Enterprise Resource Planning and Firm Value: Case of Oil and Gas Firm in Indonesian Stock Exchange

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ABSTRACT

Since oil price crash has big impact on oil and gas firm value, it is important to implements information technology for value improvement, such as enterprise resource planning implementation. This research is aimed to examine the effect of enterprise resource planning implementation on oil and gas firm value. Research sample are oil and gas firms which listed in Indonesian Stock Exchange 2013-2018. Enterprise resource planning implementation is measured by dummy variable. Firm value is measured by return on assets and market to assets value. Based on random effect regression analysis, enterprise resource planning implementation increases firm value. Enterprise resource planning provides higher information quality, integrated relationship between firms' functions and departments, integrated relationship between supplier and customer, also efficiency in resource usage.

Keyword: Enterprise Resource Planning, Firm Value, Indonesian Stock Exchange, Oil and Gas, Return on Assets, Market to Assets Value
JEL Classifications: M15, O33, Q40

1. INTRODUCTION

In era of globalization, firms should be adaptive and have competitive advantage. One of factor that can help firms to be competitive is information technology that can help their business process. Information technology is important to create new method for problem solving, task working, and communication management (Ferrell et al., 2016).

Technology strategy that can be implemented specifically as business investment is Enterprise Resource Planning. Enterprise resource planning is a system to integrates information across functions in a firm (Scapens and Jazayeri, 2003). Basically, enterprise resource planning is an automatized and integrated system (Kristianti and Achjari, 2017), include modules of finance, human resource and payroll, order to cash, manufacture purchase to pay, project management, customer relationship, tools system (Romney and Steinbart, 2018). Enterprise resource planning is built because the needs of business complexity and will help management to achieve efficiency (Scapens and Jazayeri, 2003).

Some studies find the benefit of enterprise resource planning implementation for firm business. Kanellou and Spathis (2013) find that ERP system implementation helps firm to make less costly and timely accounting process. Poston and Grabski (2001) find that eEnterprise resource planning implementation increases employee effectivity to generate sales and reduce production cost. Enterprise resource planning implementation also improves higher financial performance (such as return on investment and assets turnover) (Hunton et al., 2003) and market give positive response to it (Hitt et al., 2002). In case of Indonesia, enterprise resource planning implementation helps firm to improve return on assets (Kristianti and Achjari, 2017).

Since enterprise resource planning implementation helps firm business in many aspects (include in operational, financial, market share aspects), it can be conclude that enterprise resource planning implementation has positive effect on firm value. In the context of finance, maximization of firm value is main objective of firm. Currently, the issue of firm value declining comes from oil and gas industry. In 2014-2016, global experiences the fall of oil price

significantly (Mikhaylov, 2019), include in Indonesia. In 2014, global market has been shocked with oil price crash. Oil price has been decreased globally. The lowest price level is in 2016 since last 10 years. Figure 1 shows the global oil price volatility in last 10 years.

Oil price declining surprises the oil industry. Because of this phenomenon, fifteen big oil firms are bankrupt (Helman, 2016). As one of oil supplier, Indonesia is also get shock. Linear to global oil price crash, national oil price also falls from 2014 to 2016. Graphic of Indonesian oil price can be seen in Figure 2.

The volatility of oil price can give impact to oil and gas firms and industry market value (Ulusoy and Özdurak, 2018). Since market value is indicator of firm value (Kesten, 2010), oil and gas firm value is easily fall when there is negative global issue that can make oil price decline. Enterprise resource planning implementation is one way to help oil and gas firms to improve firm value.

2. LITERATURE REVIEW

2.1. Enterprise Resource Planning
The business today face the challenging environment to create competitive advantages. It is harder to beat the competitor, market pressure, and customer needs. Firms are expected to reduce the costs, includes costs of supply chain, inventory, expanding and improves product quality (Nawaz and Channakeshavalu, 2013). Firms have to upgrade their business system to generate efficient operational activities. In order to solve it, enterprise resource planning can be implemented by the firms.
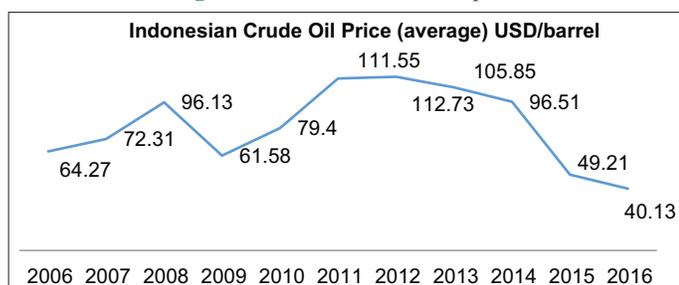
Enterprise resource planning is a result of evolution from traditional resource planning to automated and integrated planning system.

Figure 1: Global crude oil price
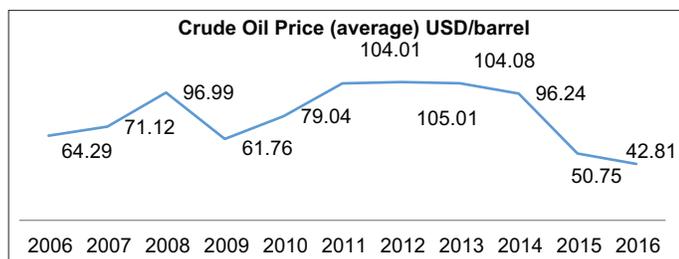
Source: World Bank (2017)

Figure 2: Indonesian crude oil price

Source: Ministry of Energy and Mineral Resources Republic of Indonesia (2017)

Enterprise resource planning is an integrated and multi-module application which has a concept to plan and manage firm resource (Pracita et al., 2018). Enterprise resource planning suggests two main benefits, which are (Nawaz and Channakeshavalu, 2013):
1. A unified enterprise view of the business that encompasses all functions and departments.
2. An enterprise database where all business transactions are entered, recorded, processed, monitored, and reported.

Enterprise resource planning integrates various procedures, applications, and functions into one whole business and as database to help firm working with real-time information (Kanellou and Spathis, 2013). It covers wide function of daily business operation and decision making application (Hitt et al., 2002). Enterprise resource planning puts integration between firms departments and function in first place so the information can be accessed together (Kristianti and Achjari, 2017). Enterprise resource planning system consists of some modules to fulfill any firm needs. The enterprise resource planning modules include in (Romney and Steinbart, 2018):
1. Financial module, which has function to make transaction journal and reporting system between receivable, fixed assets, budgeting, cash management, and managerial and financial reporting plan.
2. Human resources and payroll module, which used to manage human resource, payroll, employee benefit, training, working absence, other compensation, and reporting for stakeholders.
3. Order to cash module, which used to entry the sales order, product delivery, inventory, cash inflow, and charge.
4. Purchase to pay module, which related to purchasing order, purchase delivery, inventory delivery and control, inventory and warehouse management, and cash outflow.
5. Manufacturing module, which used to manage production schedule, raw material and processed good factures, working path management, control, cost management, and manufacturing project and process.
6. Project management (costing) module, which used to manage collection, time and expenses, working unit, and activities management
7. Customer relationship management module, which related to sales and marketing, sales charge, service, customer contact, and call center support
8. System tools module, which used to make data master, determine information flow, access monitoring etc.

2.2. Oil and Gas Sector in Indonesia
In Indonesia, oil and gas business regulated by UUD 1945 art. 33 s 3 (Dwi Qurbani, 2012). In 2013, Indonesia is 22nd biggest crude oil and gas supplier country while in 2016, Indonesia is 21st biggest crude oil and gas supplier country in the world (Putri et al., 2019). There are seven locations as the biggest crude oil suppliers, which are South Sumatera, Riau Islands, Java Ocean Sector, Riau, East Java, West Papua, and East Kalimantan (Putri et al., 2018).

2.3. Hypothesis
Enterprise resource planning implementation focuses on integration between functions and departments of firm. Enterprise resource planning also helps the firm activities to be automated

(Tambovcevs and Tambovceva, 2013). Enterprise resource planning makes manual activities are able to be done by a system. It help firm to reduce the needs of large employees and working forces.

Enterprise resource planning improves firm productivity (Tambovcevs and Tambovceva, 2013). In the context of financial performance, Hunton et al. (2003) find that firms that by implementing enterprise resource planning at least 3 years will achieve better return on assets, return on investment and assets turnover than non-adopter enterprise resource planning.

In enterprise resource planning implementation, integration is important concept. Enterprise resource planning can help integrates better communication between customer and supplier, so it can give positive impact to receivable and payable management (Hitt et al., 2002). It helps the performance of supply chain. Forslund (2010) finds that firms that implement enterprise resource planning with Oracle program helps improves supply chain performance to generate revenue, further, it improves firm value.

Another benefit of eEnterprise resource planning implementation is improvement of inventory management. Enterprise resource planning system can integrates information between sales department and production department to generate better schedule and avoid idle goods in the warehouse (Matolcsy et al., 2005).

Enterprise resource planning improves information integration to generate better information quality (Elragal and Al-Serafi, 2011; Loh et al., 2006; Nicolaou, 2004). It helps manager to perform better monitoring and control function. Integrated system can eliminates limitation across firms' functions so manager can get reliable information to make best decision.

An automated and integrated system like enterprise resource planning is needed by oil and gas firms. Oil and gas firm is sensitive to global oil and gas industry condition. The case of oil price crash in 2014 make oil and gas firms need enterprise resource planning system to maintain cost efficiency and production management so it will not followed by firm value fall as well.

Ha: Enterprise resource planning implementation increases oil and gas firm value.

3. RESEARCH METHOD

3.1. Sample
Research sample are oil and gas firms listed in Indonesian Stock Exchange 2013-2018. It easier for this research to accesses the data if firms are publicly held that listed Indonesian Stock Exchange. Firms sample can be seen in Table 1.

3.2. Variables
Dependent variable is firm value. Firm value refers to shareholders' wealth. Firm value consist of accounting and market measurements. Since earnings are include in shareholders' wealth, accounting measurement is occurred by return on assets, which calculated by earnings after tax divided by total assets.

$$Return\ on\ Assets = \frac{Earnings\ after\ Tax}{Total\ Assets} \qquad (1)$$

Another shareholders' wealth indicator is market share value, so market measurements will be occurred by market to assets value, which calculated by market capitalization divided by total assets.

$$Market\ to\ Assets\ Value = \frac{Share\ price \times Number\ of\ outstanding\ share}{Total\ Assets} \qquad (2)$$

Independent variable is enterprise resource planning implementation. It is measured by dummy variable, score 1 if firm implements enterprise resource planning, score 0 if otherwise.

Control variables are size, leverage, and crude oil price. Size and leverage are factors to determine the firm value (Muzir, 2011). The bigger the firms, the larger resource and it easier to improve firm value. The higher leverage indicates the higher firm risk so it will reduce firm value. Size is measured by natural logarithm of total assets while leverage is measured by debt to total assets ratio. Crude oil price is indicator of oil and gas industry in specific year. Crude oil price is measured by average of national crude oil price.

3.3. Analysis Method
Hypothesis test uses regression analysis. Since enterprise resource planning implementation is not easily change each year in the certain firm, this research rather use random effect regression than fixed effect regression analysis. This research also uses pooled least regression as robustness test with fulfillment of heteroscedasticity and multicollinearity assumptions. Regression model is as follow.

$$Value = a + b_1 ERP + b_2 SIZE + b_3 LEV + b_4 PRICE \qquad (3)$$

Where Value is firm value, ERP is enterprise resource planning implementation, SIZE is firm size, LEV is firm leverage, PRICE is crude oil price.

4. RESULT

4.1. Descriptive Statistics
Table 2 shows average return on assets (ROA) for firms that do not implement enterprise resource planning is −0.1960. Average return on assets (ROA) for firms that implement enterprise resource planning is 0.0742. As expected, return on assets of firms that do not implement enterprise resource planning is lower than return

Table 1: Research sample

Firms	Stock code
Apexindo Pratama Duta	APEX
Benakat Integra	BIPI
Elnusa	ELSA
Energi Mega Persada	ENRG
Medco Energi International	MEDC
Perdana Karya Perkasa	PKPK
Radiant Utama Interinsco	RUIS
Ratu Prabu Energi	ARTI
Surya Esa Perkasa	ESSA

Source: Indonesian Stock Exchange

Table 2: Descriptive statistics

		ROA	MAV	Size	DAR	Price
Not implement ERP	n	48	48	48	48	48
	Mean	−0.0196	0.3467	12.6816	0.6578	67.9017
Implement ERP	n	6	6	6	6	6
	Mean	0.0742	0.6432	12.6623	0.3954	67.9017
Total	n	54	54	54	54	54
	Mean	−0.0092	0.3796	12.6794	0.6287	67.9017
t-statistics		2.246**	2.280***	0.175	2.786*	

Source: Data Proceed. *Significant in 0.01, **Significant in 0.05, ***Significant in 0.10

Table 3: Random effect regression

	Coefficient	t-statistics	Coefficient	t-statistics	Notes
ERP	0.224914	1.720487***	0.267078	2.180103**	Ha is accepted
Size	0.053318	2.090737**	0.468493	3.93619*	
Lev	−0.266210	−3.562000*	−0.840049	−3.30277*	
Price	0.000901	2.139126**	0.002493	2.281405**	
Constant	−0.581765		6.671193		
Dependent variable	Return on Assets		Market to Asset Value		
F-Statistics	6.167622*		8.246810*		
Adj R²	0.280580		0.353558		

Source: Data Proceed. *Significant in 0.01, **Significant in 0.05, ***Significant in 0.10

on assets or firms that implement enterprise resource planning with t-statistics value 2.246 (significant in 0.05).

Average market to assets value (MAV) for firms that do not implement enterprise resource planning is 0.3467. Average market to assets value (MAV) for firms that implement enterprise resource planning is 0.6432. As expected, market to assets value of firms that do not implement enterprise resource planning is lower than return on assets or firms that implement enterprise resource planning with t-statistics value 2.280 (significant in 0.10).

4.2. Hypothesis Test
This research uses random effect regression as hypothesis test. Result of random effect regression can be seen in Table 3.

Table 3, in return on assets model, shows that enterprise resource planning has coefficient value 0.224914 with t-statistics 1.720487 (significant in 0.10). It shows that enterprise resource planning has positive effect on return on assets. In market to assets value mode, enterprise resource planning has coefficient value 0.267078 with t-statistics 2.180103 (significant in 0.05). It shows that enterprise resource planning has positive effect on market to asset value. The result indicates that hypothesis, enterprise resource planning implementation increases oil and gas firm value, is accepted.

The result is consistent with previous researches that enterprise resource planning helps firm to provide productivity improvement (Tambovcevs and Tambovceva, 2013) and performance improvement (Hunton et al., 2003). Enterprise resource planning provides automated system so efficiency will be occurred. It also produces higher financial performance. Enterprise resource planning helps firm to performs better supply chain, because it provide higher information quality and integrates customer, supplier, and production well. Enterprise resource planning system can integrates information between sales department and production department to generate better schedule. It helps manager to perform better monitoring and control function. Integrated system can eliminates limitation across

Table 4: Heteroscedasticity and multicollinearity

Test	Return on assets model	Market to assets value model
VIF	VIF below 10	VIF below 10
White test	Value of sig.=0.2217	Value of sig.=0.0072*

Source: Data Proceed. *Significant in 0.01

firms' functions so manager can get reliable information to make best decision. Since oil and gas firms are shocked by oil price crash, enterprise resource planning is important to be implemented by oil and gas firms to avoid performance lost, or event, avoid bankruptcy.

4.3. Robustness Test
This research performs pooled least square as robustness test. In order to fill the pooled least square assumptions, heteroscedasticity and multicollinearity tests are examined first. Result of heteroscedasticity and multicollinearity tests can be seen in Table 4.

Table 4 shows that VIF values for return on assets and market to assets value models are below 10. It indicates that there is no multicollinearity problems. In return on assets model, significance value of White test is 0.2217 (insignificant). It indicates that there is no heteroscedasticity problems for return on assets model. In market to assets value model, significance value of White test is 0.0072 (significant in 0.01). It indicates that there is heteroscedasticity problems for market to assets value model.

Since there is heteroscedasticity problems, market to assets value model will be examined by Huber-White test with heteroscedasticity condition. Result of pooled least square regression can be seen in Table 5.

In Table 5, in return on assets model, shows that enterprise resource planning has coefficient value 0.235394 with t-statistics 1.924233 (significant in 0.10). It shows that enterprise resource planning has positive effect on return on assets. In market to assets value mode,

Table 5: Pooled least square regression

	Coefficient	t-statistics	Coefficient	t-statistics	Notes
ERP	0.235394	1.924233***	0.290977	1.757908***	Result is consistent
Size	0.047574	2.745052*	−0.04521	−1.00211	
Lev	−0.22585	−3.94224*	−0.01793	−0.04755	
Price	0.000943	2.063306**	0.003836	1.580693	
Constant	−0.53834		0.671311		
Dependent variable	Return on assets		Market to asset value****		
F-statistics	7.706216*		3.038690**		
Adj R²	0.336046		0.051024		

Source: Data Proceed. *Significant in 0.01, **Significant in 0.05, ***Significant in 0.10, ****Huber-White with Heteroscedasticity Condition

enterprise resource planning has coefficient value 0.290977 with t-statistics 1.757908 (significant in 0.10). It shows that enterprise resource planning has positive effect on market to asset value. It indicates that pooled least regression result is consistent with random effect regression result.

5. CONCLUSION

Based on analysis data, enterprise resource planning has positive effect on oil and gas firm value. Enterprise resource planning provides higher information quality, integrated relationship between firms' functions and departments, integrated relationship between supplier and customer, also efficiency in resource usage. Limitation of this research is this research only occurs enterprise resource planning by seeing if firm implement occurs enterprise resource or do not implement. This research does not occurs which modules of enterprise resource planning implemented and how difficult enterprise resource planning integrated into firms' old business system. Future research expected to measures enterprise resource planning enterprise resource planning deeper so it can be occurred accurately.

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