

# Role of Supply Chain Management on Prevention of Crude Oil and Gas Company's Value Decreasing in Oil Price Falling Period: Evidence from Indonesia

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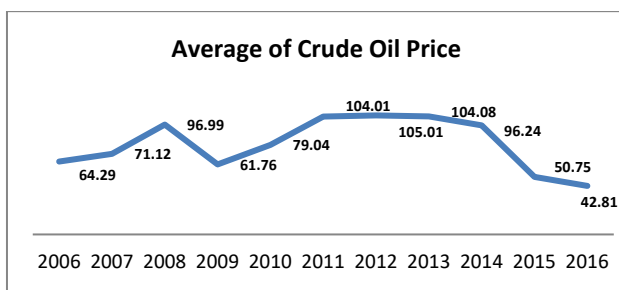
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**Abstract**— This research is aimed to examine role of supply chain management in prevent company's value decreasing in oil price falling period. This research use nine crude oil and gas companies listed in Indonesian Stock Exchange from 2013-2016 as research sample. Based on fixed effect regression, supply chain management weakens negative effect of oil price falling on company's value. It indicates that by implementing better oil demand forecast; company reduces overload production and inventory cost, integrating function of drilling contract, demand forecasting, maximization of assets utilization; good supply chain management helps company to prevent value decreasing in oil price falling period. This research has implication to management to formulate excellent supply chain strategy in order to make company survive in oil price collapse.

**Keywords**— Supply Chain Management, Crude Oil and Gas Company, Company's Value, Oil Price Falling, Indonesia

## 1. Introduction

In 2013-2016, oil price has been decreased globally. Shock of oil price decreasing happens in 2015-2016 where the price decreases at the lowest level in last ten years. Graphic of global oil price can be seen in figure 1 [1].

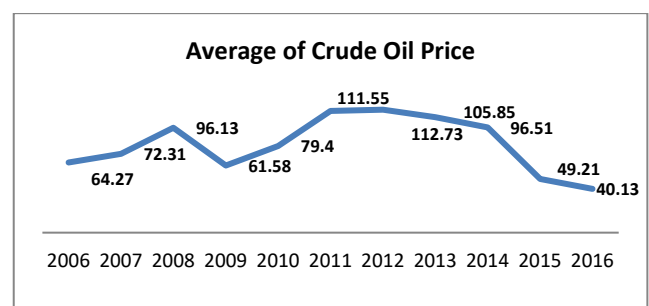


**Figure 1.** Global Crude Oil Price (USD/barrel)

Based on figure 1, oil price decreases from 2013-2016 from 104.08 USD/barrel to 42.81 USD/barrel. Oil price falling gives big impact to oil industry. Prices in 2015 and

2016 are 50.75 USD/barrel and 42.81 USD/barrel where it is the lowest level since 2006. Big oil price falling in 2015 makes profitability of big oil companies; such as Total, Royal Dutch Shell and BP; declines [2]. In addition, [3] states there are fifteen big oil companies that have been bankrupted because of oil price drop. It happens because companies have no enough revenues to be generated because sales price is low. This phenomenon is important to be studied because oil industry is one of the most important of basic industry to support other industries as energy supplier.

Indonesia, as one of OPEC (Organization of the Petroleum Exporting Countries) former member, is affected by falling price as well, because Indonesian oil price refers to global price. Decreasing of global oil price followed by Indonesian oil price from 2013-2016. In 2015-2016, Indonesian oil price touches the lowest level in last ten years. Graphic of Indonesian oil price can be seen in figure 2 [4].



**Figure 2.** Indonesian Crude Oil Price (USD/barrel)

Figure 2 shows that oil price in Indonesia falls from 105.85 USD/barrel to 40.13 USD/barrel in 2013-2016. Prices in 2015 and 2016 are 49.21 USD/barrel and 40.13 USD/barrel where it is the lowest level since 2006.

Oil price has effect on company's value by two aspects; which are direct effect of oil price on stock market [5]–[7] and on price of energy which economics units use [8]. Effect of oil price consequently will transfer sum of costs, earnings of economic, which in turn have effect on

shareholders wealth [9]. Oil price change leads to change of demand and supply decisions of company's product, further, leads to change of company's value [10]. Decreasing of oil price will reduce revenues as well as earnings of company. By decreasing of earnings, shareholders get low return as well as low potential dividend. Ref. [6] states that oil price shocks have effect on shareholders wealth.

Factor that could reduce bad effect of oil price falling on company's value is supply chain management. Supply chain management is picture of relation and integration of procedure of on time product or service delivery with assurance of highest customer satisfaction, further, it makes link between buyer and supplier in ensuring backward and forward integration effectively [11]. By implementing supply chain management, crude oil and gas company could reduce bad effect of oil price falling on its value. Main problem of oil price falling is reduces level of revenues, at the same time, there is overload production of oil. It leads to higher cost of production, lower revenues and earnings. By ensuring accurate demand of oil products, high quality production and distribution, and increases sales volume to covers price falling; supply chain management has important role to make company survive in oil price falling period. While company with low quality of supply chain management experiences low value in price falling period, company with high quality of supply chain management will reduce or prevent further negative effect of oil price falling on company's value. Supply chain management can increase logistics performance [12] as well as makes efficient inventory management [13]. It shows that supply chain management could create value added to company. This research is aimed to examine role of supply chain management reduces negative effect of oil price falling on company's value listed in Indonesian Stock Exchange.

## 2. Literature Review

### 2.1 Stewardship Theory

Development of financial field gives explanation of organization management in financial management perspective by stewardship theory approach. Stewardship theory is theory that shows situation where managers do not motivated by individual interests but more on their performance for organization interests, so this theory has psychology and sociology basis that place managers as steward that acts as principal (owners) interest, further, steward will try to achieve organization objectives [14]. Based on the theory, manager is steward that involved to works together in organization. Even though there is interest difference between steward and principal, steward works to fulfill principal interests and maximizes principal wealth. Success of organization as well as maximizes management utilization and its individual.

In order to achieve organization objectives, it is important to make strategies that will be adjusted to company's working capital, either financial or non financial capital. Company's strategy can be explained in concept of inside and outside company's functions integration, such as implementation of supply chain management [15]. Supply chain management is process of value creation that focuses on efficient and effective inventory, cash and information flows. This process involves all company's functions to work together to achieve company's objectives.

### 2.2 Supply Chain Management

Good business process indicated by rapid technology development, short product life cycle and competition intensity. This condition makes company find new way to build competitive advantages. It depends on efficiency and productivity between company's functions to have more responsive on customer needs and market demands. Products have to in high quality condition with fast shipping. Based on it, effective supply chain management is needed.

Ref. [16] defines supply chain management as a approach set that used for integration efficiencies of suppliers, manufacturers, inventories and stores; so products will be manufactured and distributed in accurate amount, right location, and on time; in order to minimize costs but still in high quality service. Ref. [17] defines supply chain management as organization management integration and supply chain activities by organization cooperation relationship, effective business process and information sharing to create high performance value system and gives sustainable competitive advantages for organization.

There are two supply chain management strategies, which are efficient supply chain and responsive supply chain [15]. Efficient supply chain strategy focuses on customer need fulfillment at the lowest cost, while responsive supply chain focuses on fast responses for customer need fulfillment by supporting inventory system. Supply chain management implementation has three main objectives; which are cost reduction [18], capital optimization [19] and service improvement [20]. Cost reduction could be achieved by minimizing logistic cost, such as transportation selection with low cost. Capital reduction could be achieved by minimizing logistics investment. Service improvement could be done proactively because it can affect revenues and profitability. Excellent supply chain management related to superior performance [21], [22]. Ref. [21] states that main areas where supply chain management has effect on company's performance; which are profitability, liquidity and productivity. In profitability area, supply chain management could improve service quality as well as reduce operational costs. In liquidity area, supply chain

management contributes to reduce the uses of liabilities and capital maximization. In productivity area, supply chain management leads to efficient assets use.

### 2.3 Hypothesis Development

In terms of financial management, a company is established to increase wealth of the owner or shareholders by increasing company's value [23]. When company's value is high, wealth of shareholders is high as well. In stock market context, stock price is an indicator of the company's value. Stock price is an overview of various decisions and policies that made by the management, so that company's value is result of management action [23].

One of factors that have effect on company's value is industry condition. In 2015 and 2016, oil and gas industry has the most intentions. According to [1] oil price has felt down to the lowest level in last ten year. In Indonesia, it happens as well [4]. Oil price falling leads to low company's revenue, further, it decreases profitability. Since profit is main component to determine shareholders wealth, either by stock price change or dividend payment, oil price has effect on company's value. Oil price has effect on company's value by two aspects; which are direct effect of oil price on stock market [5]–[7] and operation activities [8]. In terms of operation area, the main factor that causes oil price falling is overload of oil production [24]. Supply of oil is bigger than its demand makes price decreases, at the same time, it leads to uncover production and inventory costs.

Supply chain management could be the role of prevention of value decreasing in price collapse. Supply chain management is picture of relation and integration of procedure of on time product or service delivery with assurance of highest customer satisfaction, further, it makes link between buyer and supplier in ensuring backward and forward integration effectively [11]. Advantages of excellent supply chain management are cost reduction, capital reduction and service improvement [18]–[20]. By implementing better oil demand forecast, company reduces overload production. It leads to efficiency of production and inventory cost. It can reduce assets-production investment as well, by making contract to uses drilling assets in shorter time. Even though there is revenue reducing, company could reduce costs as well, in order to prevent profit decreasing. By integrating function of drilling contract, demand forecasting, maximization of assets utilization; good supply chain management helps company to prevent value decreasing in oil price falling period.

**Ha: Supply chain management weakens negative effect of oil price falling on company's value**

## 3. Research Method

### 3.1 Research Sample

Sample in this research is all crude oil and gas companies listed in Indonesian Stock Exchange (IDX) from 2013-

2016. Consideration of period 2013-2016 as research period because decreasing of oil price happens from 2013 to 2016 leads to high probability of value decreasing. All data accessed from [www.idx.co.id](http://www.idx.co.id). Based on table 1 there are nine crude oil and gas companies listed in IDX 2013-2016.

**Table 1.** Research Sampel

Crude Oil and Gas Company listed in IDX 2013-2016	Stock Code
PT. Apexindo Pratama Duta tbk.	APEX
PT. Benakat Integra tbk.	BIPI
PT. Elnusa tbk.	ELSA
PT. Energi Mega Persada tbk.	ENRG
PT. Medco Energi International tbk.	MEDC
PT. Perdana Karya Perkasa tbk.	PKPK
PT. Radiant Utama Interinsco tbk.	RUIS
PT. Ratu Prabu Energi tbk.	ARTI
PT. Surya Esa Perkasa tbk.	ESSA
<b>Total Observations 2013-2016 is 36 Observation</b>	

### 3.2 Variables

This research examines role of supply chain management in decreasing negative effect of oil price falling period on company's value. Based on research aim, company's value is positioned as dependent variable, price falling period is positioned as independent variable, and supply chain management is positioned as moderating variable. Company's value is measured by market to assets value (market capitalization divided by total assets). Price falling measured by dummy variable (score 1 if year of oil price decreasing is oil price falling period, 0 if otherwise). Determinant of falling period is based on the lowest level price decreasing since last ten years, which is period 2015 and 2016. Even though oil price is decreased in 2013 and 2014, price decreasing does not at lowest level in last ten years. Supply chain management build up by two components; which are cash generation and assets efficiency [25]. Cash generation calculated by cash flow from operation divided by sales, while assets efficiency calculated by sales divided by total assets less current liabilities. Complete measurement of supply chain management can be seen as followed [25].

$$\text{Supply Chain Management} = \frac{\text{Operation cash flow}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total assets} - \text{current liabilities}} = \frac{\text{Operation cash flow}}{\text{Total assets} - \text{current liabilities}} \quad (1)$$

Control variables are company's factors and shareholders factors. Company's factors are size, leverage and growth. Size, leverage and growth are factors seen by shareholders to measure their wealth from implementation of supply chain management [26]. Size measured by logarithm of share market capitalization. The bigger company's size, company has more resource to increases value. Leverage measured by debt to assets ratio. High

leverage indicates high company risk and decreases company's value. Company's growth is measure by sales growth. The uses of sales growth as company's growth because it is related to company's revenue, since revenue get direct effect by oil price change. Higher growth leads to value increasing. Shareholders factors are used because company's value related to shareholders wealth. Shareholders factors are measured by share ownership by institution, foreign, and management.

### 3.3 Analysis Model

Hypothesis test is performed by regression test. This research tests whether fixed or common effect will be fitted for analysis by redundant fixed effect test. Regression model is as followed.

$$MVA = a + b_1FALL + b_2FALL\_SCM + b_3SCM + b_4SIZE + b_5DAR + b_6SG + b_7FO + b_8MO + b_9IO + e \quad (2)$$

Where:

- MVA = Market Value to Assets Ratio  
 FALL = 1 if oil price falling period, 0 otherwise  
 SCM = Supply Chain Management  
 SIZE = Company's Size  
 DAR = Debt to Assets Ratio  
 SG = Sales Growth  
 FO = Foreign Ownership  
 MO = Managerial Ownership  
 IO = Institutional Ownership  
 a = Constant  
 b<sub>1</sub>-b<sub>9</sub> = Coefficients

## 4. Results

### 4.1 Statistics Descriptive

**Table 2.** Descriptive Statistics

Variable	Mean Value		
	Before Falling Period	Falling Period	Total
MVA	0.5291	0.3210	0.4251
SCM	0.1303	0.1515	0.1409
SIZE	12.1515	12.0462	12.0989
DAR	0.6856	0.6358	0.6112
SG	0.3513	-0.2768	0.0373
FO	0.1592	0.1505	0.1549
MO	0.0552	0.0551	0.0551
IO	0.5408	0.5138	0.5273

Oil price falling period in this research is period 2015 and 2016, while non oil price falling period is 2013-2014. Based on table 2, average of market value to total assets is 0.4251. Market value to total assets between 2013 until 2014 (before oil price falling period) is 0.5291, while between 2015 until 2016 (oil price falling period) market value to total assets is 0.3210. As expected, average of company's value in oil price falling period is lower than before oil price falling period. Supply chain management

before oil price falling period is 0.1303, while in oil price falling period is 0.1515. It shows that supply chain management of crude oil and gas companies in IDX is better when oil price falling period than before oil price falling period.

### 4.2 Hypothesis Test and Discussion

**Table 3.** Fixed-Effect Regression

Variable	t-Statistics	Significance
FALL	-2.184235**	0.0424
FALL_SCM	1.879107***	0.0765
SCM	-1.327261	0.2010
SIZE	2.239939**	0.0380
DAR	-2.038917***	0.0564
SG	-0.780824	0.4451
FO	-0.531854	0.6013
MO	-1.172035	0.2565
IO	0.502271	0.6216
C	0.638396	0.5313
Adjusted R-squared	0.656938	
F-statistic	4.942495*	
Redundant Fixed Effect Test	28.941647*	
*Significant in 1 percent		
**Significant in 5 percent		
***Significant in 10 percent		

Based on table 3, statistics value of redundant fixed effect test is 28.941647 (significant in 1 percent). It shows that fixed effect regression model is the best test for this research. Oil price falling period has t-statistics value -2.184235 (significant in 5 percent). As expected, oil price falling has negative effect on company's value. It is consistence with study of [9] and [10] that oil price has effect on operational activities and stock market atmosphere and change company's value.

Variable interaction between oil price falling period and supply chain management has t-statistics value 1.879107 (significant in 10 percent). It shows that supply chain management weakens negative effect of oil price falling on company's value. By implementing better oil demand forecast, company reduces overload production. It leads to efficiency of production and inventory cost. It can reduce assets-production investment as well, by making contract to uses drilling assets in shorter time. Even though there is revenue reducing, company could reduce costs as well, in order to prevent profit decreasing. By integrating function of drilling contract, demand forecasting, maximization of assets utilization; good supply chain management helps company to prevent value decreasing in oil price falling period.

### 4.3 Additional Test

Company's value reflects shareholders wealth. Shareholders wealth could be seen by share return in market share as well. Share return will be use as alternative company's value measurement. Share return calculated by change of annual share price plus dividend yield [27], which is:

$$\text{Share Return} = \frac{(\text{Current Price} - \text{Previous Price} + \text{Current Dividend})}{\text{Previous Price}} \quad (3)$$

Second alternative is regression only with company's factors as control variables. Third alternative is regression only with shareholders factors as control variables. Alternative test could be seen in table 4.

**Table 4.** Alternative Test

Variable	t-Statistics				Notes
	Main Analysis	Alternative 1	Alternative 2	Alternative 3	
FALL	-2.184235**	-0.918286	-1.973437***	-1.804990***	
FALL_SCM	1.879107***	0.237081	1.417330	0.847854	Inconsistent
SCM	-1.327261	-0.433031	-0.760125	-0.638504	
SIZE	2.239939**	4.637805*	2.087254**		
DAR	-2.038917***	1.711352	-2.043272**		
SG	-0.780824	-1.478100	-0.900872		
FO	-0.531854	0.161884		0.250642	
MO	-1.172035	-1.835544***		-0.716499	
IO	0.502271	0.692380		-0.393797	
Adjusted R-squared	0.656938	0.474168	0.675813	0.479660	
F-statistic	4.942495*	2.856540*	6.211597*	3.304553*	
Redundant Fixed Effect Test	28.941647*	34.729063*	41.447500*	27.710265*	
Alternative 1 = Annual share return as company's value Alternative 2 = Controlled by company's factors only Alternative 3 = Controlled by ownership factors only *Significant in 1 percent **Significant in 5 percent ***Significant in 10 percent					

Based on table 4, for alternative 1, variable interaction between oil price falling period and supply chain management has t-statistics value 0.237081. For alternative 2, variable interaction between oil price falling period and supply chain management has t-statistics value 1.417330. For alternative 3, variable interaction between oil price falling period and supply chain management has t-statistics value 0.847854.

Alternative test show that all alternative results are inconsistent with main result. For alternative 1, supply chain management in oil price falling period is sensitive to company's value if it measured by market to assets value and stock return. It indicates that supply chain management only could capture company's value if company's value measurement considers book value of assets to shows value added of market value compares to company's assets. As alternative 2, supply chain management in oil price falling period is sensitive if it controlled by company's factors only. As alternative 3, supply chain management in oil price falling period is sensitive if it controlled by shareholders factors only. Tests of alternative 2 and 3 show that supply chain management could capture company's value if effect of supply chain management (either as independent or moderating variable) controlled by shareholders and company's factor.

## 5. Conclusion

This research is aimed to examine role of supply chain management in prevent company's value decreasing in oil price falling period. Based on data analysis, supply chain management weakens negative effect of oil price falling on company's value. It indicates that by implementing better oil demand forecast; company reduces overload

production and inventory cost, integrating function of drilling contract, demand forecasting, maximization of assets utilization; good supply chain management helps company to prevent value decreasing in oil price falling period. This research has implication to management to formulate excellent supply chain strategy in order to make company survive in oil price collapse, so company can prevent its value decreasing. Limitation of this research is measurement of supply chain management does not divided into each company's function; such supplier, contractors, production, and sells and marketing function; because this research only uses data from publish financial statement in Indonesian Stock Exchange. Future research could use non-financial or qualitative data to measures supply chain management.

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