

The Design of Collaborative Procurement Strategy in the Subsidiaries of a Gas Administrator Company

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Abstract- The purpose of this study was to determine how much efficiency and feasibility from the design of collaborative procurement strategy on three subsidiaries from PT Induk that runs in gas sectors. The methodology used in this study is Cost-Benefit Analysis approach, with criteria of calculation Present Value (PV), Future Value (FV), and Benefit-Cost Ratio (B/C Ratio). This study found that the procurement process at the three subsidiaries with the classification of materials/ parts is a redundant process and inefficient. A calculation in this study proves that the collaboration which has been done by three subsidiaries is more efficient if implemented with the collaboration procurement strategy on the classification of material/ parts by specifying the manufacturer and the right quantity so as to reduce the cost it does cost sharing. The result B/C ratio showed 8,19 indicating this collaboration strategy should be feasible.

Index Terms- collaboration strategy, procurement, cost-benefit analysis, efficiency.

I. INTRODUCTION

Declining in the price of world's oil and gas has brought impacts on the degradation in the price of oil and gas in Indonesia. The downward trend of the price of oil and gas as a commodity has been getting worse since 2014 until 2016. Forex released the closing price of oil that is as much as 57,35 USD/barrel in 2014 dan the closing price in January 2016 was around 31,1 USD/barrel. This downward trend in the sale value of oil and gas also brings impacts on the weakening of the sale and the income of oil and gas business in Indonesia. PT Induk is the only State-Owned Enterprise that runs oil and gas management in Indonesia. Based on Table 1 PT Induk records that there is a decline in the sale and the income of the linear business that is as much as 55 percent.

Table 1 Sale and Income of Business Followed by PT Induk's Net Profit in Years 2013-2015

Year	Sale and Income of the Pertamina Business	Pertamina's Net Profit	The Gas Directory's Net Profit
2013	71.102	3.062	299
2014	70.648	1.505	279
2015	31.966	914	148

Source: PT Induk's Annual Report and Company Budget Work Plan of 2016. The numbers are expressed in millions in USD.

One of the directories under PT Induk, which is the Gas Directory as the administrator of natural gas which has just entered its fourth year of operation in gas management, also experiences the impacts of the degradation of price due to the instability of the price of oil and gas in the world. It can be seen in Table 1 that there has been a decline in the Gas Directory's net profit since 2014, while since 2014 until 2015 there had been a decline in the net profit that is as much as 60 million USD. This degradation in the net profit is caused by several factors, but the most dominant factor is the increase of the cost for operation & maintenance that is as much as 43 million USD or 553 percent compared to the cost in 2015 which includes the cost for the making of new projects, the maintenance of ongoing projects and the difference in the exchange rates of rupiah to USD that degrades. This causes PT Induk, with the help from all of its directories, to promote efficiency in every sector, in accordance with the establishment of five prioritized strategy pillars of the

company that are assigned by the President Director of PT Induk in 2015, where the application of this strategy is the company's plan program to reach its goals by maximizing its strengths in competitions and minimizing the company's weaknesses (Wheelan and Hunger 1995).

An idea to perform efficiency by applying collaborative concept on the purchase and the delivery of goods on ongoing projects that are managed by PT Induk's subsidiaries emerges. PT Induk's subsidiaries are business entities which take the form of limited company or other forms that are similar to it, where all or more than 50 percent of the share is owned by PT Induk and governmental institutions or anything like it (Guidance of Procurement of PT Induk 2015). Three subsidiaries that are going to be examined are PT Badak, PT Donggi, and PT Gas which are known to have similar business fields. Procurement of goods and services is highly important for oil and gas companies, because this is the ultimate point in the oil and gas activities

(Nugroho and Vanany, 2013). Due to the similar business fields, it is assumed that the three subsidiaries have similar needs in terms of goods in relation to both materials and spare parts. According to Guidance of Procurement of Goods/Services of Pertamina No. A-001/K220300/2015-S9 Third Revision, it is explained that Delivery Contract system allows Join/Sharing Contract which is a contract between several work units or several projects and certain Suppliers of Goods/Services in completing work in accordance with the program using joint funding, which is elaborated in the agreement. The Joint/Sharing Contract is elaborated if there are similar interests from several work units to accelerate the process and cut the cost.

A research that supports this research is one that is done by Widarsono (2011), who explains that making a good choice in the application of the correct strategies is highly important. Strategic control system is needed in order to ensure that the strategy can be interpreted into actions or implementations (Suhartoyo, 2015). The function of cost management is to give information for the decision holder in order to make a decision that enhances effectiveness and efficiency, one of the analysis tools that can be used is Value Chain Analysis. Pomponi et al (2014) also states that cooperation in terms of logistic collaboration in a business can decrease the cost that has to be spent by the company. In the application, this cooperation involves the vertical supply chain area of two or more companies which reaches the operational, tactical and strategic levels. Collaboration emerges from company's various problems where doing a job and operational process is not enough to solve problems and reach the intended goal (Wagner *et al*, 2002).

A research that conforms to this research's methodology is the one that is done by Tangvitoontham and Chaiwat (2010), who explains that in order to estimate the cost and the benefit in the development of logistic projects Cost-Benefit Analysis can be used which can help making decisions to make project development investment. Analytically it can be calculated using decision making calculating technique using *Net Present Value (NPV)*, *Net Benefit Cost (Net B/C)* and *Internal Return of Rate (IRR)* in the case (Alkony et al., 2014). Linn (2009) in the research regarding benefit cost analysis states that this can be beneficial in terms of determining how much money that can be

saved in determining economic price (Linn, 2009). Benefit cost analysis may be performed to find out the cost and the benefit that are experienced by the related parties without valuing them in the form of money (Bappenas, 2011). Procurement process can be expressed by the measurement of the time, the cost and the quality that are received, in every procurement process it can be compared to the positive benefits and the negative impacts of the application of the ongoing process (Onosakponome, 2011). Porter (1985) also explains the procurement process as a supporting activity in the value chain whose function is to handle input or resources for a company/organization.

II. RESEARCH METHOD

The number of respondents in this research is six experts who are practitioners and business people in the related industry. Suyitman (2009) states that the requirements of expert respondents are having competent experience in accordance with the field that is examined, having a reputation, a position or a title in the competence with the field that is examined, having commitment to the problems that are examined, neutral and willing to accept other respondents' opinions and having high credibility and willing to be asked for opinions. The data that is used in this research is secondary data and primary data. The secondary data that is used includes the list of materials/parts purchase from the three subsidiaries PT Badak LNG, PT Donggi and PT Gas since 2013 until 2015 which have been through the determined classification, annual reports, Standard Operating Procedure (SOP), and procurement rules of PT Induk in 2015. This research is done in Jakarta in each central office of the subsidiaries PT Badak LNG, PT Donggi and PT Gas and the researcher also performs direct observation to gas management operation factory in Bontang, East Kalimantan. The duration of the research and the data collection is between February 2015 and February 2016.

The data that is obtained qualitatively and quantitatively, dan presented in the form of table, pictures and matrix. The data management and analysis are done in several process stages, which are:

Table 2 Data Source and Informants' Elaboration

No	Data Source	PIC
1	Procurement PT Badak LNG	Procurement & Contract Senior Manager
2	Procurement PT Gas	Manager Supply Chain Management
3	Procurement PT Donggi Senoro LNG	Procurement Manager
4	Procurement PT Induk	Procurement Excellence Group Manager
5	Subsidiary Management PT Induk	Subsidiary Performance Optimization Manager
6	PT TAP Logistics	Operation Manager

Source: The data is taken based on FGD on January 12, 2016

According to Porter (1985), the value chain of a company can be divided into main activity and supporting activity. The value chain analysis stages are divided into three stages, which are: 1) Identifying the value chain activity, 2) Identifying the factors that can increase the cost in every value activity, and 3) Developing the competitive strengths by cutting the cost or

adding the value (Widarsono, 2011). Managing the supply chain on a certain level is a part of the strategy that can increase the competitive strength and the profit (Baig, 2011). From this supply chain, it will be collaborated in the form of procurement of goods, collaboration is a cooperation process to achieve certain goals which cannot be achieved by making individual

attempt (Ozener, 2008), this can enhance the flexibility of the combination of the two collaborations in a horizontal form (Bhakoo and Chan, 2011). Generally, the environment of the collaboration process only focuses on the short-term results of the joint venture, but, on a good stage, the collaboration will create a new design that is as good as the product that is going to be produced (Blome *et al*, 2013).

Cost benefit analysis is a tool that can be used to determine a choice, where the choice is not always decided technically only, but also based on subjective input that is related to the technical part (Nasution, 2006). Cost Benefit Analysis can save money if it is implemented (Fearne and Martinez, 2012). In order to keep the cost and the benefit balanced, there are 3 things that should be considered: 1) Efficiency, which means enhancing efficiency, which means achieving the same result with lower cost; 2) Effective, which means enhancing effectiveness, which means achieving better results with the same cost; 3) Productive, which means enhancing productivity, which means achieving better results with lower cost (Widjaja, 1994). In this research analysis the project will be discounted for future value determination process for the current value. This is caused by uncertainty that occurs in the future. The estimated interest rate for this discount is called "Discount Factor" (Gittinger 1986). Discount Factor (DF) can be calculated mathematically using this following formula (Kadariah *et al* 1978):

$$FV = PV (1 + i)^n$$

$$PV = \frac{FV}{(1 + i)^n}$$

Where :

FV = Future Value

PV = Present Value

n = t = The number of time period

i = r = Interest rate

Benefit Cost Ratio (B/C) is used to analyze the cost and the benefit in every unit of cost that is produced (Sagita 2011). This analysis considers the cost and the benefit that are obtained from

the implementation of a program or a project (Hafidh 2010). The formula to count B/C is as follows (Tangvitoontham 2010):

$$B/C \text{ Ratio} = \frac{\sum_{t=0}^n \frac{Bt}{(1+i)^t}}{\sum_{t=0}^n \frac{Ct}{(1+i)^t}}$$

Where :

Bt = *Benefit* at t time

Ct = *Cost* at t time

i = Interest rate

n = t = The number of time period

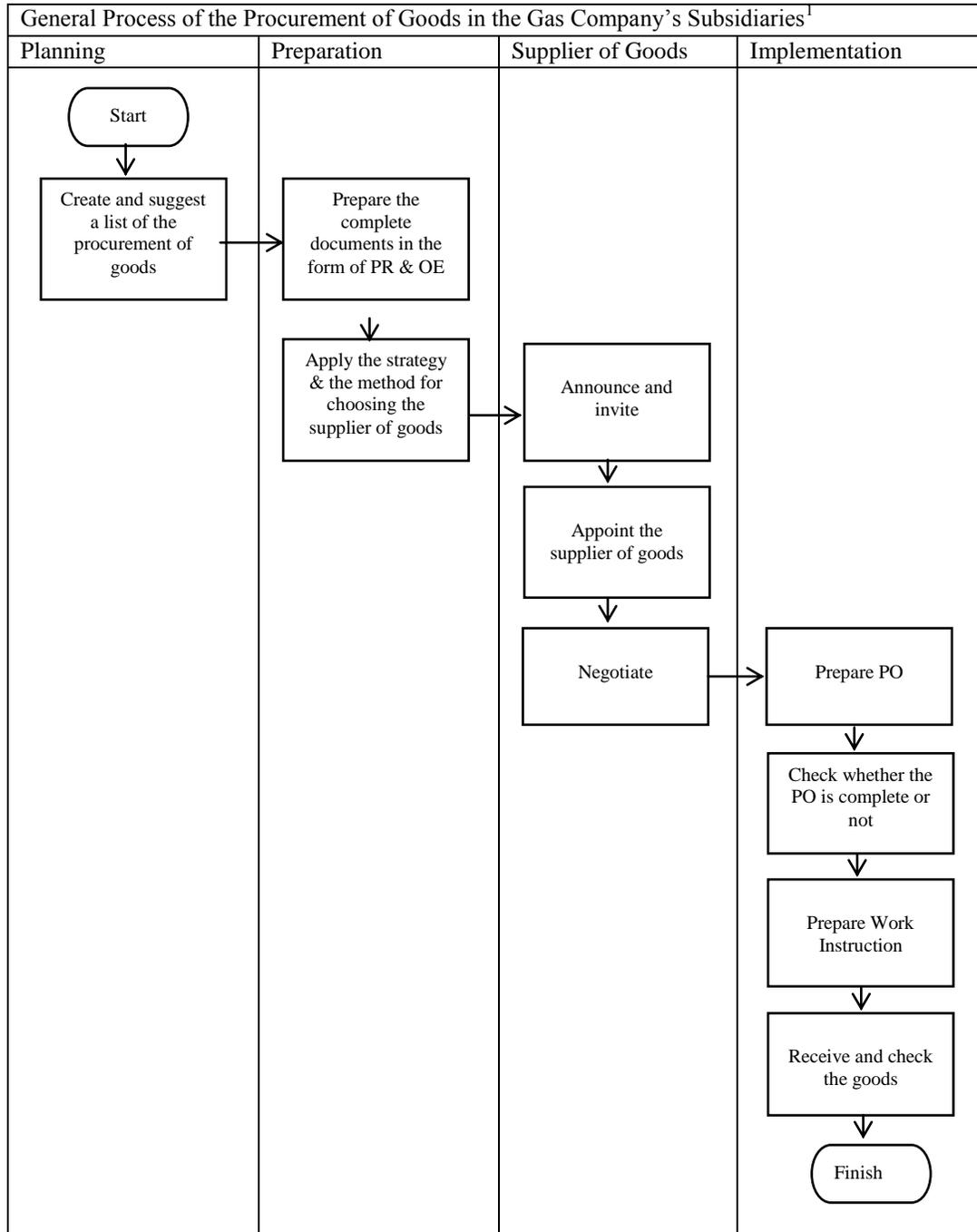
Explanations of B/C ratio are as follows:

- a. If B/C ratio > 1, this collaborative concept is proper to be implemented.
- b. If B/C ratio < 1, this collaborative concept is not proper to be implemented.
- c. If B/C ratio = 1, this collaborative concept is not proper to be implemented because it does not have any significant benefit.

III. RESEARCH RESULTS

Value Chain Analysis on the Collaborative Strategy

In terms of the procurement of goods, each subsidiary has similar process flows. A new collaborative procurement process can cover the weaknesses and increase the strengths of the existing chances from the ongoing procurement process. The stages of the procurement of goods process in the 3 subsidiaries consist of these sequences: 1) Planning to list the necessities for the procurement of goods; 2) Preparation of documents and choosing the method for the procurement of goods; 3) Choosing the supplier of goods; 4) Implementation of the procurement of goods until the delivery. The following is identified for the determination of strengths and weaknesses of the ongoing process of the procurement of goods in the three subsidiaries through the primary activity stages of the inbound logistic process. This process is supported by the horizontal collaborative theory which is a form of cooperation from two or more companies that run the same supply chain and logistic processes (Crujissen 2006).



In the figure, it is shown that Collaborative Procurement of Goods is expected to create benefit calculation with considerations on all the cost that emerges, so it is expected that, with the implementation of collaborative procurement of goods especially for materials/parts and supplier combination scheme can enhance the efficiency and the effectiveness (Seshadri, 2013). In terms of the process of the procurement of goods, each subsidiary has similar process flow. Explanations regarding the ongoing process of procurement as shown in the flow diagram has been given generalization on every stage of the 3 subsidiaries. Based on the ongoing process flow in the

subsidiaries, it can be elaborated in the value chain analysis. Value chain analysis is used to determine the strengths and the weaknesses of the ongoing process (Widarsono, 2011). It is expected that, from the illustration, the process where optimization using collaborative strategy can be done can be seen. The new collaborative procurement process can cover the weaknesses and enhance the strengths of the existing chances of the ongoing procurement process. This is triggered by the more effective information spread with collaboration and better decision-making (Fearne, 2012).

Table 3 Strengths and Weaknesses of Procurement on Gas Subsidiaries' Inbound Logistics

<i>Supporting Activity</i>	<i>Procurement</i>	
<i>Primary Activities</i>	Strength	Weakness
<i>Inbound Logistics</i>	<ul style="list-style-type: none"> All the decision makings are implemented by the company so that flexibility from the choices of manufacturer, price, time and quality of materials/parts can be created. 	<ul style="list-style-type: none"> Fund the whole procurement process such as import duty cost, value-added tax, income tax, Custom Clearance fee and Freight Forwarding Service (delivery cost). It is difficult to escalate the bargain position with manufacturer because of doing the procurement in quantity that is adjusted by the company. It is difficult to find a capable manufacturer due to limited knowledge. It is difficult to reach the best price that is offered by manufacturer.

The Determination of the Criteria of Collaborative Procurement of Goods

Horizontal collaboration is a form of cooperation from two or more companies that implement the same supply chain and logistic processes (Crujssen, 2006). Crujssen (2006) explains the dimension that is going to be the character of a horizontal collaborative procurement which consists of: decision-making stage, competition among the companies involved, asset combination, and goals. In Wehre in collaborative procurement of goods, Gas subsidiaries can enhance the competitiveness in the supply chain (Ghaderi, 2013) can be elaborated again with framework that is divided into three stages to fulfill the goals of the collaboration. This is stated by Audy et al. (2011) as a win-win solution among the supply chain levels of the companies to collaborate horizontally. In order to implement collaborative procurement of goods in relation to the dimension of the collaboration, filtration process of materials/parts from the three subsidiaries will be done in order to find out information and data regarding the three subsidiaries' procurement: 1) The material/parts data that is used is the purchase data that has been renewed in the last 3 years from PT Badak, PT DSLNG and PT Pertamina. This is caused by the data adjustment owned by PT DSLNG whose gas refinery has just been operating for the last three years and on the average of the time period of long term contract; 2) Filtration is performed in the same manufacturer/supplier category or supplier that fulfills the request of the same material/parts description that is used by the three subsidiaries; 3) Filtration is performed in the same manufacturer/supplier category or supplier that fulfills the request of the same material/parts description that is used by the

three subsidiaries; 4) Filtration is performed in the same material/parts description/name category in the three subsidiaries. This is meant to find the same necessities from the three subsidiaries so that the procurement process of the materials/parts can be enhanced in terms of the purchase volume by doing collaborative purchase which will be done by the manufacturer who has been filtrated as capable of performing procurement of goods.

In the flow diagram process (Figure 2), it is shown that there are several differences from the flow diagram process (Figure 3) before the collaborative procurement of goods process is applied. The most significant difference can be seen in the absence of process flow in the Supplier stage. This occurs because the connecting process with the Supplier has been redirected to the Implementer of the Collaborative Process. In this case, the appointed one is the PEG Implementer to implement purchase whose source is abroad. Purchase from a worldwide source can make the company reliable in international business (Seshadri, 2013).

Hence, PEG Implementer has one more activity as the regulator of the procurement concept. One detail that can be explained regarding the flow diagram for the alteration of business process flow due to the application of collaborative strategy is that there has been a change of process in this stage whose initial information regarding PR and OE will be delivered to Supplier, but now the process has its delivery redirected to the Implementer of the Procurement of Goods Concept. In this stage, the Implementer of Collaborative Concept focuses on handling the procurement of goods process known as Procurement Excellence Group (PEG) which, in the flow diagram, is called PEG Implementer.

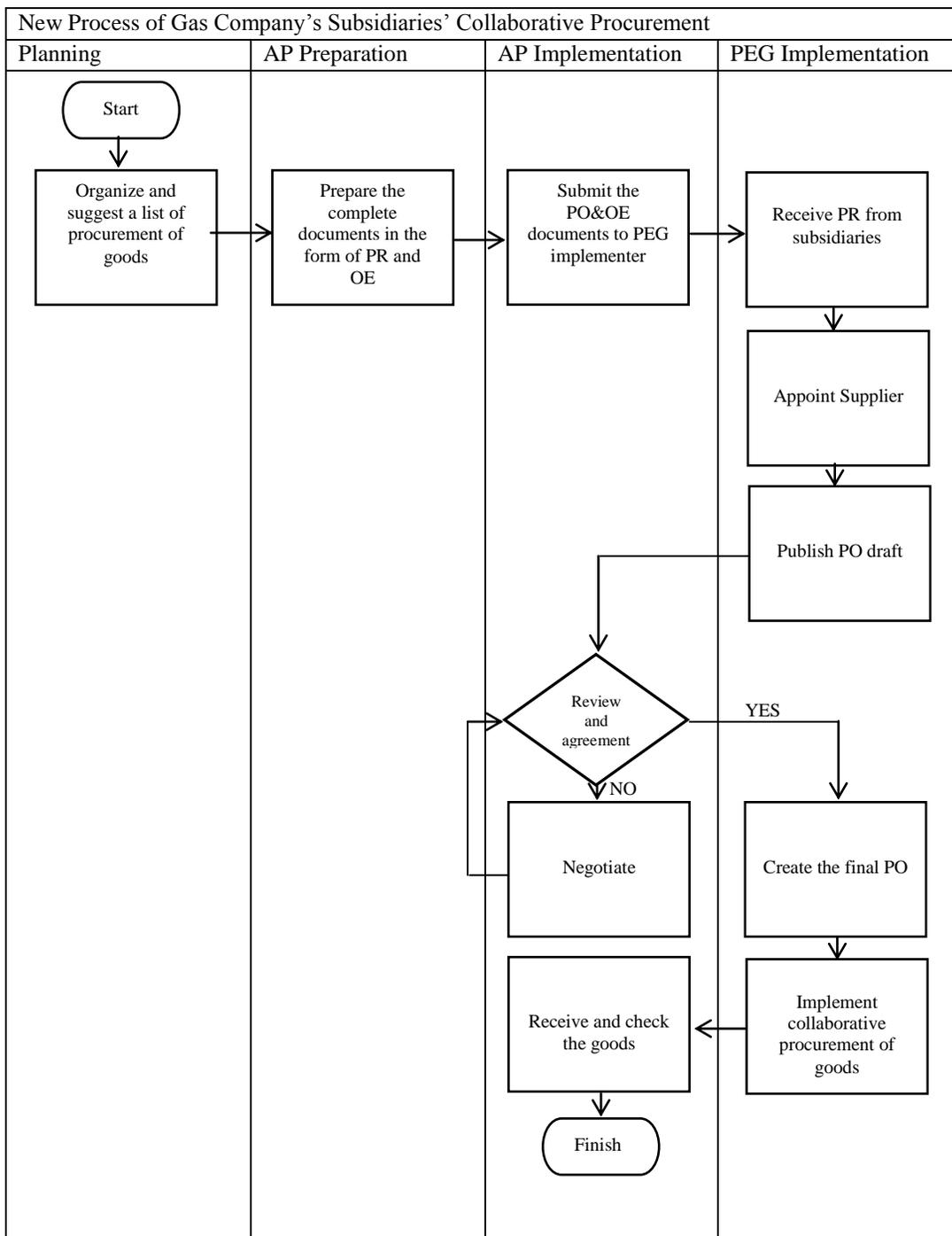


Figure 3. The Collaborative Process in Gas Company's Subsidiaries' Procurement of Goods

PEG as the Collaborative Concept Implementer plays an important function in this stage by receiving PR and OE documents from each subsidiary to be analyzed further regarding the necessities that are adjusted with material/parts filtration. Then, PEG will determine the suppliers of service who are competent and suitable for the submitted materials/parts necessities. Supplier Source is available on PEG's database as well as recommendations from the three related subsidiaries. PEG will publish the PO draft that has been agreed by them and the related Supplier, to be given to each subsidiary afterwards.

Each subsidiary has the right to perform review if there are things that are out of place and perform price negotiation on PO draft which is informed by PEG. PEG has the right to create the final PO with the agreement that has been made. PEG implements the collaborative procurement process with the Service Supplier and asks for the delivery process to be done to each subsidiary's warehouse.

Cost and Benefit of Collaborative Procurement

The process of an independent procurement of goods in each gas company’s subsidiary creates a repetitive process. According to the regulation that is elaborated in regulation No. A-001(2015) regarding Guidance of Procurement of Goods and Services, Subsidiaries can have their procurement process optimized by the parent company. From the ongoing procurement process there is a repetitive cost that emerges such as tax, delivery cost and custom clearance, where each of these variables have become a component that is directly imposed when purchasing materials/parts whose source is abroad.

Important points in implementing procurement of goods/services are explained by Listiyanto (2012) are seen from the urgency level of procurement with effective and efficient ways to get maximum benefits from the budget. Finance Department (2015) ensures that tax has been determined by provision Number 107/PMK.010/2015, in this case the tax that is determined by Import Duty, Value-Added Tax and Income Tax. Delivery cost is a cost that is spent by the company to deliver goods from Supplier to the company’s warehouse. Custom clearance is a cost for services spent by the company to pay imported goods’ administrative fee, because almost all materials/parts needed by Gas Company’s Subsidiaries are materials/parts whose sources are abroad (imported). The cost that later emerges due to this strategy in the organization will be calculated as well.

Analysis of the Benefits of Collaboration

The analysis of the benefits of collaboration in Gas Company’s Subsidiaries that is applied on the materials/parts that have been filtrated before so that, in this stage, data processing will be done as it is explained that the analysis of Gas Company’s Subsidiaries’ collaborative procurement concept is an analysis that measures the efficiency of the cost of materials/parts procurement and the effectiveness of the process

from three Gas Company’s Subsidiaries based on data renewal in 2015 or stock opname data of the three Subsidiaries in 2015. The cost that is going to be considered in the calculation is the cost of materials/parts procurement from 3 Gas Company’s subsidiaries that has been filtrated and proper to undergo collaboration. The benefit that can be considered is the difference in the procurement cost before and after when the collaborative concept is applied. The three points above can be explained using the calculation method that is started with filtration of materials/parts procurement data which has had stock opname performed from the third.

The analysis of the benefits of collaborative procurement in Gas Company’s Subsidiaries that is applied on materials/parts of three subsidiaries as much as 13 types of materials/parts groups with the quantity total of 24.358. PT Badak LNG performs procurement of materials/parts that is facilitated by two manufacturers of procurement for the 13 lists of materials create two types of materials that have the potential to be collaborated with the quantity of 1.006 unit and the total purchase value reaches \$ 188.533,81. PT DSLNG performs procurement of materials/parts that is facilitated by twenty four manufacturers of procurement for the 13 lists of materials that have create 13 types of materials that have the potential to be collaborated with the quantity of 22.547 units and the total of the purchase value reaches \$ 1.916.322,56. PT Gas fulfills the needs of materials/parts by two manufacturers with the quantity of 805 units and the total purchase value is \$33.188,18. With the calculation of the procurement of materials/parts before and after the concept is applied, the efficiency of the benefit value before and when the collaborative concept is applied can be calculated. With that calculation, the calculation that is performed from the whole materials/parts of the three subsidiaries take the following proportion:

Table 4 Procurement Value of the 3 Subsidiaries before Collaboration

Procurement before Collaboration	
INVESTEMENT VALUE	
Material price	\$ 2.037.517,56
VARIABLE COST	
Import Duty	\$ 99.826,31
Value-added Tax	\$ 199.652,61
Income Tax	\$ 149.739,46
Custom Clearance Fee	\$ 2.233,98
Freight Forwarding Service	\$ 49.340,72
TOTAL VARIABLE COST	\$ 500.793,08
TOTAL	\$ 2.538.310,64

Later, the final variable cost is imposed to the three subsidiaries and lowers the value of the variable cost of each subsidiary. The value of the purchase of materials/parts per year is known to have increased as much as 40% every year since 2013 to 2015. If the procurement value is calculated for the next

three years and does not use the collaborative scheme with an umbrella agreement that is binding for three years, will have cost increase that is different to one another. Hence, in the table, Future Value (FV) is calculated.

Table 5 Procurement Value of the Three Subsidiaries before Collaboration in Future Value (FV)

Procurement before Collaboration in Future Value (FV)		
INVESTMENT VALUE		
Material price		\$ 2.104.248,67
VARIABLE COST		
Import Duty	\$ 103.095,73	
Value-added Tax	\$ 206.191,47	
Income Tax	\$ 154.643,61	
Custom Clearance Fee	\$ 2.307,15	
Freight Forwarding Service	\$ 50.956,69	
TOTAL OF VARIABLE COST		\$ 517.194,65
TOTAL		\$ 2.621.443,31

Table 6 Procurement Value of the 3 Subsidiaries After Collaboration

Procurement of Goods After Collaboration		
INVESTMENT VALUE		
Material price (after 3,5% discount is added)		\$ 1.966.204,44
VARIABLE COST		
Import Duty	\$ 101.875,88	
Value-added Tax	\$ 203.751,76	
Income Tax	\$ 152.813,82	
Custom Clearance Fee	\$ 79,79	
Freight Forwarding Service	\$ 2.099,61	
TOTAL BIAYA VARIABLE		\$ 460.620,84
TOTAL		\$ 2.426.825,28

By cutting the FV value and after collaboration, benefit cost as much as \$ 194.618,03. Then, the benefit will be subtracted by the disbenefit value in the research occurs in the reduction of admin

staff's overtime hours in each subsidiary. The reduction of overtime hours is caused by the reduction of working lot in the procurement of materials/spareparts.

Table 7 Loss Value caused by Collaboration (Disbenefit)

No	Elaboration	Quantification	Total
1	The reduction of overtime hours of the admin staff for proportional procurement of materials/parts. ³	Rp 15,053,340.72	\$ 1,089.26

³Data based on the Decision of the Minister of Labor and Transmigration No. 102/MEN/VI/2004 Hours and Fee for Overtime

Analysis of the cost for Collaboration

The cost that is analyzed in this collaboration is the cost that emerges in the organization when there is a change in the process

flow of the collaboration such as in the labor cost and the cost for the formation of new work units.

Table 8 The Value of Collaborative Procurement Cost

No	Elaboration	Quantification	Total
1	Admin staff 1 person ⁴	Rp180,000,000.00	\$ 13,024.84
2	Official travel cost for each personnel of the subsidiaries' procurement teams for one person ⁵	\$ 10,605.54	\$ 10,605.54
Total Cost			\$ 23,630.38

⁴Refer to the Inkindo 2015 value

⁵Refer to the 2016 Gas Directory ABO data

Cost-Benefit Analysis

From the calculation that has been done with benefit value that is as much as \$ 194,618,03, with cost value that is as much

as \$ 23.630,38, and disbenefit value that is as much as \$ 1.089,26, then the Benefit and Cost value will be calculated as follows:

Table 9 Calculation of Benefit-Cost Ratio

Benefit and Cost Calculation	
<i>Benefit</i>	\$ 194.618,03
<i>Disbenefit</i>	\$ 1.089,26
<i>Cost</i>	\$ 23.630,38
B/C	8,19

IV. CONCLUSION

The resources of this Research develops a collaborative concept for procurement of goods by three Subsidiaries of Pertamina that operate in gas administration field especially in the materials/parts type, based on the existence of this collaborative concept, it can be concluded that the application of collaborative concept for the procurement of goods in the materials/parts classification that is going to be applied in each subsidiary creates alterations in the process flow of the procurement business. The alteration is in the redirection of Purchase Order (PO) process, Bidding Process and Delivery to the parent company that is Pertamina that is managed by PEG Function. The number of materials/parts that are collaborated in this concept is 13 types of materials/parts groups with the quantity total of 24.358 units. This number is the 17% of the total value of the procurement of materials/parts from the total number of goods purchase of the three subsidiaries from 2013 to 2015 that is as much as \$ 15.360.499,91. Based on the application of collaborative procurement of goods, it is estimated that the cost for the procurement of goods decreases from \$ 2.621.443,31 and is subtracted by the difference between the results of the calculation of the value of the collaborative strategy that is as much as \$ 2.426.825,28, so that efficiency value that is as much as \$ 194,618,03 or 10% of the efficiency value from the existence of the collaborative strategy of procurement that is applied in the three subsidiaries is created. From the result of the calculation of Benefit/Cost (B/C) ratio, benefit that is as much as \$ 194,618,03, disbenefit that is as much as \$ 1.089,26, and cost that is as much as \$ 23,630, 38 are found. The ratio of the B/C calculation is 8,19 which means that the collaborative concept of the procurement of goods in the materials/parts type is feasible and brings real benefits to the company. This research can be applied in other companies with similar sectors to measure how beneficial a company strategy in terms of procurement process is. In this case, the scope of the research is the type of goods in the materials/parts classification. Future researches can be expanded in terms of the research's scope such as the whole classification of the needs of goods or services.

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