy is not able to limit oligopolistic behavior, especially in the state-owned business sector.
Basyal, Poudyal & Seo (2018)	Examine the relationship between e-government and corruption.	Archival	No relationship exists between e-government and corruption.
Nam (2018)	Examines the influence of e-government maturity on corruption control.	Archival	Given political and economic capacities, e-government can help reduce corruption at the country level.
Park & Kim (2019)	Empirically examine the effect of e-government in reducing corruption in all countries.	Archival	E-government as a whole significantly reduces corruption.

The economic spillover of South Sumatera toward economic of Southern Sumatera Provinces in Indonesia

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Abstract
This study to investigation effect of hinterland government expenditure each region, Gross Regional Domestic Product (GRDP), investment, consumer price index, and the road length of South Sumatera province toward the GRDP of other provinces in Southern Sumatera such as Jambi, Lampung, Bengkulu, and Bangka-Belitung Island. The data use secondary data during 1986-2015, data source from the Central Bureau of Statistics, Directorate General of Regional Fiscal Balance, and Indonesia Investment Coordinating Board. The analysis uses multiple regressions with Ordinary Least Square (OLS) method. The results showed that the economic spillover of South Sumatera consisting of gross domestic product, investment, consumer price index and the road length caused spread effects to Jambi, Lampung, Bengkulu, and Bangka Belitung with positive values except for Bangka Belitung whose consumer price index was negative.

INTRODUCTION

Development basically is a multidimensional process that involves changes in social structure, attitudes of society and national institutions. It also includes changes in the rate of economic growth, reduction in income inequality, and poverty eradication (Sinding, 2009). To achieve the desired objectives, the development of a country can be directed to three main things, namely increasing the availability and distribution of basic needs for the community, community living standards and the ability of the community to access, both economic and social activities (Todaro & Smith, 2011).

Shanzi & Feser (2010) found that spread-effect occurred in urban areas, while backwash-effect occurred in rural areas. Thus, it was illustrated that the impact of the Growth Center strategy differed across the hierarchy thus suggesting that the expected trickle-down effect around the growth center did not occur evenly. Furthermore, a study conducted by Basile, Capello & Caragliu (2011) the results showed that the effect of geographic and relational proximity on knowledge spillovers strengthened one another; the data clearly showed that the immediate area in terms of spatial to exchange knowledge was easier when having the same level of confidence.

In addition, the study conducted by Pasaribu (2015) showed that the spillover effect of growth centers in Kalimantan detected using the LM Spatial lag test significantly proved that there was regional dependence on output, labor, and investment growths. Simultaneous testing of their models proved that the major factors affecting all the three growths were spatial interactions with nearby growth centers. While multi-polarization test results between growth centers in and outside Kalimantan confirmed by spatio-temporal test on goods flow and passenger flow showed significant results. The polarization of the entry of goods in Kalimantan tended to be faster, as opposed to result for polarization of passenger flow to Kalimantan. These findings indicated that growth centers in Kalimantan had high demands for goods from outside their territory, while residents living in growth centers in Kalimantan were more likely to migrate to growth centers outside it.

The process of economic growth of a region is closely related to the geographic position between one region and another. The hypothesis of spread-backwash effect by Myrdal (1957) against geographic events and the spread of economic growth contribute to the development of regional economic studies as it attempts to explain the effects of growth spreading from the economic aspects (Chiang, 2018; Samimi & Jenatabadi, 2014). The spread effect occurs when the growth of Gross Regional Domestic Product (GRDP) caused by the growth center has a positive coefficient meaning that the development of the region of growth center will increase the development of GRDP in hinterland area (Dholakia, 2009). Backwash effect occurs when the development of GRDP in the region of growth center makes a decrease in the development of hinterland GRDP reflected from negative coefficient. The interregional linkage in the economic field can be in the form of: flow of goods, intermediate goods, final goods, market links, production linkages, consumer shopping patterns, control patterns, economic ownership, income streams including remittance, capital flows, formal and informal financial systems, and labor migration (Bendavid-Val, 1991).

The economic development leads to a circular cause-effect process that makes the rich get more profits, and those left behind are hampered. Backwash effects tend to grow and spread effects tend to shrink (Myrdal, 1957). Cumulatively this trend is exacerbating international inequality and causing regional inequality among underdeveloped countries (Alvaredo & Gasparini, 2013; Goda, 2016).

Positive influence on the development of the surrounding region is called the spread effect such as the opening of employment opportunities, the number of incoming investments, higher labor costs, and the population able to market the raw materials. Its negative effect is called backwash effect, like the emergence of regional imbalance (Chiang, 2018; Samimi & Jenatabadi, 2014). The imbalance of this region occurs because the flow of interaction between the hinterland regions to the central region of growth is greater than the interaction flow from the central region of growth to the hinterland region. The real form of this phenomenon can be known from the large dependence of the village community on the central areas of growth.

Backwash effects and spread effects are unlikely to run in balance. First, much larger regional inequality occurs in the hinterland area. Secondly, in the suburbs, the regional inequality widened and the regions in the developed regions narrowed further. The higher the level of economic development that has been achieved an area, the stronger the spread effect will occur because the development is accompanied by

transportation and communication and the level of education is getting better (Jhingan, 2012).

South Sumatera is a region with the greater potential to grow than other regions based on the value of Gross Regional Domestic Product at constant prices. South Sumatera has a GRDP value greater than other regions of Southern Sumatera meaning that the economic region that can be set as a growth center have excess factors that can affect the growth of the surrounding area.

Table 1. GRDP on the Basis of constant price 2010 (IDR. Billion) 2011-2015

Provinces	2011	2012	2013	2014	2015
Jambi	97,740.9	104,615.1	111,766.1	119,984.7	125,038.7
South Sumatera	206,360.7	220,459.2	232,175.0	243,093.8	254,022.9
Bengkulu	30,295.1	32,363.0	34,326.0	36,206.7	38,067.5
Lampung	160,437.5	170,769.2	180,620.0	189,790.0	199,525.4
Bangka Belitung	38,014.0	40,104.9	42,190.9	44,159.4	45,961.5

Source: Central Bureau of Statistics, Statistics Indonesia, 2016

In addition to the value of GRDP, South Sumatera province has a greater investment value compared to the provinces in Southern Sumatera. It shows that it is a destination province of domestic and foreign investors. With the increasing value of investment from year to year, as well as the construction of infrastructure such as the corridor of the eastern route of Sumatera, the development of Tanjung Api-Api port, the Tanjung Api-Api industrial estate, Inderalaya-Palembang-Betung toll road, and the role of South Sumatera as the food barn and energy in Sumatera, making South Sumatera a region that has the appeal to conduct economic activities. High investment value can affect the economic growth of a region, because of the multiplier effects resulting from such investment activities such as employment and an increase of flow of goods and services from one region to another.

Table 2. Realization of domestic and foreign investment of provinces in Southern Sumatera

Provinces	2011		2012		2013		2014		2015	
	DDI*	FDI**	DDI*	FDI**	DDI*	FDI**	DDI*	FDI**	DDI*	FDI**
Jambi	2,134.80	19.50	1,445.70	156.30	2,799.60	34.30	908.00	51.40	3.540.00	107.70
South Sumatera	1,068.90	557.30	2,930.60	786.40	3.,396.00	485.90	7,042.80	1,056.50	10,944.10	645.80
Bengkulu	0.00	43.10	52.60	30.40	109.60	22.30	7.80	19.30	553.90	20.60
Lampung	824.50	79.50	304.20	114.30	1,325.30	46.80	3,495.70	156.50	1.102.30	257.70
BangkaBelitung	514.40	146.00	533.50	59.20	608.20	112.40	615.50	105.00	1.023.70	82.70

Source: Central Bureau of Statistics, Statistics Indonesia in several years (processed)
*Note: *Domestic Direct Investment (Billion IDR), **Foreign Direct Investment (Million U$D)*

Investment is an injection for the expansion of growth spread in a region through infrastructure development and other capital expenditures (Yuliana, Bashir, & Rohima, 2019). The consideration is that investment is still a major supporting factor in driving growth in Indonesia (Soebyakto & Bashir, 2017). The fulfillment of the need for the development of physical investment is strongly influenced by the need for raw materials, information, and technology from outside the region. The level of commodity prices in a certain region can affect the economic growth of the region through the working of interregional trade mechanisms (Marwa, Bashir, Adam, Azwardi, & Thamrin, 2017; McCann, 2010). The price level is an economic variable that plays an important role and is a strategic economic variable because it can affect the workings of

market mechanisms in an economy (Adam, Marwa, Azwardi, Thamrin, & Bashir, 2017).

South Sumatera province is expected to be a province capable of performing functions and able to develop hinterland region. The spillover effect that emerges from economic activities conducted by South Sumatera province makes the region around the development centers namely Jambi, Bangka-Belitung Islands, Bengkulu and Lampung provinces will benefit from regional spillover. In addition, the benefits also come from interregional cooperation and interregional trade (changes in demand and supply influenced by the Consumer Price Index in South Sumatera Province) resulting in a beneficial effect due to the spillover effect of South Sumatera Province in the surrounding area called spread effect.

Interregional trade in Southern Sumatera provinces is supported by a country road length infrastructure owned by each province and the distance of district/cities among provinces connected by directly interconnected land routes, except the Bangka Belitung Islands province, which does not have a direct land route in the region of South Sumatera. Therefore this study to investigate the economic spillover effect such as government expenditure, Gross Regional Domestic Product, investment, consumer price index, and the road length of South Sumatera province toward the Gross Regional Domestic Products of other provinces in Southern Sumatera such as Jambi, Lampung, Bengkulu, and Bangka-Belitung Island.

METHODS

The scope of this study discussed the economic and investment conditions in the Southern Sumatera region covering the Province of South Sumatera as a growth center, while the hinterland areas consisted of Jambi, Lampung, Bengkulu, and Bangka-Belitung Islands provinces. The types of data used in this study were secondary data i.e. publications from Central Bureau of Statistics (BPS), Bank Indonesia, Investment Coordinating Board (BKPM), Directorate General of Fiscal Balance (DJPK) and literature study in the form of articles, journals and other sources associated with this study. The data used were secondary data of 1986 to 2015.

The descriptive method was conducted by presenting and compiling existing data into tables as information material to be analyzed using a qualitative approach. The method of quantitative analysis used to identify the economic spillover effect on economic of Southern Sumatera provinces use multiple regressions with Ordinary Least Square (OLS) method. Based on Richardson's regional income theory, the regression model was used to see the magnitude of the spillover effect of South Sumatera Province (Growth Center) to hinterland areas as follows:

$$\ln Y_h = a_0 + \beta_1 PP_h + \beta_2 Y_{ss} + \beta_3 INV_{ss} + \beta_4 IHK_{ss} + \beta_5 \ln PJ_{ss} + e_1 \ldots\ldots\ldots\ldots\ldots (1)$$

Furthermore, for each regions, the semi-log models were used as follows:

$$\ln Y_J = a_0 + \beta_1 PP_J + \beta_2 Y_{ss} + \beta_3 \ln INV_{ss} + \beta_4 IHK_{ss} + \beta_5 \ln PJ_{ss} + e_2 \ldots\ldots\ldots\ldots\ldots (2)$$

$$\ln Y_L = a_0 + \beta_1 PP_L + \beta_2 \ln Y_{ss} + \beta_3 \ln INV_{ss} + \beta_4 IHK_{ss} + \beta_5 \ln PJ_{ss} + e_3 \ldots\ldots\ldots\ldots\ldots (3)$$

$$\ln Y_B = a_0 + \beta_1 PP_B + \beta_2 Y_{ss} + \beta_3 INV_{ss} + \beta_4 \ln IHK_{ss} + \beta_5 \ln PJ_{ss} + e_4 \ldots\ldots\ldots\ldots\ldots (4)$$

$$\ln Y_{BB} = a_0 + \beta_1 PP_{BB} + \beta_2 Y_{ss} + \beta_3 INV_{ss} + \beta_4 IHK_{ss} + \beta_5 PJ_{ss} + e_5 \ldots\ldots\ldots\ldots\ldots (5)$$

where: Y_h is GRDP of hinterland regions; α is αconstants; β is coefficient of parameters; Y_J is GRDP of Jambi province; Y_J is Government expenditure of Jambi province; Y_L is GRDP of Lampung province; PP_L is Government expenditure of Lampung province; Y_B is GRDP of Bengkulu province; PP_B is Government expenditure of Bengkulu province; Y_{BB} is GRDP of Bangka-Belitung Island; PP_{BB} is Government expenditure of Bangka-Belitung Island; PP_h is hinterland regional government expenditure; Y_{SS} is GRDP of South Sumatera; INV_{SS} is Investment of South Sumatera; IHK_{SS} is consumer price index of South Sumatera; PJ_{SS} is road length of South Sumatera; e is error term.

RESULTS AND DISCUSSION

One of the most indicators commonly used to find out the economic condition of a region was the Gross Regional Domestic Product (GRDP). Within 30 years, the value of GRDP in South Sumatera increased very significantly; the highest increase of GRDP was achieved by South Sumatera province. According to business field at constant price, GRDP of South Sumatera province in 1986 was 4,249 billion rupiah and increased to 254,022.9 billion rupiah in 2015.

During the period of 1986 until 2015 there was a change of economic sector contribution to the formation of GRDP South Sumatera. In 1986 the trade sector contributed the most with 22.95%, agriculture sector with contribution of 21.58%, manufacturing industry sector 20.53% and mining and quarrying sector by 18.43%. While in 2015, sectors that contribute greatly to the economy of South Sumatera was the mining sector of 21.87%, the manufacturing sector with a contribution of 18.27% and the agricultural sector by 16.5%.

The rate of economic growth during the period of 30 years in South Sumatera has fluctuated. The rate of economic growth in 1986 grew by 4.60%, during the period of 1986 to 2015, the highest economic growth rate occurred in 1992 reaching 9.29%, while in 1998 the rate of economic growth contracted to minus 6.81%. The monetary crisis that infected the Indonesian economy which began in 1997 peaked in 1998 resulted in all economic sectors in all parts of Indonesia decreased not an exception the area in southern Sumatera because of the rapidly evolving economic crisis developed into a multidimensional crisis including crises in the economic, political, social and even legal fields.

Economic sectors that were able to survive during the economic crisis were agriculture with the growth of 4.44%, and electricity, gas and water sector grew by 4.83%. Compared to the provinces of southern Sumatera, Lampung Province was the province with the lowest economic growth rate contraction in southern Sumatera in 1998 reaching minus 6.95%, Bengkulu province minus 6.27% and Jambi province minus 5.41%, while in the year 1998 Province of Bangka Belitung Islands was still incorporated with the Province of South Sumatera.

The estimation results of this study in Table 3 indicated that estimation result of each region, first, Jambi province (Eq.2) showed that the value of R^2 was 0.8810 meaning that 88.10% of GRDP Jambi Province could be explained by the variables of Jambi Provincial Government Expenditure (PP_J), GRDP of South Sumatera Province (Y_{SS}), South Sumatera Provincial Investment (INV_{SS}), Consumer Price Index of South

Sumatera province (IHK$_{SS}$) and road length of South Sumatera province (PJ$_{SS}$), while 11.9% were explained by other variables not included in the estimation model.

The second, Lampung province (Eq. 3) the estimation result show that the value of R^2 was 0.9958 meaning that 99.58% GRDP of Jambi province could be explained by the variables of Lampung Provincial Government Expenditure (PP$_L$), GRDP of South Sumatera province (Y$_{SS}$), South Sumatera Provincial Investment (INV$_{SS}$), consumer price index of South Sumatera province (IHK$_{SS}$) and road length of South Sumatera province (PJ$_{SS}$), while 0.42% was explained by other variables not included in the estimation model.

Table 3. The model estimation result

Model	Descriptions	Model Estimation of Region			
		Jambi	Lampung	Bengkulu	Bangka Belitung
C	Constant	-13.91392 [-1,62769]	- 0.12968 [-0,33054]	3.70596 [5,88813]**	15.27708 [10.35596]**
PP	Government expenditure of hinterland each region	0.00078 [2,83689]**	0.00206 [2,29384]**	0.693093 [12,2327]**	0.08411 [4.72406]**
Y	GRDP of South Sumatera	0.00473 [3,16113]**	0.89100 [2,96232]**	0.00164 [2,57250]**	0.00281 [5.27125]**
INV	Investment of South Sumatera	0.16751 [2,65985]**	0.00212 [4,07932]**	0.00458 [3,41031]**	0.00084 [8.70869]**
IHK	Consumer price index of South Sumatera	0.00454 [2,13943]**	0.001201 [3,11476]**	0.50182 [4,26008]**	-0.00309 [-3.92461]**
PJ	Road length of South Sumatera	2.77906 [2,92725]**	0.00817 [6,05261]**	0.00311 [2,13923]**	0.00171 [2.31870]**
R^2 f-test		0,881089 [43,97581]***	0,995846 [139,1588]***	0,987038 [442,6480]***	0.961212 [75.3444]***

Note: Dependent variable is Y (GRDP each region); Digit in parentheses [ ] is t-test
Level of significant at ***1%, **5%, and *10%

The third, region of Bengkulu (Eq. 4) estimation result show that R^2 was 0.9870 meaning that 98.70% of GRDP of Jambi province could be explained by the variables of Bengkulu Provincial Government Expenditure (PP$_B$), GRDP of South Sumatera province (Y$_{SS}$), South Sumatera Provincial Investment (INV$_{SS}$), consumer price index of South Sumatera province (IHK$_{SS}$) and road length of South Sumatera province (PJ$_{SS}$), while 1.3% was explained by other variables not included in the estimation model.

The fourth, the estimation result of Bangka-Belitung Islands province (Eq. 5) showed that R^2 was 0.9612 meaning that 96.12% of GRDP of Jambi province could be explained by the variables of Bangka-Belitung Islands Provincial Government Expenditure (PP$_{BB}$), GRDP of South Sumatera province (Y$_{SS}$), South Sumatera Provincial Investment (INV$_{SS}$), consumer price index of South Sumatera province (IHK$_{SS}$) and road length of South Sumatera province (PJ$_{SS}$), while 3.88% was explained

by other variables not included in the estimation model.

In Table 3 show government expenditure variables have positive sign and significant influence on all study regions. This shows that the government spending on study areas has an effect on economic growth. Regional government expenditures will encourage regional economic growth if local government spending is largely or wholly used to purchase products produced by economic actors in the area. This is in line with the study conducted by Suparta (2009) showing that government spending had a positive and significant impact. The coefficient of government expenditure in all study areas is inelastic meaning that GRDP is not sensitive to changes in government expenditure even though the development of government expenditures increases rapidly every year, especially Lampung and Jambi provinces which have higher government expenditures if compared to Bengkulu and Bangka-Belitung Islands Provinces.

GRDP of South Sumatera province (Y_{SS}) has a positive and significant influence to the GRDP of Jambi (Y_J), Lampung (Y_L), Bengkulu (Y_B) and Bangka-Belitung Islands (Y_{BB}), so it can be concluded that the spillover effect of GRDP of South Sumatera province has a spread effect for hinterland area meaning that the increase in GRDP of South Sumatera province is also able to stimulate increase in GRDP of Jambi, Lampung, Bengkulu and Bangka-Belitung Islands. This is in line with the study conducted by Dholakia, (2009) which stated that regions with high GRDP will provide spread effects, it is also mentioned that the spread effect will be stronger if the economic activity of growth center and hinterland areas have a strong connection to the need of goods, services, and factors of production.

Investment variables show a positive and significant effect meaning that the investment of both domestic and foreign investment can encourage economic activity in South Sumatera region due to the absorption of labor and the increase of output that can increase the growth of GRDP. The result of this study is in line with Pasaribu (2015) showing that the investment variable has a positive and significant effect on output growth. The high level of investment, especially foreign investment, in addition to opening employment also allows the transfer of technology from developed countries that invest. Technology transfer is expected to improve the skill through information about the production process, method and company policy in producing goods and services. If information can be transferred properly, it will stimulate innovation and efficiency in the product produced, thus increasing productivity, GRDP growth, and long-term economic growth. Therefore, investment plays an important role in creating GRDP and regional economic growth. The consumer price index variable shows the positive and significant effect of price level working through the interregional trading mechanism. Price level through market mechanism can affect economic growth of a region.

The IHK elasticity coefficient is inelastic throughout southern Sumatera, meaning that changes in consumer price index in South Sumatera province are not sensitive to changes occurring in the hinterland GRDP. The value of the IHK coefficients on the regression equation indicates a negative sign in the Bangka-Belitung Islands Province, as some basic commodities for the needs of the province are still imported from South Sumatera Province consisting of basic goods (nine basic necessities, textiles, iodine, green beans, soybeans, and peanuts); and strategic goods (cement, fertilizer, and fuel),

so that the increase of consumer price index has a negative effect on GRDP of Bangka-Belitung Islands province, while Jambi, Lampung and Bengkulu provinces show positive sign. The variable of road length showed a positive and significant influence on all study areas. This showed that infrastructure in the form of road length in South Sumatera province can increase economic activity in the regions of Southern Sumatera. The movement of goods flow using land line has an important role in increasing interregional trade. The coefficient elasticity of road length is inelastic in Lampung, Bengkulu and Bangka-Belitung provinces, where as in Jambi Province it is elastic, this is supported by the distance between the capital regions of South Sumatera province closer to the provincial capital of Jambi if compared to other provinces of Southern Sumatera.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This study indicated that government expenditure variable, gross domestic product, investment, consumer price index and road length of South Sumatera shows has positive and significant effect on Gross Regional Domestic Product of Jambi, Lampung and Bengkulu Provinces, only the consumer price index variables provide has negative and significant effect on Gross Regional Domestic Product of Bangka-Belitung Island province.

This implies that economic spillovers of South Sumatera consisting of government expenditure, Gross Regional Domestic Product, investment, consumer price index and road length has a spread effect to Jambi, Lampung, and Bengkulu provinces indicated by the value of Gross Regional Domestic Product of South Sumatera province, investment, consumer price index and road length with positive value, except in Bangka-Belitung Islands province with the value of consumer price index is negative. In addition, the economic development that occurred in the hinterland region is not only influenced by economic factors coming from the region itself but also from the outside region that is from South Sumatera province which acts as a growth center for regions in Southern Sumatera..

Recommendations

The study has recommendations for policymakers such as (1) improving interregional cooperation in Southern Sumatera through various economic activities, technology, and information transfer; (2) improving adequate supporting facilities and infrastructure such as improving the infrastructure of each hinterland region due to the existence of interdependence between regions in meeting the various needs in supporting economic activities; and (3) A necessary further study to find out the effect of boundary or shipping distance among study areas.

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Fiscal decentralization and its impact on industrial development in Jambi Province

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Abstract

This study aims to analyze: 1) factors influencing the degree of fiscal decentralization in Jambi Province; 2) the influence of the degree of fiscal decentralization on the industrial sector in Jambi Province. The analysis model is the panel data regression. The results showed that, first, the economic level, the amount of regional spending, and the investment level significantly influence the degree of fiscal decentralization in Jambi Province. Second, there is a significant impact of the degree of fiscal decentralization on the development of the industrial sector in Jambi Province. This study recommends increasing local own-source revenue in order to improve the degree of fiscal decentralization. Furthermore, the allocation of regional expenditure must be directed towards direct expenditure, especially capital expenditure, which is related to industrial development in Jambi Province.

Keywords: *Fiscal decentralization, GRDP, Investment, Regional expenditure*

JEL Classsification: G38, L52, O23

INTRODUCTION

Regional autonomy and fiscal decentralization policy in Indonesia is a manifestation of the central government authority by giving rights to regional governments to carry out regional economic activities, based on the aspirations and needs of the community. It is expected that there will be an even distribution of development outcomes between regions with this policy (Shankar & Shah, 2003; Canaleta, Arzoz & Garate, 2004).). Fiscal decentralization will deliver optimal benefits if it is followed by adequate financial capacity by the autonomous region (Liu & Zhang, 2018).

According to the Law No. 33 of 2004, local revenue sources in the context of implementing fiscal decentralization consist of Local Own-Source Revenues, Balance Funds, and Other Legitimate Revenues. The enactment of Law No. 32 of 2004 and Law No. 33 of 2004 provides opportunities for regions to improve its financial performance, in order to realize regional independence and reduce fiscal dependence on the central government. Increased on the regional independence level is closely related to the capacity of the region to manage its Local Own-Source Revenue (Putra & Hidayat, 2016).

Jambi Province is one of the provinces in Indonesia. Many efforts had been done in increasing independency and in reducing fiscal dependence of regencies/cities in the province. However, out of 11 regencies/cities, there is a gap concerning the degree of fiscal decentralization between regencies/cities.

Fiscal decentralization as measured by the degree of fiscal decentralization is expected to have impact on the regional economic development (Devarajan, Swaroop, & Zou, 1996; Soejoto, Subroto & Suyanto, 2015). The greater the degree of fiscal decentralization means the greater the budget for regional expenditure. If the expenditure is allocated to sectors related to industrial development, it will have an impact on industrial development (Gbettor, Adjimah & Tibu, 2014). If this multiplier effect continues in the development of existing industries, the welfare of community will be achieved through increase revenues. Therefore, inequality of the degree of fiscal decentralization between regencies/cities in Jambi Province will also have an impact on the imbalance of community welfare between them.

Several research findings found that efforts to increase the degree of fiscal decentralization in regencies/cities in Jambi Province are influenced by several internal and external factors. Some of them are the economic level (GRDP), the amount of regional spending/expenditure, and the investment level (Paniza, 1999; Globerman & Shapiro, 2002; Bacarreza, Varquez,Yedgenov, 2016; Sari, Thjahjono & Turino, 2018; Armaja, Ridwan & Aliamin, 2015).

Based on the explanation, this study aims to analyze: 1) factors influencing the degree of fiscal decentralization in Jambi Province; 2) the influence of the degree of fiscal decentralization on the industrial sector in Jambi Province.

METHODS

This research used a quantitative descriptive method that is based on the secondary data analysis. Secondary data in the study include data on Local Own-Source Revenue, total regional revenue, Gross Regional Domestic Product, regional expenditures, Investment level, and number of industries.

Data observed were limited from 2011 to 2017 data. The data analyzed were obtained from the Regional Development Planning Agency (BAPPEDA), the Statistics Indonesia (BPS), and Finance Department of Regencies/Cities in Jambi Province. Descriptive quantitative research is conducted to identify the factors influencing the degree of fiscal decentralization of regencies/cities in Jambi Province, and to analyze the impact of the degree of fiscal decentralization on the industrial sector development in Jambi Province. Based on these considerations, the Panel Data Regression Analysis Model is used as shown in equation (1) and equation (2):

$$DDF_{it} = \beta_0 + \beta_1 LnPDRB_{it} + \beta_2 LnBD_{it} + \beta_3 LnINV_{it} + \mu_{it} \quad \text{...} (1)$$

$$IND_{it} = \beta_0 + \beta_1 DDF_{it} + \mu_{it} \dots \text{...}(2)$$

In which:

DDF	= Degree of fiscal decentralization
IND	= Industrial development
β_0	= Constant
$\beta_1 \ \beta_2 \ \beta_3$	= Regression coefficient
PDRB	= Gross Regional Domestic Product
BD	= Regional expenditure
INV	= Investment

Ln   = Natural logarithm
μ   = Error term
i   = Cross section
t   = Time series

To determine the estimation model of panel data regression, three models are used namely the common effect model, the fixed effect model, and the random effect model. From these models, it will be determined one best estimation model by conducting several tests. First, the Chow Test or Likelihood Test Ratio is carried out to find out whether the Fixed Effect Model is better than the Common Effect Model by doing F-statistical test. Second, the Hausman Test is used to determine whether the Fixed Effect Model is better than the Random Effect Model. Hausman's statistical testing follows the Chi-square distribution based on Wald's criteria. Third, the Lagrange Multiplier Test is used to determine whether the Random Effect Model is better than the Common Effect Model. It can be done by comparing the chi-square probability value to a certain significant level (α). After getting the best estimation model, R^2, F_{count} and t_{count} will be analyzed.

The Degree of fiscal decentralization is a comparison the realization of local own-source revenue (*Pendapatan Asli Daerah/PAD*) with total regency/city regional revenue in Jambi Province in 2011-2017 in per cent (%). GRDP is GRDP value in each regency/city in Jambi Province in 2011-2017 based on the constant (2010) prices in units of millions of rupiah per year.

Other independent variables are regional expenditure and investment level. Regional expenditure is the amount of budget available for the regional expenditure in Regional Government Budget (*Anggaran Pendapatan dan Belanja Daerah/APBD*) of each regency/city in Jambi Province, stated in units of millions of rupiah per year. As for investment, it means the amount of domestic investment (*Penanaman Modal Dalam Negeri/PMDN*) and foreign investment (*Penanaman Modal Asing/PMA*) in the regencies/cities of Jambi Province, stated in units of millions of rupiah per year. The dependent variable in equation (2) is industry, which has an operational definition as the development of the number of industry in each regency/city in Jambi Province, stated in units of per cent per year.

RESULTS AND DISCUSSION

Based on the analysis of GRDP of regency/city in Jambi Province, two regencies had the largest number of GRDP in 2017. They were Tanjung Jabung Barat of Rp. 27.361 billion and Jambi City of Rp. 12.728 billion and each region provided contribution to GRDP of Province Jambi as much as 20.04 percent and 12.98 percent respectively.

Regencies/Cities that have the smallest number of GRDP in Jambi Province were Sungai Penuh City of Rp. 4.192 billion and Kerinci Regency of Rp. 5.792 billion, with the contributions of 3.07 percent and 4.24 percent of Jambi Province's GRDP. If it was compared to the number in 2011, Tanjung Jabung Barat Regency increased its GRDP by 5.26 percent per year while Jambi City increased its GRDP by 6.09 percent per year.

For the regional expenditure, the capacity of each regency/city is very varied. In 2011, regional expenditure of Jambi City was Rp. 797.797 billion and was the highest among other regencies/cities. The lowest regional expenditure was from Tanjung Jabung Timur Regency of Rp. 314.212 billion. Whereas in 2017, the highest regional expenditure was still from Jambi City and the lowest was Sungai Penuh City of Rp.

714.887 billion. This shows that Jambi City has better ability to manage its regional finance.

Investment level of regency/city reflects the characteristics of the regional economic potential. Tanjung Jabung Barat Regency always has the highest investment level compared to other regencies/cities. It reached Rp. 25.966 trillion or 72.37 percent of the total investment in Jambi Province. This number can be justified as there are several large-scale mining and plantation companies in Tanjung Jabung Barat Regency. Likewise, Bungo Regency (of Rp. 2.444 trillion or 6.81 percent), Muaro Jambi Regency (of Rp. 2.369 trillion or 6.60 percent) and Batang Hari Regency (of Rp. 1.437 trillion or 4.01 percent) are the regions based on the plantation and mining sector. The exception is for Jambi City that has a quite stable investment value of Rp. 1.525 trillion (4.25 percent) based on the industry, trade, and services sectors. Based on its development, investment level of each region/city shows a proportional development since 2011.

The explanation of variables above conceptually affects the degree of fiscal decentralization of each regency/city in Jambi Province. Based on the factual data in 2017, there is only one region that has a degree of fiscal decentralization above ten per cent, namely Jambi City (18.30 percent), while others have it below ten percent. Sungai Penuh City has the lowest degree of fiscal decentralization at 5.18 percent. If it was compared to the number in 2011, Jambi City showed a great development of fiscal decentralization degree, from 11.30 percent to 18.30 percent (an increase of 7 percent). This indicated that the capacity of Jambi City to increase its Local Own-Source Revenue is quite good, so it can increase its degree of fiscal decentralization.

Further analysis was carried out by testing the panel data regression model, through the Chow test and the Hausman test. Then, the best estimation model was obtained, which is the Fixed Effect Model. This model will analyze the influence of economic level, amount of direct expenditure, and investment level on the degree of fiscal decentralization in Jambi Province. The Fixed Effect Model regression equation is shown in the Table 1.

Table 1. Fixed effect model regression test results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	198.5018	79.94128	2.483095	0.0224
LN(PDRB)	14.71529	7.168716	2.052709	0.0351
LN(BL)	11.27111	5.206769	2.164703	0.0200
LN(INV)	0.199716	0.097082	2.057189	0.0362
Fixed Effects (Cross)				
Batang Hari	0.059702			
Bungo	1.352162			
Kerinci	3.396048			
Merangin	-2.593642			
Muaro Jambi	-4.285943			
Sarolangun	0.190411			
Tanjung Jabung Barat	-4.505039			
Tanjung Jabung Timur	-5.360362			
Tebo	-1.842154			
Jambi City	4.591198			
Sungai Penuh City	-3.874712			
R-squared	0.752034			
F-statistic	22.78224		**Prob.** : 0.0230	

Source: Data processed

The Table 1 show that GRDP, the amount of regional expenditure and the investment level influence the degree of fiscal decentralization of regencies/cities in Jambi Province. This is shown by the F-statistic value of 22.78224 with a prob value of 0.0230. It means that the error rate of the estimation model is only 2.3 percent. The influence of GRDP, regional expenditure, and investment level of regencies/cities in Jambi Province is shown by the R^2 coefficient of 0.752034. This means that 75.20 percent of independent variables in the estimated model are able to explain the dependent variables.

In partial test, there is a significant effect of each independent variable on the dependent variable. GRDP and regional expenditure variable significantly influence with a prob value of 0.0351 and 0.0200 respectively. Likewise, investment level variable influence significantly with a prob value of 0.0362. Estimation results are in line with the finding of Panizza (1999) which concluded that economic level of a country which is reflected in GDP will has a correlation with the degree of fiscal decentralization, in addition to other factors. Whereas Frank & Martinez-Vazquez (2014) stated that infrastructure has a correlation with fiscal decentralization. In the case of Indonesia, the availability of infrastructure is very dominantly provided by the state through government spending. The same opinion was also expressed by Bacarreza, Varquez & Yedgenov (2016).

The results as shown in the Table 1 emphasize a need for serious attention from regency/city government in Jambi Province to always make efforts to improve the local economy (Cull, Demirgüç-Kunt, & Lin, 2013), to increase the amount of direct spending, especially capital expenditure and to increase regional investment opportunities in order to increase the degree of fiscal decentralization (Sari, Thjahjono & Turino, 2018). Serious regards to this matter will make the regency/city government in Jambi City have more opportunities in designing and planning their programs in regional development, because the local governments have independence in their expenditure budget.

Further analysis showed that constants from the estimation result have very varied values. The values of constants from each regency/city can be categorized into three groups. The categorization was carried out because geographical characteristics can also influence the fiscal decentralization (Alexeev & Mamedov, 2017). First, there are regencies/cities that have positive constants above one, namely Bungo Regency, Kerinci Regency, and Jambi City. This means that if all independent variables in the model are zero then the degree of fiscal decentralization for each regency/city will have a positive value above one. This condition reflects the regency/city has quite large local own-source revenue, so it has a level of independence in its budget (Ibrahima & Alagidede, 2018). Second, the regencies/cities that have zero constant values are Batang Hari Regency and Sarolangun Regency. This means that if all the independent variables in the model are zero then the fiscal decentralization degree of each regency will be around zero. Regencies in this group show relatively a financial dependence on the central government. Third, there are regencies that have negative constant values. Regencies/Cities in this group are those with a very low degree of fiscal decentralization or with a very high financial dependency on the central government.

Next, there is the estimation result of the impact of fiscal decentralization degree on the industry development in regencies/cities in Jambi Province. The estimation results show that there is a positive and significant effect of fiscal decentralization

degree on the industry development in regencies/cities in Jambi Province. This is shown by the t-value of 2.1525 or with a prob value of 0.0360. The impact of fiscal decentralization degree on the industry development in regencies/cities in Jambi Province is shown by the R^2 value of 81.19 percent. Details are shown in the Table 2.

Table 2. Simple regression model estimation results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	202.7014	85.34125	2.375186	0.0213
LN(PDRB)	15.21537	7.068414	2.152586	0.0360
R-squared = 0.811920				

Source: Data processed

These results are in line with the results of Vazquez, Penas & Sacchi (2016) who conducted a survey of the impact of fiscal decentralization on the economy, society, and politics. His research indicated that there is an impact of fiscal decentralization on the economy, including the industry development. On the other hand, Gbettor, Adjimah & Tibu (2014) stated that through fiscal decentralization, there would be poverty reduction thanks to the economic growth, including activities in industry sector.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the results, several things can be concluded. First, economic developments, regional expenditure by the government and investment level have a significant effect on the fiscal decentralization degree in Jambi Province. Second, there is a significant influence of fiscal decentralization degree on the development of industry in Jambi Province.

This conclusion offers an understanding that the degree of fiscal decentralization of a region is closely related to the role of government through regional expenditure and the role of the private sector through the investment level. If there is a positive synergy, it will have a positive impact on the fiscal decentralization degree of the region. All of them will be reflected in the industry development in the region concerned.

Recommendations

Commitment of government in industrial development in Jambi Province must be the main concern. One that can influence it is related to the degree of fiscal decentralization. Therefore, government of Jambi Province has to make an effort to do a number of things. First thing is to maintain the economic growth to be more progressive. Second effort is to increase local own-source revenue in order to increase its regional expenditure sources. Thus, it is easier to increase direct expenditure. Third effort is to create conducive investment climate, both in the form of infrastructure and in the form of regulations. If those three things are realized, it will have an impact on improving the degree of fiscal decentralization. So it will also have an impact on the development of industry in Jambi Province.

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Development of Morotai Island-North Maluku based on oceanographic-ecosystem condition

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Abstract
Morotai Island is developing district located in the North of North Halmahera and one of the areas that has potential source from ecosystem biodiversity. This biodiversity is very unique related to ocean condition such as ocean currents and other properties. This research used survey data in 2015 and other data from satellite and database insitu. The results showed that the Sea Surface Temperature (SST) ranges from 26.7 ^{0}C to 32.8 ^{0}C and the salinity ranges from 33.48 to 36.8 psu characterized by open ocean. The ocean currents patterns different in surrounding area due to variety of depth, tide effect, monsoonal situation, and local aspects. The mangrove area mostly located in the south, while coral reef stands in the almost coastal area. This region is mostly influenced by monsoons and also the Indonesia throughflow. From the results, the location in the southern part is very suitable for marine culture and tourism, while in the northern region it is very suitable for tourism, conservancy, and fishing. These activities will lead Morotai as an important area for enhancing the local revenue.

INTRODUCTION

Indonesia seas have a high diversity of ecosystem, renewable and non-renewable natural resources, which have provided numerous impact for increasing economic, social, and cultural sustainable (Nurkholis, Nuryadin, Syaifudin, Handika, Setyobudi & Udjianto 2015). The high biodiversity in Indonesia due to the unique archipelago position related to Asian and Australia terrestrial and two oceans.

One of area has unique ecosystem and ocean system is Morotai Island. The island is a part of North Maluku Province located in North Halmahera. This island is a strategic area in the northeast of Indonesia. These regions have rich water nutrients due to existence of Indonesia Throughflow (ITF) (Purba & Pranowo, 2015). Ocean circulation that comes from Pacific transferred high nutrients and trapped in the south of the islands due to currents retroflection around these islands. Nutrients are very important for marine ecosystem and biota to grow. These two aspects (oceanographic condition and ecosystems) as main aspect for Marine Spatial Planning (MSP). MSP or sea zoning as guidance to industries, government, and other stakeholder to invest in specific area. In this case, Ministry

of Fishery and Marine Affairs (MMAF) already surveyed environments condition of Morotai since 2009.

Several scientists have done observed the correlation between oceanographic and ecosystem condition related to marine zoning. Purba, Pangestu, Mulyani & Fadhillah (2018), explained the challenge to acquire Biawak Island based on Oceanographic condition. Simanjorang, Pranowo, Sari, Purba & Syamsuddin (2018), used oceanographic database to build marine ecoregion. Nurhayati (2006) has observed around Morotai Island and found the pattern of salinity, temperature, and ocean currents. In tropic waters, differences of Sea Surface Temperature (SST) within the year is quite small. The temperature in Indonesia around 26.5°- 32°C (Nugraha, Purba, Junianto & Sunarto, 2018). Water mass in Morotai Islands also affected by local water masses and global circulation from the Pacific (Haikal, Taofiqurohman & Riyantini, 2012).

Scientific study needed in oceanography and ecosystems for development of Morotai Islands. This paper described the coral reef, mangroves, and seagrass ecosystems conditions and distribution need to find out along oceanographic parameters to determined conditions of Morotai Island suitable for conservation, tourism, and fisheries. Reflecting these challenges, this research aims to describe the potential economic sectors based on ecosystem, fisheries biodiversity, and oceanographic.

DATA AND METHOD

Geographic locations

The area embedded from 2° 00" to 2° 40" N and 128° 15" to 128° 48" E. Bathymetry profile averages 0-1000 meters with deepest depth in east of the island. Around small islands in the southwest of the main island, depth of water less than 200 meters which consist of 0-20 m (shallow waters) (KKP, 2015). The Morotai islands District experiences a rainy and dry season and is highly influenced by tropical monsoon seasons.
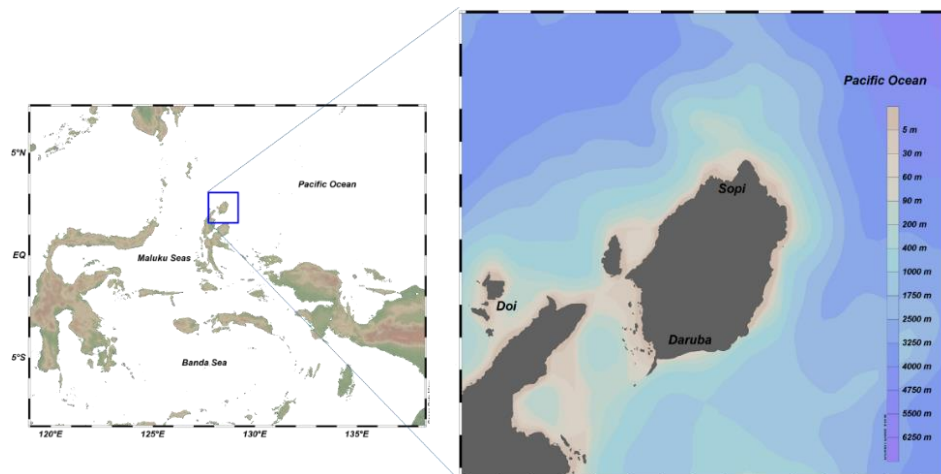

Figure 1. The geographic location of Morotai island with bathymetry
Source: GEBCO; Schiltzer, 2018

Morotai Island consists of around 33 small islands and borders with Pacific Oceans to the north and east of islands, the Halmahera Sea on Southeast, Morotai Strait on South, and Sulawesi Sea on West. The area surrounding Morotai also known as Alur Lintas Kepulauan Indonesia (ALKI) from north to south. This water influenced by Indonesia Throughflow (ITF) and also by monsoon wind that blows periodically (Haikal,

Taofiqurohman, & Riyantini, 2012). The smallest island located in the southwest of the main island.

Data profiles

In 2015, MMAF did the primary survey to describe the condition of terrestrial and ocean condition for zoning plan. For this purpose, data collected included Sea Surface Temperature (SST), salinity, ocean currents, and water quality. These parameters measured by portable instruments and laboratory analysis. Secondary data from a various source are using such as from National Oceanographic Data Centre (NODC) for salinity and sea surface temperature. Wind data monthly collected from the European Centre for Medium-Range Weather Forecasts (ECMWF). For ecosystem conditions, survey of mangrove and seagrass used quadrat transects and coral reef via manta taw surveyed. To support the analysis, literature from online searching also used. For fishery activities, the result was done by questionnaire and in-situ survey. This research used descriptive analysis and combined oceanographic conditions and ecosystem profiles as a basis to analyze the locations and potential economic.

RESULTS AND DISCUSSION

Oceanographic condition

Generally, in all regions, wind speed has range 2.2 to 8.8 m/s with dominant direction to the west. Maximum speed of wind occurred during January, which is west monsoon, which is also affected surface current that moves to the west (Figure 1). Minimum speed of wind happens in May, directed to the east. East of Indonesia especially Morotai islands also affected by westward wind from Pacific, monsoons, El Nino situation (Purba & Pranowo, 2015).
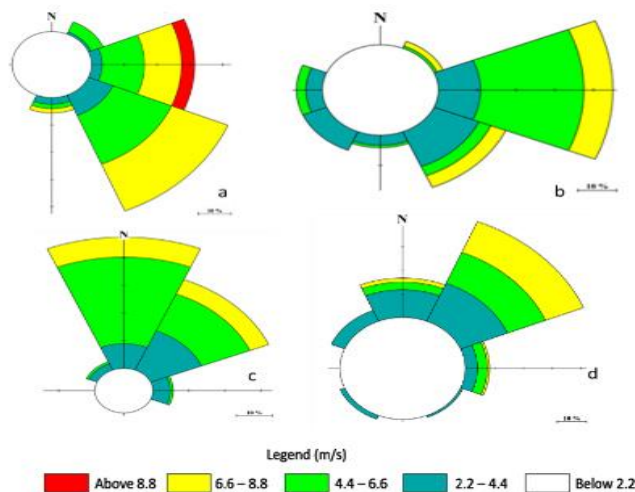

Figure 1. Wind condition during monsoons,
Notes: a) Dec-Jan-Feb, b) Mar-Apr-May, c) Jun-Jul-Aug, d) Sep-Oct-Nov
Source: ECMWF

In general, with interaction between monsoon and surface water, the velocity of water range from 0.5-1.5 m/s. In the shallow waters (south and southwest) the currents dominantly to south-east. Moreover, in the west side, ocean currents move from south to north parallel to coastline. Furthermore, pattern of currents surrounding Morotai Island not only affected by monsoon and ITF, but also by tides especially in Rao Straits.

SST is one of parameter used to identify the fishing ground and thermal stress for ecosystem to growth. P$_2$O LIPI (2006) found that SST around 29.0 – 30.1 ℃ in 14 stations around these islands. The values were similar to data in 2007 which was around 29,72 – 30,51°C, and the averages was around 30,12 ± 0,255°C (Figure 2). In 2015, it was measured between 26.7 – 32.8 °C. The high temperature in 2015 caused by El Nino that drift WPWP (Western Pacific Warm Pool). SST in Morotai Island affected by tropical water mass in the Pacific Ocean that passes Indonesia to Indian Oceans. SST also affected by local currents, wind pattern, and tides. The type of water mass is similar to a warm pool in west tropical Pacific Oceans.
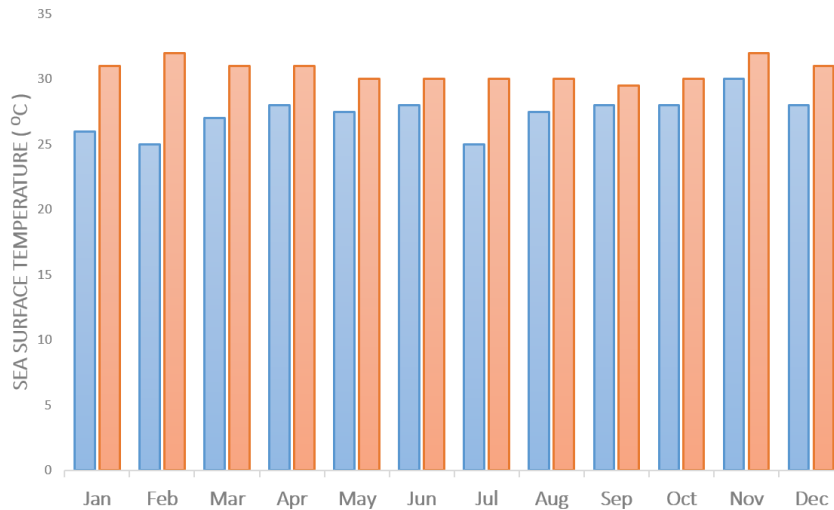

Figure 2. SST each month in a year (Minimun-Maximum).
Source: NODC and in-situ survey in 2015

SST conditions that close to the mainland rather high and less to open sea. This phenomenal related to bathymetry in that area. In shallow waters (around mainland) profile of bedload is slope, more high temperature than deep waters area (far from the mainland). The similar result found by (Nurhayati, 2006; Lana, Kurniawati, Purba & Syamsuddin, 2017) mentioned that the thermocline layer between 100-150 m.

The average value of salinity was around 33.48 PSU and, in some locations, reached 36.8 PSU characterized by the open ocean from the Pacific Ocean. Although many rivers are in the east of the Island, these conditions do not and reduce the value of salinity because the water discharge from the river is not large. Horizontal distribution of salinity in the sea waters west and south (southwest), based on the results of several previous studies, shows increasing salinity by increasing the distance from the coast of this island towards the open sea. On the coast of Morotai Islands salinity ranges from 31-33 PSU and increases to around 34 PSU with increasing distance towards the sea. In some river estuaries on the coast of this island, the salinity is relatively lower compared to other parts. There are many flowing rivers to the east, but relatively small so that at high tide they will enter deep into the waters. This will also cause a salinity value that shows a value of around 27.9 PSU (almost the same as sea water). As for Zoning Planning, the salinity value is still suitable for marine culture, especially in the south and Southwest regions.

Ecosystem biodiversity

There are three main ecosystems in shallow waters such as coral reef, mangroves, and seagrass. Coral reef ccosystems are widespread in small islands mostly located in the southwest and around Morotai Island (Figure 3). Mangroves and seagrass also found

around small islands and the south west coast which is flat and muddy. The trapped currents in south and south-west side also bring high nutrients to coastal area where the habitat of ecosystems.
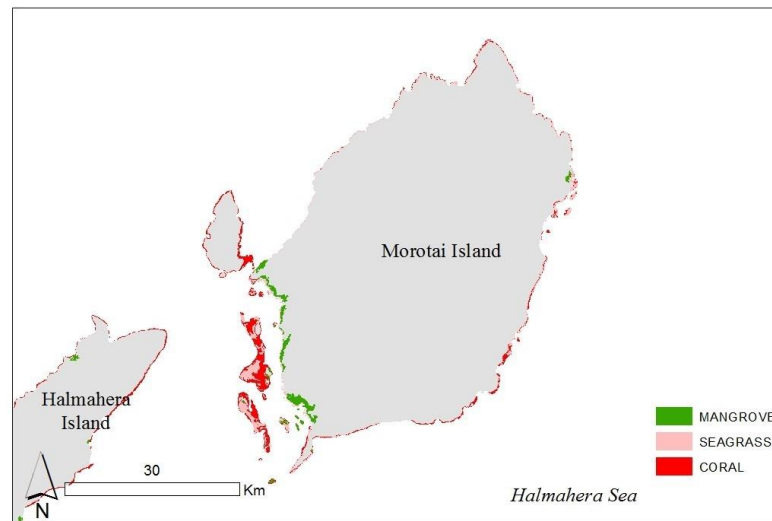

Figure 3. Shallow water ecosystem
Source: Insitu data and satellite imaginery

Coral conditions ranged from moderate (with a cover of 30%) to good (50%). The distribution of coral reef ecosystems is almost evenly distributed in several coastal waters and small islands. The massive coral and foliose coral species dominate coral cover at the observation location with a percentage of 8.69%. The abundance of fish in the observation location is worth 1.16 with the number of fish counted as many as 1624 at 20 observation stations with different amounts for each station. Comparison of coral and reef fish conditions above, most of the observation stations have coral conditions which are included in the medium category and in reef fish shows that most of the stations belong to the good category. Aorrelation that occurs between coral reefs and reef fish shows that the correlation that occurs is positive, which means that good coral conditions will have a good effect on the abundance of reef fishes (Figure 4).
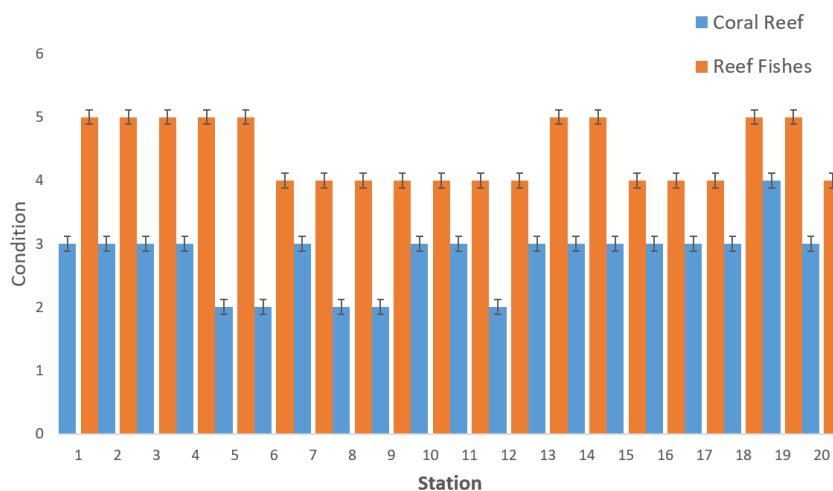

Figure 4. Coral reefs and reef fishes conditions
Notes: 1) Very Bad; 2)Bad; 3)Moderate; 4)Good; 5)Very Good
Source: MMAF survey in 2015

In general, these mangroves are found in the form of a broad population. The types of mangroves or mangroves found consisted of the types of *Sesuvium portulacastrum, Lumnitzera racemosa, Terminalia cattapa, Scaevola taccada, Lythraceae Phempis, Hibiscus tiliaceus, Xylocarpus granatum, X. moluccensis, Aegiceras corniculatum.* Ahmad (2005) also found *Osbornia octodonta, Pandanus tectorius, Pongamia pinnata, Bruguiera gymnorhiza, Ceriops tagal, Rhizophora apiculata, R. mucronata, R. stylosa, Sonneratia alba, Heritiera* littoralis in south Morotai. The density of mangrove cover is in the range of 1800-2000 trees/ha, especially very high on small islands in the waters south west and the coastal area of Morotai Island from Wayabula to Daruba.
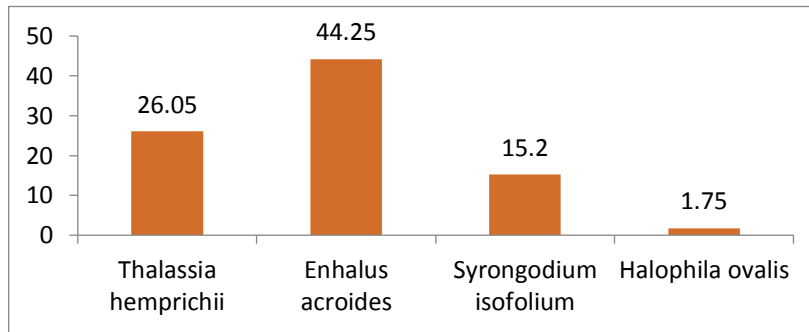

Figure 5. Seagrass type density
Source: MMAF survey in 2015

Seagrasses are found in four types and three types of the Hydrocharitaceae family, namely *Enhalus acoroides, Thalassia hemprichii* and *Halophila ovalis*. One type of Cymodoceaceae family is *Syringodium isoetifolium*. In the small islands scattered in the south and southwest of Morotai Island, four seagrass species were found with the largest to the smallest seagrass stands, respectively, *Thalassia hemprichii, Enhalus acoroides, Halophila ovalis* and *Syringodium isoetifolium*, while in the southern coastal areas west coast of Morotai Island, only one species of seagrass was found, *Enhalus acoroides* with 30-80% cover. In the northern area, the percentage of cover up to 100% was found in Sangowo Village, which consisted of seagrass types, *Thalassia hemprichii* and *Syrongodium isofolium*.

Fishery profiles

Fisheries is one of the marine economic activities in North Maluku Province and becomes "Prime movers" because of it is considerable contribution to fisheries and marine products in general. The standing stock potential in North Maluku waters is estimate to reach 694382.48 tons with a maximum sustainable yield of 347,191.24 tons/year consisting of large pelagic fish of 211,590.00 tons/year and demersal fish 135,005.24 tons/year. There is also an increasing trend from capture fisheries from 2011-2013, from 9,434 tons to 16,198 tons which is equal to 58%. Data from MMAF (2019), showed that fishery production in from 2017 to 2019 increase from 1580 tons 1793 ton in 2017. Moreover, estimation of potential fish resources 4 mile 61.167 units based on 2015-2017 data.

One of the main fish standing is tuna and become the largest catch compared to other species with 10,884 tons in 2013, followed by flying fish, other pelagic fish. Furthermore, the production of demersal fish commodities of 2,325 tons. From this potential estimate shows that the potential of North Maluku's water resources is prospective to be managed and utilized sustainably. Some areas that can be used as areas for developing marine culture such as minapolitan area in the south, south-west as the core area (Minapolis), as well as North Morotai, Morotai Jaya, East Morotai as a buffer zone (hinterland). The leading commodities developed are seaweed and grouper. For fish commodities such as snapper also has a fairly high production value of 1.12 tons.
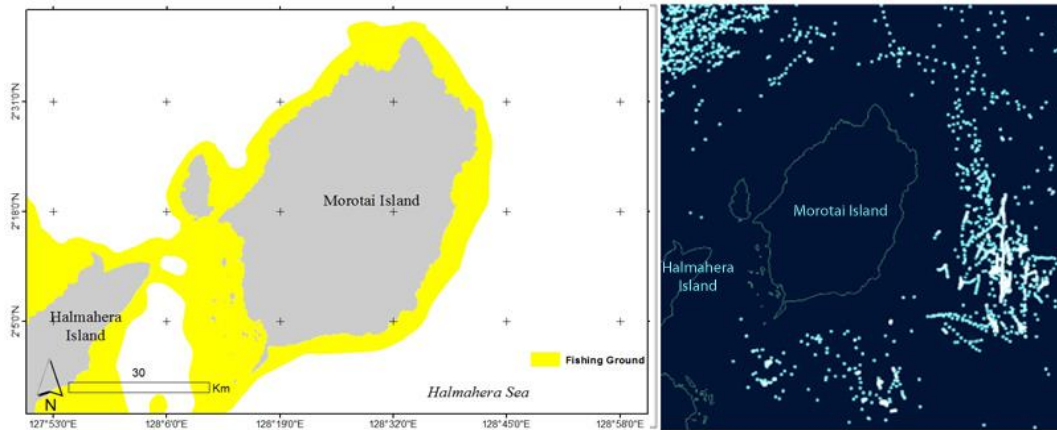
Figure 6. Fishing ground area around Morotai, (left) 4 mil waters, (right) catch area outside Morotai, with data from global fishing watch snapshot.
Source: Satellite imaginary and Global Fishing Watch.

Some commodities Aquaculture in this region is a superior commodity, among others, North Maluku waters are very potential for seaweed cultivation where the area of cultivation is estimated at 10,000 ha. The new potential is used as much as 500 tons/year and is an extract-making material so the investment opportunity for making extracts is potential activities. Aquaculture development using a sustainable cultivation system, such as development using floating net cages and embedded net cages.

Development and challenges

Based on oceanographic and ecosystem conditions, the development in Morotai Islands divided into several parts. In the south, especially around the small islands, the conditions of the waters are calm with nutrient rich, more suitable for marine tourism and marine culture (Figure 7). In the eastern part of the islands, it is established as offshore fishing. For the northern region, it is more suitable for special water tourism such as surfing, marine defense, and special marine area.
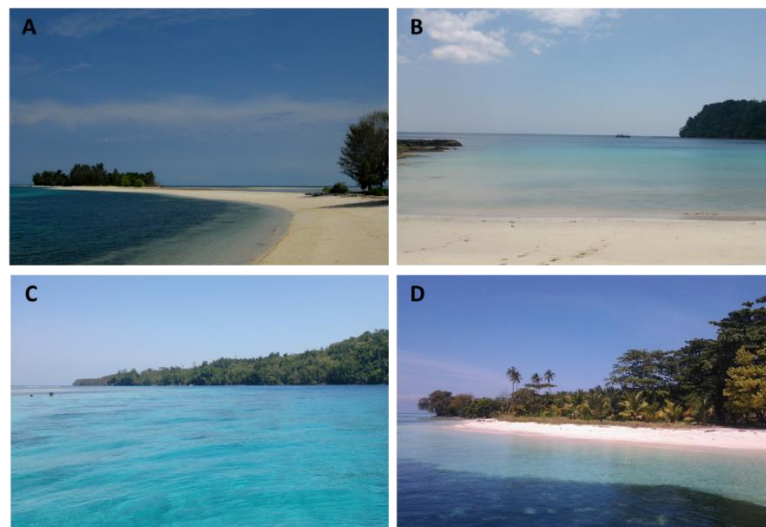

Figure 7. Strategic locations for tourists development in Morotai Islands
Notes: A) Dodola island, B) Tanjung Gorango, C) Rao island, D) Kokoya island.
Source: In-situ survey in 2015

These regions are currently being built and some of them have been carried out by infrastructure development and made into Special Economic Zones (*Kawasan Ekonomi*

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*Khusus/*KEK) by government. KEK which is located on north Morotai Island, North Maluku Province is stipulated through Government Regulation No. 50 of 2014 with an area of 1,101.76 hectares (DKEK, 2018). Due to the potential of biodiversity and ocean condition, the potential area located in 31 locations, whereas 21 locations located in south of the island. Some of potential area describes in Table 1.

Table 1. Some of potential resources and locations based on oceanographic and ecosystem divesity

Location	Uniqueness
Dodola Island	Landscape view, ecosystem
Tanjung Gorango	Sharks, semi-enclosed water
Rao Island	Turtle, reefs, and seagrass
Kokoya Island	Snorkeling, diving, and beach activities
Koloray	Landscape view, ecosystem
Ngele-ngele	Aquaculture
Zumzum	Ecosystem biodiversity, historic place

Source: In-situ survey in 2015

These small islands also supported by several numbers of side infrastructures such as hotels, small ships, tour guide, homestay, halal food, dive center, and culinary. Based on data, there are around 29.000 tourists came to Morotai from January to March 2019. The tourists came to visit the historical place, snorkeling and diving, and culinary. For this potential area, the development must be improved. The ocean condition such as ocean currents and temperature fit with tourism activities. In the north side, the surfer uses high wave, meanwhile in the south side, tourists use calm water to snorkel and dive.

To develop Morotai in general has the aim by analyzing the ocean condition and utilizing the potential of the region to prosper the people in the region. Indonesia via the government mission, create tourism as an important role in economic growth (Rashid, 2019). Furthermore, the government must be ensuring that high biodiversity and ocean support could be raise the revenue from these aspects. OECD (2016) based on year 2010 estimated economic activities associated with the ocean amounted to around US$1.5 trillion.

Revenue of regional government in Pulau Morotai consist of local revenue. (PAD) is pure income that obtained from region, meanwhile balance fund is transfer from central to region for denied different fiscal among region. In 2018, Morotai has a revenue 35.000,00 million rupiah, a significant increase when compared to the previous year amounted to 7.538,51 million rupiah. Meanwhile, expenditure consists of expenditure not directly and indirectly. In 2018, the expenditures is 674.587,82 million rupiah an increase compared to the previous year of 759.792,05 million rupiah.

GDRP at current prices by business sector in 2018 amounted to 1.319,05 billion rupiah. The share is still dominated by agricultural groups in the amount of 47,26 percent. Moreover, USAID (2017) has found that Morotai has abundant fisheries and marine resources and become one of the national priorities to accelerate economic growth from the fisheries sector. Based on fish-production estimations, Morotai contributes about 61,167 tons of fish per year.

The last is about global warming not only affected ecosystem health especially to coral bleaching but also fishery revenue. In Korea, revenue losses from tourism were estimated at $29–37M USD (Jang, Hong, Lee, Lee, & Shim, 2014). In the other case, The Great Barrier Reef in Australia has an economic asset value equal to $56 billion. These areas of coral reefs support 64,000 jobs and contributes $6.4 billion to the Australian economy (Deloitte Access Economics, 2017).

CONCLUSION AND RECOMMENDATION

Conclusion

The location in the southern part is very suitable for marine culture and tourism, while in the northern region it is very suitable for tourism, conservancy, and fishing. The presence of endemic biota is a potential that can be developed as a tourist attraction. Walking sharks can only be found in two regions in Indonesia, one of this species can found in Morotai Islands. If the stakeholders can provide facilities and infrastructure and disseminate this as a special interest tour with the main object seeing the beauty of the underwater ecosystem and biota. This can become a new source of income and enhance Morotai's economy. The community is very supportive in developing this tourism for the economic growth of the community by facilitating access to the city. Therefore infrastructure development, especially road infrastructure is a very important development priority to be realized.

Recommendation

There are some policies recommendation that can be implemented in Morotai such as monitoring ecosystem health, ocean forecast, and fishery area. By monitoring the ocean character will be a guide to enhance the potential of natural resources. The government also has to sustain the area by making conservation area. Therefore, the government should focus on strengthening the information and systems. The challenge in Morotai are the infrastructure, awareness, education, and technology. In addition, the challenges that must be watched out from marine pollution include the oil spill by ships, because this region is also one of the ALKI line. Moreover, marine debris is national issue that led to aesthetic for tourism. This ocean garbage not only produce by local source, moreover comes from other countries. On the other hand, this region is also one part of the "ring of fire" in the Pacific route. Volcanoes that are under the sea and plate movements can cause earthquakes and tsunamis. Infrastructure development should consider this potential.

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Model and strategies for the development of coffee in Jambi Province to respond the global market demand

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Abstract

Indonesia is one of the world's top coffee producing countries after Brazil, Vietnam, and Colombia. Although not as the largest coffee producers, Jambi Province has three types of coffee as the region's mainstay product, namely Robusta coffee, Arabica coffee, and Libtukom (*Liberika Tungkal Komposit*) coffee. The demand for these three types of coffee is quite high. However, there are various problems faced including low land productivity, crop failure, and distribution channels that are not profitable for farmers. Based on this, the study aims to formulate a model and strategies for developing Jambi Province's coffee. Main data used were derived from coffee farmers, experts and stakeholders, and related agencies. Data were analyzed using SWOT and QSPM analysis. It was found that there are eight priority strategies for developing Jambi Province's coffee, namely 1) cutting off distribution channels, 2) working directly with relevant agencies, 3) increasing promotion of Jambi's coffee, 4) coffee as one of the Jambi Province icons, 5) coffee product innovations, 6) cooperation with export destinations, 7) improving knowledge and processing technology, and 8) improving human resources.

Keywords: Coffee, Farmer, QSPM, SWOT

JEL Classification: Q13, Q17, Q18

INTRODUCTION

Coffee is an agricultural commodity that has an important role in the Indonesian economy. According to Indonesian Coffee Exporters Association (*Asosiasi Eksportir Kopi Indonesia*/AEKI) (2017), Indonesia is one of the world's largest coffee producing countries after Brazil, Vietnam, and Colombia. Based on the type of coffee that most widely cultivated in Indonesia, Robusta occupied the largest proportion (81.96 %), while Arabica was only cultivated 18.04 % of the total area of coffee plantations in Indonesia (Martauli, 2018). Even so, more than 90 % of the total plantations are cultivated by small-scale growers who own about 1-2 hectares of land. This has an impact on difficulties to safeguard stable production volumes and quality; hence its competitiveness in international market is less strong (Indonesia Investment, 2018).

In 2017, the value of Indonesia's coffee exports reached 469.4 million US dollars (ICO, 2017). Most of Indonesia's coffee production is exported to foreign countries and the rest is marketed domestically. Indonesia exported coffee to five continents, namely Asia, Africa, Australia, America, and Europe. Its main market share is in Europe. Large coffee production in Indonesia is the main capital for the coffee industry development, especially for Arabica and Robusta coffee. International market is a potential market for this industry in addition to the domestic market. Indonesian coffee has a different taste,

so that it has high economic value and is favored by foreign coffee lovers (Sudjarmoko, 2013). Increasing the economic value of coffee can also be done by diversifying the coffee products. According to Kustiari (2016), coffee product diversification could be done at MSME which provides benefits for farmers.

Jambi Province is one of the coffee producing provinces in Indonesia. Robusta, Arabica, and Libtukom (*Liberika Tungkal Komposit*) Coffee are produced there and become the regions' mainstay. These three types of coffee are planted each in different regions. Robusta is concentrated in Merangin Regency, while Arabica is in Kerinci Regency, and Libtukom Coffee is planted in West Tanjung Jabung Regency. Jambi Province's coffee plantations cover a total area of 26,666 Ha, consisting of 22,521 Ha of Robusta plantations, 1,535 Ha of Arabica plantations, and 2,610 Ha of Libtukom. Coffee production in Jambi Province in 2017 was 14,323 tons, with coffee production of 2,043 kg per hectare. The number of coffee farmers in Jambi Province is 20,814 farmers (Estate Crops Office of Jambi Province, 2019).

Coffees from Jambi are highly favored in foreign countries such as Malaysia, Singapore, Belgium, and Netherlands. It is thanks to the distinctive taste that differentiates it with coffee beans from other regions. However, the high demand is not followed by the increase in coffee production. There are unresolved problems such as crop failure and distribution channels that do not benefit farmers despite various attempts to increase the production by farmers. Therefore, it is necessary to have a model and strategies for the development of coffee commodity in Jambi Province.

METHODS

The study was conducted in three regencies in Jambi Province, namely Merangin Regency, Kerinci Regency, and West Tanjung Jabung Regency. The three regencies are coffee plantation centers in Jambi Province. Specifically, Merangin Regency is the center for Robusta, Kerinci Regency is for Arabica, and West Tanjung Jabung is for Libtukom.

Primary data and secondary data were used and obtained from farmers and stakeholders/key informant. Sampling in coffee farmers used Cluster Sampling method. The distribution of the number of samples based on regency is given in Table 1.

Table 1. Sample distribution by regency

No	Regency	Number of coffee farmers	Samples
1	Merangin (Robusta)	9.327	45
2	Kerinci (Arabica)	9.150	44
3	West Tanjung Jabung (Libutkom)	2.337	11
	Total	20.814	100

Survey results on farmers are the basis for formulating strength, weakness, opportunity, and threat in the coffee commodity development of Jambi Province. To formulate a model and development strategy for coffee, a SWOT analysis is done. The analysis is based on data derived from interviews with four stakeholders/key informants: 1) Estate Crops Office of Jambi Province, 2) Trade and Industry Service of Jambi Province, 3) Regional Development Planning Agency of Jambi Province, and 4) Lecturers from Jambi University].

SWOT (Strength, Weakness, Opportunity, Threat) is one of the methods used to formulate a strategy. Two factors, strength and weakness, are related to internal factors, while opportunity and threat are external factors (Oreksi, 2012). David (2004) and Rangkuti (2006) explained that the analytical tools used in formulating a strategy are IFE matrix, EFE matrix, IE matrix, SWOT matrix, and grand strategy matrix (SWOT Diagram Matrix).

RESULT AND DISCUSSION

Development strategy of coffee in Jambi Province

Strength, weakness, opportunity, and threat are identified based on the results of the analysis of internal environment and external environment.

Strength

a. Good Quality Coffee

Coffee planted in Jambi Province is a good quality coffee. They are cultivated in some region with each has different type of coffee. Arabica beans have been a mainstay in Kerinci Regency, Robusta beans are founded in Merangin Regency, while Liberika coffee beans only grow in peat soil such in West Tanjung Jabung Regency.

From the survey, it was found that 78 % of farmers use superior seeds, 12 % of them use seeds from the existing parent trees on the land, and 10 percent of them use seeds from old coffee. As many as 77 percent of farmers using superior seeds received the seeds from government assistance through Estate Crops Office and 23 percent buy the seeds from seeds sellers in their village. Large proportion of coffee farmers using superior seeds is also founded in the study of Evizal (2013) in West Lampung. In addition, it was found that there is a usage of coffee seeds from ripe fruit of local superior coffee trees.

According to Nurhakim, Rahayu, and Nurmalasari (2014), choosing the good quality seeds also determines the success of coffee plantation businesses. It is in line with the statement of Hasnam (2007) which said that superior seeds have an important role in productivity, good quality products, and production efficiency. Lisyati (2013) in Lampung found different result, and concluded that owning small land likely to make farmers reluctant to use superior seeds.

b. Coffee plantations area can be expanded

Related to the availability of land, coffee plantations owned by farmers in Jambi Province are possible to be expanded by opening new land for coffee plantation or replacing old plants that are no longer productive. Findings indicate that there is conversion of lands for cinnamon, coconut, and vegetables into coffee plantation.

The average area of Robusta plantations owned by farmers in Merangin Regency is 1.2 hectares, of Arabica plantations in Kerinci Regency is 1.65 hectares and of Libtukom plantations in West Tanjung Jabung Regency is 1.33 hectares. These figures are relatively larger when it is compared to the finding of Listyati, Sudjarmoko & Hasibuan (2013) in Lampung and of Maridelana, Hariyati & Kuntadi (2014) in Bangli Regency, in which the average area owned by farmers is below 1 hectare.

c. Coffee production continues to increase

Coffee production in Jambi Province continues to increase every year. In 2016, Jambi Province's coffee production was 13,181 ton and it experienced an increase of 6.835 percent for year 2017. It was possible because there was an increase in the land area of productive plants from 15,684 hectares (2016) to 16,036 hectares (2017), experiencing an increase of 1.084 percent (Estate Crops Office, Jambi Province 2019).

From the survey conducted, it is found that the average production of Robusta is 800 − 1400 kg per harvest, Arabica production is 550 − 680 kg per harvest, and libtukom production is 500 kg per harvest. It can experience a significant increase in the peak harvest. Farmers harvested coffee beans every day which is then collected for a week or a month, with an average production of 5 kg/day. Ninety seven percent of them stated that they continued to cultivate, while the rest (three percent) of them said they did not

continue due to obstacles in the form of coffee diseases that suddenly attack shoots.

Productivity for Arabica beans in Jambi is relatively higher than the productivity in Solok Regency, found by Putri, Yusmarni, Paloma & Zakir (2018)'s research, which is 570.5 kg per hectare. For Robusta, its productivity is also higher if it is compared to the finding of Kiyingi & Gwali (2012) in Uganda which has an average of 748 kg per hectares for fertilized coffee and 486 kg per hectare for coffee without fertilizer.

d. Owning Geographical Indication (GI) certificate

GI certificate is a sign indicating the area of origin of products and/or goods based on the geographical factors which give certain characteristics and qualities to the goods/products. GI certificate is coffee patent. This certificate can protect Indonesian products in global market (Rahmatullah, 2014).

GI certificate guarantees and maintain the quality and authenticity of coffee. Arabica coffee from Kerinci and Libtokum coffee from West Tanjung Jabung have GI certificate. All farmers in Kerinci Regency and West Tanjung Jabung regency are aware of GI certificate for the coffee they produce. The farmers from these two regions have joined the Community Protection of Geographical Indications or *Masyarakat Perlindungan Indikasi Geografis* (MPIG). On the contrary, no farmers in Merangin Regency have known about IG certificate.

e. Distinctive characteristics of coffee, different from other region's coffee

Coffee produced in Jambi Province has a different taste from other coffees in Indonesia. This distinctive taste made Arabica coffee from Kerinci became the best Indonesian specialty coffee in 2017. Robusta from Merangin won the best Indonesian Robusta award in the Expo of Specialty Coffee Association of Indonesia (SCAI).

f. Own Capital

Almost all (95 percent) farmers use their own capital, and only five percent of them get loans from their relatives, through leasing, and banking.

Weakness

Although Jambi Province's coffee has several strengths, it also has some weaknesses:

a. Coffee selling price is not determined by farmers

Farmers sell dried coffee beans at a determined price by their buyer. This finding is in line with the finding of Tanan, Limbongan & Tangkesalu (2013) concluding that farmers as coffee producers still sell their products at the price set unilaterally by coffee trades.

Selling price of Libtukom coffee at the farmer level is Rp. 25,500 per kilogram which is the highest when it is compared to Robusta coffee's price of Rp. 18,000/kg and Arabica coffee of Rp. 10,000/kg. Unlike Robusta and Libtukom, Arabica is sold in the form of freshly harvested coffee cherries so it has a low price.

The average selling price of Libtukom coffee at the seller/trader level is Rp. 40,000 per kilogram, Robusta coffee is Rp. 22,000 per kilogram and Arabica coffee is Rp. 19,500 per kilogram. Cheap prices from farmers are due to lack of market information and inability of farmers to meet the required standard of product quality by large traders, exporters, processed coffee entrepreneurs, and end users.

b. Coffee sales are through brokers/middleman

Farmers prefer to sell their products to brokers/middleman. Most (81 percent) of them sell coffee to brokers/middleman and only 19 percent of them sell coffee directly to large traders/sellers.

c. Few types of products

Products from coffee farmers in Jambi Province are still very limited. Most (86 percent) of farmers sell coffee beans and only 14 percent of them have done further processing such as ground coffee. The processing is not only done by farmers but also by SMEs and Cooperatives.

d. Lack of promotion and lack of wide distribution network

Promotion of coffee products is still relatively limited. In general, it is only carried out by local governments through national and international exhibitions.

e. Limited science and technology innovations

Innovations by coffee farmers are still limited. The production process still uses traditional method in general, both in terms of the dry process (only relying on sunlight) and stripping.

Opportunity

There are many opportunities to develop Jambi Province's coffee commodities, such as:

a. Export market is largely available

Jambi Province's coffee is much in demand by foreign coffee lovers because it has the distinctive characteristic that is different from coffee from other regions. Opportunities for coffee exports to Malaysia and Singapore are still largely available for Liberika coffee, while Arabica coffee is in high demand in European countries (m.wartaekonomi.co.id).

b. Lower level of coffee product diversification

Product diversification from coffee beans can have an impact on increasing the income of coffee farmers. From the survey results, it is found that the price of coffee beans is Rp. 20,000 per kilogram, while the price of ground coffee is an average of 25,000 per 200 grams, for Robusta, Arabica, and Libutkom.

c. The existence of MSMEs processing coffee beans on a small scale

There are a number of MSMEs that process coffee beans in Jambi Province. Three MSMEs are in Merangin, processing Robusta coffee. In Kerinci, there are eleven MSMEs processing Arabica coffee, while four MSMEs processing Libtukom coffee are in West Tanjung Jabung. It should be noted, however, the downstream coffee industry is still in a small scale. Based on the research findings of Nalurita, Winandi & Jahroh (2014) and Fadhil, Qanytah, Hastati & Maarif (2018), these small-scale industries have limited production facilities and infrastructures, lacks innovation in diversify coffee products, lower quality of coffee production, and bad management.

d. Marketing through online media

With current technological advancements, marketing is not a major issue. Marketing through online media is one of the best ways of marketing to this day and it does not require a large budget. However, the use of online media at present in coffee marketing remains limited. The survey results show that online marketing is only carried out by MSMEs in West Tanjung Jabung and Kerinci, through Facebook and Instagram.

Threat

Threats in the development of coffee commodities in Jambi Province include:

a. Coffee from other regions has lower price

Although Robusta, Arabica, and Libtukom coffees are the mainstay of Jambi

Province, the price which is more expensive than that of other regions' coffee is important issues that must be get government's attention. Jambi Province's ground coffee price in 200 grams packaging is Rp. 25,000 while the price of coffee from other regions is Rp. 10,000 per 250 grams.

b. Diseases attacking coffee trees

Diseases attacking coffee trees are significant threats to coffee production. It does not only attack coffee trees that had yet produced, but also productive coffee plants. One of the diseases is that the coffee plants suddenly die.

Around 1.73 percent of Robusta coffee plantations in Merangin Regency and 0.87 percent of Libtukom coffee plantations in West Tanjung Jabung are experiencing such diseases.

c. Unstable coffee prices

Unstable coffee price is a threat to the sustainability of coffee plantations in Jambi Province. Price fluctuation of coffee beans is a major problem for coffee farmers, so that coffee is not a main livelihood of the community in Jambi Province. The selling price of coffee beans or the income gained by farmers varies with each harvest. The lowest price for Robusta coffee is Rp. 7,000/kg, for Arabica coffee is Rp. 10,000/kg and Libtukom coffee is Rp. 14,000/kg. The highest price for Robusta is Rp. 21,000/kg, Arabica's is Rp. 20,000/kg, and Libtukom's is Rp. 38,000/kg.

Formulation of alternative strategies for development of coffee

Strategy formulation is carried out through three stages, namely input stage (IFE matrix and EFE matrix), matching stage (IE matrix and SWOT matrix), and decision-making stage (QSPM matrix).

IFE matrix

Based on the results of identification of internal factors, namely strength and weakness, the calculation of the IFE matrix is presented in Table 2.

Table 2. IFE matrix, model and strategies for development of coffee commodity in Jambi Province

Internal strategic factors	Weight	Rating	Weighted score
Strengths			
1. Good quality coffee	0.073	4.000	0.291
2. Coffee plantations area can be expanded	0.099	3.500	0.346
3. Coffee production continues to increase	0.073	4.000	0.291
4. Owning Geographical Indication (GI) certificate	0.116	3.750	0.435
5. Distinctive characteristics of coffee, different from other region's coffee	0.107	4.000	0.427
6. Own capital	0.092	3.750	0.345
Weaknesses			
1. Coffee selling price is not determined by farmers	0.063	1.500	0.094
2. Coffee sales are through brokers/middleman	0.074	1.250	0.092
3. Few types of products	0.108	1.500	0.162
4. Lack of promotion and lack of wide distribution network	0.092	2.000	0.184
5. Limited science and technology innovations	0.103	1.500	0.155
Total	1.000		2.822

Based on the IFE matrix, it can be seen that the strength factor that has the highest score is *GI certificate* of 0.435. Geographical Indication is an important strength in the development of coffee commodities. Silitonga's (2008) research findings show that one

of the competitive advantages of organic Gayo Arabica coffee is that it has Gayo as its geographical indications.

Main weakness in the development of coffee commodities in Jambi Province *is the coffee trade system through brokers/middleman* with a score of 0.092. The absence of alternative ways to sell coffee beans causes farmers to sell it to brokers/middleman. Another weakness is *the selling price of coffee that is not determined by farmers* with a score of 0.094.

Overall, the total weighted score of strengths and weaknesses in the IFE matrix is 2.822 which is above the average score of 2.50. Based on this, it can be concluded that the development of coffee commodities in Jambi Province is in a strong position in taking advantages of its strengths and is quite capable to overcome weaknesses.

EFE matrix

Opportunities and threats can be seen from the availability of quite large lands, human resources as labor, the presence of local markets, regional markets in the province and outside the province, and international markets, the existence of local government support and the availability of connecting facilities and other supporting institutions (Rika, Febriamansyah & Tanjung, 2016).

The EFE matrix is used to find out the influence of external factors. It is carried out based on the identification of external environment in the form of opportunities and threats.

Table 3. EFE matrix, model and strategies for development of coffee in Jambi Province

External strategic factors	Weight	Rating	Weighted score
Opportunities			
1. Export market is largely available	0,167	3,500	0,583
2. Lower level of coffee product diversification	0,176	2,250	0,395
3. The existence of MSMEs processing coffee beans on a small scale	0,152	3,750	0,569
4. Marketing through online media	0,164	2,000	0,327
Threat			
1. Coffee from other regions has lower price	0,134	1,500	0,201
2. Diseases attacking coffee trees	0,092	3,250	0,300
3. Unstable coffee prices	0,116	3,500	0,406
Total	1.000		2.782

Based on Table 2., the biggest opportunity is *export market share is largely available* with the score of 0.583. It indicates that the coffee commodity of Jambi Province has the opportunity to be an export commodity. The existence of MSMEs processing coffee beans on a small scale has a score of 0.569.

The main threat faced in developing coffee in Jambi Province is *coffee from other regions has a lower price* with the score of 0.201. Diseases attacking coffee trees are also threats that must be given attention. Diseases causing coffee trees to die suddenly make coffee farmers to become confused and discourage, so their coffee production and enthusiasm decline.

Overall, total weighted score from four opportunities and three threats on the EFE matrix is 2.782 or above the average score of 2.50. It can be concluded that the development of coffee in Jambi Province is able to respond to the external environment by taking opportunities to face threats.

IE matrix

The IE matrix is based on the analysis of internal and external factors, combined from IFE matrix and EFE matrix. IE matrix can be seen in Figure 3.
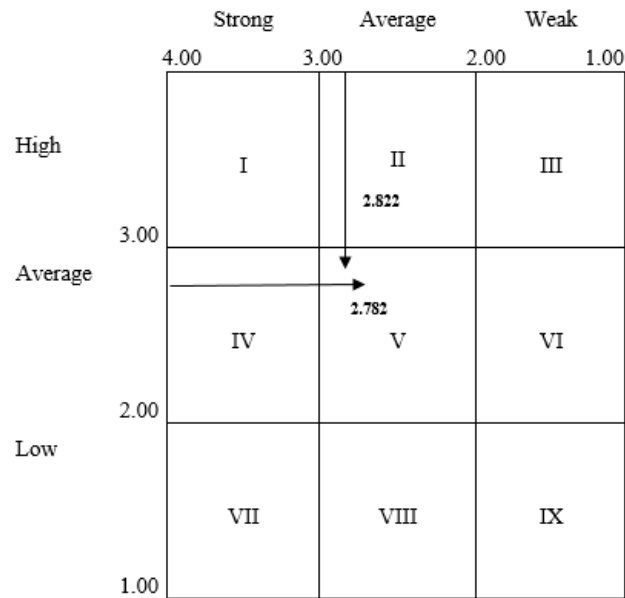
Figure 1. IE matrix for development of coffee in Jambi Provinces

The total weighted score from IFE (2.822) matrix and EFE matrix (2.782) place the development of coffee commodities in Jambi Province in cell V in IE matrix. Strategy than can be taken based on the position of cell is hold and maintain strategy. The best strategy that can be taken is market penetration strategy and product development strategy.

SWOT matrix

Integration of internal and external factors in the SWOT matrix generates several strategic alternatives that can be used in the development of coffee commodities in Jambi Province. It generates four sets of possible strategic alternatives namely S-O strategy, S-T strategy, W-O strategy, and W-T strategy. These strategies can be seen in Table 4.

Table 4. SWOT matrix, model and strategies for development of coffee in Jambi Province

Internal factors / External factors	Strengths : (S) 1. Good quality coffee 2. Coffee plantations area can be expanded 3. Coffee production continues to increase 4. Owning GI certificate 5. Distinctive characteristics of coffee, different from other region's coffee 6. Own capital	Weaknesses : (W) 1. Coffee selling price is not determined by farmers 2. Coffee sales are through brokers/middleman 3. Few types of products 4. Lack of promotion and lack of wide distribution network 5. Limited science and technology innovations
Opportunities : (O) 1. Export market is largely available 2. Lower level of coffee product diversification 3. The existence of MSMEs processing coffee beans Online marketing	S-O strategy 1. Cooperation development with export destinations 2. Coffee products innovations (S3, S4, S5 and O1, O2)	W-O strategy 1. Cutting off distribution channels 2. Direct cooperation with related agencies (W1, W2 and O1)
Threats : (T) 1. Coffee from other regions has lower price 2. Diseases attacking coffee trees 3. Unstable coffee prices	S-T strategy 1. Increase promotion of Jambi Province's coffee 2. Making Jambi's coffee as one of the icons of Jambi Province (S3, S4, S5 and T1)	W-T strategy 1. Improving knowledge and coffee processing technology 2. Improving human resources (W3, W5 and T1)

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QSPM Matrix

Selection of priority strategic alternatives to be implemented is carried out using the QSPM matrix, given in Table 5.

Table 5. QSPM matrix, strategic alternatives for the development of coffee commodities in Jambi Province to respond the global market demand

Strategies	Linkage	TAS	Rank.
1. Cooperation development with export destinations	S3, S4, S5 and O1	5.340	V
2. Coffee products innovations	S3, S5 and O2	5.458	IV
3. Cutting off distribution channels	W1, W2 and O1	5.636	I
4. Direct cooperation with related agencies	W5 and O3	5.124	VI
5. Increase promotion of Jambi Province's coffee	S4, S5 and T1	5.584	III
6. Making Jambi's coffee as one of the icons of Jambi Province	S4, S5 and T1	5.598	II
7. Improving knowledge and coffee processing technology	W3, W5 and T1	5.025	VII
8. Improving human resources	W1, W2 and T2	4.878	VIII

Based on the results of the QSPM matrix analysis, the most appropriate priority of strategies are:

1. Cutting off the distribution channel is the main strategy with a TAS value of 6.636. This measure has an impact on increasing the selling price of coffee which has not benefited farmers in coffee sales. May & Mascarenhas (2004) argues that there are many challenges in the coffee trade, but there are several opportunities, including maintaining long-term cooperation agreements between producers and consumers.
2. Making Jambi's coffee as one of the regional icons has the highest TAS value of 5.598. In addition to Jambi batik, three types of coffee from Jambi Province namely Arabica, Robusta, and Libtukom can be promoted as icons of Jambi Province.
3. Increasing the promotion of Jambi Province's coffee has a TAS value of 5.584. One of the ways to promote is giving Jambi's coffee as a gift or souvenir for tourists. Another one is holding exhibitions both in national and international events.
4. Development of coffee product innovation has a TAS value of 5.458. Innovation must continue to be present in order to provide more added-values to the coffee. Related to this strategy, Sitanggang (2013) stated that establishing a coffee research and development institute creates new innovations in improving the quality and quantity of coffee.
5. Development of cooperation with export destinations has a TAS value of 5.340. By implementing this strategy, the marketing of Jambi Province's coffee has no longer have difficulties to meet global market demand because there will a large coffee production.
6. Cooperating/Working directly with related agencies has a TAS value of 5.124. One way to cut distribution channels is to establish cooperatives or storages for coffee beans produced by farmers. Related agencies such as Estate Crops Office and Trade and Industry Service could collect farmer's coffee beans and sell them directly to consumers.
7. Improving knowledge and coffee processing technology has a TAS value of 5.025. Training to increase knowledge and use of technology has a positive impact on production to be more efficient and effective so the cost of processing can be reduced.
8. Improving human resources has a TAS value of 4.878. It will have an impact on increasing the development of coffee in Jambi Province.

Jambi Province's coffee development model

Development of Jambi Province's coffee began by cutting off the distribution channels for coffee sales. Farmers will sell coffee to cooperatives which then work together with Estate Crops Office and Trade and Industry Service to distribute coffee products directly to destination countries, and also to promote coffee.

Local government will provide counseling and improvement of knowledge and technology to coffee farmers through trainings, workshops, good-quality coffee seeds and creating innovative products that can be accepted in the market. From the several priority strategies in developing Jambi Province's coffee, a model can be generated as shown in the figure below.
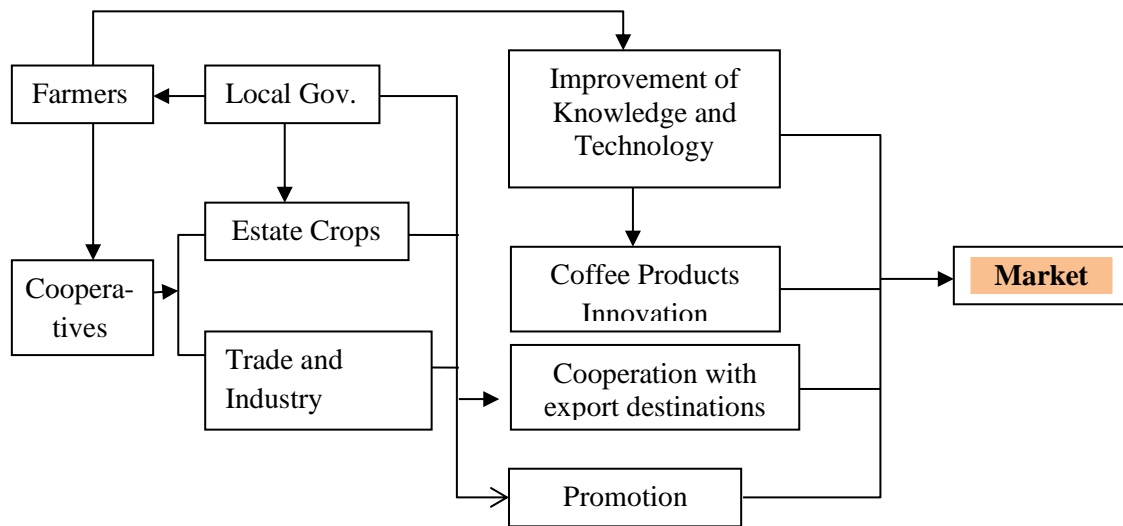

Figure 2. Jambi Province's coffee development model

Coffee agribusiness development is a synchronization of four agribusiness subsystems, namely upstream sub-agribusiness, primary sub-agribusiness, downstream sub-agribusiness, and supporting sub-agribusiness (Bilhak & Ma'arif, 2014).

CONCLUSION AND RECOMMENDATIONS

Conclusion

There are eight strategies for developing Jambi Province's coffee. Those strategies are cutting off distribution channels, working directly with relevant agencies, increasing promotion of coffee as one of the Jambi Province icons, cooperation with export destinations, coffee product innovations, improving knowledge and processing technology of coffee, and improving human resources. From the existing strategy, a good development model is to involve all components starting from coffee farmers, local government, and cooperation with export destinations that can ultimately meet global market demand.

Recommendations

Government and farmers must work together especially in cutting off the distribution channel of coffee which is detrimental to farmers. They also must work in carrying out training and coaching for the existing MSMEs which has to be the focus of all parties to further make innovations for coffee products. Existing cooperation with several countries has to be maintained well so that coffee exports to those countries will go well in a long period.

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